Package: eyeprocess (via r-universe)

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Type Package

Title Harmonize Eye-Tracking, Pupillometry, Biometrics, and Psychometric Process Data

Version 0.11.1

Description Provides an extensible, vendor-neutral framework for importing, validating, harmonizing, transforming, visualizing, and modelling eye-tracking, pupillometry, behavioural, and biometric process data. The package uses explicit timebase and coordinate-space registries, preserves native fields and provenance, and offers first-class adapters for Gazepoint Analysis and Gazepoint Biometrics exports alongside generic and vendor-specific importers. Downstream tools support trial and area of interest reconstruction, signal-quality auditing, feature derivation, scanpath analysis, response-time and item-response workflows, and optional psychometric modelling engines. An integrated Gazepoint workflow produces quality-control evidence, media-trial reconstruction, plots, analysis-ready process tables, item response theory (IRT)-ready response structures, and reproducible reports. Brain Imaging Data Structure (BIDS) interoperability for eye-tracking and validation-release infrastructure support disk-backed storage, independent multi-vendor evidence, grouped validation, simulation calibration, model-equivalence audits, and explicitly experimental advanced psychometric process models. Research-scale infrastructure adds deterministic resumable Monte Carlo execution, atomic validation checkpoints, explicit advanced-model promotion gates, independent multi-vendor evidence registries, stable object contracts, partitioned disk-backed storage, optional probabilistic engines, and a fully synthetic multimodal benchmark for reproducibility testing. The measurement-intelligence programme adds probabilistic and compositional area of interest (AOI) analysis, measurement-uncertainty propagation, calibration and device-transportability audits, process reliability, phase-amplitude pupil registration, informative-missingness

sensitivity, temporal and spatial process models, item-bank decision optimization, fairness monitoring, conditional process reference distributions, and evidence-provenance graphs.

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URL https://stefanosbalaskas.github.io/eyeprocess/, https://github.com/stefanosbalaskas/eyeprocess

BugReports https://github.com/stefanosbalaskas/eyeprocess/issues

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Contents

eyeprocess-package 23
ablate_multimodal_channels 23
addm_glam_proxy_features 24
adjust_pupil_confounds 25
advanced_model_evidence_spec 25
advanced_validation_grid 26
algorithm_facet_effects 27

analysis_decision_entropy . . . 27
analysis_environment_snapshot . . . 28
analysis_resolution_guard . . . 28
aoi_membership_probability . . . 29
aoi_trajectory_features . . . 30
api_family_map . . . 31
api_lifecycle_diff . . . 31
api_surface_summary . . . 32
apply_preflight_decision . . . 32
apply_synthetic_corruption . . . 33
as_irt_recovery_results . . . 33
assign_aois_probabilistic . . . 34
assign_process_feature_family . . . 36
audit_3pl_process_signatures . . . 36
audit_advanced_model_evidence . . . 37
audit_benchmark_release . . . 38
audit_bias . . . 38
audit_biometric_imputation . . . 39
audit_biometric_preflight . . . 39
audit_candidate_item_bank . . . 40
audit_channel_incremental_information . . . 41
audit_convergence . . . 42
audit_coverage . . . 42
audit_decision_provenance . . . 43
audit_distractor_attention . . . 44
audit_eye_api . . . 44
audit_eye_pipeline . . . 45
audit_frontier_model_contract . . . 45
audit_identifiability . . . 46
audit_interval_width . . . 47
audit_irf_shape . . . 47
audit_item_reduction_sensitivity . . . 48
audit_latent_distribution . . . 49
audit_measurement_transportability . . . 49
audit_model_promotion . . . 50
audit_multimodal_identifiability . . . 51
audit_multimodal_m2_identifiability . . . 51
audit_multimodal_m3_identifiability . . . 52
audit_multimodal_m4_identifiability . . . 53
audit_multimodal_measurement . . . 54
audit_multivariate_process_quality . . . 54
audit_nonparametric_rasch . . . 55
audit_presentation_accessibility . . . 55
audit_process_adjusted_dif . . . 56
audit_process_anomalies . . . 57
audit_process_drift . . . 58
audit_process_external_validity . . . 59
audit_process_local_dependence . . . 59

audit_process_measurement_invariance . . . 60
audit_process_window_sensitivity . . . 61
audit_pupil_fatigue_drift . . . 62
audit_pupil_frequency_stability . . . 62
audit_pupil_preprocessing_order . . . 63
audit_rmse . . . 64
audit_roundtrip_loss . . . 64
audit_sampling_irregularity . . . 65
audit_sbc . . . 66
audit_signal_filter . . . 66
audit_temporal_leakage . . . 67
audit_validation_completion . . . 67
audit_vendor_field_coverage . . . 68
audit_vendor_validation . . . 68
audit_visual_context_dependence . . . 69
bayesian_process_diagnostic_flags . . . 69
bayesian_process_diagnostics_dashboard . . . 70
benchmark_expected_outputs . . . 71
benchmark_eye_storage . . . 71
benchmark_eyeprocess . . . 72
benchmark_memory_estimate . . . 72
benchmark_scaling_curve . . . 73
bind_process_windows . . . 73
biometric_imputation_sensitivity . . . 74
bootstrap_process_reliability . . . 74
build_compatibility_matrix . . . 75
build_evidence_graph . . . 76
build_gazepoint_media_trials . . . 77
calibration_drift_profile . . . 78
calibration_error_model . . . 78
calibration_sensitivity_grid . . . 79
calibration_transfer_audit . . . 80
canonical_eye_api . . . 80
classify_item_missingness . . . 81
collect_eye_storage . . . 81
collect_validation_evidence . . . 82
collect_validation_jobs . . . 82
compare_aoi_methods . . . 83
compare_aoi_trajectories . . . 84
compare_bayesian_process_models . . . 84
compare_decision_manifests . . . 85
compare_deployment_batches . . . 85
compare_diffusion_accuracy_rt . . . 86
compare_dynamic_transition_models . . . 87
compare_engine_adapters . . . 87
compare_fixation_methods . . . 88
compare_functional_scalar_models . . . 88
compare_hard_probabilistic_aoi . . . 89

compare_irt_models . . . 90
compare_latent_distribution_models . . . 90
compare_model_engines . . . 91
compare_parametric_nonparametric_irf . . . 91
compare_presentation_fairness . . . 92
compare_process_criterion_models . . . 93
compare_process_models . . . 93
compare_process_profile_solutions . . . 94
compare_pupil_kernels . . . 94
compare_pupil_preprocessing . . . 95
compare_raw_adjusted_pupil . . . 95
compare_reproducibility_fingerprints . . . 96
compare_signal_filters . . . 96
compare_strategy_heterogeneity . . . 97
compare_validation_engines . . . 97
compare_vendor_semantics . . . 98
compare_visual_context_irt . . . 98
compatibility_evidence_matrix . . . 99
context_factor_effects . . . 99
coordinate_fidelity_audit . . . 100
coverage_calibration_curve . . . 101
create_public_benchmark . . . 101
cross_device_process_equating_audit . . . 102
cross_version_adapter_regression . . . 103
crossed_grouped_cv . . . 104
crossed_grouped_folds . . . 104
data_quality_reporting_table . . . 105
decision_manifest_diff . . . 106
decision_manifest_hash . . . 106
decision_manifest_table . . . 107
decision_space_coverage . . . 107
decision_stability . . . 108
decode_dynamic_states . . . 108
derive_aoi_composition . . . 109
derive_gazepoint_workflow_features . . . 111
detect_calibration_drift . . . 111
detect_corrupt_partitions . . . 113
detect_irt_changepoints . . . 113
detect_process_changepoint . . . 114
detect_process_changepoints . . . 115
device_facet_effects . . . 116
diffusion_identification_study . . . 117
diffusion_parameter_diagnostics . . . 117
diffusion_posterior_predictive . . . 118
distractor_process_map . . . 118
drift_by_device . . . 119
drift_by_site . . . 119
drift_by_stimulus_version . . . 120

drift_by_vendor . . . 120
dynamic_irtree_recovery . . . 121
dynamic_irtree_spec . . . 121
dynamic_posterior_predictive_check . . . 123
dynamic_transition_design . . . 124
effective_sampling_frequency . . . 124
encode_response_combinations . . . 125
engine_adapter_status . . . 126
equate_irt_scales . . . 126
estimate_calibration_error . . . 127
estimate_visual_exposure_probability . . . 128
evaluate_validation_acceptance . . . 128
event_marker_qc . . . 129
event_roundtrip_audit . . . 129
event_semantics_audit . . . 130
expand_eyeprocess_stress_evidence_plan . . . 131
expand_eyeprocess_validation_plan . . . 131
expand_process_validation_design . . . 132
expected_process_information . . . 132
explain_latent_interaction . . . 133
export_eye_bids . . . 133
export_eye_pipeline . . . 134
export_prov_json . . . 135
export_ro_crate_metadata . . . 135
export_validation_bundle . . . 136
external_eye_adapters . . . 137
external_model_engines . . . 137
external_validate_irt . . . 138
extract_diffusion_parameters . . . 138
extract_functional_pupil_parameters . . . 139
extract_parameter_truth . . . 139
extract_process_windows . . . 140
eye_analysis_pipeline . . . 141
eye_analysis_spec . . . 142
eye_api_inventory . . . 143
eye_api_lifecycle . . . 143
eye_api_recommendation . . . 144
eye_api_status . . . 144
eye_api_superseded . . . 145
eye_benchmark_design . . . 145
eye_decision_manifest . . . 146
eye_pipeline_dot . . . 147
eye_pipeline_graph . . . 147
eye_pipeline_manifest . . . 148
eye_pipeline_mermaid . . . 148
eye_pipeline_step . . . 149
eye_plot_spec . . . 149
eye_prov_graph . . . 151

eye_reproducibility_fingerprint . . . 151
eye_session_manifest . . . 152
eye_storage_spec . . . 153
eye_stream_fidelity_audit . . . 154
eye_targets_manifest . . . 154
eyeprocess-adapters . . . 155
eyeprocess-class . . . 155
eyeprocess-coordinates-time . . . 156
eyeprocess-experimental . . . 157
eyeprocess-export-report . . . 157
eyeprocess-features . . . 158
eyeprocess-format-validation . . . 158
eyeprocess-import-gazepoint . . . 159
eyeprocess-import-generic . . . 160
eyeprocess-import-vendors . . . 160
eyeprocess-models . . . 161
eyeprocess-plots . . . 161
eyeprocess-preprocessing . . . 162
eyeprocess-quality . . . 163
eyeprocess-schema . . . 163
eyeprocess-simulation . . . 164
eyeprocess-trials-aoi . . . 164
eyeprocess_api_version . . . 165
eyeprocess_benchmark_study . . . 165
eyeprocess_cdm_attribute_profiles . . . 166
eyeprocess_cdm_classification_uncertainty . . . 166
eyeprocess_cdm_dina_ideal_response . . . 167
eyeprocess_cdm_dina_probability . . . 167
eyeprocess_cdm_qmatrix_audit . . . 168
eyeprocess_deprecation . . . 168
eyeprocess_irt_2pl_probability . . . 169
eyeprocess_irt_3pl_probability . . . 170
eyeprocess_irt_4pl_probability . . . 170
eyeprocess_irt_adaptive_trace . . . 171
eyeprocess_irt_anchor_audit . . . 172
eyeprocess_irt_anchor_purification . . . 172
eyeprocess_irt_apply_link . . . 173
eyeprocess_irt_bank_coverage . . . 174
eyeprocess_irt_category_function_audit . . . 174
eyeprocess_irt_classification_precision . . . 175
eyeprocess_irt_conditional_sem . . . 176
eyeprocess_irt_content_balance_audit . . . 176
eyeprocess_irt_device_drift . . . 177
eyeprocess_irt_dif_effect_curve . . . 177
eyeprocess_irt_dtf_curve . . . 178
eyeprocess_irt_eap_score . . . 179
eyeprocess_irt_engine_evidence_table . . . 179
eyeprocess_irt_engine_registry . . . 180

eyeprocess_irt_engine_status . . . 180
eyeprocess_irt_expected_score . . . 181
eyeprocess_irt_exposure_summary . . . 181
eyeprocess_irt_extreme_score_audit . . . 182
eyeprocess_irt_fit_dashboard . . . 182
eyeprocess_irt_functioning_effect_summary . . . 183
eyeprocess_irt_gpcm_probability . . . 184
eyeprocess_irt_grm_probability . . . 184
eyeprocess_irt_haebara_link . . . 185
eyeprocess_irt_identification_audit . . . 185
eyeprocess_irt_infit_outfit . . . 186
eyeprocess_irt_information_area . . . 187
eyeprocess_irt_information_gain . . . 187
eyeprocess_irt_information_targeting . . . 188
eyeprocess_irt_invariance_evidence . . . 188
eyeprocess_irt_item_bank . . . 189
eyeprocess_irt_item_fit_residuals . . . 190
eyeprocess_irt_item_information . . . 190
eyeprocess_irt_item_selection . . . 191
eyeprocess_irt_latent_regression_design . . . 192
eyeprocess_irt_link_stability . . . 192
eyeprocess_irt_local_dependence_pairs . . . 193
eyeprocess_irt_map_score . . . 194
eyeprocess_irt_marginal_reliability . . . 194
eyeprocess_irt_mean_mean_link . . . 195
eyeprocess_irt_mean_sigma_link . . . 196
eyeprocess_irt_measurement_precision_profile . . . 196
eyeprocess_irt_missing_by_design_audit . . . 197
eyeprocess_irt_misspecification_metrics . . . 198
eyeprocess_irt_misspecification_suite . . . 198
eyeprocess_irt_mle_score . . . 199
eyeprocess_irt_model_card . . . 199
eyeprocess_irt_model_card_audit . . . 200
eyeprocess_irt_model_spec . . . 201
eyeprocess_irt_monotonicity_audit . . . 202
eyeprocess_irt_nominal_probability . . . 202
eyeprocess_irt_parameter_plausibility_audit . . . 203
eyeprocess_irt_person_fit_lz . . . 203
eyeprocess_irt_person_fit_residuals . . . 204
eyeprocess_irt_plausible_values . . . 205
eyeprocess_irt_ppc_discrepancy . . . 205
eyeprocess_irt_precision_evidence_table . . . 206
eyeprocess_irt_prior_sensitivity_grid . . . 206
eyeprocess_irt_prior_sensitivity_summary . . . 207
eyeprocess_irt_prior_spec . . . 208
eyeprocess_irt_process_alignment . . . 209
eyeprocess_irt_process_aware_selection_penalty . . . 209
eyeprocess_irt_process_dif_concordance . . . 210

eyeprocess_irt_q3 . . . 211
eyeprocess_irt_recovery_design . . . 211
eyeprocess_irt_recovery_failures . . . 212
eyeprocess_irt_recovery_summary . . . 213
eyeprocess_irt_sbc_ranks . . . 213
eyeprocess_irt_sbc_summary . . . 214
eyeprocess_irt_score_table . . . 214
eyeprocess_irt_score_uncertainty . . . 215
eyeprocess_irt_session_drift . . . 216
eyeprocess_irt_sparse_design_audit . . . 216
eyeprocess_irt_stocking_lord_link . . . 217
eyeprocess_irt_stopping_rule . . . 218
eyeprocess_irt_targeting_gap . . . 219
eyeprocess_irt_test_characteristic_curve . . . 219
eyeprocess_irt_test_information . . . 220
eyeprocess_irt_testlet_audit . . . 220
eyeprocess_irt_testlet_spec . . . 221
eyeprocess_irt_threshold_order_audit . . . 221
eyeprocess_joint_process_irt_spec . . . 222
eyeprocess_mirt_directional_information . . . 223
eyeprocess_mirt_information_matrix . . . 223
eyeprocess_mirt_loading_audit . . . 224
eyeprocess_mirt_loading_spec . . . 225
eyeprocess_multichannel_measurement_map . . . 225
eyeprocess_negative_control_evidence_plan . . . 226
eyeprocess_negative_control_evidence_table . . . 227
eyeprocess_process_irt_data_bundle . . . 227
eyeprocess_process_item_profile . . . 228
eyeprocess_process_missingness_pattern . . . 229
eyeprocess_process_person_profile . . . 229
eyeprocess_recovery_evidence_table . . . 230
eyeprocess_reliability_evidence_plan . . . 230
eyeprocess_reliability_evidence_table . . . 231
eyeprocess_response_time_profile . . . 231
eyeprocess_sbc_evidence_table . . . 232
eyeprocess_speed_accuracy_profile . . . 232
eyeprocess_stress_evidence_plan . . . 233
eyeprocess_stress_evidence_table . . . 234
eyeprocess_validation_atlas_gaps . . . 234
eyeprocess_validation_claim_matrix . . . 235
eyeprocess_validation_evidence_atlas . . . 235
eyeprocess_validation_evidence_grade . . . 236
eyeprocess_validation_evidence_index . . . 237
eyeprocess_validation_evidence_manifest . . . 237
eyeprocess_validation_plan . . . 238
eyeprocess_validation_readiness . . . 239
eyeprocess_validation_release_gate . . . 240
eyeprocess_validation_seed . . . 240

facet_effects . . . 241
field_fidelity_report . . . 241
file_hash_manifest . . . 242
filter_eye_signal . . . 243
filter_pupil_signal . . . 243
find_process_measures . . . 244
fingerprint_validation_case . . . 244
fit_aoi_growth_curve . . . 245
fit_brms_adapter . . . 246
fit_censored_normal_process_irt . . . 246
fit_changepoint_multimodal_irt . . . 247
fit_changepoint_rt_irt . . . 248
fit_cognitive_diagnosis_process . . . 248
fit_continuous_time_irt . . . 249
fit_crossclassified_process_irt . . . 250
fit_crossclassified_process_irt_mhrm . . . 251
fit_device_linking . . . 251
fit_diffirt_adapter . . . 253
fit_diffirt_engine_adapter . . . 253
fit_dynamic_gpirt . . . 254
fit_dynamic_irtree . . . 254
fit_dynamic_irtree_stan . . . 255
fit_event_time_irt . . . 255
fit_external_engine . . . 256
fit_eyeprocess_erm . . . 257
fit_eyeprocess_gdina . . . 258
fit_eyeprocess_lnirt . . . 258
fit_eyeprocess_mirt . . . 259
fit_eyeprocess_tam . . . 259
fit_eyetrackingr_adapter . . . 260
fit_fixation_point_process . . . 261
fit_flow_mirt . . . 262
fit_functional_pupil_stan . . . 263
fit_gaze_anchored_3pl_audit . . . 263
fit_gaze_diffusion_irt . . . 264
fit_gaze_diffusion_stan . . . 265
fit_gaze_informed_missingness_irt . . . 265
fit_gdina_adapter . . . 266
fit_gpirt . . . 267
fit_irt_model . . . 268
fit_item_parameter_seed_model . . . 268
fit_joint_functional_pupil_irt . . . 269
fit_joint_gaze_rt_irt . . . 270
fit_joint_graded_rt_process_irt . . . 271
fit_kde_latent_distribution_irt . . . 272
fit_latent_class_process_irt . . . 272
fit_latent_space_irt . . . 273
fit_lnirt_adapter . . . 274

fit_manyfacet_process_irt . . . 275
fit_mirt_adapter . . . 276
fit_mixture_irt_process_classes . . . 276
fit_multiblock_process_map . . . 277
fit_multimodal_m2 . . . 278
fit_multimodal_m3 . . . 279
fit_multimodal_m4 . . . 280
fit_multimodal_trait_irt . . . 282
fit_multinomial_transition . . . 283
fit_multiple_response_process_irt . . . 284
fit_nominal_gaze_irt . . . 285
fit_nonignorable_missing_irt . . . 286
fit_omission_survival_irt . . . 286
fit_openmx_adapter . . . 287
fit_openmx_process_model . . . 288
fit_persistence_gaze_diffusion_irt . . . 289
fit_process_dif . . . 289
fit_process_gstudy . . . 291
fit_process_hmm_irt . . . 292
fit_process_missingness_model . . . 293
fit_process_norms . . . 294
fit_process_observation_model . . . 296
fit_process_profile_mixture . . . 297
fit_process_rasch_tree . . . 298
fit_pupil_confound_model . . . 298
fit_pupil_event_deconvolution . . . 299
fit_pupillometryr_adapter . . . 300
fit_response_process_embedding_irt . . . 301
fit_revisit_process_cdm . . . 302
fit_seqhmm_adapter . . . 303
fit_speed_accuracy_engagement_irt . . . 303
fit_strategy_mixture_em . . . 304
fit_strategy_mixture_stan . . . 304
fit_tam_adapter . . . 305
fit_theory_strategy_irt . . . 306
fit_traminer_adapter . . . 306
fit_validation_replicate . . . 307
fit_variational_irt . . . 308
fit_visual_context_irt . . . 308
fixation_boundary_uncertainty . . . 309
freeze_eyeprocess_irt_reference . . . 310
freeze_eyeprocess_validation_atlas . . . 310
freeze_eyeprocess_validation_evidence . . . 311
freeze_software_paper_evidence . . . 312
freeze_validation_reference . . . 312
functional_pupil_basis . . . 313
functional_pupil_diagnostics . . . 314
functional_pupil_irt_spec . . . 314

gaze_anchored_3pl_alignment . . . 316
gaze_data_quality_profile . . . 317
gaze_diffusion_spec . . . 318
gaze_precision_rms_s2s . . . 319
gaze_recurrence . . . 319
gaze_uncertainty_ellipse . . . 321
gazepoint_analysis_tables . . . 321
gazepoint_irt_tables . . . 322
gazepoint_workflow_spec . . . 322
generalizability_process_study . . . 324
get_irt_model . . . 324
grade_model_evidence . . . 325
grouped_cv . . . 325
grouped_folds . . . 326
import_benchmark_study . . . 327
import_eye_bids . . . 327
incremental_process_validity . . . 328
init_vendor_corpus . . . 328
inject_aoi_label_noise . . . 329
inject_calibration_offset . . . 329
inject_device_shift . . . 330
inject_eye_missingness . . . 331
inject_pupil_dropout . . . 331
inject_sampling_jitter . . . 332
inject_trial_imbalance . . . 332
irt_compositional_channel . . . 333
irt_continuous_channel . . . 333
irt_count_channel . . . 334
irt_functional_channel . . . 335
irt_model_spec . . . 335
irt_nominal_channel . . . 336
irt_response_channel . . . 337
irt_rt_channel . . . 338
irt_sequence_channel . . . 338
irt_survival_channel . . . 339
irt_validation_spec . . . 340
item_objective_spec . . . 341
latent_distribution_stress_test . . . 343
latent_trait_trajectory . . . 343
leave_device_out_validation . . . 344
leave_item_out_validation . . . 344
leave_session_out_validation . . . 345
leave_site_out_validation . . . 345
list_irt_models . . . 346
lock_decision_manifest . . . 346
map_latent_classes_to_process_profiles . . . 347
measurement_error_budget . . . 348
migrate_eye_storage_schema . . . 348

model_promotion_spec . . . 349
model_validation_spec . . . 350
model_validation_summary . . . 351
multiblock_contributions . . . 351
multiblock_person_coordinates . . . 352
multiblock_variable_coordinates . . . 352
multimodal_backend_status . . . 353
multimodal_irt_spec . . . 353
multimodal_m2_ablation . . . 354
multimodal_m2_negative_controls . . . 354
multimodal_m2_ppc . . . 355
multimodal_m2_process_information . . . 355
multimodal_m2_recovery . . . 356
multimodal_m2_spec . . . 357
multimodal_m3_ablation . . . 357
multimodal_m3_functional_bridge . . . 358
multimodal_m3_negative_controls . . . 359
multimodal_m3_ppc . . . 359
multimodal_m3_process_information . . . 360
multimodal_m3_recovery . . . 360
multimodal_m3_spec . . . 361
multimodal_m4_ablation . . . 362
multimodal_m4_negative_controls . . . 363
multimodal_m4_ppc . . . 363
multimodal_m4_process_information . . . 364
multimodal_m4_recovery . . . 365
multimodal_m4_sensitivity . . . 366
multimodal_m4_spec . . . 366
multimodal_m4_state_diagnostics . . . 367
multimodal_ppc . . . 368
negative_control_concordance . . . 368
negative_control_process_test . . . 369
object_hash . . . 370
object_schema . . . 370
open_eye_storage . . . 371
open_partitioned_eye_storage . . . 371
option_process_information . . . 372
outcome_blind_feature_audit . . . 372
outcome_blind_snapshot . . . 373
package_reproducibility_manifest . . . 373
paper_reproducibility_manifest . . . 374
partition_eye_storage . . . 374
pipeline_failures . . . 375
pipeline_result . . . 375
pipeline_step_status . . . 376
placebo_window_audit . . . 376
plot.eye_adapter_regression_audit . . . 377
plot.eye_aoi_growth_curve . . . 377

plot.eye_aoi_trajectory . . . 378
plot.eye_bayesian_process_dashboard . . . 378
plot.eye_bids_roundtrip . . . 379
plot.eye_biometric_imputation_sensitivity . . . 379
plot.eye_biometric_preflight . . . 380
plot.eye_candidate_item_bank_audit . . . 380
plot.eye_compatibility_evidence_matrix . . . 381
plot.eye_decision_process_proxy . . . 381
plot.eye_dynamic_irtree . . . 382
plot.eye_dynamic_ppc . . . 382
plot.eye_event_roundtrip_audit . . . 383
plot.eye_event_time_irt . . . 383
plot.eye_functional_pupil_diagnostics . . . 384
plot.eye_functional_pupil_irt . . . 384
plot.eye_functional_pupil_sensitivity . . . 385
plot.eye_gated_process_model . . . 385
plot.eye_gaze_anchored_3pl_audit . . . 386
plot.eye_gaze_informed_missingness_irt . . . 386
plot.eye_gpirt . . . 387
plot.eye_incremental_information_audit . . . 387
plot.eye_irt_changepoints . . . 388
plot.eye_irt_equating . . . 388
plot.eye_irt_ppc . . . 389
plot.eye_irt_recovery_summary . . . 389
plot.eye_irt_sbc . . . 390
plot.eye_item_parameter_seed . . . 391
plot.eye_item_reduction_sensitivity . . . 391
plot.eye_joint_gaze_rt_irt . . . 392
plot.eye_joint_graded_rt_process_irt . . . 392
plot.eye_latent_distribution_comparison . . . 393
plot.eye_latent_process_alignment . . . 393
plot.eye_latent_space_irt . . . 394
plot.eye_manyfacet_process_irt . . . 394
plot.eye_mixture_irt_process . . . 395
plot.eye_model_promotion_audit . . . 395
plot.eye_multiblock_process_map . . . 396
plot.eye_nominal_gaze_irt . . . 396
plot.eye_nonparametric_rasch_audit . . . 397
plot.eye_omission_survival_irt . . . 397
plot.eye_preaction_process_features . . . 398
plot.eye_presentation_accessibility . . . 398
plot.eye_presentation_fairness_comparison . . . 399
plot.eye_process_anomaly_audit . . . 399
plot.eye_process_cat_simulation . . . 400
plot.eye_process_channel_ablation . . . 400
plot.eye_process_dependent_discrimination . . . 401
plot.eye_process_drift_audit . . . 401
plot.eye_process_external_validity . . . 402

plot.eye_process_facet_effects . . . 403
plot.eye_process_feature_blocks . . . 403
plot.eye_process_g_study . . . 404
plot.eye_process_hmm_irt . . . 404
plot.eye_process_local_dependence_audit . . . 405
plot.eye_process_negative_control . . . 405
plot.eye_process_person_fit . . . 406
plot.eye_process_profile_mixture . . . 406
plot.eye_process_rasch_tree . . . 407
plot.eye_process_window_sensitivity . . . 407
plot.eye_process_windows . . . 408
plot.eye_pupil_confound_model . . . 408
plot.eye_pupil_deconvolution . . . 409
plot.eye_pupil_fatigue_drift . . . 410
plot.eye_pupil_frequency_features . . . 410
plot.eye_pupil_frequency_stability . . . 411
plot.eye_roundtrip_loss_audit . . . 411
plot.eye_sbc_audit . . . 412
plot.eye_semantic_roundtrip . . . 412
plot.eye_signal_filter_audit . . . 413
plot.eye_storage_benchmark . . . 413
plot.eye_strategy_aoi_sensitivity . . . 414
plot.eye_streaming_score . . . 414
plot.eye_transition_diagnostics . . . 415
plot.eye_validation_bundle . . . 415
plot.eye_vendor_compatibility_matrix . . . 416
plot.eye_vendor_semantic_validation . . . 416
plot.eye_visual_context_irt . . . 417
plot_aoi_transition_matrix . . . 417
plot_aoi_transition_rank . . . 418
plot_distractor_information . . . 419
plot_gazepoint_workflow . . . 419
plot_interval_coverage . . . 420
plot_irf_uncertainty . . . 420
plot_parameter_recovery . . . 421
plot_person_item_space . . . 422
plot_process_changepoint . . . 422
plot_process_channel_ablation_delta . . . 423
plot_process_feature_stability . . . 424
plot_process_window_sensitivity . . . 424
plot_pupil_activity_sensitivity . . . 425
plot_pupil_activity_windows . . . 426
plot_pupil_band_power . . . 426
plot_pupil_components . . . 427
plot_pupil_preprocessing_audit . . . 427
plot_pupil_spectrum . . . 428
plot_sbc_rank . . . 429
plot_validation_failures . . . 429

plot_validation_runtime . . . 430
posterior_predictive_discrepancies . . . 430
posterior_sbc_contract . . . 431
preaction_process_features . . . 431
predict.eye_censored_normal_process_irt . . . 432
predict.eye_multinomial_transition . . . 433
predict_aoi_trajectory . . . 433
predict_item_parameter_priors . . . 434
predict_theta_at_time . . . 434
preflight_decisions . . . 435
preflight_exclusion_manifest . . . 435
preflight_failures . . . 436
preflight_passed . . . 436
prepare_dynamic_irtree_data . . . 437
prepare_functional_pupil_data . . . 437
prepare_gaze_diffusion_data . . . 438
prepare_multimodal_irt_data . . . 439
prepare_strategy_mixture_data . . . 440
prepare_structured_unstructured_process_features . . . 440
preprocessing_multiverse . . . 441
print.eye_benchmark_reproduction . . . 442
print.eye_benchmark_study . . . 442
print.eye_benchmark_validation . . . 443
print.eye_diffusion_diagnostics . . . 443
print.eye_diffusion_identification_study . . . 444
print.eye_dynamic_irtree . . . 444
print.eye_dynamic_ppc . . . 445
print.eye_dynamic_recovery . . . 445
print.eye_engine_adapter_result . . . 446
print.eye_functional_pupil_data . . . 446
print.eye_functional_pupil_diagnostics . . . 447
print.eye_functional_pupil_irt . . . 447
print.eye_functional_pupil_sensitivity . . . 448
print.eye_functional_scalar_comparison . . . 448
print.eye_gated_process_model . . . 449
print.eye_gaze_diffusion_data . . . 449
print.eye_gaze_diffusion_irt . . . 450
print.eye_gaze_diffusion_spec . . . 450
print.eye_irt_evidence_grade . . . 451
print.eye_irt_model_spec . . . 451
print.eye_irt_validation_spec . . . 452
print.eye_model_contract_validation . . . 452
print.eye_model_promotion_audit . . . 453
print.eye_multinomial_transition . . . 453
print.eye_partition_spec . . . 454
print.eye_partitioned_storage . . . 454
print.eye_process_drift_spec . . . 455
print.eye_process_negative_control . . . 455

print.eye_process_preflight_spec . . . 456
print.eye_process_window_spec . . . 456
print.eye_redaction_result . . . 457
print.eye_roundtrip_loss_audit . . . 457
print.eye_strategy_data . . . 458
print.eye_strategy_manipulation_validation . . . 458
print.eye_theory_strategy_irt . . . 459
print.eye_theory_strategy_spec . . . 459
print.eye_transition_design . . . 460
print.eye_transition_diagnostics . . . 460
print.eye_validation_bundle . . . 461
print.eye_validation_case_fingerprint . . . 461
print.eye_validation_collection . . . 462
print.eye_validation_completion_audit . . . 462
print.eye_validation_job_plan . . . 463
print.eye_validation_run . . . 463
print.eye_vendor_case . . . 464
print.eye_vendor_compatibility_matrix . . . 464
print.eye_vendor_schema_contract . . . 465
print.eye_vendor_semantic_comparison . . . 465
print.eye_visual_context_registry . . . 466
probabilistic_aoi_assignment . . . 466
process_anomaly_distance . . . 467
process_bland_altman . . . 468
process_channel_ablation . . . 468
process_criterion_associations . . . 469
process_dependent_discrimination_audit . . . 470
process_dif_nuisance_surrogate . . . 471
process_drift_alerts . . . 471
process_drift_spec . . . 472
process_feature_blocks . . . 473
process_feature_family_registry . . . 473
process_feature_stability . . . 474
process_feature_time_provenance . . . 474
process_icc . . . 475
process_information . . . 476
process_item_information . . . 476
process_measure_card . . . 477
process_measure_coverage . . . 478
process_measure_guardrails . . . 478
process_measure_lineage . . . 479
process_measure_registry . . . 479
process_measure_units . . . 480
process_negative_control_permute . . . 480
process_negative_control_shift . . . 481
process_ngram_features . . . 482
process_null_benchmark . . . 482
process_person_fit . . . 483

process_preflight_spec . . . 483
process_profile_probabilities . . . 485
process_profile_summary . . . 485
process_reliability_profile . . . 486
process_residual_map . . . 486
process_sensitivity_grid . . . 487
process_sequence_embedding . . . 487
process_state_occupancy . . . 488
process_state_transition_summary . . . 488
process_temporal_stability . . . 489
process_uncertainty_spec . . . 490
process_validation_design . . . 491
process_window_spec . . . 492
promote_irt_model . . . 493
promote_vendor_support . . . 494
propagate_calibration_uncertainty . . . 494
provenance_edge_table . . . 495
provenance_lineage_table . . . 496
prune_validation_checkpoints . . . 496
public_validation_corpus . . . 497
pupil_activity_index . . . 497
pupil_band_power . . . 498
pupil_baseline_sensitivity . . . 499
pupil_confound_effects . . . 499
pupil_event_effects . . . 500
pupil_event_regressor . . . 500
pupil_frequency_features . . . 501
pupil_latency_sensitivity . . . 502
pupil_preprocessing_grid . . . 503
pupil_preprocessing_sensitivity . . . 503
pupil_response_kernel . . . 504
pupil_unit_fidelity_audit . . . 505
pupil_velocity_activity . . . 506
quantify_process_leakage . . . 506
query_eye_storage . . . 507
raven_reproduction_spec . . . 507
read_api_lifecycle_registry . . . 508
read_benchmark_table . . . 509
read_decision_manifest . . . 509
read_eyeprocess_validation_evidence . . . 510
read_reproducibility_fingerprint . . . 510
read_validation_job_manifest . . . 511
read_validation_scenario_manifest . . . 511
read_vendor_registry . . . 512
recalibrate_after_changepoint . . . 512
recommended_validation_replications . . . 513
redact_validation_case . . . 514
register_eye_api_status . . . 514

register_irt_model . . . 515
register_process_measure . . . 516
register_pupil_curves . . . 516
register_validation_case . . . 518
register_vendor_semantics . . . 519
reporting_guideline_audit . . . 520
representative_scanpath . . . 521
resume_eye_pipeline . . . 522
resume_validation_jobs . . . 523
roundtrip_eye_bids . . . 523
run_benchmark_reproduction . . . 524
run_eye_benchmark . . . 525
run_eye_pipeline . . . 525
run_eyeprocess_equateirt . . . 526
run_eyeprocess_irt_ability_sbc . . . 527
run_eyeprocess_irt_recovery . . . 528
run_eyeprocess_mirtcat . . . 528
run_eyeprocess_stress_evidence . . . 529
run_eyeprocess_validation_program . . . 529
run_gazepoint_workflow . . . 531
run_model_validation . . . 532
run_posterior_sbc . . . 533
run_process_negative_controls . . . 533
run_process_sensitivity . . . 534
run_process_validation . . . 535
run_raven_reproduction . . . 536
run_sbc . . . 536
run_validation_jobs . . . 537
sbc_ecdf_deviation . . . 538
sbc_rank_diagnostics . . . 539
sbc_summary . . . 539
score_partial_response_pattern . . . 540
score_response_stream . . . 540
select_next_item_process . . . 541
semantic_fidelity_spec . . . 542
semantic_loss_map . . . 543
semantic_roundtrip_audit . . . 543
sensitivity_branch_fingerprint . . . 544
sensitivity_decision_leverage . . . 545
sensitivity_fragility_index . . . 545
sensitivity_multiverse_manifest . . . 546
sensitivity_rank_stability . . . 546
sensitivity_sign_stability . . . 547
sensitivity_significance_stability . . . 547
sensitivity_threshold_stability . . . 548
sequence_interoperability . . . 548
session_facet_effects . . . 549
simulate_advanced_process_data . . . 550

simulate_dynamic_irtree_data . . . 551
simulate_eyeprocess_catr . . . 552
simulate_eyeprocess_irt_binary . . . 552
simulate_from_model . . . 553
simulate_gaze_diffusion_data . . . 554
simulate_irt_model . . . 555
simulate_multimodal_irt . . . 555
simulate_multimodal_m2 . . . 556
simulate_multimodal_m3 . . . 557
simulate_multimodal_m4 . . . 559
simulate_presentation_variants . . . 560
simulate_process_cat . . . 560
simulate_process_validation_data . . . 561
simulate_strategy_mixture_data . . . 562
simulation_based_calibration . . . 562
simulation_rank_statistic . . . 563
software_paper_claim_matrix . . . 564
software_paper_coverage . . . 565
software_paper_evidence_bundle . . . 565
software_paper_gap_analysis . . . 566
software_paper_readiness . . . 567
software_paper_validation_table . . . 568
specification_coverage . . . 568
specification_curve_data . . . 569
split_half_process_reliability . . . 569
split_validation_plan . . . 570
storage_transaction_manifest . . . 571
strategy_aoi_sensitivity . . . 571
strategy_classification_uncertainty . . . 572
strategy_label_switching_diagnostics . . . 572
strategy_posterior_probabilities . . . 573
streaming_score_history . . . 573
stress_test_latent_distribution . . . 574
stress_test_local_dependence . . . 574
stress_test_missingness . . . 575
stress_test_misspecification . . . 576
stress_test_preprocessing . . . 576
stress_test_process_pipeline . . . 577
stress_test_speededness . . . 578
stress_test_summary . . . 578
stress_tolerance_frontier . . . 579
structural_transition_mask . . . 579
summarise_eye_benchmark . . . 580
summarise_eyeprocess_stress_evidence . . . 581
summarise_process_negative_controls . . . 581
summarise_process_sensitivity . . . 582
summarise_process_validation . . . 582
summarise_validation_acceptance . . . 583

summarize_parameter_recovery . . . 583
summarize_process_windows . . . 584
summary.eye_validation_bundle . . . 584
summary.eye_validation_job_plan . . . 585
synthetic_corruption_plan . . . 585
theory_strategy_spec . . . 586
timestamp_fidelity_audit . . . 588
transition_residual_diagnostics . . . 589
update_person_score . . . 589
upgrade_eye_dataset . . . 590
upgrade_eyeprocess_model . . . 591
validate_against_reference . . . 591
validate_benchmark_study . . . 592
validate_bids_eye_semantics . . . 592
validate_decision_manifest . . . 593
validate_engine_adapter . . . 593
validate_eye_pipeline . . . 594
validate_eye_prov_graph . . . 594
validate_eye_storage_metadata . . . 595
validate_eyeprocess_external_irt_fit . . . 595
validate_eyeprocess_irt_item_bank . . . 596
validate_eyeprocess_irt_model_spec . . . 596
validate_eyeprocess_joint_process_irt_spec . . . 597
validate_eyeprocess_validation_plan . . . 597
validate_feature_availability . . . 598
validate_gazepoint_workflow . . . 598
validate_hed_event_semantics . . . 599
validate_irt_model . . . 599
validate_latent_space_process_similarity . . . 600
validate_model_object . . . 600
validate_multimodal_irt . . . 601
validate_multimodal_m2 . . . 601
validate_multimodal_m3 . . . 602
validate_multimodal_m4 . . . 602
validate_process_measure_registry . . . 603
validate_process_validation_design . . . 604
validate_process_windows . . . 604
validate_strategy_manipulation . . . 605
validate_vendor_semantics . . . 605
validate_vendor_timestamp_semantics . . . 606
validation_acceptance_matrix . . . 607
validation_acceptance_rule . . . 607
validation_bundle_manifest . . . 608
validation_calibration_summary . . . 609
validation_condition_id . . . 609
validation_condition_ranking . . . 610
validation_coverage_table . . . 610
validation_evidence_levels . . . 611

validation_evidence_matrix . . . 611
validation_failure_profile . . . 612
validation_failure_summary . . . 612
validation_failure_taxonomy . . . 613
validation_job_plan . . . 613
validation_ladder . . . 614
validation_mcse . . . 614
validation_mcse_profile . . . 615
validation_recovery_summary . . . 615
validation_recovery_table . . . 616
validation_replication_budget . . . 616
validation_report . . . 617
validation_robustness_score . . . 617
validation_runtime_summary . . . 618
validation_sbc_summary . . . 618
validation_scenario_manifest . . . 619
validation_seed . . . 620
validation_summary_mcse . . . 620
validation_thresholds . . . 621
vendor_schema_contract . . . 622
vendor_validation_spec . . . 623
verify_decision_manifest_lock . . . 624
verify_eyeprocess_validation_atlas . . . 624
verify_eyeprocess_validation_evidence . . . 625
verify_outcome_blind_snapshot . . . 625
verify_reproducibility_fingerprint . . . 626
verify_reproducibility_manifest . . . 626
visual_context_registry . . . 627
write_advanced_model_evidence_report . . . 627
write_api_lifecycle_registry . . . 628
write_benchmark_data_dictionary . . . 629
write_decision_manifest . . . 629
write_eye_pipeline_report . . . 630
write_eye_storage . . . 630
write_eye_targets_template . . . 631
write_eyeprocess_validation_evidence . . . 632
write_eyeprocess_validation_report . . . 632
write_gazepoint_workflow_report . . . 633
write_model_promotion_report . . . 633
write_partitioned_eye_storage . . . 634
write_prov_dot . . . 634
write_reporting_guideline_report . . . 635
write_reproducibility_fingerprint . . . 635
write_software_paper_evidence . . . 636
write_software_paper_reproduction . . . 636
write_software_paper_scaffold . . . 637
write_validation_job_manifest . . . 637
write_validation_release_report . . . 638

write_validation_report 638
write_validation_scenario_manifest 639
write_vendor_case_report 639
write_vendor_registry 640
write_vendor_validation_report 640

Index **642**

`eyeprocess-package` *eyeprocess: Harmonize Eye-Tracking and Psychometric Process Data*

Description

An extensible, vendor-neutral framework for importing, validating, harmonizing, transforming, visualizing, and modelling eye-tracking, pupillometry, behavioural, and biometric process data, with first-class Gazepoint support.

Details

The package represents heterogeneous exports as linked canonical tables with explicit timebase, coordinate-space, processing-level, quality, and provenance information. It supports generic mappings and dedicated adapters, then provides common downstream workflows for preprocessing, AOIs, trials, features, plots, and optional psychometric modelling.

Author(s)

Stefanos Balaskas

References

Package documentation and the methodological references cited in the vignettes.

`ablate_multimodal_channels` *Create formal channel-ablation datasets*

Description

Create formal channel-ablation datasets

Usage

```
ablate_multimodal_channels(
  x,
  include = c("response", "rt", "gaze", "pupil"),
  include_response = TRUE
)
```

Arguments

`x`	An ‘eye_multimodal_measurement‘.
`include`	Character vector of channels eligible for ablation.
`include_response`	Whether response must remain in every scenario.

Value

An ‘eye_multimodal_ablation‘ list.

---

addm_glam_proxy_features

Compute aDDM/GLAM-inspired gaze-evidence proxy features

Description

Compute aDDM/GLAM-inspired gaze-evidence proxy features

Usage

```
addm_glam_proxy_features(
  data,
  by = c("person_id", "trial_id"),
  time = "time_ms",
  aoi = "aoi",
  target_aoi = "target",
  distractor_aoi = "distractor",
  action_aoi = "button"
)
```

Arguments

`data`	Sample-level data.
`by`	Grouping columns.
`time`, `aoi`	Columns.
`target_aoi`, `distractor_aoi`, `action_aoi`	AOI labels.

Value

An object of class "eye_decision_process_proxy", stored as a named list, with components "features", "by", "status", "caveat". It contains aDDM/GLAM-inspired gaze-evidence proxy features and associated metadata or diagnostics needed to interpret the result.

adjust_pupil_confounds

Extract confound-adjusted pupil values

Description

Extract confound-adjusted pupil values

Usage

```
adjust_pupil_confounds(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A data frame containing the fitted model data, including ‘pupil_confound_residual‘ and ‘pupil_confound_adjusted‘ columns.

advanced_model_evidence_spec

Specify evidence required to promote advanced model interfaces

Description

Specify evidence required to promote advanced model interfaces

Usage

```
advanced_model_evidence_spec(
  models = c("fit_joint_process_model", "fit_shared_process_factor",
    "fit_strategy_mixture", "fit_process_irt", "fit_pupil_informed_irt",
    "fit_multimodal_irt", "fit_dynamic_aoi_model", "fit_gaze_weighted_choice",
   "fit_dynamic_irtree", "fit_joint_functional_pupil_irt", "fit_theory_strategy_irt",
    "fit_gaze_diffusion_irt"),
  require_recovery = TRUE,
  require_calibration = TRUE,
  require_misspecification = TRUE,
  require_grouped_validation = TRUE,
  require_engine_equivalence = TRUE,
  require_empirical_reproduction = TRUE,
  require_sensitivity = TRUE
)
```

Arguments

`models` Advanced model function names.

`require_recovery` Require passing parameter-recovery evidence.

`require_calibration` Require simulation-based calibration evidence.

`require_misspecification` Require evidence that prespecified failure scenarios are detected.

`require_grouped_validation` Require grouped out-of-sample validation.

`require_engine_equivalence` Require comparison with a benchmark engine.

`require_empirical_reproduction` Require a licensed empirical reproduction.

`require_sensitivity` Require a multi-specification preprocessing/AOI sensitivity analysis.

Value

An ‘eye_advanced_evidence_spec‘.

`advanced_validation_grid` *Construct the advanced-model validation grid*

Description

By default this returns a one-factor-at-a-time screening design around a declared reference scenario. This preserves every factor and level from the research programme without accidentally launching hundreds of thousands of Monte Carlo scenarios. Set ‘full_factorial = TRUE‘ only when the computing plan explicitly supports the complete Cartesian design.

Usage

```
advanced_validation_grid(quick = FALSE, full_factorial = FALSE)
```

Arguments

`quick` Whether to return a compact smoke-test design.

`full_factorial` Whether to return the complete Cartesian design.

Value

A scenario data frame for ‘run_model_validation()‘ or custom Monte Carlo programmes.

algorithm_facet_effects

Extract algorithm facet effects

Description

Extract algorithm facet effects

Usage

```
algorithm_facet_effects(object, channel = c("response", "process"))
```

Arguments

`object`	A fitted eyeprocess model or audit object.
`channel`	Measurement channel to inspect.

Value

An object of class "eye_process_facet_effects", stored as a named list, with components "facet", "column", "channel", "random_effects", "variance_component". It contains algorithm facet effects and associated metadata or diagnostics needed to interpret the result.

analysis_decision_entropy

Entropy of an explicitly enumerated analysis-decision space

Description

Entropy of an explicitly enumerated analysis-decision space

Usage

```
analysis_decision_entropy(..., base = 2)
```

Arguments

`...`	Named option vectors.
`base`	Logarithm base.

Value

Data frame with option counts and maximum entropy under equal weighting.

analysis_environment_snapshot

Snapshot an eyeprocess analysis environment

Description

Snapshot an eyeprocess analysis environment

Usage

```
analysis_environment_snapshot(packages = loadedNamespaces())
```

Arguments

packages	Optional package names; defaults to loaded namespaces.

Value

A named list with components "r_version", "platform", "os", "locale", "timezone", "packages", containing snapshot an eyeprocess analysis environment and associated metadata or diagnostics.

analysis_resolution_guard

Audit compatibility between measurement resolution and an analysis target

Description

Audit compatibility between measurement resolution and an analysis target

Usage

```
analysis_resolution_guard(
  event_duration_ms,
  effective_hz,
  spatial_feature_size = NA_real_,
  radial_error = NA_real_,
  min_samples = 3,
  max_error_fraction = 0.5
)
```

Arguments

`event_duration_ms`
: Smallest event duration the analysis intends to resolve.

`effective_hz`
: Empirical sampling frequency.

`spatial_feature_size`
: Optional smallest spatial feature/AOI dimension in coordinate units.

`radial_error`
: Optional empirical radial error in the same spatial units.

`min_samples`
: User-declared minimum samples per temporal feature.

`max_error_fraction`
: User-declared maximum spatial-error / feature-size ratio.

Value

A named list with components "expected_samples", "temporal_ok", "spatial_error_fraction", "spatial_ok", "min_samples", "max_error_fraction", "overall", "caveat", containing compatibility between measurement resolution and an analysis target and associated metadata or diagnostics.

`aoi_membership_probability` *AOI membership probabilities from uncertainty draws*

Description

AOI membership probabilities from uncertainty draws

Usage

```
aoi_membership_probability(draws, aois)
```

Arguments

`draws`
: Output of ‘propagate_calibration_uncertainty()‘ or compatible table.

`aois`
: Rectangular AOI table with aoi/x_min/x_max/y_min/y_max.

Value

A tabular R object containing aOI membership probabilities from uncertainty draws; rows represent analysis units and columns contain the returned quantities.

aoi_trajectory_features

Extract AOI growth-curve/trajectory features

Description

Converts AOI occupancy over binned time into orthogonal-polynomial trajectory coefficients. Coefficients summarize temporal shape and are not latent psychological traits by themselves.

Usage

```
aoi_trajectory_features(
  data,
  person = "person_id",
  trial = "trial_id",
  time = "time_ms",
  aoi = "aoi",
  bin_ms = 100,
  degree = 3L,
  aois = NULL
)
```

Arguments

`data`	Sample-level data.
`person`, `trial`, `time`, `aoi`	Column names.
`bin_ms`	Temporal bin width.
`degree`	Polynomial degree.
`aois`	Optional AOIs to encode; defaults to observed AOIs.

Value

An object of class "eye_aoi_trajectory", stored as a named list, with components "features", "aois", "degree", "bin_ms", "person", "trial", "caveat". It contains aOI growth-curve/trajectory features and associated metadata or diagnostics needed to interpret the result.

api_family_map — *Map exported APIs to conceptual families*

Description

Map exported APIs to conceptual families

Usage

```
api_family_map(inventory)
```

Arguments

`inventory`	API inventory or character names.

Value

A data frame containing exported APIs to conceptual families. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

api_lifecycle_diff — *Compare two API lifecycle registries*

Description

Compare two API lifecycle registries

Usage

```
api_lifecycle_diff(old, new)
```

Arguments

`old`	Old registry.
`new`	New registry.

Value

A tabular R object containing two API lifecycle registries; rows represent analysis units and columns contain the returned quantities.

api_surface_summary *Summarise API surface by family and lifecycle status*

Description

Summarise API surface by family and lifecycle status

Usage

```
api_surface_summary(inventory)
```

Arguments

inventory	Output of ‘eye_api_inventory()‘ or compatible table.

Value

A data frame containing aPI surface by family and lifecycle status. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

apply_preflight_decision *Apply a pre-flight decision to data explicitly*

Description

Apply a pre-flight decision to data explicitly

Usage

```
apply_preflight_decision(
  data,
  audit,
  keep_decisions = c("pass_preflight", "use_with_caution")
)
```

Arguments

data	Original data.
audit	Pre-flight audit.
keep_decisions	Decisions to retain.

Value

Filtered data with an attached ‘preflight_application‘ attribute.

apply_synthetic_corruption

Apply a synthetic corruption plan

Description

Apply a synthetic corruption plan

Usage

```
apply_synthetic_corruption(
  data,
  plan,
  gaze_columns = c("gaze_x", "gaze_y"),
  pupil = "pupil",
  time = "timestamp_ms",
  aoi = NULL,
  device_column = NULL
)
```

Arguments

`data`	Data frame.
`plan`	Corruption plan.
`gaze_columns`	Gaze columns receiving generic missingness/offset.
`pupil`	Pupil column.
`time`	Timestamp column.
`aoi`	Optional AOI column.
`device_column`	Optional numeric column receiving device shift.

Value

An R object containing a synthetic corruption plan. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

as_irt_recovery_results

Canonicalise parameter-recovery results

Description

Canonicalise parameter-recovery results

Usage

```
as_irt_recovery_results(results)
```

Arguments

results	Data frame with at least ‘replicate‘, ‘parameter‘, ‘truth‘, and ‘estimate‘; optional ‘lower‘, ‘upper‘, ‘converged‘, ‘scenario‘, ‘engine‘, and ‘failure_type‘ columns are retained.

Value

A data frame containing canonicalise parameter-recovery results. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

assign_aois_probabilistic *Probabilistic AOI assignment and uncertainty propagation*

Description

Probabilistic AOI assignment and uncertainty propagation. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
assign_aois_probabilistic(x, aois, error_model = c("empirical", "gaussian",
  "ellipse"), accuracy = NULL, precision = NULL, x_col = NULL, y_col = NULL,
  id_cols = NULL)
audit_aoi_separation(x = NULL, aois = NULL)
summarise_aoi_membership(x, by = NULL)
propagate_aoi_uncertainty(x, metrics = c("dwell", "ttff", "transitions", "entropy"),
  draws = 500, time_col = NULL, duration_col = NULL, seed = 20260807)
plot_aoi_probability_map(x, ...)
plot_aoi_boundary_risk(x, ...)
plot_probabilistic_scanpath(x, ...)
plot_fuzzy_transition_matrix(x, ...)
plot_aoi_metric_uncertainty(x, ...)
```

Arguments

x	Input object or data structure appropriate for the selected analysis.
aois	Argument controlling ‘aois‘; see the function usage and returned audit metadata.
error_model	Argument controlling ‘error_model‘; see the function usage and returned audit metadata.

`accuracy`	Argument controlling ‘accuracy‘; see the function usage and returned audit metadata.
`precision`	Argument controlling ‘precision‘; see the function usage and returned audit metadata.
`x_col`	Argument controlling ‘x_col‘; see the function usage and returned audit metadata.
`y_col`	Argument controlling ‘y_col‘; see the function usage and returned audit metadata.
`id_cols`	Argument controlling ‘id_cols‘; see the function usage and returned audit metadata.
`by`	Argument controlling ‘by‘; see the function usage and returned audit metadata.
`metrics`	Argument controlling ‘metrics‘; see the function usage and returned audit metadata.
`draws`	Argument controlling ‘draws‘; see the function usage and returned audit metadata.
`time_col`	Argument controlling ‘time_col‘; see the function usage and returned audit metadata.
`duration_col`	Argument controlling ‘duration_col‘; see the function usage and returned audit metadata.
`seed`	Argument controlling ‘seed‘; see the function usage and returned audit metadata.
`...`	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

assign_process_feature_family

Assign features to conservative process-feature families

Description

Assign features to conservative process-feature families

Usage

```
assign_process_feature_family(
  feature_names,
  registry = process_feature_family_registry()
)
```

Arguments

feature_names	Feature names.
registry	Feature-family registry.

Value

A vector or matrix containing assign features to conservative process-feature families, with shape determined by the supplied analysis units.

audit_3pl_process_signatures

Identify items for descriptive 3PL/process review

Description

Identify items for descriptive 3PL/process review

Usage

```
audit_3pl_process_signatures(
  x,
  lower_asymptote_quantile = 0.8,
  fast_rt_quantile = 0.2,
  fast_ttff_quantile = 0.2
)
```

Arguments

`x` An ‘eye_gaze_anchored_3pl_audit‘.

`lower_asymptote_quantile`
Quantile used to flag relatively large lower asymptotes.

`fast_rt_quantile`
Optional lower quantile for RT review.

`fast_ttff_quantile`
Optional lower quantile for TTFF review.

Value

Item-level review table. These flags are not behavioral classifications.

`audit_advanced_model_evidence` *Audit advanced-model scientific evidence*

Description

Audit advanced-model scientific evidence

Usage

```
audit_advanced_model_evidence(evidence, spec = advanced_model_evidence_spec())
```

Arguments

`evidence` Named list keyed by model function. Each model may contain ‘recovery‘, ‘calibration‘, ‘misspecification‘, ‘grouped_validation‘, ‘engine_equivalence‘, ‘empirical_reproduction‘, and ‘sensitivity‘ objects.

`spec` Evidence specification.

Value

An ‘eye_advanced_evidence_audit‘ data frame.

audit_benchmark_release

Audit whether benchmark assets are ready for public release

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
audit_benchmark_release(study = eyeprocess_benchmark_study())
```

Arguments

study	Benchmark study.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

audit_bias

Audit bias

Description

Audit bias

Usage

```
audit_bias(results, threshold = 0.1, by = c("scenario", "engine", "parameter"))
```

Arguments

results	Validation or model results.
threshold	Decision or diagnostic threshold.
by	Grouping variables used when summarizing results.

Value

An R object containing bias. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

audit_biometric_imputation

Alias emphasizing sensitivity rather than automatic replacement

Description

Alias emphasizing sensitivity rather than automatic replacement

Usage

```
audit_biometric_imputation(...)
```

Arguments

...	Additional arguments passed to the underlying method or helper.

Value

An R object containing alias emphasizing sensitivity rather than automatic replacement. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

audit_biometric_preflight

Audit incoming biometric/process data before modelling

Description

Aggregates trial-level signal-quality indicators by person/recording (or other supplied grouping columns) and returns review-oriented flags. No rows are automatically deleted.

Usage

```
audit_biometric_preflight(
  data,
  by = c("person_id"),
  spec = process_preflight_spec(),
  valid_gaze_prop = "valid_gaze_prop",
  valid_pupil_prop = "valid_pupil_prop",
  missing_gaze = "missing_gaze",
  missing_pupil = "missing_pupil",
  rt_ms = "rt_ms",
  blink_cluster_count = "blink_cluster_count",
  sampling_rate_hz = "sampling_rate_hz"
)
```

Arguments

`data` Trial- or recording-level data.

`by` Grouping columns, usually participant and optionally recording/session.

`spec` A ‘process_preflight_spec()‘ object.

`valid_gaze_prop`, `valid_pupil_prop`
Column names for validity proportions.

`missing_gaze`, `missing_pupil`
Column names for missingness indicators/proportions.

`rt_ms` Response-time column.

`blink_cluster_count`
Blink-cluster count column.

`sampling_rate_hz`
Sampling-rate column.

Value

An ‘eye_biometric_preflight‘ object.

---

audit_candidate_item_bank

Audit a candidate item bank against a seed model

Description

Audit a candidate item bank against a seed model

Usage

```
audit_candidate_item_bank(
  object,
  candidate_data,
  difficulty_range = c(-3, 3),
  discrimination_min = 0.3
)
```

Arguments

`object` Seed model.

`candidate_data` Candidate item feature data.

`difficulty_range`
Plausible screening range for predicted difficulty.

`discrimination_min`
Minimum screening discrimination.

Value

An object of class "eye_candidate_item_bank_audit", stored as a named list, with components "table", "seed_model", "status", "caveat". It contains a candidate item bank against a seed model and associated metadata or diagnostics needed to interpret the result.

---

audit_channel_incremental_information

Audit out-of-sample incremental information from a process channel

---

Description

Audit out-of-sample incremental information from a process channel

Usage

```
audit_channel_incremental_information(
  data,
  fold,
  baseline_fitter,
  process_fitter,
  predictor,
  scorer,
  higher_is_better = TRUE
)
```

Arguments

`data`	Input data.
`fold`	Group/fold column. Every unique value is held out once.
`baseline_fitter`	Function fitted without the process channel.
`process_fitter`	Function fitted with the process channel.
`predictor`	Function ‘(fit, test)‘ returning predictions.
`scorer`	Function ‘(test, prediction)‘ returning a scalar score.
`higher_is_better`	Direction of the score.

Value

A tabular R object containing out-of-sample incremental information from a process channel; rows represent analysis units and columns contain the returned quantities.

audit_convergence *Audit convergence and classified failures*

Description

Audit convergence and classified failures

Usage

```
audit_convergence(results, minimum = 0.95, by = c("scenario", "engine"))
```

Arguments

results	Validation or model results.
minimum	Minimum acceptable value or threshold.
by	Grouping variables used when summarizing results.

Value

An object of class "eye_irt_convergence_audit", "data.frame", stored as a data frame, containing convergence and classified failures and associated metadata needed to interpret the result.

audit_coverage *Audit coverage*

Description

Audit coverage

Usage

```
audit_coverage(
  results,
  minimum = 0.9,
  maximum = 1,
  by = c("scenario", "engine", "parameter")
)
```

Arguments

results	Validation or model results.
minimum	Minimum acceptable value or threshold.
maximum	Maximum acceptable value or threshold.
by	Grouping variables used when summarizing results.

Value

An R object containing coverage. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

audit_decision_provenance *Audit decision provenance and completeness*

Description

Audit decision provenance and completeness

Usage

```
audit_decision_provenance(
  x,
 required_domains = c("sampling", "validity", "fixation", "pupil", "aoi", "model",
    "sensitivity", "exclusions"),
  required_provenance = c("data_source", "software_version", "analysis_commit")
)
```

Arguments

`x` Manifest.

`required_domains` Required decision domains.

`required_provenance` Provenance keys expected under ‘provenance‘.

Value

An object of class "eye_decision_provenance_audit", stored as a named list, with components "missing_domains", "empty_domains", "missing_provenance", "complete", "manifest_hash". It contains decision provenance and completeness and associated metadata or diagnostics needed to interpret the result.

audit_distractor_attention *Audit distractor attention patterns*

Description

Audit distractor attention patterns

Usage

```
audit_distractor_attention(
  data,
  response_option = "response_option",
  option_gaze,
  chosen_suffix = NULL
)
```

Arguments

data	Input data frame or compatible tabular object.
response_option	Column identifying the selected response option.
option_gaze	Option-level gaze variables.
chosen_suffix	Suffix identifying the selected option indicator.

Value

A data frame containing distractor attention patterns. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

audit_eye_api *Audit API lifecycle completeness and replacement contracts*

Description

Audit API lifecycle completeness and replacement contracts

Usage

```
audit_eye_api(inventory = eye_api_inventory(), registry = eye_api_lifecycle())
```

Arguments

inventory	API inventory.
registry	Lifecycle registry.

Value

An object of class "eye_api_audit", stored as a named list, with components "table", "unreviewed", "invalid_replacements", "invalid_canonical", "reviewed_fraction", "valid". It contains aPI lifecycle completeness and replacement contracts and associated metadata or diagnostics needed to interpret the result.

---

audit_eye_pipeline *Audit a pipeline definition or completed run*

Description

Audit a pipeline definition or completed run

Usage

```
audit_eye_pipeline(x)
```

Arguments

x	Pipeline or pipeline run.

Value

An object of class "eye_pipeline_audit", stored as a named list, with components "table", "undeclared_decisions", "valid", "pipeline_hash". It contains a pipeline definition or completed run and associated metadata or diagnostics needed to interpret the result.

---

audit_frontier_model_contract *Audit whether a gated frontier model has a minimum evidence contract*

Description

Audit whether a gated frontier model has a minimum evidence contract

Usage

```
audit_frontier_model_contract(x, evidence = list())
```

Arguments

x	Gated model object.
evidence	Named evidence objects.

Value

A data frame containing whether a gated frontier model has a minimum evidence contract. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

audit_identifiability *Audit empirical identifiability from replicate estimates*

Description

Flags parameters with near-zero estimate variance, explosive dispersion, excessive missingness, or strongly correlated estimates when a covariance matrix is supplied.

Usage

```
audit_identifiability(
  results,
  max_missing = 0.05,
  max_sd_ratio = 10,
  correlation_matrix = NULL,
  max_abs_correlation = 0.995
)
```

Arguments

`results`	Validation or model results.
`max_missing`	Maximum acceptable missingness.
`max_sd_ratio`	Maximum acceptable standard-deviation ratio.
`correlation_matrix`	Optional parameter-correlation matrix.
`max_abs_correlation`	Maximum acceptable absolute parameter correlation.

Value

An object of class "eye_irt_identifiability_audit", "data.frame", stored as a data frame, containing empirical identifiability from replicate estimates and associated metadata needed to interpret the result.

audit_interval_width *Audit interval width*

Description

Audit interval width

Usage

```
audit_interval_width(
  results,
  maximum = Inf,
  by = c("scenario", "engine", "parameter")
)
```

Arguments

results	Validation or model results.
maximum	Maximum acceptable value or threshold.
by	Grouping variables used when summarizing results.

Value

An R object containing interval width. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

audit_irf_shape *Audit item response-function shape departures*

Description

Audit item response-function shape departures

Usage

```
audit_irf_shape(
  comparison,
  mean_absolute_threshold = 0.05,
  max_absolute_threshold = 0.15
)
```

Arguments

`comparison` Value supplied to ‘comparison‘; see Details for its model-specific role.

`mean_absolute_threshold` Threshold for mean absolute IRF departure.

`max_absolute_threshold` Threshold for maximum absolute IRF departure.

Value

A tabular R object containing item response-function shape departures; rows represent analysis units and columns contain the returned quantities.

---

audit_item_reduction_sensitivity *Run stepwise Rasch item-reduction as a sensitivity analysis*

Description

Run stepwise Rasch item-reduction as a sensitivity analysis

Usage

```
audit_item_reduction_sensitivity(
  erm_model,
  criterion = list("itemfit"),
  alpha = 0.05,
  maxstep = 5L
)
```

Arguments

`erm_model` Fitted eRm model.

`criterion` Criterion list passed to ‘eRm::stepwiseIt()‘.

`alpha` Significance threshold.

`maxstep` Maximum elimination steps.

Value

An object of class "eye_item_reduction_sensitivity", stored as a named list, with components "model", "eliminated_items", "alpha", "maxstep", "status", "caveat". It contains stepwise Rasch item-reduction as a sensitivity analysis and associated metadata or diagnostics needed to interpret the result.

audit_latent_distribution

Audit the empirical latent-trait distribution

Description

Audit the empirical latent-trait distribution

Usage

```
audit_latent_distribution(theta, tail_z = 3)
```

Arguments

theta	Numeric latent-trait draws/estimates.
tail_z	Absolute standardized threshold used for tail-rate diagnostics.

Value

A data frame containing the empirical latent-trait distribution. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

audit_measurement_transportability

Summarise measurement transportability across held-out groups

Description

Summarise measurement transportability across held-out groups

Usage

```
audit_measurement_transportability(
  validation,
  metric,
  higher_is_better = TRUE,
  max_range = NULL,
  minimum = NULL,
  maximum = NULL
)
```

Arguments

`validation`	Validation results or validation specification.
`metric`	Metric to calculate or audit.
`higher_is_better`	Whether larger metric values indicate better performance.
`max_range`	Maximum allowed range across held-out groups.
`minimum`	Minimum acceptable value or threshold.
`maximum`	Maximum acceptable value or threshold.

Value

An object of class "eye_measurement_transportability_audit", "data.frame", stored as a data frame, containing measurement transportability across held-out groups and associated metadata needed to interpret the result.

`audit_model_promotion` *Audit promotion readiness for advanced model families*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
audit_model_promotion(evidence, spec = model_promotion_spec())
```

Arguments

`evidence`	Named list by model family. Each family may contain
`spec`	Promotion specification.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

audit_multimodal_identifiability

Audit basic multimodal design identifiability

Description

This is a structural pre-flight screen, not a proof of statistical identifiability.

Usage

```
audit_multimodal_identifiability(x, min_person = 30L, min_item = 5L)
```

Arguments

`x`	An ‘eye_multimodal_measurement‘.
`min_person`, `min_item`	Minimum structural counts.

Value

An ‘eye_multimodal_identifiability_audit‘.

audit_multimodal_m2_identifiability

Audit structural and data identifiability for M0-M2

Description

This is a conservative pre-fit audit. It does not prove global identifiability. It verifies support, design connectivity, channel coverage, response variation, and the explicit scale constraints used by the reference likelihoods.

Usage

```
audit_multimodal_m2_identifiability(
  x,
  person = "person_id",
  item = "item_id",
  response = "response",
  rt = "rt",
  gaze = "gaze",
  model = c("M2", "M1", "M0"),
  min_persons = 20L,
  min_items = 5L
)
```

Arguments

`x`	Data frame or compatible M2 object.
`person`, `item`, `response`, `rt`, `gaze`	Column names.
`model`	‘"M0"‘, ‘"M1"‘, or ‘"M2"‘.
`min_persons`, `min_items`	Conservative design thresholds.

Value

An ‘eye_multimodal_m2_identifiability‘ object.

`audit_multimodal_m3_identifiability` *Audit structural and measurement support for M3*

Description

Performs a conservative pre-fit audit for the four-channel response, RT, fixation-count and pupil reference model. The audit checks design connectivity, channel coverage and variation, pupil nuisance availability, blink/interpolation burden, device/session representation and explicit M3 identification constraints. It is a support screen, not proof of global identifiability or construct validity.

Usage

```
audit_multimodal_m3_identifiability(
  x,
  pupil_scale = c("z", "raw"),
  min_persons = 20L,
  min_items = 5L,
  max_pupil_missing = 0.5,
  max_blink_rate = 0.3,
  max_interpolation_rate = 0.3
)
```

Arguments

`x`	M3-compatible data, simulation, fit, or measurement object.
`pupil_scale`	Pupil transformation used by the reference likelihood.
`min_persons`, `min_items`	Conservative design thresholds.
`max_pupil_missing`, `max_blink_rate`, `max_interpolation_rate`	Warning thresholds.

Value

An ‘eye_multimodal_m3_identifiability‘ object.

audit_multimodal_m4_identifiability

Audit M4 structural and posterior identifiability

Description

Evaluates sequence information, channel support, state occupancy, assignment uncertainty, state separation, transition degeneracy, and HMC diagnostics. The result is deliberately multi-criterion; M4 does not collapse validity to a single undocumented boolean.

Usage

```
audit_multimodal_m4_identifiability(
  x,
  spec = NULL,
  include_posterior = TRUE,
  rhat_max = 1.05,
  ess_min = 100,
  ebfmi_min = 0.3,
  occupancy_min = 0.03,
  entropy_fraction_review = 0.8
)
```

Arguments

`x`	Data, M4 simulation, M4 fit, or internal prepared M4 data.
`spec`	Optional M4 specification when ‘x‘ is not a fit.
`include_posterior`	Whether to evaluate posterior criteria for a fit.
`rhat_max`, `ess_min`, `ebfmi_min`	Sampler thresholds.
`occupancy_min`	Minimum mean posterior state occupancy for non-null K.
`entropy_fraction_review`	Review threshold relative to maximum entropy.

Value

An ‘eye_multimodal_m4_identifiability‘ with machine-readable checks.

audit_multimodal_measurement

Audit a multimodal measurement object

Description

Audit a multimodal measurement object

Usage

```
audit_multimodal_measurement(x)
```

Arguments

x	An ‘eye_multimodal_measurement‘.

Value

An ‘eye_multimodal_audit‘.

audit_multivariate_process_quality

Alias emphasizing data-quality interpretation of process anomaly auditing

Description

Alias emphasizing data-quality interpretation of process anomaly auditing

Usage

```
audit_multivariate_process_quality(...)
```

Arguments

...	Additional arguments passed to the underlying method or helper.

Value

An R object containing alias emphasizing data-quality interpretation of process anomaly auditing. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

audit_nonparametric_rasch

Run nonparametric Rasch diagnostics with eRm

Description

Run nonparametric Rasch diagnostics with eRm

Usage

```
audit_nonparametric_rasch(
  response_matrix,
  methods = c("T1", "T10"),
  n = 100L,
  splitcr = "median",
  seed = 321
)
```

Arguments

response_matrix	Dichotomous response matrix.
methods	eRm NPtest methods, e.g. T1 and T10.
n	Number of sampled matrices.
splitcr	Split criterion for tests that use one.
seed	Seed.

Value

An object of class "eye_nonparametric_rasch_audit", stored as a named list, with components "tests", "status", "n", "splitcr", "caveat". It contains nonparametric Rasch diagnostics with eRm and associated metadata or diagnostics needed to interpret the result.

audit_presentation_accessibility

Audit presentation/accessibility sensitivity without clinical inference

Description

Creates a transparent presentation-review score from response time/dwell, revisit/entropy, pupil-effort proxies, and gaze quality. It is an experimental design/fairness audit only.

Usage

```
audit_presentation_accessibility(
  data,
  person = "person_id",
  rt = "rt_ms",
  dwell = "dwell_ms",
  revisits = "revisits",
  entropy = "aoi_entropy",
  pupil = "pupil_peak",
  gaze_validity = "valid_gaze_prop",
  review_quantile = 0.9
)
```

Arguments

`data`	Process data.
`person`	Person identifier.
`rt`, `dwell`, `revisits`, `entropy`, `pupil`, `gaze_validity`	Optional column names.
`review_quantile`	Quantile for a presentation-review flag.

Value

An object of class "eye_presentation_accessibility", stored as a named list, with components "table", "threshold", "review_quantile", "status", "caveat". It contains presentation/accessibility sensitivity without clinical inference and associated metadata or diagnostics needed to interpret the result.

`audit_process_adjusted_dif` *Audit DIF before and after process-data adjustment*

Description

Audit DIF before and after process-data adjustment

Usage

```
audit_process_adjusted_dif(
  data,
  response = "response",
  ability,
  group,
  item = "item_id",
  process_features,
  person = "participant_id"
)
```

Arguments

data	Input data frame or compatible tabular object.
response	Response variable or response-column name.
ability	Value supplied to ‘ability‘; see Details for its model-specific role.
group	Value supplied to ‘group‘; see Details for its model-specific role.
item	Item identifier, name, or item column.
process_features	Names of process-derived features.
person	Person or participant identifier column.

Value

An object of class "eye_process_adjusted_dif", stored as a named list, with components "unadjusted_model", "adjusted_model", "coefficients", "surrogate", "note". It contains dIF before and after process-data adjustment and associated metadata or diagnostics needed to interpret the result.

---

audit_process_anomalies

Audit multivariate process/data-quality anomalies

Description

Computes a regularized Mahalanobis distance over selected person-level process metrics. Flags indicate review needs only; they are not cheating, identity, diagnosis, or intent classifications.

Usage

```
audit_process_anomalies(
  data,
  person = "person_id",
  metrics = NULL,
  alpha = 0.975,
  aggregate = TRUE,
  ridge = 1e-06
)
```

Arguments

data	Data frame.
person	Person identifier column.
metrics	Numeric process metrics. If omitted, usable numeric columns are selected.
alpha	Chi-square review quantile.
aggregate	If TRUE, aggregate metrics to person level before auditing.
ridge	Diagonal covariance regularization.

Value

An object of class "eye_process_anomaly_audit", stored as a named list, with components "table", "metrics", "alpha", "threshold", "center", "covariance", "caveat". It contains multivariate process/data-quality anomalies and associated metadata or diagnostics needed to interpret the result.

---

audit_process_drift *Audit post-deployment psychometric and biometric drift*

Description

Audit post-deployment psychometric and biometric drift

Usage

```
audit_process_drift(
  data,
  item = "item_id",
  batch = "deployment_batch",
 metrics = c("irt_difficulty", "irt_discrimination", "rt_ms", "dwell_ms", "pupil_bc",
    "valid_gaze_prop", "screen_luminance"),
  spec = process_drift_spec(),
  reference_batch = NULL,
  aggregate_fun = .ep08_mean
)
```

Arguments

data	Item-by-batch or trial-level deployment data.
item	Item identifier column.
batch	Ordered deployment batch/date column.
metrics	Numeric metrics to monitor.
spec	Drift specification.
reference_batch	Optional reference batch value(s).
aggregate_fun	Aggregation function used when multiple rows occur within item x batch.

Value

An object of class "eye_process_drift_audit", stored as a named list, with components "table", "trajectories", "item", "batch", "metrics", "spec", "reference_batch", "flag_columns", "caveat". It contains post-deployment psychometric and biometric drift and associated metadata or diagnostics needed to interpret the result.

audit_process_external_validity

Audit external/structural validity of process traits

Description

Audit external/structural validity of process traits

Usage

```
audit_process_external_validity(
  data,
  criterion,
  predictors,
  baseline_predictors = NULL
)
```

Arguments

`data`	Person-level data containing a criterion and process predictors.
`criterion`	External criterion column.
`predictors`	Process predictors.
`baseline_predictors`	Optional baseline predictors for incremental validity.

Value

An object of class "eye_process_external_validity", stored as a named list, with components "full_model", "baseline_model", "comparison", "associations", "criterion", "predictors", "baseline_predictors", "data", "incremental_r2", "status", "caveat". It contains external/structural validity of process traits and associated metadata or diagnostics needed to interpret the result.

audit_process_local_dependence

Audit inter-option/process local dependence

Description

Computes pairwise residual correlations (a Q3-style diagnostic) across item or option columns and, when supplied, analogous process-residual correlations. This is a diagnostic for local dependence, not a formal test with universal cutoffs.

Usage

```
audit_process_local_dependence(
  response_residuals,
  process_residuals = NULL,
  threshold = 0.2
)
```

Arguments

`response_residuals`
: Person-by-item/option residual matrix.

`process_residuals`
: Optional aligned process-residual matrix.

`threshold`
: Absolute correlation threshold used only for flagging.

Value

An object of class "eye_process_local_dependence_audit", stored as a named list, with components "pairs", "threshold", "max_absolute_response", "note". It contains inter-option/process local dependence and associated metadata or diagnostics needed to interpret the result.

---

audit_process_measurement_invariance

Audit process measurement invariance across facets

Description

Audit process measurement invariance across facets

Usage

```
audit_process_measurement_invariance(
  object,
  channel = c("process", "response"),
  relative_sd_threshold = 0.25
)
```

Arguments

`object`
: A fitted eyeprocess model or audit object.

`channel`
: Measurement channel to inspect.

`relative_sd_threshold`
: Value supplied to ‘relative_sd_threshold‘; see Details for its model-specific role.

Value

An object of class "eye_process_measurement_invariance", stored as a named list, with components "pass", "threshold", "components", "channel", "note". It contains process measurement invariance across facets and associated metadata or diagnostics needed to interpret the result.

---

audit_process_window_sensitivity

Audit sensitivity of process summaries to temporal window choices

---

Description

Audit sensitivity of process summaries to temporal window choices

Usage

```
audit_process_window_sensitivity(
  data,
  widths_ms = c(250, 500, 1000, 1500),
  steps_ms = c(100, 250, 500),
  metric = "pupil_mean",
  grid = TRUE,
  ...
)
```

Arguments

`data`	Sample-level data.
`widths_ms`	Window widths.
`steps_ms`	Step widths; recycled or crossed depending on ‘grid‘.
`metric`	Extracted process metric to compare.
`grid`	If TRUE, evaluate all width-step combinations.
`...`	Passed to ‘extract_process_windows()‘.

Value

An object of class "eye_process_window_sensitivity", stored as a named list, with components "table", "metric", "settings", "caveat". It contains sensitivity of process summaries to temporal window choices and associated metadata or diagnostics needed to interpret the result.

audit_pupil_fatigue_drift

Audit within-person pupil fatigue/trial-order drift

Description

Audit within-person pupil fatigue/trial-order drift

Usage

```
audit_pupil_fatigue_drift(
  data,
  pupil = "pupil_peak",
  trial_order = "trial_sequence",
  person = "person_id",
  luminance = NULL,
  difficulty = NULL,
  engine = c("auto", "plm", "lm_fixed_effects")
)
```

Arguments

`data` Trial-level data.

`pupil`, `trial_order`, `person` Required columns.

`luminance`, `difficulty` Optional covariates.

`engine` ‘auto‘, ‘plm‘, or ‘lm_fixed_effects‘.

Value

An object of class "eye_pupil_fatigue_drift", stored as a named list, with components "model", "coefficients", "data", "engine", "status", "caveat". It contains within-person pupil fatigue/trial-order drift and associated metadata or diagnostics needed to interpret the result.

audit_pupil_frequency_stability

Audit stability of pupil frequency features across window lengths

Description

Audit stability of pupil frequency features across window lengths

Usage

```
audit_pupil_frequency_stability(
  data,
  windows_ms = c(500, 1000, 2000),
  by = c("person_id", "trial_id"),
  time = "time_ms",
  pupil = "pupil_bc",
  sampling_rate_hz = 60
)
```

Arguments

`data` Sample-level data.

`windows_ms` Window lengths to evaluate.

`by`, `time`, `pupil`, `sampling_rate_hz` Passed through to feature construction.

Value

An object of class "eye_pupil_frequency_stability", stored as a named list, with components "table", "windows_ms", "caveat". It contains stability of pupil frequency features across window lengths and associated metadata or diagnostics needed to interpret the result.

---

audit_pupil_preprocessing_order

Audit declared order of pupil preprocessing steps

Description

Audit declared order of pupil preprocessing steps

Usage

```
audit_pupil_preprocessing_order(
  steps,
 cleaning_patterns = c("blink", "missing", "interpol", "artifact", "smooth", "filter"),
  baseline_pattern = "baseline"
)
```

Arguments

`steps` Character vector in execution order.

`cleaning_patterns` Patterns considered cleaning/preprocessing.

`baseline_pattern` Pattern identifying baseline correction.

Value

A named list with components "steps", "baseline_positions", "cleaning_positions", "cleaning_after_baseline", "status", "caveat", containing declared order of pupil preprocessing steps and associated metadata or diagnostics.

---

audit_rmse *Audit rmse*

Description

Audit rmse

Usage

```
audit_rmse(results, threshold = 0.3, by = c("scenario", "engine", "parameter"))
```

Arguments

results	Validation or model results.
threshold	Decision or diagnostic threshold.
by	Grouping variables used when summarizing results.

Value

An R object containing rmse. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

audit_roundtrip_loss *Audit semantic and numerical loss after a round trip*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
audit_roundtrip_loss(source, roundtrip, tables = canonical_table_names(),
  tolerance = 1e-8)
```

Arguments

source	Source and re-imported ‘eye_dataset‘ objects.
roundtrip	Source and re-imported ‘eye_dataset‘ objects.
tables	Canonical tables to compare.
tolerance	Numeric tolerance.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

audit_sampling_irregularity *Audit sampling irregularity*

Description

Audit sampling irregularity

Usage

```
audit_sampling_irregularity(
  data,
  time = "timestamp_ms",
  unit = c("ms", "s", "us"),
  by = NULL,
  cv_threshold = 0.05
)
```

Arguments

`data`	Sample data.
`time`	Timestamp column.
`unit`	Timestamp unit.
`by`	Optional grouping columns.
`cv_threshold`	Review threshold for interval coefficient of variation.

Value

An object of class "eye_sampling_irregularity_audit", stored as a named list, with components "table", "cv_threshold", "caveat". It contains sampling irregularity and associated metadata or diagnostics needed to interpret the result.

audit_sbc *Audit SBC rank uniformity*

Description

Uses binned chi-square diagnostics as a coarse screening diagnostic and also reports the mean/variance of normalized ranks. It is not a replacement for rank-histogram inspection.

Usage

```
audit_sbc(x, bins = 10L, alpha = 0.01)
```

Arguments

x	Object to print, plot, summarize, or audit.
bins	Number of bins used by the diagnostic.
alpha	Significance or tail-probability level.

Value

An object of class "eye_sbc_audit", "data.frame", stored as a data frame, containing sBC rank uniformity and associated metadata needed to interpret the result.

audit_signal_filter *Summarize a signal-filter audit*

Description

Summarize a signal-filter audit

Usage

```
audit_signal_filter(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A data frame containing a signal-filter audit. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

audit_temporal_leakage

Audit temporal leakage in a feature provenance table

Description

Leakage here means information becoming available after the declared outcome boundary. It is a data/analysis property and is not an allegation of misconduct.

Usage

```
audit_temporal_leakage(provenance, allow_equal = TRUE, tolerance = 0)
```

Arguments

provenance	Output of [process_feature_time_provenance()] or compatible table.
allow_equal	Whether features available exactly at outcome time are allowed.
tolerance	Numeric tolerance in the provenance time unit.

Value

A named list with components "status", "n_features", "n_flagged", "flagged_fraction", "detail", "interpretation", containing temporal leakage in a feature provenance table and associated metadata or diagnostics.

audit_validation_completion

Audit whether a validation programme is complete

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
audit_validation_completion(x, thresholds = validation_thresholds(),
  empirical_reproduction = NULL)
```

Arguments

x	Validation collection.
thresholds	Validation thresholds.
empirical_reproduction	Optional empirical-reproduction evidence required when configured in ‘thresholds‘.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

audit_vendor_field_coverage

Audit vendor field coverage against canonical semantics

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
audit_vendor_field_coverage(semantics, required_fields)
```

Arguments

`semantics`	Semantics registry or corpus path.
`required_fields`	Data frame with canonical table/field pairs.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

audit_vendor_validation

Audit a multi-vendor validation corpus

Description

Audit a multi-vendor validation corpus

Usage

```
audit_vendor_validation(x, spec = vendor_validation_spec())
```

Arguments

`x`	An ‘eye_corpus_validation‘ object or its summary data frame.
`spec`	Validation specification.

Value

An ‘eye_vendor_validation‘ data frame.

audit_visual_context_dependence

Audit visual-context dependence

Description

Audit visual-context dependence

Usage

```
audit_visual_context_dependence(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A data frame containing visual-context dependence. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

bayesian_process_diagnostic_flags

Extract compact Bayesian process-model diagnostic flags

Description

Extract compact Bayesian process-model diagnostic flags

Usage

```
bayesian_process_diagnostic_flags(
  x,
  rhat_threshold = 1.01,
  ess_threshold = 400
)
```

Arguments

x	An ‘eye_bayesian_process_dashboard‘.
rhat_threshold	Review threshold for R-hat.
ess_threshold	Review threshold for bulk/tail effective sample size.

Value

An R object containing compact Bayesian process-model diagnostic flags. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

bayesian_process_diagnostics_dashboard

Summarize Bayesian process-model diagnostics

Description

Collects model availability, optional approximate leave-one-out summaries, posterior diagnostics, and (only when explicitly requested) a Bayes-factor comparison. The function does not treat any one diagnostic as proof of the substantive process interpretation.

Usage

```
bayesian_process_diagnostics_dashboard(
  ...,
  model_names = NULL,
  compute_loo = TRUE,
  compute_bayes_factor = FALSE,
  posterior_summary = TRUE
)
```

Arguments

`...`	Fitted ‘brmsfit‘ objects.
`model_names`	Optional model labels.
`compute_loo`	Whether to compute approximate leave-one-out diagnostics.
`compute_bayes_factor`	Whether to attempt a Bayes factor. This requires exactly two suitable brms models and typically models fitted with ‘save_pars = save_pars(all = TRUE)‘.
`posterior_summary`	Whether to collect posterior convergence summaries when package ‘posterior‘ is available.

Value

An ‘eye_bayesian_process_dashboard‘ object.

benchmark_expected_outputs *Return expected benchmark outputs*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
benchmark_expected_outputs(study = eyeprocess_benchmark_study())
```

Arguments

study	Benchmark object or path.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

benchmark_eye_storage *Benchmark storage formats and query operations*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
benchmark_eye_storage(x, formats = c("rds", "csv", "parquet"),
  partition_by = c("participant_id", "recording_id"), repetitions = 3L,
  directory = tempdir())
```

Arguments

x	Named list of tables or eye dataset.
formats	Formats to benchmark.
partition_by	Partition columns.
repetitions	Repetitions.
directory	Parent temporary directory.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

benchmark_eyeprocess *Benchmark an eyeprocess operation*

Description

Benchmark an eyeprocess operation

Usage

```
benchmark_eyeprocess(expr, iterations = 5L, label = "operation")
```

Arguments

expr	Function with no arguments to benchmark.
iterations	Number of iterations.
label	Benchmark label.

Value

An ‘eye_benchmark‘ data frame.

benchmark_memory_estimate *Memory estimate for an R object or generated problem size*

Description

Memory estimate for an R object or generated problem size

Usage

```
benchmark_memory_estimate(x, generator = NULL)
```

Arguments

x	Object, or numeric n when ‘generator‘ is supplied.
generator	Optional function taking n.

Value

A data frame containing memory estimate for an R object or generated problem size. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

benchmark_scaling_curve *Estimate scaling exponent from benchmark results*

Description

Estimate scaling exponent from benchmark results

Usage

```
benchmark_scaling_curve(x)
```

Arguments

x	Benchmark result.

Value

A data frame containing scaling exponent from benchmark results. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

bind_process_windows *Bind compatible process-window objects*

Description

Bind compatible process-window objects

Usage

```
bind_process_windows(...)
```

Arguments

...	Additional arguments passed to the underlying method or helper.

Value

An object of class "eye_process_windows", stored as a named list, with components "data", "spec", "source_n", "status". It contains bind compatible process-window objects and associated metadata or diagnostics needed to interpret the result.

biometric_imputation_sensitivity

Run biometric-feature imputation as a sensitivity analysis

Description

Run biometric-feature imputation as a sensitivity analysis

Usage

```
biometric_imputation_sensitivity(
  data,
  variables,
  methods = c("mice", "missForest"),
  m = 3L,
  maxit = 3L,
  seed = 521
)
```

Arguments

data	Data containing biometric/process features.
variables	Variables to impute.
methods	Any of ‘mice‘ and ‘missForest‘.
m	Number of MICE imputations.
maxit	Iteration count.
seed	Seed.

Value

An ‘eye_biometric_imputation_sensitivity‘ object. Complete-case analysis is not replaced automatically.

bootstrap_process_reliability

Bootstrap ICC reliability by resampling participants

Description

Bootstrap ICC reliability by resampling participants

Usage

```
bootstrap_process_reliability(
  data,
  person,
  session,
  measure,
  replications = 500L,
  seed = 1L
)
```

Arguments

`data`	Long data.
`person`, `session`, `measure`	Column names.
`replications`	Bootstrap replications.
`seed`	Seed.

Value

A data frame containing bootstrap ICC reliability by resampling participants. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`build_compatibility_matrix` *Build the declared/fixture/empirical compatibility matrix*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
build_compatibility_matrix(x, required_vendors = c("gazepoint", "tobii", "pupillabs",
  "eyelink", "smi"), min_empirical_cases = 2L)
```

Arguments

`x`	Corpus path or registry data frame.
`required_vendors`	Required vendors.
`min_empirical_cases`	Minimum independent empirical cases per vendor.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

build_evidence_graph *Evidence and decision provenance graphs*

Description

Evidence and decision provenance graphs. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
build_evidence_graph(raw_data, transformations = NULL, metrics = NULL,
  models = NULL, diagnostics = NULL, decisions = NULL, edges = NULL)
trace_item_decision(graph, item_id)
compare_decision_provenance(graph_a, graph_b)
audit_evidence_dependencies(graph)
plot_evidence_graph(x, ...)
plot_item_decision_path(x, ...)
plot_metric_dependency_graph(x, ...)
plot_model_decision_impact(x, ...)
```

Arguments

raw_data	Argument controlling ‘raw_data‘; see the function usage and returned audit metadata.
transformations	Argument controlling ‘transformations‘; see the function usage and returned audit metadata.
metrics	Argument controlling ‘metrics‘; see the function usage and returned audit metadata.
models	Argument controlling ‘models‘; see the function usage and returned audit metadata.
diagnostics	Argument controlling ‘diagnostics‘; see the function usage and returned audit metadata.
decisions	Argument controlling ‘decisions‘; see the function usage and returned audit metadata.
edges	Argument controlling ‘edges‘; see the function usage and returned audit metadata.
graph	Argument controlling ‘graph‘; see the function usage and returned audit metadata.
item_id	Argument controlling ‘item_id‘; see the function usage and returned audit metadata.
graph_a	Argument controlling ‘graph_a‘; see the function usage and returned audit metadata.

graph_b	Argument controlling ‘graph_b‘; see the function usage and returned audit metadata.
x	Input object or data structure appropriate for the selected analysis.
...	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

---

build_gazepoint_media_trials

Reconstruct media presentations as analysis trials

Description

Converts contiguous Gazepoint media runs into explicit trial intervals. This provides stable person-by-item-by-trial keys even when the original export contains no behavioural response file.

Usage

```
build_gazepoint_media_trials(x, item_map = NULL, overwrite = TRUE)
```

Arguments

x	An ‘eye_dataset‘ imported from Gazepoint.
item_map	Optional data frame or CSV path containing ‘stimulus_id‘, ‘item_id‘, and optionally ‘condition_id‘.
overwrite	Replace existing trial intervals.

Value

The updated ‘eye_dataset‘.

calibration_drift_profile

Calibration drift profile across sessions/batches

Description

Calibration drift profile across sessions/batches

Usage

```
calibration_drift_profile(
  data,
  by,
  gaze_x = "gaze_x",
  gaze_y = "gaze_y",
  target_x = "target_x",
  target_y = "target_y"
)
```

Arguments

`data`	Validation-target data.
`by`	Ordered batch/session column.
`gaze_x`, `gaze_y`	Recorded gaze-coordinate columns.
`target_x`, `target_y`	Known target-coordinate columns.

Value

An object of class "eye_calibration_drift_profile", stored as a named list, with components "table", "by", "caveat". It contains calibration drift profile across sessions/batches and associated metadata or diagnostics needed to interpret the result.

calibration_error_model

Build an empirical bivariate calibration-error model

Description

Build an empirical bivariate calibration-error model

Usage

```
calibration_error_model(
  data,
  gaze_x = "gaze_x",
  gaze_y = "gaze_y",
  target_x = "target_x",
  target_y = "target_y"
)
```

Arguments

`data`	Validation-target data.
`gaze_x`, `gaze_y`	Recorded gaze-coordinate columns.
`target_x`, `target_y`	Known target-coordinate columns.

Value

An object of class "eye_calibration_error_model", stored as a named list, with components "mean_error", "covariance", "errors", "n", "metrics", "coordinate_units", "status", "caveat". It contains an empirical bivariate calibration-error model and associated metadata or diagnostics needed to interpret the result.

`calibration_sensitivity_grid` *Sensitivity grid for deterministic calibration offsets*

Description

Sensitivity grid for deterministic calibration offsets

Usage

```
calibration_sensitivity_grid(
  offset_x = c(-0.02, 0, 0.02),
  offset_y = c(-0.02, 0, 0.02)
)
```

Arguments

`offset_x`, `offset_y`	Candidate offsets in coordinate units.

Value

A tabular R object containing sensitivity grid for deterministic calibration offsets; rows represent analysis units and columns contain the returned quantities.

calibration_transfer_audit *Audit transfer of calibration across devices/sessions/sites*

Description

Audit transfer of calibration across devices/sessions/sites

Usage

```
calibration_transfer_audit(data, group, observed, predicted)
```

Arguments

data	Data containing group, observed and predicted values.
group	Grouping column.
observed	Observed binary/numeric outcome column.
predicted	Predicted probability/numeric score column.

Value

An object of class "eye_calibration_transfer_audit", "data.frame", stored as a data frame, containing transfer of calibration across devices/sessions/sites and associated metadata needed to interpret the result.

canonical_eye_api *Canonical API mapping*

Description

Canonical API mapping

Usage

```
canonical_eye_api(registry = eye_api_lifecycle())
```

Arguments

registry	Lifecycle registry.

Value

A tabular R object containing canonical API mapping; rows represent analysis units and columns contain the returned quantities.

classify_item_missingness

Classify item missingness using exposure and response evidence

Description

Classify item missingness using exposure and response evidence

Usage

```
classify_item_missingness(
  data,
  response = "response",
  reached = "reached",
  inspected = NULL,
  started = NULL
)
```

Arguments

data	Input data frame or compatible tabular object.
response	Response variable or response-column name.
reached	Indicator that the item was reached.
inspected	Indicator that the item or response area was inspected.
started	Indicator that responding was initiated.

Value

An object of class "factor", stored as an R object, containing classify item missingness using exposure and response evidence and associated metadata needed to interpret the result.

collect_eye_storage

Collect a disk-backed eye dataset

Description

Collect a disk-backed eye dataset

Usage

```
collect_eye_storage(x, tables = NULL)
```

Arguments

`x`	An ‘eye_storage‘ handle or storage path.
`tables`	Optional subset of canonical tables.

Value

An ‘eye_dataset‘.

`collect_validation_evidence` *Collect validation evidence into a common bundle*

Description

Collect validation evidence into a common bundle

Usage

```
collect_validation_evidence(..., model_name = NULL, notes = NULL)
```

Arguments

`...`	Named validation objects.
`model_name`	Optional model/workflow label.
`notes`	Optional free-text notes.

Value

An ‘eye_validation_bundle‘ object.

`collect_validation_jobs` *Collect validation checkpoints from one or more directories*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
collect_validation_jobs(path, plan = NULL, strict = TRUE)
```

Arguments

`path`	Manifest/output directory or character vector of directories.
`plan`	Optional validation plan.
`strict`	Fail when duplicate job identifiers disagree.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`compare_aoi_methods` *Compare explicit AOI assignment methods*

Description

Compare explicit AOI assignment methods

Usage

```
compare_aoi_methods(
  data,
  methods,
  analysis_fun,
  extract_fun = .ep09_default_sensitivity_extract
)
```

Arguments

`data`	Data.
`methods`	Named methods/specifications.
`analysis_fun`	Function ‘(data, method, specification)‘.
`extract_fun`	Result extractor.

Value

An object of class "eye_process_sensitivity", stored as a named list, with components "grid", "results", "failures", "warnings", "grid_hash", "created_at", "status", "caveat". It contains explicit AOI assignment methods and associated metadata or diagnostics needed to interpret the result.

compare_aoi_trajectories

Compare AOI trajectory feature objects

Description

Compare AOI trajectory feature objects

Usage

```
compare_aoi_trajectories(...)
```

Arguments

...	Additional arguments passed to the underlying method or helper.

Value

A data frame containing aOI trajectory feature objects. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

compare_bayesian_process_models

Compare Bayesian process models by LOO or Bayes factor

Description

Compare Bayesian process models by LOO or Bayes factor

Usage

```
compare_bayesian_process_models(..., method = c("loo", "bayes_factor"))
```

Arguments

...	Fitted brms models.
method	‘loo‘ or ‘bayes_factor‘.

Value

An R object containing bayesian process models by LOO or Bayes factor. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

compare_decision_manifests

Compare two research decision manifests

Description

Compare two research decision manifests

Usage

```
compare_decision_manifests(old, new)
```

Arguments

old	Earlier manifest.
new	Later manifest.

Value

An object of class "eye_decision_manifest_diff", "data.frame", stored as a data frame, containing two research decision manifests and associated metadata needed to interpret the result.

compare_deployment_batches

Compare two deployment batches descriptively

Description

Compare two deployment batches descriptively

Usage

```
compare_deployment_batches(
  data,
  batch = "deployment_batch",
  batch_a,
  batch_b,
  metrics = NULL,
  item = "item_id"
)
```

Arguments

`data`	Deployment data.
`batch`	Batch column.
`batch_a`, `batch_b`	Values to compare.
`metrics`	Metrics to compare.
`item`	Optional item identifier for item-matched differences.

Value

A data frame containing two deployment batches descriptively. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`compare_diffusion_accuracy_rt` *Compare diffusion and conventional accuracy-RT models*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
compare_diffusion_accuracy_rt(object)
```

Arguments

`object`	Diffusion fit.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

compare_dynamic_transition_models

Compare dynamic transition models

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
compare_dynamic_transition_models(..., criterion = c("AIC", "BIC", "log_score",
  "accuracy"))
```

Arguments

`...`	Named fitted dynamic IRTree models.
`criterion`	AIC, BIC, log score, or classification accuracy.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

compare_engine_adapters

Compare multiple external-engine adapter results

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
compare_engine_adapters(...)
```

Arguments

`...`	Adapter results or a list.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

compare_fixation_methods

Compare explicit fixation-detection methods

Description

Compare explicit fixation-detection methods

Usage

```
compare_fixation_methods(
  data,
  methods,
  analysis_fun,
  extract_fun = .ep09_default_sensitivity_extract
)
```

Arguments

data	Data.
methods	Named methods/specifications.
analysis_fun	Function ‘(data, method, specification)‘.
extract_fun	Result extractor.

Value

An object of class "eye_process_sensitivity", stored as a named list, with components "grid", "results", "failures", "warnings", "grid_hash", "created_at", "status", "caveat". It contains explicit fixation-detection methods and associated metadata or diagnostics needed to interpret the result.

compare_functional_scalar_models

Compare functional and scalar pupil summaries

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
compare_functional_scalar_models(x, scalar_features = c("pupil_peak", "pupil_auc",
  "pupil_mean"), criterion = c("AIC", "log_loss"), folds = 5L, seed = 1L)
```

Arguments

`x`	Functional pupil fit or prepared data.
`scalar_features`	Scalar feature names.
`criterion`	AIC or cross-validated log loss.
`folds`	Grouped folds for cross-validation.
`seed`	Random seed.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`compare_hard_probabilistic_aoi` *Compare hard and probabilistic AOI assignments*

Description

Compare hard and probabilistic AOI assignments

Usage

```
compare_hard_probabilistic_aoi(
  data,
  aois,
  probabilistic,
  x = "gaze_x",
  y = "gaze_y"
)
```

Arguments

`data`	Gaze samples.
`aois`	Rectangular AOIs.
`probabilistic`	Probabilistic assignment object.
`x, y`	Gaze-coordinate columns.

Value

An R object containing hard and probabilistic AOI assignments. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

compare_irt_models *Compare multimodal IRT model objects*

Description

Uses supplied scoring functions when models expose different engines. The default extracts AIC/BIC/logLik when available and never treats in-sample fit as sufficient evidence for model promotion.

Usage

```
compare_irt_models(..., names = NULL)
```

Arguments

`...`	Additional arguments passed to the selected model, engine, or method.
`names`	Value supplied to ‘names‘; see Details for its model-specific role.

Value

An R object containing multimodal IRT model objects. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

compare_latent_distribution_models *Compare simple latent-distribution reference models*

Description

Compares Gaussian, location/scale Student-t, and two-normal-mixture reference densities by AIC/BIC. This is a stress-test diagnostic; it does not change the latent distribution inside an already fitted IRT model.

Usage

```
compare_latent_distribution_models(theta)
```

Arguments

`theta`	Numeric latent-trait draws/estimates.

Value

An object of class "eye_latent_distribution_comparison", stored as a named list, with components "comparison", "audit", "student_t", "mixture", "status". It contains simple latent-distribution reference models and associated metadata or diagnostics needed to interpret the result.

compare_model_engines *Compare equivalent model engines*

Description

Compare equivalent model engines

Usage

```
compare_model_engines(
  data,
  engines,
  extractors,
  reference = names(engines)[1L],
  tolerance = 0.05
)
```

Arguments

data	Model-ready data.
engines	Named list of fitting functions receiving ‘data‘.
extractors	Named list of extractor functions or one shared extractor.
reference	Optional reference engine name.
tolerance	Maximum absolute estimate difference for equivalence.

Value

An ‘eye_engine_comparison‘ object.

compare_parametric_nonparametric_irf *Compare conventional logistic and flexible IRF shapes*

Description

Compare conventional logistic and flexible IRF shapes

Usage

```
compare_parametric_nonparametric_irf(
  response_matrix,
  gpirt_object = NULL,
  theta_grid = seq(-4, 4, length.out = 101)
)
```

Arguments

`response_matrix`	Person-by-item response matrix.
`gpirt_object`	Value supplied to ‘gpirt_object‘; see Details for its model-specific role.
`theta_grid`	Grid of latent-trait values used for evaluation.

Value

An object of class "eye_irf_comparison", "data.frame", stored as a data frame, containing conventional logistic and flexible IRF shapes and associated metadata needed to interpret the result.

`compare_presentation_fairness` *Compare outcomes across presentation variants*

Description

Compare outcomes across presentation variants

Usage

```
compare_presentation_fairness(data, variant, outcome, person = NULL)
```

Arguments

`data`	Data containing presentation version and an outcome.
`variant`	Presentation-version column.
`outcome`	Numeric outcome.
`person`	Optional participant column for descriptive aggregation.

Value

An object of class "eye_presentation_fairness_comparison", stored as a named list, with components "model", "summary", "status", "caveat". It contains outcomes across presentation variants and associated metadata or diagnostics needed to interpret the result.

compare_process_criterion_models

Compare process external-validity models

Description

Compare process external-validity models

Usage

```
compare_process_criterion_models(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A data frame containing process external-validity models. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

compare_process_models

Compare explicit process-model specifications

Description

Compare explicit process-model specifications

Usage

```
compare_process_models(
  data,
  methods,
  analysis_fun,
  extract_fun = .ep09_default_sensitivity_extract
)
```

Arguments

data	Data.
methods	Named methods/specifications.
analysis_fun	Function ‘(data, method, specification)‘.
extract_fun	Result extractor.

Value

An object of class "eye_process_sensitivity", stored as a named list, with components "grid", "results", "failures", "warnings", "grid_hash", "created_at", "status", "caveat". It contains explicit process-model specifications and associated metadata or diagnostics needed to interpret the result.

---

compare_process_profile_solutions *Compare candidate process-profile solutions*

Description

Compare candidate process-profile solutions

Usage

```
compare_process_profile_solutions(data, variables, k_values = 2:6, seed = 777)
```

Arguments

data	Person-level process data.
variables	Variables used for profiling.
k_values	Candidate numbers of profiles.
seed	Seed.

Value

A tabular R object containing candidate process-profile solutions; rows represent analysis units and columns contain the returned quantities.

---

compare_pupil_kernels *Compare pupil deconvolution kernels*

Description

Compare pupil deconvolution kernels

Usage

```
compare_pupil_kernels(data, tmax_values = c(512, 930), ...)
```

Arguments

data	Same input used for fitting.
tmax_values	Candidate peak times.
...	Passed to ‘fit_pupil_event_deconvolution()‘.

Value

A tabular R object containing pupil deconvolution kernels; rows represent analysis units and columns contain the returned quantities.

---

compare_pupil_preprocessing

Compare explicit pupil-preprocessing methods

Description

Compare explicit pupil-preprocessing methods

Usage

```
compare_pupil_preprocessing(
  data,
  methods,
  analysis_fun,
  extract_fun = .ep09_default_sensitivity_extract
)
```

Arguments

`data`	Data.
`methods`	Named methods/specifications.
`analysis_fun`	Function ‘(data, method, specification)‘.
`extract_fun`	Result extractor.

Value

An object of class "eye_process_sensitivity", stored as a named list, with components "grid", "results", "failures", "warnings", "grid_hash", "created_at", "status", "caveat". It contains explicit pupil-preprocessing methods and associated metadata or diagnostics needed to interpret the result.

---

compare_raw_adjusted_pupil

Compare raw and confound-adjusted pupil values

Description

Compare raw and confound-adjusted pupil values

Usage

```
compare_raw_adjusted_pupil(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A data frame containing raw and confound-adjusted pupil values. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

compare_reproducibility_fingerprints

Compare two reproducibility fingerprints

Description

Compare two reproducibility fingerprints

Usage

```
compare_reproducibility_fingerprints(old, new)
```

Arguments

old, new	Fingerprints.

Value

A named list with components "detail", "identical", "old_hash", "new_hash", containing two reproducibility fingerprints and associated metadata or diagnostics.

---

compare_signal_filters

Compare multiple signal filters

Description

Compare multiple signal filters

Usage

```
compare_signal_filters(
  signal,
  widths = c(5L, 9L, 15L),
  methods = c("runmed", "robfilter")
)
```

Arguments

`signal`	Numeric signal.
`widths`	Widths to compare.
`methods`	Methods to compare.

Value

A tabular R object containing multiple signal filters; rows represent analysis units and columns contain the returned quantities.

`compare_strategy_heterogeneity` *Compare mixture and continuous heterogeneity descriptions*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
compare_strategy_heterogeneity(object)
```

Arguments

`object`	Strategy fit.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`compare_validation_engines` *Compare validation engines on common recovery output*

Description

Compare validation engines on common recovery output

Usage

```
compare_validation_engines(results)
```

Arguments

`results`	Validation or model results.

Value

An object of class "eye_validation_engine_comparison", "data.frame", stored as a data frame, containing validation engines on common recovery output and associated metadata needed to interpret the result.

---

compare_vendor_semantics

Compare semantic mappings between vendors

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
compare_vendor_semantics(x, vendors = NULL)
```

Arguments

x	Corpus path or semantics data frame.
vendors	Optional vendor subset.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

compare_visual_context_irt

Compare base and visual-context IRT models

Description

Compare base and visual-context IRT models

Usage

```
compare_visual_context_irt(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A data frame containing base and visual-context IRT models. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

compatibility_evidence_matrix

Build a detailed compatibility evidence matrix

Description

Build a detailed compatibility evidence matrix

Usage

```
compatibility_evidence_matrix(compatibility, evidence = NULL)
```

Arguments

compatibility	Existing output from ‘build_compatibility_matrix()‘ or a compatible data frame.
evidence	Case-level evidence with columns ‘ecosystem‘, ‘device‘, ‘evidence_level‘, and optionally ‘semantic_roundtrip_pass‘.

Value

An ‘eye_compatibility_evidence_matrix‘ object.

context_factor_effects

Extract visual-context factor effects/loadings

Description

Extract visual-context factor effects/loadings

Usage

```
context_factor_effects(x, IRTpars = FALSE)
```

Arguments

x	Object to process, inspect, compare, or plot.
IRTpars	Passed to the underlying IRT coefficient extractor to request IRT parameterization when supported.

Value

An R object containing visual-context factor effects/loadings. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

coordinate_fidelity_audit

Coordinate semantic-fidelity audit

Description

Detects lossless preservation and stable affine coordinate transformations.

Usage

```
coordinate_fidelity_audit(
  source,
  roundtrip,
  source_x = "x",
  source_y = "y",
  roundtrip_x = source_x,
  roundtrip_y = source_y,
  key = NULL,
  tolerance = 1e-06,
  correlation_floor = 0.999
)
```

Arguments

`source`	Original/source representation.
`roundtrip`	Round-tripped or comparison representation.
`source_x`	Source horizontal coordinate column.
`source_y`	Source vertical coordinate column.
`roundtrip_x`	Round-tripped horizontal coordinate column.
`roundtrip_y`	Round-tripped vertical coordinate column.
`key`	Column or columns used to align records.
`tolerance`	Numerical tolerance used by the comparison.
`correlation_floor`	Minimum correlation treated as compatible.

Value

An object of class "eye_coordinate_fidelity", stored as a named list, with components "status", "x", "y", "matched_n", "tolerance", "correlation_floor". It contains coordinate semantic-fidelity audit and associated metadata or diagnostics needed to interpret the result.

coverage_calibration_curve

Interval coverage calibration curve

Description

Interval coverage calibration curve

Usage

```
coverage_calibration_curve(truth, lower, upper, nominal = NULL)
```

Arguments

truth	True values.
lower	Matrix/data.frame of lower limits or numeric vector.
upper	Matrix/data.frame of upper limits or numeric vector.
nominal	Nominal coverage labels, one per interval column.

Value

A data frame containing interval coverage calibration curve. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

create_public_benchmark

Create a public, de-identified benchmark bundle

Description

Create a public, de-identified benchmark bundle

Usage

```
create_public_benchmark(
  x,
  path,
  max_participants = 50L,
  include_samples = FALSE,
  overwrite = FALSE
)
```

Arguments

`x`	An ‘eye_dataset‘.
`path`	Output directory.
`max_participants`	Optional participant cap.
`include_samples`	Whether to include sample-level tables.
`overwrite`	Whether to replace the output directory.

Value

Output directory.

`cross_device_process_equating_audit` *Cross-device process-scale equating audit*

Description

Fits a simple affine linking map on anchor observations and reports residual bias/RMSE by device. It complements, rather than replaces, IRT anchor linking.

Usage

```
cross_device_process_equating_audit(
  data,
  value,
  reference_value,
  device,
  anchor = NULL
)
```

Arguments

`data`	Input data frame or compatible tabular object.
`value`	Process-value column or values.
`reference_value`	Value supplied to ‘reference_value‘; see Details for its model-specific role.
`device`	Device identifier or device facet.
`anchor`	Anchor or reference group used for linking.

Value

An object of class "eye_cross_device_equating_audit", "data.frame", stored as a data frame, containing cross-device process-scale equating audit and associated metadata needed to interpret the result.

cross_version_adapter_regression

Compare adapter output across software/format versions

Description

Compare adapter output across software/format versions

Usage

```
cross_version_adapter_regression(
  input,
  baseline_adapter,
  candidate_adapter,
  baseline_version = "baseline",
  candidate_version = "candidate",
  extract_samples = .ep07_adapter_extract_samples,
  audit_args = list()
)
```

Arguments

`input` Shared raw fixture/input.

`baseline_adapter`, `candidate_adapter` Functions that parse ‘input‘.

`baseline_version`, `candidate_version` Version labels.

`extract_samples` Function extracting comparable sample tables.

`audit_args` Arguments passed to ‘field_fidelity_report()‘.

Value

An object of class "eye_adapter_regression_audit", stored as a named list, with components "status", "baseline_version", "candidate_version", "fidelity", "baseline", "candidate". It contains adapter output across software/format versions and associated metadata or diagnostics needed to interpret the result.

crossed_grouped_cv *Cross-classified grouped cross-validation*

Description

Cross-classified grouped cross-validation

Usage

```
crossed_grouped_cv(
  data,
  formula,
  family = stats::binomial(),
  groups = c("participant_id", "item_id"),
  v = 5L,
  metric = c("log_loss", "brier", "accuracy"),
  seed = 1L
)
```

Arguments

data	Data frame.
formula	Model formula.
family	GLM family.
groups	Crossed grouping columns.
v	Number of folds.
metric	Metric: log loss, Brier score, or accuracy.
seed	Random seed.

Value

An ‘eye_crossed_grouped_cv‘ object.

crossed_grouped_folds *Create cross-classified grouped folds*

Description

Holds out levels from every declared grouping dimension simultaneously. The assessment set is the intersection of held-out levels; the analysis set excludes every held-out level. Rows combining held-out and retained levels form a buffer and are deliberately used in neither set.

Usage

```
crossed_grouped_folds(
  data,
  groups = c("participant_id", "item_id"),
  v = 5L,
  seed = 1L
)
```

Arguments

data	Data frame.
groups	Two or more crossed grouping columns.
v	Number of folds.
seed	Random seed.

Value

An ‘eye_crossed_grouped_folds‘ object.

---

data_quality_reporting_table *Compact reporting table for eye-tracking data quality*

Description

Compact reporting table for eye-tracking data quality

Usage

```
data_quality_reporting_table(x)
```

Arguments

x	Data-quality profile.

Value

An R object containing compact reporting table for eye-tracking data quality. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

decision_manifest_diff

Alias for manifest comparison emphasizing changed decision paths

Description

Alias for manifest comparison emphasizing changed decision paths

Usage

```
decision_manifest_diff(old, new)
```

Arguments

old	Earlier manifest.
new	Later manifest.

Value

An R object containing alias for manifest comparison emphasizing changed decision paths. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

decision_manifest_hash

Stable hash of decision content

Description

Stable hash of decision content

Usage

```
decision_manifest_hash(x)
```

Arguments

x	Manifest or decision object.

Value

An R object containing stable hash of decision content. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

decision_manifest_table

Flatten a decision manifest to a table

Description

Flatten a decision manifest to a table

Usage

```
decision_manifest_table(x)
```

Arguments

x	Manifest.

Value

A logical value or vector indicating flatten a decision manifest to a table.

decision_space_coverage

Coverage of a declared decision space by evaluated specifications

Description

Coverage of a declared decision space by evaluated specifications

Usage

```
decision_space_coverage(grid, evaluated)
```

Arguments

grid	Sensitivity grid.
evaluated	Sensitivity result or vector of evaluated specification IDs.

Value

A data frame containing coverage of a declared decision space by evaluated specifications. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

decision_stability *Overall decision-stability summary*

Description

Overall decision-stability summary

Usage

```
decision_stability(
  x,
  effect = "effect",
  p_value = NULL,
  alpha = 0.05,
  threshold = 0
)
```

Arguments

x	Sensitivity result.
effect	Effect column.
p_value	Optional p-value column.
alpha	Significance threshold.
threshold	Substantive threshold.

Value

An object of class "eye_decision_stability", stored as a named list, with components "summary", "stable_sign", "stable_threshold", "stable_significance", "thresholds", "caveat". It contains overall decision-stability summary and associated metadata or diagnostics needed to interpret the result.

decode_dynamic_states *Decode latent or fitted transition states*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
decode_dynamic_states(object, method = c("mode", "probability", "draw"))
```

Arguments

`object`	Dynamic IRTree fit.
`method`	Marginal probabilities, posterior mode, or draw.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

derive_aoi_composition

Compositional analysis of AOI attention

Description

Compositional analysis of AOI attention. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
derive_aoi_composition(x, aois, denominator = c("total_aoi_dwell",
 "trial_duration"), zero_method = c("multiplicative", "bayesian"), id_cols = NULL,
  aoi_col = "aoi", value_col = "dwell_ms", trial_duration_col = NULL)
transform_aoi_composition(x, method = c("ilr", "clr", "alr"), reference = NULL)
fit_aoi_compositional_model(composition, formula, random = NULL, data = NULL,
  method = "ilr")
compare_aoi_compositions(x, group, method = c("permanova", "compositional_manova"),
  permutations = 499, seed = 20260807)
aoi_balance_coordinates(x, balances)
plot_aoi_ternary(x, ...)
plot_aoi_balance_biplot(x, ...)
plot_aoi_variation_matrix(x, ...)
plot_compositional_group_difference(x, ...)
plot_aoi_composition_trajectory(x, ...)
```

Arguments

`x`	Input object or data structure appropriate for the selected analysis.
`aois`	Argument controlling ‘aois‘; see the function usage and returned audit metadata.
`denominator`	Argument controlling ‘denominator‘; see the function usage and returned audit metadata.
`zero_method`	Argument controlling ‘zero_method‘; see the function usage and returned audit metadata.
`id_cols`	Argument controlling ‘id_cols‘; see the function usage and returned audit metadata.

`aoi_col` Argument controlling ‘aoi_col‘; see the function usage and returned audit metadata.

`value_col` Argument controlling ‘value_col‘; see the function usage and returned audit metadata.

`trial_duration_col` Argument controlling ‘trial_duration_col‘; see the function usage and returned audit metadata.

`method` Argument controlling ‘method‘; see the function usage and returned audit metadata.

`reference` Argument controlling ‘reference‘; see the function usage and returned audit metadata.

`composition` Argument controlling ‘composition‘; see the function usage and returned audit metadata.

`formula` Argument controlling ‘formula‘; see the function usage and returned audit metadata.

`random` Argument controlling ‘random‘; see the function usage and returned audit metadata.

`data` Argument controlling ‘data‘; see the function usage and returned audit metadata.

`group` Argument controlling ‘group‘; see the function usage and returned audit metadata.

`permutations` Argument controlling ‘permutations‘; see the function usage and returned audit metadata.

`seed` Argument controlling ‘seed‘; see the function usage and returned audit metadata.

`balances` Argument controlling ‘balances‘; see the function usage and returned audit metadata.

`...` Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

derive_gazepoint_workflow_features

Derive the complete Gazepoint workflow feature set

Description

Derive the complete Gazepoint workflow feature set

Usage

```
derive_gazepoint_workflow_features(x, reset_workflow_features = TRUE)
```

Arguments

x	An ‘eye_dataset‘ with reconstructed media trials.
reset_workflow_features	Remove features previously generated by this workflow while preserving native Gazepoint Data Summary features.

Value

The updated ‘eye_dataset‘.

detect_calibration_drift

Calibration drift and offline recalibration

Description

Calibration drift and offline recalibration. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
detect_calibration_drift(x, references = NULL, window = "30 sec",
  method = c("targets", "known_aois", "fixation_density"), x_col = NULL,
  y_col = NULL, time_col = NULL)
fit_offline_recalibration(x, method = c("translation", "affine", "polynomial"),
  robust = TRUE, x_col = NULL, y_col = NULL, reference_x_col = NULL,
  reference_y_col = NULL)
apply_offline_recalibration(x, model, x_col = NULL, y_col = NULL,
  suffix = "_recalibrated")
audit_recalibration(before, after, minimum_improvement = NULL)
plot_calibration_vector_field(x, ...)
```

```
plot_calibration_error_ellipses(x, ...)
plot_drift_over_time(x, ...)
plot_recalibration_before_after(x, ...)
plot_screen_coverage(x, ...)
```

Arguments

`x`	Input object or data structure appropriate for the selected analysis.
`references`	Argument controlling ‘references‘; see the function usage and returned audit metadata.
`window`	Argument controlling ‘window‘; see the function usage and returned audit metadata.
`method`	Argument controlling ‘method‘; see the function usage and returned audit metadata.
`x_col`	Argument controlling ‘x_col‘; see the function usage and returned audit metadata.
`y_col`	Argument controlling ‘y_col‘; see the function usage and returned audit metadata.
`time_col`	Argument controlling ‘time_col‘; see the function usage and returned audit metadata.
`robust`	Argument controlling ‘robust‘; see the function usage and returned audit metadata.
`reference_x_col`	Argument controlling ‘reference_x_col‘; see the function usage and returned audit metadata.
`reference_y_col`	Argument controlling ‘reference_y_col‘; see the function usage and returned audit metadata.
`model`	Argument controlling ‘model‘; see the function usage and returned audit metadata.
`suffix`	Argument controlling ‘suffix‘; see the function usage and returned audit metadata.
`before`	Argument controlling ‘before‘; see the function usage and returned audit metadata.
`after`	Argument controlling ‘after‘; see the function usage and returned audit metadata.
`minimum_improvement`	Argument controlling ‘minimum_improvement‘; see the function usage and returned audit metadata.
`...`	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

`detect_corrupt_partitions` *Detect missing, truncated, or modified partitions*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
detect_corrupt_partitions(storage)
```

Arguments

`storage`	Storage object or path.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`detect_irt_changepoints` *Detect IRT/process change points using an SIC-inspired multichannel score*

Description

This implementation is a transparent package reference inspired by the 2026 SIC-CPA literature. It combines Bernoulli response likelihood with normal log-RT and standardized gaze likelihoods. It is not a line-for-line reproduction of the article's estimator.

Usage

```
detect_irt_changepoints(
  data,
  person = "participant_id",
  order = "item_order",
  response = "response",
  rt = "rt",
  gaze = NULL,
  min_segment = 5L,
  min_delta_sic = 2,
  max_changes = 2L
)
```

Arguments

data	Input data frame or compatible tabular object.
person	Person or participant identifier column.
order	Within-sequence ordering variable.
response	Response variable or response-column name.
rt	Response-time variable or column name.
gaze	Gaze/process variable or column name.
min_segment	Minimum segment length.
min_delta_sic	Minimum information-criterion improvement.
max_changes	Maximum number of change points.

Value

An object of class "eye_irt_changepoints", stored as a named list, with components "results", "channels", "method", "min_segment", "min_delta_sic", "max_changes". It contains iRT/process change points using an SIC-inspired multichannel score and associated metadata or diagnostics needed to interpret the result.

---

detect_process_changepoint

Detect a response-process change point

Description

Public roadmap alias for ‘detect_irt_changepoints()‘.

Usage

```
detect_process_changepoint(...)
```

Arguments

...	Additional arguments passed to the selected model, engine, or method.

Value

An R object containing a response-process change point. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

detect_process_changepoints

Cognitive-episode change-point detection

Description

Cognitive-episode change-point detection. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
detect_process_changepoints(x, channels = c("gaze_velocity", "aoi", "pupil", "eda"),
  time_col = NULL, window = 10, threshold_quantile = 0.9, min_segment = 5)
segment_process_episodes(x, ...)
label_process_episodes(x, rules = NULL, model = NULL)
compare_episode_structure(x, group)
plot_process_episodes(x, ...)
plot_changepoint_ribbons(x, ...)
plot_episode_waterfall(x, ...)
plot_episode_transition_graph(x, ...)
plot_episode_duration_distribution(x, ...)
```

Arguments

x	Input object or data structure appropriate for the selected analysis.
channels	Argument controlling ‘channels‘; see the function usage and returned audit metadata.
time_col	Argument controlling ‘time_col‘; see the function usage and returned audit metadata.
window	Argument controlling ‘window‘; see the function usage and returned audit metadata.
threshold_quantile	Argument controlling ‘threshold_quantile‘; see the function usage and returned audit metadata.
min_segment	Argument controlling ‘min_segment‘; see the function usage and returned audit metadata.

`...`	Additional arguments passed to the underlying method or plotting function.
`rules`	Argument controlling ‘rules‘; see the function usage and returned audit metadata.
`model`	Argument controlling ‘model‘; see the function usage and returned audit metadata.
`group`	Argument controlling ‘group‘; see the function usage and returned audit metadata.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

`device_facet_effects` *Extract device facet effects*

Description

Extract device facet effects

Usage

```
device_facet_effects(object, channel = c("response", "process"))
```

Arguments

`object`	A fitted eyeprocess model or audit object.
`channel`	Measurement channel to inspect.

Value

An object of class "eye_process_facet_effects", stored as a named list, with components "facet", "column", "channel", "random_effects", "variance_component". It contains device facet effects and associated metadata or diagnostics needed to interpret the result.

diffusion_identification_study

Construct a simulation-based identification study

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
diffusion_identification_study(conditions = list(n_person = c(50L, 150L),
 n_item = c(10L, 30L), gaze_effect = c(0, 0.35), contaminant_fraction = c(0, 0.05)),
  replications = 20L, base_seed = 20260805L,
  spec = gaze_diffusion_spec(drift_features = "gaze_balance", engine = "stan"))
```

Arguments

conditions	Named list or data frame of design conditions.
replications	Replications per condition.
base_seed	Base seed.
spec	Confirmatory diffusion specification used for each fit.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

diffusion_parameter_diagnostics

Diagnose diffusion-parameter trade-offs and sampling

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
diffusion_parameter_diagnostics(object, correlation_threshold = 0.85)
```

Arguments

object	Diffusion fit.
correlation_threshold	Correlation threshold.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

diffusion_posterior_predictive

Posterior predictive summaries for accuracy and RT

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
diffusion_posterior_predictive(object, draws = 200L, method = c("rtdists",
  "stan_proxy"), seed = 1L)
```

Arguments

`object`	Diffusion fit.
`draws`	Number of generated-quantity draws to retain.
`method`	Value for ‘method‘. See the function description and relevant article for constraints.
`seed`	Value for ‘seed‘. See the function description and relevant article for constraints.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

distractor_process_map

Build a distractor process map

Description

Build a distractor process map

Usage

```
distractor_process_map(object)
```

Arguments

`object`	A fitted eyeprocess model or audit object.

Value

A data frame containing a distractor process map. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

drift_by_device *Drift audit stratified by device*

Description

Drift audit stratified by device

Usage

```
drift_by_device(data, device = "device_id", ...)
```

Arguments

data	Data frame containing the required process variables.
device	Name of the column identifying device.
...	Additional arguments passed to the underlying method or helper.

Value

An R object containing drift audit stratified by device. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

drift_by_site *Drift audit stratified by study site*

Description

Drift audit stratified by study site

Usage

```
drift_by_site(data, site = "site_id", ...)
```

Arguments

data	Data frame containing the required process variables.
site	Name of the column identifying site.
...	Additional arguments passed to the underlying method or helper.

Value

An R object containing drift audit stratified by study site. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

drift_by_stimulus_version *Drift audit stratified by stimulus version*

Description

Drift audit stratified by stimulus version

Usage

```
drift_by_stimulus_version(data, stimulus_version = "stimulus_version", ...)
```

Arguments

`data`	Data frame containing the required process variables.
`stimulus_version`	Name of the column identifying stimulus version.
`...`	Additional arguments passed to the underlying method or helper.

Value

An R object containing drift audit stratified by stimulus version. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

drift_by_vendor *Drift audit stratified by vendor*

Description

Drift audit stratified by vendor

Usage

```
drift_by_vendor(data, vendor = "vendor", ...)
```

Arguments

`data`	Data frame containing the required process variables.
`vendor`	Name of the column identifying vendor.
`...`	Additional arguments passed to the underlying method or helper.

Value

An R object containing drift audit stratified by vendor. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

dynamic_irtree_recovery *Evaluate dynamic-state recovery under misclassification*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
dynamic_irtree_recovery(grid = expand.grid(state_misclassification = c(0, 0.05, 0.15),
  missing_state = c(0, 0.10), stringsAsFactors = FALSE), replications = 20L,
  spec = dynamic_irtree_spec(engine = "multinomial"), base_seed = 1L)
```

Arguments

grid	Scenario grid.
replications	Replications per scenario.
spec	Dynamic IRTree specification.
base_seed	Base seed.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

dynamic_irtree_spec *Specify a hardened dynamic gaze-state IRTree*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
dynamic_irtree_spec(source = c("samples", "visits", "fixations"),
  collapse_consecutive = TRUE, engine = c("baseline", "multinomial", "stan"),
  hidden_states = 0L, include_response = TRUE, include_person = FALSE,
  include_item = TRUE, condition_columns = character(),
  transition_predictors = character(), interactions = character(),
  include_time_gap = TRUE, person_effect = c("none", "fixed", "random"),
  item_effect = c("none", "fixed", "random"), structural_zeros = NULL,
  allowed_transitions = NULL, hidden_structural_zeros = NULL,
  hidden_allowed_transitions = NULL, missing_state = c("drop", "unknown",
```

```
"marginalize"), uncertain_state_probability = NULL, misclassification_matrix = NULL,
 ridge = 1e-4, standardize = TRUE, reference_state = NULL, chains = 4L,
 parallel_chains = chains, iter_warmup = 1000L, iter_sampling = 1000L,
 adapt_delta = 0.95, max_treedepth = 12L)
```

Arguments

`source` Sequence source for an ‘eye_dataset‘.

`collapse_consecutive` Collapse consecutive identical states.

`engine` Estimation engine: auditable binary baseline, penalized

`hidden_states` Number of latent states. Zero fits observed-state

`include_response` Include item response as a predictor.

`include_person` Include person effects.

`include_item` Include item effects.

`condition_columns` Condition-level predictors.

`transition_predictors` Additional transition-level predictors.

`interactions` Optional interaction terms supplied as formula strings.

`include_time_gap` Include log time gap for irregular observations.

`person_effect` Person effect type for Stan.

`item_effect` Item effect type for Stan.

`structural_zeros` Optional forbidden observed-state transition pairs.

`allowed_transitions` Optional allowed observed-state transition pairs.

`hidden_structural_zeros` Optional forbidden hidden-state pairs named ‘state1‘, ‘state2‘, and so forth.

`hidden_allowed_transitions` Optional explicitly allowed hidden-state pairs.

`missing_state` Treatment of missing observed states.

`uncertain_state_probability` Optional column containing probability of

`misclassification_matrix` Optional observed-state misclassification matrix.

`ridge` Penalization for the multinomial baseline.

`standardize` Standardize numeric design columns.

`reference_state` Optional reference destination state.

`chains` CmdStan controls.

`parallel_chains`
: CmdStan controls.

`iter_warmup`
: CmdStan controls.

`iter_sampling`
: CmdStan controls.

`adapt_delta`
: CmdStan sampler controls.

`max_treedepth`
: CmdStan sampler controls.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`dynamic_posterior_predictive_check`
Posterior predictive checks for dynamic state models

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
dynamic_posterior_predictive_check(object, draws = 200L, seed = 1L)
```

Arguments

`object`
: Dynamic IRTree fit using the Stan engine.

`draws`
: Maximum posterior predictive draws to summarize.

`seed`
: Seed used when subsampling posterior draws.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

dynamic_transition_design

Build an explicit dynamic-transition design matrix

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
dynamic_transition_design(data, spec = dynamic_irtree_spec(), formula = NULL)
```

Arguments

data	Prepared transition data.
spec	Dynamic IRTree specification.
formula	Optional explicit right-hand-side formula.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

effective_sampling_frequency

Estimate effective sampling frequency from timestamps

Description

Estimate effective sampling frequency from timestamps

Usage

```
effective_sampling_frequency(
  data,
  time = "timestamp_ms",
  unit = c("ms", "s", "us"),
  by = NULL
)
```

Arguments

data	Sample data.
time	Timestamp column.
unit	Timestamp unit.
by	Optional grouping columns.

Value

A logical value or vector indicating effective sampling frequency from timestamps.

---

encode_response_combinations *Encode multiple-response item response combinations*

Description

Encode multiple-response item response combinations

Usage

```
encode_response_combinations(
  data,
  person = "participant_id",
  item = "item_id",
  option = "option_id",
  selected = "selected",
  sort_options = TRUE,
  empty_code = "<none>"
)
```

Arguments

`data`	Long person-item-option table.
`person`, `item`, `option`, `selected`	Column names.
`sort_options`	Sort selected option labels before combining.
`empty_code`	Code for no selected options.

Value

A tabular R object containing encode multiple-response item response combinations; rows represent analysis units and columns contain the returned quantities.

engine_adapter_status *Report an adapter's availability and contract*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
engine_adapter_status(engine)
```

Arguments

engine	Engine name.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

equate_irt_scales *Equate IRT scales using anchor item parameters*

Description

Implements mean-sigma, mean-mean, Stocking-Lord, and Haebara linking for dichotomous 2PL-style item parameters. New-form parameters are transformed onto the reference scale using theta_ref = A * theta_new + B.

Usage

```
equate_irt_scales(
  reference,
  new,
  method = c("stocking-lord", "haebara", "mean-sigma", "mean-mean"),
  theta_grid = seq(-4, 4, length.out = 81)
)
```

Arguments

reference	Reference-scale parameters or data.
new	New-scale parameters or data.
method	Method used for estimation, linking, or comparison.
theta_grid	Grid of latent-trait values used for evaluation.

Value

An object of class "eye_irt_equating", stored as a named list, with components "A", "B", "method", "transformed", "reference", "new", "equation". It contains equate IRT scales using anchor item parameters and associated metadata or diagnostics needed to interpret the result.

---

estimate_calibration_error

Estimate empirical calibration/validation error

Description

Estimate empirical calibration/validation error

Usage

```
estimate_calibration_error(
  data,
  gaze_x = "gaze_x",
  gaze_y = "gaze_y",
  target_x = "target_x",
  target_y = "target_y",
  by = NULL
)
```

Arguments

`data`	Validation-target data.
`gaze_x`, `gaze_y`	Recorded gaze-coordinate columns.
`target_x`, `target_y`	Known target-coordinate columns.
`by`	Optional grouping columns such as participant/session.

Value

A tabular R object containing empirical calibration/validation error; rows represent analysis units and columns contain the returned quantities.

estimate_visual_exposure_probability

Estimate visual exposure probability

Description

Estimate visual exposure probability

Usage

```
estimate_visual_exposure_probability(
  data,
  exposed = "reached",
  predictors,
  family = stats::binomial()
)
```

Arguments

data	Input data frame or compatible tabular object.
exposed	Value supplied to ‘exposed‘; see Details for its model-specific role.
predictors	Predictor variables used by the model.
family	Statistical family used by the channel or model.

Value

An object of class "eye_visual_exposure_model", stored as a named list, with components "model", "fitted_probability", "exposed", "predictors". It contains visual exposure probability and associated metadata or diagnostics needed to interpret the result.

evaluate_validation_acceptance

Evaluate a validation acceptance rule

Description

Evaluate a validation acceptance rule

Usage

```
evaluate_validation_acceptance(value, rule)
```

Arguments

value	Observed metric value to evaluate.
rule	Validation acceptance rule to apply.

Value

A logical value or vector indicating a validation acceptance rule.

---

event_marker_qc *Event-marker plausibility audit*

Description

Evaluates whether independent channel offsets corroborate a nominal event. This is annotation/event plausibility QC, not clock synchronization, and it never modifies timestamps.

Usage

```
event_marker_qc(offsets, tolerance, min_corroborating = 2L)
```

Arguments

`offsets`	Numeric corroborating-channel offsets in seconds.
`tolerance`	Allowed absolute offset in seconds.
`min_corroborating`	Minimum corroborating channels for ‘confirmed‘.

Value

A list containing status, consensus offset, uncertainty, and counts.

---

event_roundtrip_audit *Audit event survival across an interchange round trip*

Description

Audit event survival across an interchange round trip

Usage

```
event_roundtrip_audit(source_events, roundtrip_events, hed_column = NULL, ...)
```

Arguments

`source_events`, `roundtrip_events`	Event tables.
`hed_column`	Optional HED annotation column to compare structurally.
`...`	Arguments forwarded to ‘event_semantics_audit()‘.

Value

An object of class "eye_event_roundtrip_audit", stored as a named list, with components "status", "event_semantics", "hed". It contains event survival across an interchange round trip and associated metadata or diagnostics needed to interpret the result.

---

event_semantics_audit *Audit event semantic preservation*

Description

Audit event semantic preservation

Usage

```
event_semantics_audit(
  source_events,
  roundtrip_events,
  label = "event",
  time = "timestamp",
  key = NULL,
  tolerance = 1e-06
)
```

Arguments

`source_events`, `roundtrip_events`	Event tables.
`label`	Event-label field.
`time`	Event-time field; set ‘NULL‘ to compare labels only.
`key`	Optional event identity key.
`tolerance`	Timestamp tolerance.

Value

An object of class "eye_event_semantics", stored as a named list, with components "status", "source_n", "roundtrip_n", "matched_n", "exact_label_fraction", "max_time_error". It contains event semantic preservation and associated metadata or diagnostics needed to interpret the result.

expand_eyeprocess_stress_evidence_plan

Expand a stress evidence plan into one-factor-at-a-time scenarios

Description

Expand a stress evidence plan into one-factor-at-a-time scenarios

Usage

```
expand_eyeprocess_stress_evidence_plan(plan)
```

Arguments

plan	Validation or stress-evidence plan object.

Value

A tabular R object containing expand a stress evidence plan into one-factor-at-a-time scenarios; rows represent analysis units and columns contain the returned quantities.

expand_eyeprocess_validation_plan

Expand a validation-evidence plan to a scenario table

Description

Expand a validation-evidence plan to a scenario table

Usage

```
expand_eyeprocess_validation_plan(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

An R object containing expand a validation-evidence plan to a scenario table. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

expand_process_validation_design

Expand a process-validation design into explicit conditions

Description

Expand a process-validation design into explicit conditions

Usage

```
expand_process_validation_design(x, max_conditions = 250000L)
```

Arguments

x	Validation design.
max_conditions	Optional hard cap for accidental combinatorial explosion.

Value

A tabular R object containing expand a process-validation design into explicit conditions; rows represent analysis units and columns contain the returned quantities.

expected_process_information

Expected process-aware item utility under a theta distribution

Description

Expected process-aware item utility under a theta distribution

Usage

```
expected_process_information(info, theta_weights = NULL)
```

Arguments

info	Value supplied to ‘info‘; see Details for its model-specific role.
theta_weights	Weights over the theta distribution.

Value

An R object containing expected process-aware item utility under a theta distribution. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

explain_latent_interaction

Explain local person-item latent-space interactions

Description

Returns the closest person-item pairs in the fitted residual latent space. Closeness is descriptive residual structure, not a causal explanation.

Usage

```
explain_latent_interaction(object, person = NULL, item = NULL, top = 10L)
```

Arguments

object	Fitted ‘eye_latent_space_irt‘ object.
person	Optional person row/index/name to restrict.
item	Optional item row/index/name to restrict.
top	Number of closest pairs to return.

Value

An R object containing explain local person-item latent-space interactions. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

export_eye_bids

Export Eye-Tracking-BIDS physiological recordings

Description

Writes BIDS-compatible ‘_physio.tsv.gz‘ and JSON pairs with ‘PhysioType = "eyetrack"‘. Continuous files contain no header; ‘Columns‘ is stored in the sidecar. Each recorded eye is written separately.

Usage

```
export_eye_bids(
  x,
  path,
  task = "task",
  dataset_name = "eyeprocess eye-tracking dataset",
  overwrite = FALSE,
  screen_distance_m = NULL,
  screen_size_m = NULL
)
```

Arguments

`x`	An ‘eye_dataset‘.
`path`	BIDS dataset root.
`task`	Task label.
`dataset_name`	Dataset name for ‘dataset_description.json‘.
`overwrite`	Whether to replace existing files.
`screen_distance_m`	Optional screen distance in metres.
`screen_size_m`	Optional two-element screen size in metres.

Value

A manifest of written files.

`export_eye_pipeline` *Export a pipeline manifest and optional run status*

Description

Export a pipeline manifest and optional run status

Usage

```
export_eye_pipeline(x, path)
```

Arguments

`x`	Pipeline or run.
`path`	CSV path.

Value

An R object containing a pipeline manifest and optional run status. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

export_prov_json — *Export lightweight PROV-oriented JSON*

Description

This is a compact interoperability representation inspired by W3C PROV. It is not asserted to be a complete PROV-O serialization; consumers requiring full conformance should validate/transform it externally.

Usage

```
export_prov_json(x, path)
```

Arguments

x	Provenance graph.
path	Output JSON path.

Value

An R object containing lightweight PROV-oriented JSON. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

export_ro_crate_metadata — *Export minimal RO-Crate 1.3 metadata*

Description

Export minimal RO-Crate 1.3 metadata

Usage

```
export_ro_crate_metadata(
  path = "ro-crate-metadata.json",
  name = "eyeprocess analysis",
  description = "Reproducible eyeprocess analysis crate",
  files = NULL,
  creator = NULL,
  license = NULL,
  doi = NULL
)
```

Arguments

`path`	Output ‘ro-crate-metadata.json‘ path.
`name`	Crate/dataset name.
`description`	Description.
`files`	Optional files to include as File entities.
`creator`	Optional creator name.
`license`	Optional license URL or identifier.
`doi`	Optional DOI for the software/data product.

Value

An R object containing minimal RO-Crate 1.3 metadata. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

`export_validation_bundle` *Export a validation evidence bundle*

Description

Export a validation evidence bundle

Usage

```
export_validation_bundle(x, directory, overwrite = FALSE, include_rds = TRUE)
```

Arguments

`x`	Validation bundle.
`directory`	Output directory.
`overwrite`	Allow writing into a non-empty target directory.
`include_rds`	Save full R objects as RDS.

Value

An object of class "eye_validation_export", stored as a named list, with components "directory", "files", "manifest". It contains a validation evidence bundle and associated metadata or diagnostics needed to interpret the result.

external_eye_adapters *Convert common external eye-tracking objects*

Description

Convert common external eye-tracking objects

Usage

```
as_eyeprocess_eyetools(x, mapping = NULL, ...)

as_eyeprocess_eyetrackingr(x, mapping = NULL, ...)

as_eyeprocess_gazer(x, mapping = NULL, ...)

as_eyeprocess_eyeris(x, mapping = NULL, ...)

as_eyeprocess_pupillometryr(x, mapping = NULL, ...)
```

Arguments

x	External object coercible to a data frame.
mapping	Optional ‘eye_mapping‘.
...	Passed to ‘read_eye_generic()‘.

Value

An ‘eye_dataset‘.

external_model_engines *List external engine adapters*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
external_model_engines()
```

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

external_validate_irt *External validation on a completely held-out dataset*

Description

External validation on a completely held-out dataset

Usage

```
external_validate_irt(
  train_data,
  external_data,
  fitter,
  predictor,
  scorer,
  label = "external"
)
```

Arguments

train_data	Value supplied to ‘train_data‘; see Details for its model-specific role.
external_data	Value supplied to ‘external_data‘; see Details for its model-specific role.
fitter	Model-fitting function.
predictor	Prediction function.
scorer	Function that scores predictions.
label	Value supplied to ‘label‘; see Details for its model-specific role.

Value

A logical value or vector indicating external validation on a completely held-out dataset.

extract_diffusion_parameters *Extract diffusion parameter summaries*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
extract_diffusion_parameters(object, variables = c("beta_drift", "beta_boundary",
  "beta_nondecision", "beta_starting", "person_drift", "item_difficulty", "boundary",
  "nondecision", "starting", "contaminant_probability"))
```

Arguments

`object`	Diffusion fit.
`variables`	Optional variable prefixes.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`extract_functional_pupil_parameters` *Extract functional pupil parameters for validation*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
extract_functional_pupil_parameters(x, pattern = NULL, confidence = 0.95)
```

Arguments

`x`	Functional pupil fit.
`pattern`	Optional parameter regex.
`confidence`	Credible/confidence interval level.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`extract_parameter_truth` *Extract canonical parameter truth from simulated data*

Description

Extract canonical parameter truth from simulated data

Usage

```
extract_parameter_truth(simulation)
```

Arguments

simulation	Simulation object containing ‘truth‘, ‘parameters‘, or a ‘truth‘ attribute.

Value

Data frame with ‘parameter‘ and ‘truth‘.

---

extract_process_windows

Extract standardized sliding-window process features

Description

Extract standardized sliding-window process features

Usage

```
extract_process_windows(
  data,
  person = "person_id",
  trial = "trial_id",
  time = "time_ms",
  spec = process_window_spec(),
  align_time = NULL,
  pupil = "pupil_bc",
  pupil_tonic = "pupil_tonic",
  pupil_phasic = "pupil_phasic",
  gaze_x = "x",
  gaze_y = "y",
  aoi = "aoi",
  valid_gaze = "valid_gaze_prop",
  valid_pupil = "valid_pupil_prop",
  blink = "blink",
  trackloss = "trackloss"
)
```

Arguments

data	Sample-level eye-tracking/pupil data.
person, trial, time	Identifier/time columns.
spec	Window specification.
align_time	Optional column containing the alignment event time in the same units as ‘time‘. Required for response/custom alignment unless ‘time‘ is already relative to the desired origin.
pupil	Optional pupil signal column.

`pupil_tonic`, `pupil_phasic`
: Optional decomposed pupil columns.

`gaze_x`, `gaze_y`
: Optional gaze coordinates.

`aoi`
: Optional AOI-state column.

`valid_gaze`, `valid_pupil`
: Optional validity columns/indicators.

`blink`, `trackloss`
: Optional blink/trackloss indicators.

Value

An ‘eye_process_windows‘ object.

`eye_analysis_pipeline` *Construct a governed analysis pipeline*

Description

Construct a governed analysis pipeline

Usage

```
eye_analysis_pipeline(
  ...,
  spec = eye_analysis_spec(),
  name = "eye_analysis",
  strict = TRUE
)
```

Arguments

`...`	‘eye_pipeline_step‘ objects.
`spec`	Optional ‘eye_analysis_spec‘.
`name`	Pipeline label.
`strict`	If ‘TRUE‘, undeclared dependencies are errors.

Value

An object of class "eye_analysis_pipeline", stored as a named list, with components "name", "steps", "spec", "strict", "created_at", "status". It contains a governed analysis pipeline and associated metadata or diagnostics needed to interpret the result.

`eye_analysis_spec` *Define explicit analysis decisions for an eyeprocess workflow*

Description

Define explicit analysis decisions for an eyeprocess workflow

Usage

```
eye_analysis_spec(
  blink_correction = NULL,
  pupil_baseline = NULL,
  fixation_algorithm = NULL,
  aoi_rule = NULL,
  exclusions = NULL,
  model = NULL,
  sensitivity = NULL,
  ...
)
```

Arguments

`blink_correction`	Named blink-correction rule or ‘NULL‘.
`pupil_baseline`	Numeric baseline window or ‘NULL‘.
`fixation_algorithm`	Named fixation algorithm or ‘NULL‘.
`aoi_rule`	Named AOI assignment rule or ‘NULL‘.
`exclusions`	Explicit exclusion specification or ‘NULL‘.
`model`	Explicit model specification or ‘NULL‘.
`sensitivity`	Sensitivity specification or ‘NULL‘.
`...`	Additional named decisions.

Value

An ‘eye_analysis_spec‘ object.

eye_api_inventory *Inventory the public eyeprocess API*

Description

Inventory the public eyeprocess API

Usage

```
eye_api_inventory(package = "eyeprocess", lifecycle = eye_api_lifecycle())
```

Arguments

package	Package name or namespace environment.
lifecycle	Lifecycle registry. Defaults to the packaged 0.9 registry from ‘eye_api_lifecycle()‘.

Value

Data frame of exported symbols and lifecycle metadata.

eye_api_lifecycle *Normalize or create an API lifecycle registry*

Description

Normalize or create an API lifecycle registry

Usage

```
eye_api_lifecycle(registry = NULL)
```

Arguments

registry	Optional data frame with at least ‘name‘ and ‘status‘. ‘NULL‘ loads the packaged 0.9 lifecycle registry.

Value

‘eye_api_lifecycle‘ data frame.

eye_api_recommendation

Lifecycle recommendation for API review

Description

Lifecycle recommendation for API review

Usage

```
eye_api_recommendation(audit)
```

Arguments

audit	‘eye_api_audit‘ object.

Value

A data frame containing lifecycle recommendation for API review. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eye_api_status

Lookup lifecycle status for one or more APIs

Description

Lookup lifecycle status for one or more APIs

Usage

```
eye_api_status(name, registry = eye_api_lifecycle())
```

Arguments

name	API names.
registry	Lifecycle registry.

Value

A data frame containing lookup lifecycle status for one or more APIs. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eye_api_superseded *Return superseded/deprecated compatibility interfaces*

Description

Return superseded/deprecated compatibility interfaces

Usage

```
eye_api_superseded(registry = eye_api_lifecycle())
```

Arguments

registry	Lifecycle registry.

Value

A tabular R object containing return superseded/deprecated compatibility interfaces; rows represent analysis units and columns contain the returned quantities.

eye_benchmark_design *Define a computational benchmark design*

Description

Define a computational benchmark design

Usage

```
eye_benchmark_design(
  n_obs = c(10000, 1e+05, 1e+06),
  repetitions = 3L,
  label = "eyeprocess_scaling"
)
```

Arguments

n_obs	Observation counts.
repetitions	Repetitions per size.
label	Benchmark label.

Value

A tabular R object containing define a computational benchmark design; rows represent analysis units and columns contain the returned quantities.

eye_decision_manifest *Create a machine-readable research decision manifest*

Description

Create a machine-readable research decision manifest

Usage

```
eye_decision_manifest(
  sampling = list(),
  validity = list(),
  fixation = list(),
  pupil = list(),
  aoi = list(),
  model = list(),
  sensitivity = list(),
  exclusions = list(),
  provenance = list(),
  notes = NULL,
  ...
)
```

Arguments

`sampling`	Sampling decisions.
`validity`	Validity/missingness decisions.
`fixation`	Fixation construction decisions.
`pupil`	Pupil preprocessing decisions.
`aoi`	AOI assignment decisions.
`model`	Statistical/psychometric model decisions.
`sensitivity`	Sensitivity-analysis decisions.
`exclusions`	Exclusion rules.
`provenance`	Optional provenance fields.
`notes`	Notes.
`...`	Additional named decision domains.

Value

An object of class "eye_decision_manifest", stored as a named list, with components "domains", "notes", "created_at", "schema_version", "status", "caveat". It contains a machine-readable research decision manifest and associated metadata or diagnostics needed to interpret the result.

eye_pipeline_dot *Render pipeline dependencies as Graphviz DOT*

Description

Render pipeline dependencies as Graphviz DOT

Usage

```
eye_pipeline_dot(x)
```

Arguments

x	Pipeline.

Value

A character value or vector containing render pipeline dependencies as Graphviz DOT.

eye_pipeline_graph *Return pipeline vertices and dependency edges*

Description

Return pipeline vertices and dependency edges

Usage

```
eye_pipeline_graph(x)
```

Arguments

x	Pipeline.

Value

A named list with components "vertices", "edges", containing return pipeline vertices and dependency edges and associated metadata or diagnostics.

eye_pipeline_manifest *Machine-readable pipeline manifest*

Description

Machine-readable pipeline manifest

Usage

```
eye_pipeline_manifest(x)
```

Arguments

x	Pipeline.

Value

A data frame containing machine-readable pipeline manifest. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eye_pipeline_mermaid *Render pipeline dependencies as Mermaid flowchart text*

Description

Render pipeline dependencies as Mermaid flowchart text

Usage

```
eye_pipeline_mermaid(x)
```

Arguments

x	Pipeline.

Value

A character value or vector containing render pipeline dependencies as Mermaid flowchart text.

eye_pipeline_step *Define a governed pipeline step*

Description

Define a governed pipeline step

Usage

```
eye_pipeline_step(
  name,
  fun,
  requires = character(),
  optional = FALSE,
  description = NULL,
  decision = NULL
)
```

Arguments

name	Unique step name.
fun	Function executed by the step.
requires	Names of upstream steps.
optional	Whether an error may be retained without stopping the pipeline.
description	Human-readable description.
decision	Optional decision label linking the step to an analysis specification.

Value

An ‘eye_pipeline_step‘ object.

eye_plot_spec *Measurement-intelligence plotting and result infrastructure*

Description

Measurement-intelligence plotting and result infrastructure. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
eye_plot_spec(type = "default", title = NULL, xlab = NULL, ylab = NULL,
  caption = NULL, show_uncertainty = TRUE, show_raw = TRUE, facet_by = NULL,
  label_items = FALSE, interactive = FALSE)
plot_diagnostics(x, ...)
plot_evidence(x, ...)
plot_sensitivity(x, ...)
autoplot_eyeprocess(object, ...)
```

Arguments

`type`	Argument controlling ‘type‘; see the function usage and returned audit metadata.
`title`	Argument controlling ‘title‘; see the function usage and returned audit metadata.
`xlab`	Argument controlling ‘xlab‘; see the function usage and returned audit metadata.
`ylab`	Argument controlling ‘ylab‘; see the function usage and returned audit metadata.
`caption`	Argument controlling ‘caption‘; see the function usage and returned audit metadata.
`show_uncertainty`	Argument controlling ‘show_uncertainty‘; see the function usage and returned audit metadata.
`show_raw`	Argument controlling ‘show_raw‘; see the function usage and returned audit metadata.
`facet_by`	Argument controlling ‘facet_by‘; see the function usage and returned audit metadata.
`label_items`	Argument controlling ‘label_items‘; see the function usage and returned audit metadata.
`interactive`	Argument controlling ‘interactive‘; see the function usage and returned audit metadata.
`x`	Input object or data structure appropriate for the selected analysis.
`...`	Additional arguments passed to the underlying method or plotting function.
`object`	Input object or data structure appropriate for the selected analysis.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

eye_prov_graph *Construct a lightweight provenance graph*

Description

Construct a lightweight provenance graph

Usage

```
eye_prov_graph(
  nodes,
  edges = data.frame(from = character(), to = character(), relation = character()),
  metadata = list()
)
```

Arguments

nodes	Node table.
edges	Edge table.
metadata	Optional metadata.

Value

A named list with components "nodes", "edges", "metadata", containing a lightweight provenance graph and associated metadata or diagnostics.

eye_reproducibility_fingerprint *Construct a reproducibility fingerprint*

Description

Construct a reproducibility fingerprint

Usage

```
eye_reproducibility_fingerprint(
  data = NULL,
  analysis_spec = NULL,
  model_spec = NULL,
  decisions = NULL,
  result = NULL,
  files = NULL,
  seeds = NULL,
  label = "eyeprocess_analysis"
)
```

Arguments

`data`	Input data or hashable object.
`analysis_spec`	Analysis specification.
`model_spec`	Model specification.
`decisions`	Decision manifest.
`result`	Optional result object.
`files`	Optional input file paths.
`seeds`	Optional seeds.
`label`	Fingerprint label.

Value

A named list with components "schema_version", "label", "eyeprocess_version", "data_hash", "analysis_spec_hash", "model_spec_hash", "decisions_hash", "result_hash", "file_manifest", "seeds", "environment", containing a reproducibility fingerprint and associated metadata or diagnostics.

`eye_session_manifest` *Create a session-level provenance manifest*

Description

Create a session-level provenance manifest

Usage

```
eye_session_manifest(
  data = NULL,
  files = NULL,
  adapter = NA_character_,
  decisions = NULL,
  pipeline = NULL,
  seeds = NULL,
  notes = NULL
)
```

Arguments

`data`	Optional data object.
`files`	Optional input file paths.
`adapter`	Adapter/importer identifier.
`decisions`	Optional decision manifest.
`pipeline`	Optional pipeline or run object.
`seeds`	Optional named random seeds.
`notes`	Optional notes.

Value

A named list with components "created_utc", "eyeprocess_version", "data_hash", "files", "adapter", "decisions_hash", "pipeline_hash", "seeds", "environment", "notes", containing a session-level provenance manifest and associated metadata or diagnostics.

---

eye_storage_spec *Specify disk-backed eyeprocess storage*

Description

Specify disk-backed eyeprocess storage

Usage

```
eye_storage_spec(
  path,
  format = c("rds", "parquet", "arrow_dataset"),
  tables = canonical_table_names(),
  partitioning = NULL,
  compression = "zstd"
)
```

Arguments

path	Storage directory or RDS file.
format	One of ‘"rds"‘, ‘"parquet"‘, or ‘"arrow_dataset"‘.
tables	Canonical tables to store.
partitioning	Optional Arrow partition columns.
compression	Parquet compression codec. For writes, the default ‘"zstd"‘ is preferred; when the argument is omitted and that codec is unavailable, storage falls back to ‘"snappy"‘ and then ‘"uncompressed"‘. An explicitly requested unavailable codec errors.

Value

An ‘eye_storage_spec‘ object.

eye_stream_fidelity_audit *Audit preservation of monocular/binocular stream semantics*

Description

Audit preservation of monocular/binocular stream semantics

Usage

```
eye_stream_fidelity_audit(
  source,
  roundtrip,
  source_eye = "eye",
  roundtrip_eye = source_eye,
  key = NULL
)
```

Arguments

source	Original/source representation.
roundtrip	Round-tripped or comparison representation.
source_eye	Source recorded-eye column.
roundtrip_eye	Round-tripped recorded-eye column.
key	Column or columns used to align records.

Value

An object of class "eye_stream_fidelity", stored as a named list, with components "status", "matched_n", "source_streams", "roundtrip_streams", "confusion". It contains preservation of monocular/binocular stream semantics and associated metadata or diagnostics needed to interpret the result.

eye_targets_manifest *Create a targets-compatible dependency manifest*

Description

This function does not execute or silently translate arbitrary closures into a targets pipeline. It provides the dependency contract required to build an explicit '_targets.R' file.

Usage

```
eye_targets_manifest(x)
```

Arguments

x	Pipeline.

Value

A data frame containing a targets-compatible dependency manifest. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

eyeprocess-adapters *Mappings and adapter registry*

Description

Map heterogeneous exports, register import adapters, detect formats, and combine canonical datasets.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

---

eyeprocess-class *Create and manage eyeprocess datasets*

Description

Construct, inspect, validate, modify, and summarize canonical eye-tracking datasets.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

`eyeprocess-coordinates-time` *Coordinate and timebase management*

Description

Register and convert coordinate spaces, normalize native clocks, estimate sampling rates, and synchronize streams.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

eyeprocess-experimental

Experimental psychometric process models

Description

Experimental interfaces for multimodal IRT, functional pupil summaries, strategy mixtures, diffusion summaries, and missing-process sensitivity.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

eyeprocess-export-report

Export, reporting, and package bridges

Description

Persist canonical datasets, produce provenance-aware reports, and bridge gp3tools or gpbiometrics objects.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

---

eyeprocess-features *Derive gaze, pupil, response-time, and biometric features*

Description

Generate declared person-item-trial features, scanpaths, transitions, entropy measures, and feature dictionaries.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

---

eyeprocess-format-validation *Validate real eye-tracking exports and compatibility corpora*

Description

Build reproducible evidence for source-format compatibility. The validation framework distinguishes declared support, synthetic-fixture testing, and empirical validation with real exports. It audits source structure, adapter detection, canonical import, field coverage, native timestamp preservation, coordinate semantics, provenance, and canonical round-trip fidelity.

Details

validate_eye_source() validates one file or folder. Use validation_manifest() and validate_eye_corpus() to evaluate a versioned collection of exports from multiple vendors, devices, and software versions. init_validation_corpus() is idempotent and preserves an existing manifest and case files unless overwrite = TRUE is supplied. A source can be retained temporarily in the result for creation of an anonymized validation bundle; raw vendor data are never included in bundles by default.

anonymize_eye_dataset() replaces participant, recording, and session identifiers, removes raw tables and source paths by default, and records the operation in provenance. Automated anonymization cannot guarantee removal of all study-specific free text, so exported bundles still require human review.

Value

Depending on the function, an eye_format_validation_spec, source-file manifest, schema-coverage table, source-preservation audit, canonical round-trip result, eye_format_validation, eye_corpus_validation, anonymized eye_dataset, report path, or validation-bundle path.

See Also

read_eye_export(), validate_eye_dataset(), supported_eye_formats(), write_eye_dataset(), provenance_manifest()

---

eyeprocess-import-gazepoint

Import Gazepoint and Gazepoint Biometrics exports

Description

Detect, profile, import, pair, validate, and reconstruct Gazepoint Analysis and Biometrics exports, including Gazepoint Analysis 7.x *_all_gaze.csv, *_fixations.csv, and multi-section Data_Summary_export_*.csv files.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. For Gazepoint Analysis 7.x exports, TIMETICK(f=...) is retained as the native clock and normalized to seconds from recording start, while media-relative TIME(...) values are retained as source fields. Fixation identifiers that restart for each media item are namespaced by stimulus. Multi-section Data Summary reports are parsed into AOI definitions, user-AOI features, raw report tables, and vendor metadata. Native fields and transformations remain represented in provenance and vendor-specific metadata.

Value

The returned value depends on the function. Import and transformation functions generally return an eye_dataset; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or eyeprocess_model objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

---

eyeprocess-import-generic

Import generic delimited eye-tracking data

Description

Transform explicitly mapped data frames, CSV files, and TSV files into canonical eyeprocess datasets.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

---

eyeprocess-import-vendors

Import Tobii, Pupil Labs, EyeLink, and SMI exports

Description

Dedicated import adapters for common and legacy eye-tracking export ecosystems.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

`eyeprocess-models` *Psychometric and process-data models*

Description

Prepare response matrices and fit optional IRT, explanatory, response-time, DIF, shared-process, and dynamic models.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

`eyeprocess-plots` *Visualize eye-tracking and multimodal process data*

Description

Base-R plots for traces, fixations, scanpaths, heatmaps, AOIs, pupil, biometrics, quality, timing, and models.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

`eyeprocess-preprocessing`

Gaze and pupil preprocessing

Description

Declare preprocessing, filter signals, interpolate pupil gaps, detect ocular events, and retain a transformation record.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

eyeprocess-quality *Quality control, sensitivity, and governance*

Description

Audit data quality, flag process leakage, assess readiness, and compare preprocessing or AOI specifications.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

eyeprocess-schema *Canonical schemas and coordinate spaces*

Description

Define, inspect, standardize, and validate the relational tables used by eyeprocess.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

eyeprocess-simulation *Simulate and validate eyeprocess workflows*

Description

Simulate canonical multimodal datasets and conduct parameter-recovery or power experiments.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

eyeprocess-trials-aoi *Trials, responses, stimuli, and areas of interest*

Description

Reconstruct trial intervals, attach responses, register static or dynamic AOIs, and derive AOI visits.

Details

These functions operate on the canonical relational representation used by **eyeprocess**. Native fields and timestamps are retained whenever possible, and transformations should be recorded in the provenance table. Optional modelling engines are used only when their packages are installed.

Value

The returned value depends on the function. Import and transformation functions generally return an `eye_dataset`; audit and feature functions return data frames or enriched datasets; plotting functions return their plotted data invisibly; modelling functions return engine-specific or `eyeprocess_model` objects.

See Also

`new_eye_dataset()`, `read_eye_export()`, `validate_eye_dataset()`, `provenance_manifest()`

eyeprocess_api_version

Return the public eyeprocess API version

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
eyeprocess_api_version()
```

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

eyeprocess_benchmark_study

Locate the bundled public benchmark study

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
eyeprocess_benchmark_study(path = NULL)
```

Arguments

path	Optional alternative benchmark root.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

eyeprocess_cdm_attribute_profiles

Enumerate latent attribute profiles

Description

Enumerate latent attribute profiles

Usage

```
eyeprocess_cdm_attribute_profiles(
  n_attributes,
  attribute_names = paste0("A", seq_len(n_attributes))
)
```

Arguments

`n_attributes` Number of cognitive-diagnosis attributes.

`attribute_names` Optional names for the cognitive-diagnosis attributes.

Value

An R object containing enumerate latent attribute profiles. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

eyeprocess_cdm_classification_uncertainty

Summarise CDM classification uncertainty from profile probabilities

Description

Summarise CDM classification uncertainty from profile probabilities

Usage

```
eyeprocess_cdm_classification_uncertainty(profile_probabilities)
```

Arguments

`profile_probabilities` Posterior attribute-profile probabilities.

Value

A data frame containing cDM classification uncertainty from profile probabilities. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_cdm_dina_ideal_response

Compute deterministic DINA ideal responses from a Q-matrix

Description

Compute deterministic DINA ideal responses from a Q-matrix

Usage

```
eyeprocess_cdm_dina_ideal_response(Q, profiles)
```

Arguments

`Q`	Binary item-by-attribute Q-matrix.
`profiles`	Attribute mastery profiles, with rows representing profiles.

Value

A vector or matrix containing deterministic DINA ideal responses from a Q-matrix, with shape determined by the supplied analysis units.

eyeprocess_cdm_dina_probability

DINA response probabilities from slip and guess parameters

Description

DINA response probabilities from slip and guess parameters

Usage

```
eyeprocess_cdm_dina_probability(ideal_response, slip = 0.1, guess = 0.2)
```

Arguments

`ideal_response`	Ideal-response indicator or matrix implied by the cognitive-diagnosis model.
`slip`	DINA slip parameter or vector of slip parameters.
`guess`	DINA guessing parameter or vector of guessing parameters.

Value

An object of class "matrix", stored as an R object, containing dINA response probabilities from slip and guess parameters and associated metadata needed to interpret the result.

eyeprocess_cdm_qmatrix_audit

Audit a cognitive-diagnosis Q-matrix

Description

Audit a cognitive-diagnosis Q-matrix

Usage

```
eyeprocess_cdm_qmatrix_audit(
  Q,
  item_ids = rownames(Q),
  attribute_names = colnames(Q)
)
```

Arguments

`Q`	Binary item-by-attribute Q-matrix.
`item_ids`	Optional item identifiers.
`attribute_names`	Optional names for the cognitive-diagnosis attributes.

Value

An object of class "eye_cdm_qmatrix_audit", stored as a named list, with components "item", "attribute", "duplicate_rows", "complete_identity_block". It contains a cognitive-diagnosis Q-matrix and associated metadata or diagnostics needed to interpret the result.

eyeprocess_deprecation

Declare a deprecation in a structured form

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
eyeprocess_deprecation(old, replacement, since, remove_after, reason = "")
```

Arguments

`old`	Deprecated symbol.
`replacement`	Replacement symbol.
`since`	Version where deprecation started.
`remove_after`	Earliest removal version.
`reason`	Reason.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`eyeprocess_irt_2pl_probability` *2PL item-response probability*

Description

2PL item-response probability

Usage

```
eyeprocess_irt_2pl_probability(theta, a = 1, b = 0, D = 1)
```

Arguments

`theta`	Latent-trait value or vector of latent-trait values.
`a`	Item discrimination parameter or vector.
`b`	Item difficulty or location parameter or vector.
`D`	Logistic scaling constant.

Value

A numeric value or vector containing 2PL item-response probability.

eyeprocess_irt_3pl_probability

3PL item-response probability

Description

3PL item-response probability

Usage

```
eyeprocess_irt_3pl_probability(theta, a = 1, b = 0, c = 0.2, D = 1)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
a	Item discrimination parameter or vector.
b	Item difficulty or location parameter or vector.
c	Lower-asymptote parameter or vector.
D	Logistic scaling constant.

Value

A numeric value or vector containing 3PL item-response probability.

eyeprocess_irt_4pl_probability

4PL item-response probability

Description

4PL item-response probability

Usage

```
eyeprocess_irt_4pl_probability(theta, a = 1, b = 0, c = 0, d = 1, D = 1)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
a	Item discrimination parameter or vector.
b	Item difficulty or location parameter or vector.
c	Lower-asymptote parameter or vector.
d	Upper-asymptote parameter or vector.
D	Logistic scaling constant.

Value

A numeric value or vector containing 4PL item-response probability.

---

eyeprocess_irt_adaptive_trace *Create an auditable adaptive-testing trace*

Description

Create an auditable adaptive-testing trace

Usage

```
eyeprocess_irt_adaptive_trace(
  item_id,
  theta_before,
  theta_after,
  se_after,
  information,
  response = NA_real_
)
```

Arguments

item_id	Item identifier or vector of item identifiers.
theta_before	Latent-trait estimate before item administration.
theta_after	Latent-trait estimate after item administration.
se_after	Conditional standard error after item administration.
information	Item or test information value or vector.
response	Observed item response or response variable.

Value

An object of class "eye_irt_adaptive_trace", "data.frame", stored as a data frame, containing an auditable adaptive-testing trace and associated metadata needed to interpret the result.

eyeprocess_irt_anchor_audit

Audit candidate anchor items using supplied DIF evidence

Description

Audit candidate anchor items using supplied DIF evidence

Usage

```
eyeprocess_irt_anchor_audit(
  items,
  dif = NULL,
  max_abs_effect = 0.1,
  min_information = NULL
)
```

Arguments

`items`	Item-parameter data frame or item collection.
`dif`	Differential-item-functioning evidence or summary.
`max_abs_effect`	Maximum permitted absolute effect for an anchor candidate.
`min_information`	Minimum required item information.

Value

A data frame containing candidate anchor items using supplied DIF evidence. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_irt_anchor_purification

Iteratively remove anchors exceeding a supplied effect threshold

Description

Iteratively remove anchors exceeding a supplied effect threshold

Usage

```
eyeprocess_irt_anchor_purification(
  items,
  effect_fun,
  initial = items$item_id,
  threshold = 0.1,
  max_iter = 10L
)
```

Arguments

`items`	Item-parameter data frame or item collection.
`effect_fun`	Function that computes the anchor-screening effect.
`initial`	Initial value, state, or anchor set.
`threshold`	Decision or diagnostic threshold.
`max_iter`	Maximum number of iterations.

Value

An object of class "eye_irt_anchor_purification", stored as a named list, with components "anchors", "history", "threshold". It contains iteratively remove anchors exceeding a supplied effect threshold and associated metadata or diagnostics needed to interpret the result.

`eyeprocess_irt_apply_link` *Apply linear IRT scale-linking coefficients*

Description

Apply linear IRT scale-linking coefficients

Usage

```
eyeprocess_irt_apply_link(items, link)
```

Arguments

`items`	Item-parameter data frame or item collection.
`link`	IRT scale-linking coefficients or linking object.

Value

An R object containing linear IRT scale-linking coefficients. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

eyeprocess_irt_bank_coverage

Audit item-bank information coverage across a theta region

Description

Audit item-bank information coverage across a theta region

Usage

```
eyeprocess_irt_bank_coverage(
  items,
  theta = seq(-4, 4, length.out = 161),
  target_information = 5,
  target = c(-2, 2)
)
```

Arguments

`items`	Item-parameter data frame or item collection.
`theta`	Latent-trait value or vector of latent-trait values.
`target_information`	Target test-information level.
`target`	Target level, distribution, or criterion.

Value

An object of class "eye_irt_bank_coverage", stored as a named list, with components "curve", "target", "target_information", "fraction_target_met", "minimum_information", "maximum_sem", "gaps". It contains item-bank information coverage across a theta region and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_category_function_audit

Audit category probability functions

Description

Audit category probability functions

Usage

```
eyeprocess_irt_category_function_audit(probabilities, tolerance = 1e-08)
```

Arguments

probabilities	Probability matrix or vector, with dimensions appropriate to the model.
tolerance	Numerical or decision tolerance.

Value

An object of class "eye_irt_category_audit", stored as a named list, with components "valid_bounds", "rows_sum_to_one", "max_sum_error", "min_probability", "max_probability". It contains category probability functions and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_irt_classification_precision

Summarise decision precision at one or more theta cut scores

Description

Summarise decision precision at one or more theta cut scores

Usage

```
eyeprocess_irt_classification_precision(
  theta_estimate,
  standard_error,
  cut_score = 0,
  confidence = 0.95
)
```

Arguments

theta_estimate	Estimated latent-trait values.
standard_error	Standard errors corresponding to the estimates.
cut_score	Latent-scale classification cut score.
confidence	Requested confidence level.

Value

A tabular R object containing decision precision at one or more theta cut scores; rows represent analysis units and columns contain the returned quantities.

eyeprocess_irt_conditional_sem

Conditional standard error from information

Description

Conditional standard error from information

Usage

```
eyeprocess_irt_conditional_sem(information)
```

Arguments

information	Item or test information value or vector.

Value

A logical value or vector indicating conditional standard error from information.

eyeprocess_irt_content_balance_audit

Audit content balance in an administered adaptive form

Description

Audit content balance in an administered adaptive form

Usage

```
eyeprocess_irt_content_balance_audit(administered, item_bank, target = NULL)
```

Arguments

administered	Identifiers or records for administered items.
item_bank	Item bank or item-bank data frame.
target	Target level, distribution, or criterion.

Value

A data frame containing content balance in an administered adaptive form. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_irt_device_drift

Summarise parameter drift across acquisition devices

Description

Summarise parameter drift across acquisition devices

Usage

```
eyeprocess_irt_device_drift(
  parameters,
  item_id = "item_id",
  device = "device",
  parameter = "b"
)
```

Arguments

parameters	Item-parameter data frame or parameter estimates.
item_id	Item identifier or vector of item identifiers.
device	Device identifier or grouping variable.
parameter	Name of the parameter to compare.

Value

A tabular R object containing parameter drift across acquisition devices; rows represent analysis units and columns contain the returned quantities.

eyeprocess_irt_dif_effect_curve

Differential item functioning effect curve from two parameter sets

Description

Differential item functioning effect curve from two parameter sets

Usage

```
eyeprocess_irt_dif_effect_curve(
  reference_item,
  focal_item,
  theta = seq(-4, 4, length.out = 81)
)
```

Arguments

`reference_item`	Reference-group item parameters.
`focal_item`	Focal-group item parameters.
`theta`	Latent-trait value or vector of latent-trait values.

Value

An object of class "eye_irt_dif_curve", "data.frame", stored as a data frame, containing differential item functioning effect curve from two parameter sets and associated metadata needed to interpret the result.

`eyeprocess_irt_dtf_curve` *Differential test functioning effect curve*

Description

Differential test functioning effect curve

Usage

```
eyeprocess_irt_dtf_curve(reference, focal, theta = seq(-4, 4, length.out = 81))
```

Arguments

`reference`	Reference-form or reference-group item parameters.
`focal`	Focal-form or focal-group item parameters.
`theta`	Latent-trait value or vector of latent-trait values.

Value

An object of class "eye_irt_dtf_curve", "data.frame", stored as a data frame, containing differential test functioning effect curve and associated metadata needed to interpret the result.

eyeprocess_irt_eap_score

EAP score for dichotomous IRT item parameters

Description

EAP score for dichotomous IRT item parameters

Usage

```
eyeprocess_irt_eap_score(
  response,
  items,
  theta_grid = seq(-4, 4, length.out = 81),
  prior_mean = 0,
  prior_sd = 1,
  D = 1
)
```

Arguments

response	Observed item response or response variable.
items	Item-parameter data frame or item collection.
theta_grid	Grid of latent-trait values used for numerical scoring or integration.
prior_mean	Mean of the normal latent-trait prior.
prior_sd	Standard deviation of the normal latent-trait prior.
D	Logistic scaling constant.

Value

An object of class "eye_irt_score", stored as a named list, with components "estimate", "se", "theta", "posterior", "method". It contains eAP score for dichotomous IRT item parameters and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_engine_evidence_table

Build an external-engine capability and availability table

Description

Build an external-engine capability and availability table

Usage

```
eyeprocess_irt_engine_evidence_table()
```

Value

A data frame containing an external-engine capability and availability table. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

eyeprocess_irt_engine_registry

Registry of specialized external IRT engines

Description

Registry of specialized external IRT engines

Usage

```
eyeprocess_irt_engine_registry()
```

Value

An object of class "eye_irt_engine_registry", "data.frame", stored as a data frame, containing registry of specialized external IRT engines and associated metadata needed to interpret the result.

---

eyeprocess_irt_engine_status

Query an external IRT engine

Description

Query an external IRT engine

Usage

```
eyeprocess_irt_engine_status(engine)
```

Arguments

engine	Requested estimation or analysis engine.

Value

An object of class "eye_irt_engine_registry", "data.frame", stored as a data frame, containing query an external IRT engine and associated metadata needed to interpret the result.

eyeprocess_irt_expected_score

Expected item score

Description

Expected item score

Usage

```
eyeprocess_irt_expected_score(
  theta,
  family = c("2pl", "3pl", "4pl", "grm", "gpcm", "nominal"),
  ...
)
```

Arguments

`theta`	Latent-trait value or vector of latent-trait values.
`family`	IRT response family or model family.
`...`	Additional arguments passed to the selected method or external engine.

Value

A numeric value or vector containing expected item score.

eyeprocess_irt_exposure_summary

Summarise item exposure rates

Description

Summarise item exposure rates

Usage

```
eyeprocess_irt_exposure_summary(
  administered,
  item_bank_ids = unique(administered)
)
```

Arguments

`administered`	Identifiers or records for administered items.
`item_bank_ids`	Complete set of item identifiers in the bank.

Value

A data frame containing item exposure rates. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

eyeprocess_irt_extreme_score_audit

Audit extreme response scores without assigning behavioral labels

---

Description

Audit extreme response scores without assigning behavioral labels

Usage

```
eyeprocess_irt_extreme_score_audit(
  responses,
  lower_fraction = 0.02,
  upper_fraction = 0.98
)
```

Arguments

`responses`	Response matrix or response data.
`lower_fraction`	Lower extreme-score fraction.
`upper_fraction`	Upper extreme-score fraction.

Value

A data frame containing extreme response scores without assigning behavioral labels. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

eyeprocess_irt_fit_dashboard

Build an integrated IRT diagnostic dashboard object

Description

Build an integrated IRT diagnostic dashboard object

Usage

```
eyeprocess_irt_fit_dashboard(
  item_fit = NULL,
  person_fit = NULL,
  q3 = NULL,
  parameter_audit = NULL,
  identification = NULL
)
```

Arguments

`item_fit`	Item-fit diagnostic object or table.
`person_fit`	Person-fit diagnostic object or table.
`q3`	Q3 residual-correlation matrix or summary.
`parameter_audit`	Item-parameter plausibility audit.
`identification`	Identification specification or identification audit.

Value

An object of class "eye_irt_fit_dashboard", stored as a named list, with components "components", "present", "n_components", "interpretation". It contains an integrated IRT diagnostic dashboard object and associated metadata or diagnostics needed to interpret the result.

`eyeprocess_irt_functioning_effect_summary` *Summarise DIF/DTF curve magnitude*

Description

Summarise DIF/DTF curve magnitude

Usage

```
eyeprocess_irt_functioning_effect_summary(curve)
```

Arguments

`curve`	Curve data to summarize or inspect.

Value

A named list with components "max_abs", "mean_abs", "signed_area", containing dIF/DTF curve magnitude and associated metadata or diagnostics.

eyeprocess_irt_gpcm_probability

Generalized partial-credit category probabilities

Description

Generalized partial-credit category probabilities

Usage

```
eyeprocess_irt_gpcm_probability(theta, a = 1, steps, D = 1)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
a	Item discrimination parameter or vector.
steps	Step parameters for a generalized partial-credit model.
D	Logistic scaling constant.

Value

A logical value or vector indicating generalized partial-credit category probabilities.

eyeprocess_irt_grm_probability

Graded-response category probabilities

Description

Graded-response category probabilities

Usage

```
eyeprocess_irt_grm_probability(theta, a = 1, thresholds, D = 1)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
a	Item discrimination parameter or vector.
thresholds	Ordered response-category thresholds.
D	Logistic scaling constant.

Value

A logical value or vector indicating graded-response category probabilities.

eyeprocess_irt_haebara_link

Haebara item-characteristic-curve linking

Description

Haebara item-characteristic-curve linking

Usage

```
eyeprocess_irt_haebara_link(
  reference,
  focal,
  anchors = NULL,
  theta = seq(-4, 4, length.out = 81),
  weights = NULL,
  start = c(A = 1, B = 0)
)
```

Arguments

`reference`	Reference-form or reference-group item parameters.
`focal`	Focal-form or focal-group item parameters.
`anchors`	Anchor-item identifiers.
`theta`	Latent-trait value or vector of latent-trait values.
`weights`	Optional numerical weights.
`start`	Starting values for numerical optimization.

Value

An object of class "eye_irt_link", stored as a named list, with components "A", "B", "method", "anchors", "objective", "convergence". It contains haebara item-characteristic-curve linking and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_identification_audit

Audit IRT scale/location identification

Description

Audit IRT scale/location identification

Usage

```
eyeprocess_irt_identification_audit(
  spec,
  constraints = list(),
  n_items = NULL,
  n_persons = NULL
)
```

Arguments

spec	Model, validation, or analysis specification object.
constraints	Identification or model constraints.
n_items	Number of items.
n_persons	Number of persons.

Value

An object of class "eye_irt_identification_audit", stored as a named list, with components "spec", "location_identified", "scale_identified", "anchors", "warnings", "valid", "n_items", "n_persons". It contains iRT scale/location identification and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_irt_infit_outfit

Compute residual-based Infit and Outfit summaries

Description

These statistics summarize response-model residual behavior. They are not labels for motivation, misconduct, diagnosis, or respondent intent.

Usage

```
eyeprocess_irt_infit_outfit(
  observed,
  expected,
  by = c("item", "person"),
  min_variance = 1e-08
)
```

Arguments

observed	Observed responses or observed values.
expected	Model-expected probabilities or expected values.
by	Grouping variables or aggregation level.
min_variance	Minimum variance used to stabilize residual calculations.

Value

A data frame containing residual-based Infit and Outfit summaries. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

eyeprocess_irt_information_area

Area under an information curve

Description

Area under an information curve

Usage

```
eyeprocess_irt_information_area(theta, information)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
information	Item or test information value or vector.

Value

A numeric value or vector containing area under an information curve.

---

eyeprocess_irt_information_gain

Information gain between two conditional standard errors

Description

Information gain between two conditional standard errors

Usage

```
eyeprocess_irt_information_gain(se_before, se_after)
```

Arguments

se_before	Conditional standard error before an item is administered.
se_after	Conditional standard error after item administration.

Value

A numeric value or vector containing information gain between two conditional standard errors.

eyeprocess_irt_information_targeting

Audit how well item information targets a theta distribution

Description

Audit how well item information targets a theta distribution

Usage

```
eyeprocess_irt_information_targeting(items, theta, weights = NULL, D = 1)
```

Arguments

`items`	Item-parameter data frame or item collection.
`theta`	Latent-trait value or vector of latent-trait values.
`weights`	Optional numerical weights.
`D`	Logistic scaling constant.

Value

An object of class "eye_irt_information_targeting", stored as a named list, with components "weighted_information", "weighted_sem", "curve", "weights". It contains how well item information targets a theta distribution and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_invariance_evidence

Combine invariance evidence without converting it to a binary validity claim

Description

Combine invariance evidence without converting it to a binary validity claim

Usage

```
eyeprocess_irt_invariance_evidence(
  anchor_audit = NULL,
  dif = NULL,
  dtf = NULL,
  linking = NULL,
  process_concordance = NULL
)
```

Arguments

`anchor_audit`	Anchor-item audit result.
`dif`	Differential-item-functioning evidence or summary.
`dtf`	Differential-test-functioning evidence or curve.
`linking`	Scale-linking evidence or result.
`process_concordance`	Process-DIF concordance evidence.

Value

An object of class "eye_irt_invariance_evidence", stored as a named list, with components "components", "present", "completeness", "interpretation". It contains combine invariance evidence without converting it to a binary validity claim and associated metadata or diagnostics needed to interpret the result.

`eyeprocess_irt_item_bank` *Item bank object for adaptive design*

Description

Item bank object for adaptive design

Usage

```
eyeprocess_irt_item_bank(items, content = NULL, exposure_limit = 1)
```

Arguments

`items`	Item-parameter data frame or item collection.
`content`	Item content/category metadata.
`exposure_limit`	Maximum permitted item exposure.

Value

An object of class "eye_irt_item_bank", stored as a named list, with components "items", "exposure_limit". It contains item bank object for adaptive design and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_item_fit_residuals

Compute item residual fit summaries from observed and predicted probabilities

Description

Compute item residual fit summaries from observed and predicted probabilities

Usage

```
eyeprocess_irt_item_fit_residuals(
  responses,
  probabilities,
  item_ids = colnames(responses)
)
```

Arguments

responses	Response matrix or response data.
probabilities	Probability matrix or vector, with dimensions appropriate to the model.
item_ids	Optional item identifiers.

Value

An object of class "eye_irt_item_fit", "data.frame", stored as a data frame, containing item residual fit summaries from observed and predicted probabilities and associated metadata needed to interpret the result.

eyeprocess_irt_item_information

Compute item information for transparent IRT families

Description

Compute item information for transparent IRT families

Usage

```
eyeprocess_irt_item_information(
  theta,
  family = c("2pl", "3pl", "4pl", "grm", "gpcm", "nominal"),
  ...,
  D = 1
)
```

Arguments

`theta`	Latent-trait value or vector of latent-trait values.
`family`	IRT response family or model family.
`...`	Additional arguments passed to the selected method or external engine.
`D`	Logistic scaling constant.

Value

A numeric value or vector containing item information for transparent IRT families.

`eyeprocess_irt_item_selection` *Select the most informative eligible item at a theta estimate*

Description

Select the most informative eligible item at a theta estimate

Usage

```
eyeprocess_irt_item_selection(
  bank,
  theta,
  administered = character(),
  exposure = NULL,
  content_required = NULL,
  D = 1
)
```

Arguments

`bank`	Validated item-bank object.
`theta`	Latent-trait value or vector of latent-trait values.
`administered`	Identifiers or records for administered items.
`exposure`	Item exposure information used by the adaptive-selection rule.
`content_required`	Content constraints required for item selection.
`D`	Logistic scaling constant.

Value

An object of class "eye_irt_item_selection", stored as a named list, with components "selected", "information", "theta", "reason", "candidate_count". It contains the most informative eligible item at a theta estimate and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_latent_regression_design

Build a latent-regression design matrix with explicit centering metadata

Description

Build a latent-regression design matrix with explicit centering metadata

Usage

```
eyeprocess_irt_latent_regression_design(data, formula, center_numeric = TRUE)
```

Arguments

data	Input data frame, matrix, or compatible analysis object.
formula	Model formula.
center_numeric	Whether numeric predictors are centered.

Value

An object of class "eye_irt_latent_regression_design", stored as a named list, with components "matrix", "formula", "centers", "complete". It contains a latent-regression design matrix with explicit centering metadata and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_link_stability

Compare linking estimates across anchor subsets

Description

Compare linking estimates across anchor subsets

Usage

```
eyeprocess_irt_link_stability(
  reference,
  focal,
  anchor_sets,
  method = c("mean-sigma", "mean-mean", "Stocking-Lord", "Haebara")
)
```

Arguments

`reference`	Reference-form or reference-group item parameters.
`focal`	Focal-form or focal-group item parameters.
`anchor_sets`	Value supplied for the anchor sets argument.
`method`	Scoring, linking, or analysis method.

Value

An object of class "eye_irt_link_stability", stored as a named list, with components "table", "sd_A", "sd_B", "method". It contains linking estimates across anchor subsets and associated metadata or diagnostics needed to interpret the result.

`eyeprocess_irt_local_dependence_pairs` *Extract high residual-dependence item pairs*

Description

Extract high residual-dependence item pairs

Usage

```
eyeprocess_irt_local_dependence_pairs(q3, threshold = 0.2, absolute = TRUE)
```

Arguments

`q3`	Q3 residual-correlation matrix or summary.
`threshold`	Decision or diagnostic threshold.
`absolute`	Whether diagnostic thresholds apply to absolute values.

Value

A data frame containing high residual-dependence item pairs. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_irt_map_score

MAP score for dichotomous IRT item parameters

Description

MAP score for dichotomous IRT item parameters

Usage

```
eyeprocess_irt_map_score(
  response,
  items,
  bounds = c(-6, 6),
  prior_mean = 0,
  prior_sd = 1,
  D = 1
)
```

Arguments

response	Observed item response or response variable.
items	Item-parameter data frame or item collection.
bounds	Numerical lower and upper optimization bounds.
prior_mean	Mean of the normal latent-trait prior.
prior_sd	Standard deviation of the normal latent-trait prior.
D	Logistic scaling constant.

Value

An object of class "eye_irt_score", stored as a named list, with components "estimate", "objective", "method", "bounds". It contains mAP score for dichotomous IRT item parameters and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_marginal_reliability

Marginal reliability from latent-score variance and conditional error variance

Description

Marginal reliability from latent-score variance and conditional error variance

Usage

```
eyeprocess_irt_marginal_reliability(theta_estimate, se)
```

Arguments

theta_estimate	Estimated latent-trait values.
se	Standard-error values.

Value

A numeric value or vector containing marginal reliability from latent-score variance and conditional error variance.

---

eyeprocess_irt_mean_mean_link

Mean-mean IRT linking coefficients

Description

Mean-mean IRT linking coefficients

Usage

```
eyeprocess_irt_mean_mean_link(reference, focal, anchors = NULL)
```

Arguments

reference	Reference-form or reference-group item parameters.
focal	Focal-form or focal-group item parameters.
anchors	Anchor-item identifiers.

Value

An object of class "eye_irt_link", stored as a named list, with components "A", "B", "method", "anchors", "objective". It contains mean-mean IRT linking coefficients and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_mean_sigma_link

Mean-sigma IRT linking coefficients

Description

Mean-sigma IRT linking coefficients

Usage

```
eyeprocess_irt_mean_sigma_link(reference, focal, anchors = NULL)
```

Arguments

reference	Reference-form or reference-group item parameters.
focal	Focal-form or focal-group item parameters.
anchors	Anchor-item identifiers.

Value

An object of class "eye_irt_link", stored as a named list, with components "A", "B", "method", "anchors", "objective". It contains mean-sigma IRT linking coefficients and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_measurement_precision_profile

Summarise measurement precision across a theta region

Description

Summarise measurement precision across a theta region

Usage

```
eyeprocess_irt_measurement_precision_profile(
  theta,
  items,
  target = c(-2, 2),
  D = 1
)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
items	Item-parameter data frame or item collection.
target	Target level, distribution, or criterion.
D	Logistic scaling constant.

Value

An object of class "eye_irt_precision_profile", stored as a named list, with components "curve", "target", "area", "min_information", "max_sem". It contains measurement precision across a theta region and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_irt_missing_by_design_audit

Audit missing-by-design structure in an IRT response matrix

Description

Audit missing-by-design structure in an IRT response matrix

Usage

```
eyeprocess_irt_missing_by_design_audit(
  responses,
  design = NULL,
  min_administered = 1L
)
```

Arguments

responses	Response matrix or response data.
design	Validation or simulation design object.
min_administered	Minimum number of administered items required for a record.

Value

An object of class "eye_irt_missing_design_audit", stored as a named list, with components "n_persons", "n_items", "observed_fraction", "administered_per_person", "administered_per_item", "sparse_persons", "structural_missing", "unexpected_missing", "has_declared_design". It contains missing-by-design structure in an IRT response matrix and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_misspecification_metrics

Compare recovery under reference and misspecified scenarios

Description

Compare recovery under reference and misspecified scenarios

Usage

```
eyeprocess_irt_misspecification_metrics(
  reference_summary,
  misspecified_summary
)
```

Arguments

`reference_summary`
: Reference-model validation summary.

`misspecified_summary`
: Misspecified-model validation summary.

Value

An R object containing recovery under reference and misspecified scenarios. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

eyeprocess_irt_misspecification_suite

Create a model-misspecification suite

Description

Create a model-misspecification suite

Usage

```
eyeprocess_irt_misspecification_suite()
```

Value

A data frame containing a model-misspecification suite. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_irt_mle_score

Bounded ML score for dichotomous IRT item parameters

Description

Bounded ML score for dichotomous IRT item parameters

Usage

```
eyeprocess_irt_mle_score(response, items, bounds = c(-6, 6), D = 1)
```

Arguments

response	Observed item response or response variable.
items	Item-parameter data frame or item collection.
bounds	Numerical lower and upper optimization bounds.
D	Logistic scaling constant.

Value

An object of class "eye_irt_score", stored as a named list, with components "estimate", "objective", "method", "bounds", "boundary". It contains bounded ML score for dichotomous IRT item parameters and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_model_card

Create a governed IRT model card

Description

Create a governed IRT model card

Usage

```
eyeprocess_irt_model_card(
  spec,
  engine_status = NULL,
  identification = NULL,
  fit_evidence = NULL,
  invariance = NULL,
  validation = NULL,
  intended_use = NULL,
  excluded_interpretations = c("diagnosis", "cheating inference",
    "mental-state inference")
)
```

Arguments

`spec`	Model, validation, or analysis specification object.
`engine_status`	Availability/status record for the selected estimation engine.
`identification`	Identification specification or identification audit.
`fit_evidence`	Model-fit evidence or diagnostics.
`invariance`	Measurement-invariance evidence or audit.
`validation`	Value supplied for the validation argument.
`intended_use`	Statement of the intended analytical use.
`excluded_interpretations`	Interpretations explicitly excluded by the model card.

Value

An object of class "eye_irt_model_card", stored as a named list, with components "specification", "engine_status", "identification", "fit_evidence", "invariance", "validation", "intended_use", "excluded_interpretations", "created", "hash". It contains a governed IRT model card and associated metadata or diagnostics needed to interpret the result.

`eyeprocess_irt_model_card_audit` *Audit completeness of an IRT model card*

Description

Audit completeness of an IRT model card

Usage

```
eyeprocess_irt_model_card_audit(card)
```

Arguments

`card`	Value supplied for the card argument.

Value

A data frame containing completeness of an IRT model card. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_irt_model_spec

Declare an eyeprocess IRT model specification

Description

This specification records a psychometric model contract. Estimation is delegated to explicit engines where required; the specification itself does not fit a model.

Usage

```
eyeprocess_irt_model_spec(
 family = c("rasch", "2pl", "3pl", "4pl", "grm", "gpcm", "nominal", "multidimensional",
    "testlet", "latent_regression", "cdm", "joint_rt"),
  dimensions = 1L,
  identification = c("theta_standard", "item_sum_zero", "anchor"),
  engine = c("native_math", "mirt", "TAM", "GDINA", "LNIRT", "eRm", "custom"),
  process_channels = character(),
  status = c("reference", "experimental", "gated"),
  notes = NULL
)
```

Arguments

family	IRT response family or model family.
dimensions	Value supplied for the dimensions argument.
identification	Identification specification or identification audit.
engine	Requested estimation or analysis engine.
process_channels	Declared process-measure channels.
status	Evidence, model, or governance status.
notes	Value supplied for the notes argument.

Value

An object of class "eyeprocess_irt_model_spec", stored as a named list, with components "family", "dimensions", "identification", "engine", "process_channels", "status", "notes". It contains declare an eyeprocess IRT model specification and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_monotonicity_audit

Audit monotonicity of an item response curve

Description

Audit monotonicity of an item response curve

Usage

```
eyeprocess_irt_monotonicity_audit(theta, probability, tolerance = 1e-08)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
probability	Model-implied probability vector.
tolerance	Numerical or decision tolerance.

Value

An object of class "eye_irt_monotonicity_audit", stored as a named list, with components "monotone_non_decreasing", "n_decreases", "largest_decrease", "theta", "probability". It contains monotonicity of an item response curve and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_nominal_probability

Nominal-response category probabilities

Description

Nominal-response category probabilities

Usage

```
eyeprocess_irt_nominal_probability(theta, slopes, intercepts)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
slopes	Nominal-category slope parameters.
intercepts	Nominal-category intercept parameters.

Value

A numeric value or vector containing nominal-response category probabilities.

eyeprocess_irt_parameter_plausibility_audit

Audit basic plausibility of dichotomous item parameters

Description

Audit basic plausibility of dichotomous item parameters

Usage

```
eyeprocess_irt_parameter_plausibility_audit(
  items,
  discrimination = c(0.2, 4),
  difficulty = c(-6, 6),
  lower_asymptote = c(0, 0.5),
  upper_asymptote = c(0.5, 1)
)
```

Arguments

`items`	Item-parameter data frame or item collection.
`discrimination`	Discrimination vector or matrix.
`difficulty`	Item difficulty or location parameter.
`lower_asymptote`	Lower-asymptote parameter values.
`upper_asymptote`	Upper-asymptote parameter values.

Value

A data frame containing basic plausibility of dichotomous item parameters. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_irt_person_fit_lz

Standardized log-likelihood person-fit diagnostic

Description

Computes a Bernoulli response-pattern log-likelihood standardized against its model-implied mean and variance. Extreme values are model diagnostics, not evidence of cheating, disengagement, or a psychological state.

Usage

```
eyeprocess_irt_person_fit_lz(observed, expected, min_probability = 1e-08)
```

Arguments

observed	Observed responses or observed values.
expected	Model-expected probabilities or expected values.
min_probability	Lower probability bound used for numerical stabilization.

Value

A data frame containing standardized log-likelihood person-fit diagnostic. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

eyeprocess_irt_person_fit_residuals *Compute person residual fit summaries*

Description

Compute person residual fit summaries

Usage

```
eyeprocess_irt_person_fit_residuals(
  responses,
  probabilities,
  person_ids = rownames(responses)
)
```

Arguments

responses	Response matrix or response data.
probabilities	Probability matrix or vector, with dimensions appropriate to the model.
person_ids	Optional person identifiers.

Value

An object of class "eye_irt_person_fit", "data.frame", stored as a data frame, containing person residual fit summaries and associated metadata needed to interpret the result.

eyeprocess_irt_plausible_values

Draw plausible values from a discrete posterior grid

Description

Draw plausible values from a discrete posterior grid

Usage

```
eyeprocess_irt_plausible_values(score, n = 5L, seed = 1L)
```

Arguments

score	Score object containing posterior or uncertainty information.
n	Number of values, draws, or plausible values to generate.
seed	Random-number seed for reproducible execution.

Value

An R object containing plausible values from a discrete posterior grid. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

eyeprocess_irt_ppc_discrepancy

Compare observed and replicated IRT discrepancy statistics

Description

Compare observed and replicated IRT discrepancy statistics

Usage

```
eyeprocess_irt_ppc_discrepancy(
  observed,
  replicated,
  statistic = c("mean_score", "score_sd", "item_means", "max_item_residual")
)
```

Arguments

observed	Observed responses or observed values.
replicated	Replicated data or replicated statistic values.
statistic	Discrepancy statistic or statistic function.

Value

An object of class "eye_irt_ppc_discrepancy", stored as a named list, with components "statistic", "observed", "replicated", "posterior_predictive_p", "interval". It contains observed and replicated IRT discrepancy statistics and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_irt_precision_evidence_table

Build a paper-ready IRT information/precision table

Description

Build a paper-ready IRT information/precision table

Usage

```
eyeprocess_irt_precision_evidence_table(
  items,
  theta = seq(-3, 3, by = 0.5),
  digits = 4L
)
```

Arguments

`items`	Item-parameter data frame or item collection.
`theta`	Latent-trait value or vector of latent-trait values.
`digits`	Number of decimal digits used for presentation.

Value

An R object containing a paper-ready IRT information/precision table. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

eyeprocess_irt_prior_sensitivity_grid

Construct a prior-sensitivity grid for Bayesian IRT analyses

Description

Construct a prior-sensitivity grid for Bayesian IRT analyses

Usage

```
eyeprocess_irt_prior_sensitivity_grid(
  discrimination_scale = c(0.5, 1, 1.5),
  difficulty_scale = c(1, 2),
  guessing_mean = c(0.1, 0.2)
)
```

Arguments

`discrimination_scale`
: Prior scale for item discrimination.

`difficulty_scale`
: Prior scale for item difficulty or location.

`guessing_mean`
: Prior mean for the lower-asymptote or guessing parameter.

Value

An R object containing a prior-sensitivity grid for Bayesian IRT analyses. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

eyeprocess_irt_prior_sensitivity_summary

Summarise sensitivity of an estimand across declared prior specifications

---

Description

Summarise sensitivity of an estimand across declared prior specifications

Usage

```
eyeprocess_irt_prior_sensitivity_summary(
  results,
  prior_id = "prior_id",
  estimate = "estimate"
)
```

Arguments

`results`
: Results table or analysis results.

`prior_id`
: Identifier for the prior specification.

`estimate`
: Estimate column or numerical estimates to summarize.

Value

An object of class "eye_irt_prior_sensitivity", stored as a named list, with components "n_specifications", "n_finite", "median", "range", "sd", "table", "guardrail". It contains sensitivity of an estimand across declared prior specifications and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_irt_prior_spec

Declare prior families for Bayesian IRT engine adapters

Description

Declare prior families for Bayesian IRT engine adapters

Usage

```
eyeprocess_irt_prior_spec(
  discrimination = c("lognormal", "normal"),
  difficulty = "normal",
  guessing = c("beta", "logit-normal"),
  location = 0,
  scale = 1,
  guessing_shape = c(5, 17),
  label = "default"
)
```

Arguments

`discrimination`	Discrimination vector or matrix.
`difficulty`	Item difficulty or location parameter.
`guessing`	Prior distribution family for the guessing parameter.
`location`	Prior location hyperparameter.
`scale`	Prior scale hyperparameter.
`guessing_shape`	Shape parameters for the guessing prior.
`label`	Human-readable label.

Value

An object of class "eye_irt_prior_spec", stored as a named list, with components "discrimination", "difficulty", "guessing", "location", "scale", "guessing_shape", "label". It contains declare prior families for Bayesian IRT engine adapters and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_process_alignment

Align item parameters with process-channel summaries

Description

Align item parameters with process-channel summaries

Usage

```
eyeprocess_irt_process_alignment(
  item_parameters,
  process_profile,
  process_columns = NULL
)
```

Arguments

`item_parameters`
: Item-parameter data frame.

`process_profile`
: Process-measure profile or summary.

`process_columns`
: Names of process-measure columns to use.

Value

An object of class "eye_irt_process_alignment", stored as a named list, with components "table", "correlations", "guardrail". It contains align item parameters with process-channel summaries and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_process_aware_selection_penalty

Process-aware selection penalty without mental-state inference

Description

Process-aware selection penalty without mental-state inference

Usage

```
eyeprocess_irt_process_aware_selection_penalty(
  information,
  burden,
  burden_weight = 0,
  quality_risk = 0,
  quality_weight = 0
)
```

Arguments

information	Item or test information value or vector.
burden	Item-level process burden or cost measure.
burden_weight	Weight applied to the burden penalty.
quality_risk	Item-level measurement-quality risk.
quality_weight	Weight applied to the quality-risk penalty.

Value

A numeric value or vector containing process-aware selection penalty without mental-state inference.

---

eyeprocess_irt_process_dif_concordance

Compare psychometric DIF effect sizes with process-channel contrasts

---

Description

Compare psychometric DIF effect sizes with process-channel contrasts

Usage

```
eyeprocess_irt_process_dif_concordance(
  dif,
  process,
  item_id = "item_id",
  dif_effect = "effect",
  process_effect = "effect"
)
```

Arguments

dif	Differential-item-functioning evidence or summary.
process	Process-measure columns or process object.
item_id	Item identifier or vector of item identifiers.
dif_effect	DIF effect used for concordance.
process_effect	Process-side item effect used for concordance.

Value

An object of class "eye_irt_process_dif_concordance", stored as a named list, with components "n", "correlation", "table", "guardrail". It contains psychometric DIF effect sizes with process-channel contrasts and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_irt_q3 *Compute Yen-style Q3 residual correlations*

Description

Compute Yen-style Q3 residual correlations

Usage

```
eyeprocess_irt_q3(responses, probabilities, use = "pairwise.complete.obs")
```

Arguments

responses	Response matrix or response data.
probabilities	Probability matrix or vector, with dimensions appropriate to the model.
use	Missing-data handling mode passed to the residual correlation calculation.

Value

An R object containing yen-style Q3 residual correlations. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

eyeprocess_irt_recovery_design *Create an IRT recovery design*

Description

Create an IRT recovery design

Usage

```
eyeprocess_irt_recovery_design(
  sample_size = c(250L, 750L),
  n_items = c(12L, 24L),
  missing_rate = c(0, 0.15),
  testlet_sd = c(0, 0.35),
  replications = 10L,
  seed = 20260811L
)
```

Arguments

`sample_size`	Validation sample size or vector of sample sizes.
`n_items`	Number of items.
`missing_rate`	Proportion of responses or observations set missing.
`testlet_sd`	Standard deviation of simulated testlet effects.
`replications`	Number of simulation or validation replications.
`seed`	Random-number seed for reproducible execution.

Value

An object of class "eye_irt_recovery_design", "data.frame", stored as a data frame, containing an IRT recovery design and associated metadata needed to interpret the result.

`eyeprocess_irt_recovery_failures` *Summarise recovery failure rates*

Description

Summarise recovery failure rates

Usage

```
eyeprocess_irt_recovery_failures(x)
```

Arguments

`x`	Object to validate, summarize, verify, or otherwise process.

Value

A tabular R object containing recovery failure rates; rows represent analysis units and columns contain the returned quantities.

eyeprocess_irt_recovery_summary

Summarise IRT parameter recovery

Description

Summarise IRT parameter recovery

Usage

```
eyeprocess_irt_recovery_summary(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

A tabular R object containing iRT parameter recovery; rows represent analysis units and columns contain the returned quantities.

eyeprocess_irt_sbc_ranks

Construct SBC ranks from scalar truths and posterior draws

Description

Construct SBC ranks from scalar truths and posterior draws

Usage

```
eyeprocess_irt_sbc_ranks(truth, draws, randomize_ties = TRUE, seed = 1L)
```

Arguments

truth	Known simulated parameter value or vector of true values.
draws	Posterior draws, with draws arranged by simulation case as required.
randomize_ties	Whether ties in SBC ranks are randomized.
seed	Random-number seed for reproducible execution.

Value

A vector or matrix containing sBC ranks from scalar truths and posterior draws, with shape determined by the supplied analysis units.

eyeprocess_irt_sbc_summary

Summarise IRT SBC ranks with the package SBC diagnostics

Description

Summarise IRT SBC ranks with the package SBC diagnostics

Usage

```
eyeprocess_irt_sbc_summary(ranks, n_draws, bins = NULL)
```

Arguments

ranks	Simulation-based-calibration rank values.
n_draws	Number of posterior draws underlying each rank.
bins	Number of bins used for rank-distribution summaries.

Value

An object of class "eye_irt_sbc_evidence", stored as a named list, with components "diagnostics", "ecdf_deviation", "n", "n_draws". It contains iRT SBC ranks with the package SBC diagnostics and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_score_table

Score a response matrix with EAP, MAP, or ML

Description

Score a response matrix with EAP, MAP, or ML

Usage

```
eyeprocess_irt_score_table(
  responses,
  items,
  method = c("EAP", "MAP", "ML"),
  person_ids = rownames(responses),
  ...
)
```

Arguments

`responses`	Response matrix or response data.
`items`	Item-parameter data frame or item collection.
`method`	Scoring, linking, or analysis method.
`person_ids`	Optional person identifiers.
`...`	Additional arguments passed to the selected method or external engine.

Value

A tabular R object containing a response matrix with EAP, MAP, or ML; rows represent analysis units and columns contain the returned quantities.

`eyeprocess_irt_score_uncertainty` *Summarise score uncertainty*

Description

Summarise score uncertainty

Usage

```
eyeprocess_irt_score_uncertainty(scores)
```

Arguments

`scores`	Score object or score table.

Value

An object of class "eye_irt_score_uncertainty", stored as a named list, with components "n", "mean_se", "median_se", "p95_se", "marginal_reliability". It contains score uncertainty and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_session_drift

Summarise item-parameter drift over sessions

Description

Summarise item-parameter drift over sessions

Usage

```
eyeprocess_irt_session_drift(
  parameters,
  item_id = "item_id",
  session = "session",
  parameter = "b"
)
```

Arguments

parameters	Item-parameter data frame or parameter estimates.
item_id	Item identifier or vector of item identifiers.
session	Session identifier or grouping variable.
parameter	Name of the parameter to compare.

Value

A tabular R object containing item-parameter drift over sessions; rows represent analysis units and columns contain the returned quantities.

eyeprocess_irt_sparse_design_audit

Audit sparse person-item response coverage

Description

Audit sparse person-item response coverage

Usage

```
eyeprocess_irt_sparse_design_audit(
  data,
  person,
  item,
  response = NULL,
  min_person_items = 3L,
  min_item_persons = 10L
)
```

Arguments

`data`	Input data frame, matrix, or compatible analysis object.
`person`	Name of the person identifier column.
`item`	Name of the item identifier column.
`response`	Observed item response or response variable.
`min_person_items`	Minimum number of observed items required per person.
`min_item_persons`	Minimum number of observed persons required per item.

Value

An object of class "eye_irt_sparse_design_audit", stored as a named list, with components "n_persons", "n_items", "n_observed", "density", "person_counts", "item_counts", "sparse_persons", "sparse_items", "min_person_items", "min_item_persons". It contains sparse person-item response coverage and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_irt_stocking_lord_link

Stocking-Lord characteristic-curve linking

Description

Stocking-Lord characteristic-curve linking

Usage

```
eyeprocess_irt_stocking_lord_link(
  reference,
  focal,
  anchors = NULL,
  theta = seq(-4, 4, length.out = 81),
  weights = NULL,
  start = c(A = 1, B = 0)
)
```

Arguments

`reference`	Reference-form or reference-group item parameters.
`focal`	Focal-form or focal-group item parameters.
`anchors`	Anchor-item identifiers.
`theta`	Latent-trait value or vector of latent-trait values.
`weights`	Optional numerical weights.
`start`	Starting values for numerical optimization.

Value

An object of class "eye_irt_link", stored as a named list, with components "A", "B", "method", "anchors", "objective", "convergence". It contains stocking-Lord characteristic-curve linking and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_irt_stopping_rule

Evaluate a simple adaptive stopping rule

Description

Evaluate a simple adaptive stopping rule

Usage

```
eyeprocess_irt_stopping_rule(
  n_administered,
  se = NA_real_,
  min_items = 5L,
  max_items = 30L,
  target_se = 0.3
)
```

Arguments

n_administered	Number of items already administered.
se	Standard-error values.
min_items	Minimum number of items required.
max_items	Maximum permitted test length.
target_se	Target conditional standard error for stopping.

Value

A named list with components "stop", "reason", "n_administered", "se", containing a simple adaptive stopping rule and associated metadata or diagnostics.

eyeprocess_irt_targeting_gap

Compare an examinee distribution with item-bank targeting

Description

Compare an examinee distribution with item-bank targeting

Usage

```
eyeprocess_irt_targeting_gap(theta, items, breaks = seq(-4, 4, by = 0.5))
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
items	Item-parameter data frame or item collection.
breaks	Break points used to summarize latent-scale targeting.

Value

An object of class "eye_irt_targeting_gap", stored as a named list, with components "table", "absolute_gap", "interpretation". It contains an examinee distribution with item-bank targeting and associated metadata or diagnostics needed to interpret the result.

eyeprocess_irt_test_characteristic_curve

Test characteristic curve for dichotomous item parameters

Description

Test characteristic curve for dichotomous item parameters

Usage

```
eyeprocess_irt_test_characteristic_curve(theta, items, D = 1)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
items	Item-parameter data frame or item collection.
D	Logistic scaling constant.

Value

An object of class "eye_irt_test_characteristic_curve", "data.frame", stored as a data frame, containing characteristic curve for dichotomous item parameters and associated metadata needed to interpret the result.

eyeprocess_irt_test_information

Compute a test information curve from item parameters

Description

Compute a test information curve from item parameters

Usage

```
eyeprocess_irt_test_information(theta, items, D = 1)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
items	Item-parameter data frame or item collection.
D	Logistic scaling constant.

Value

An object of class "eye_irt_information_profile", "data.frame", stored as a data frame, containing a test information curve from item parameters and associated metadata needed to interpret the result.

eyeprocess_irt_testlet_audit

Audit testlet sizes and singleton structures

Description

Audit testlet sizes and singleton structures

Usage

```
eyeprocess_irt_testlet_audit(spec, min_items = 2L)
```

Arguments

spec	Model, validation, or analysis specification object.
min_items	Minimum number of items required.

Value

A data frame containing testlet sizes and singleton structures. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_irt_testlet_spec

Declare a testlet structure for bifactor/two-tier IRT engines

Description

Declare a testlet structure for bifactor/two-tier IRT engines

Usage

```
eyeprocess_irt_testlet_spec(item_id, testlet, general_dimension = "general")
```

Arguments

`item_id`	Item identifier or vector of item identifiers.
`testlet`	Testlet membership identifier.
`general_dimension`	General dimension name or index.

Value

An object of class "eye_irt_testlet_spec", "data.frame", stored as a data frame, containing declare a testlet structure for bifactor/two-tier IRT engines and associated metadata needed to interpret the result.

eyeprocess_irt_threshold_order_audit

Audit ordered category thresholds

Description

Audit ordered category thresholds

Usage

```
eyeprocess_irt_threshold_order_audit(item_id, thresholds)
```

Arguments

`item_id`	Item identifier or vector of item identifiers.
`thresholds`	Ordered response-category thresholds.

Value

An object of class "eye_irt_threshold_audit", stored as a named list, with components "item_id", "thresholds", "ordered", "minimum_gap", "reversals". It contains ordered category thresholds and associated metadata or diagnostics needed to interpret the result.

eyeprocess_joint_process_irt_spec

Declare a response/process joint IRT specification

Description

Declare a response/process joint IRT specification

Usage

```
eyeprocess_joint_process_irt_spec(
  response_family = c("2pl", "rasch", "grm", "gpcm"),
  time_model = c("none", "lognormal", "custom"),
  process_channels = c("dwell", "pupil", "transitions"),
  person_covariates = character(),
  item_covariates = character(),
  missingness = c("ignorable", "modeled", "gated"),
  status = c("experimental", "reference", "gated")
)
```

Arguments

`response_family` Response-model family.

`time_model` Response-time model specification.

`process_channels` Declared process-measure channels.

`person_covariates` Person-level covariates.

`item_covariates` Item-level covariates.

`missingness` Missing-data handling or missingness specification.

`status` Evidence, model, or governance status.

Value

An object of class "eye_joint_process_irt_spec", stored as a named list, with components "response_family", "time_model", "process_channels", "person_covariates", "item_covariates", "missingness", "status". It contains declare a response/process joint IRT specification and associated metadata or diagnostics needed to interpret the result.

eyeprocess_mirt_directional_information

Directional multidimensional 2PL information

Description

Directional multidimensional 2PL information

Usage

```
eyeprocess_mirt_directional_information(
  theta,
  discrimination,
  difficulty = 0,
  direction = NULL,
  D = 1
)
```

Arguments

theta	Latent-trait value or vector of latent-trait values.
discrimination	Discrimination vector or matrix.
difficulty	Item difficulty or location parameter.
direction	Direction vector used to project multidimensional information.
D	Logistic scaling constant.

Value

A numeric value or vector containing directional multidimensional 2PL information.

eyeprocess_mirt_information_matrix

Multidimensional 2PL item information matrix

Description

Multidimensional 2PL item information matrix

Usage

```
eyeprocess_mirt_information_matrix(
  theta,
  discrimination,
  difficulty = 0,
  D = 1
)
```

Arguments

`theta`	Latent-trait value or vector of latent-trait values.
`discrimination`	Discrimination vector or matrix.
`difficulty`	Item difficulty or location parameter.
`D`	Logistic scaling constant.

Value

A numeric value or vector containing multidimensional 2PL item information matrix.

`eyeprocess_mirt_loading_audit` *Audit multidimensional IRT loading coverage*

Description

Audit multidimensional IRT loading coverage

Usage

```
eyeprocess_mirt_loading_audit(spec, min_items_per_dimension = 3L)
```

Arguments

`spec`	Model, validation, or analysis specification object.
`min_items_per_dimension`	Minimum number of items required per dimension.

Value

A data frame containing multidimensional IRT loading coverage. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_mirt_loading_spec

Declare a multidimensional IRT loading structure

Description

Declare a multidimensional IRT loading structure

Usage

```
eyeprocess_mirt_loading_spec(
  items,
  loadings,
  dimension_names = colnames(loadings),
  simple_structure = FALSE
)
```

Arguments

`items`	Item-parameter data frame or item collection.
`loadings`	Item-by-dimension loading matrix.
`dimension_names`	Optional names for latent dimensions.
`simple_structure`	Whether a simple-structure loading pattern is required.

Value

An object of class "eye_mirt_loading_spec", stored as a named list, with components "items", "loadings", "dimensions", "simple_structure", "violations". It contains declare a multidimensional IRT loading structure and associated metadata or diagnostics needed to interpret the result.

eyeprocess_multichannel_measurement_map

Construct a multichannel measurement map

Description

Construct a multichannel measurement map

Usage

```
eyeprocess_multichannel_measurement_map(
  response = "accuracy",
  channels = c("response_time", "dwell", "pupil", "transitions"),
  role = NULL
)
```

Arguments

response	Observed item response or response variable.
channels	Names or definitions of measurement channels.
role	Declared role of each measurement channel.

Value

A data frame containing a multichannel measurement map. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

eyeprocess_negative_control_evidence_plan

Declare negative-control evidence targets

Description

Declare negative-control evidence targets

Usage

```
eyeprocess_negative_control_evidence_plan(
 controls = c("permutation", "temporal_shift", "placebo_window", "known_leakage"),
  replications = 100L,
  seed = 20260811L
)
```

Arguments

controls	Negative-control methods requested by the evidence plan.
replications	Number of simulation or validation replications.
seed	Random-number seed for reproducible execution.

Value

An object of class "eye_negative_control_evidence_plan", stored as a named list, with components "controls", "replications", "seed", "guardrail". It contains declare negative-control evidence targets and associated metadata or diagnostics needed to interpret the result.

eyeprocess_negative_control_evidence_table

Build a paper-ready negative-control table

Description

Build a paper-ready negative-control table

Usage

```
eyeprocess_negative_control_evidence_table(x, digits = 4L)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
digits	Number of decimal digits used for presentation.

Value

An R object containing a paper-ready negative-control table. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

eyeprocess_process_irt_data_bundle

Prepare a sparse response/process bundle for external joint engines

Description

Prepare a sparse response/process bundle for external joint engines

Usage

```
eyeprocess_process_irt_data_bundle(
  data,
  person,
  item,
  response,
  response_time = NULL,
  process = character(),
  covariates = character()
)
```

Arguments

`data`	Input data frame, matrix, or compatible analysis object.
`person`	Name of the person identifier column.
`item`	Name of the item identifier column.
`response`	Observed item response or response variable.
`response_time`	Response-time variable or values.
`process`	Process-measure columns or process object.
`covariates`	Optional covariate columns or covariate data.

Value

An object of class "eye_process_irt_data_bundle", stored as a named list, with components "data", "person", "item", "response", "response_time", "process", "covariates", "n_persons", "n_items". It contains a sparse response/process bundle for external joint engines and associated metadata or diagnostics needed to interpret the result.

`eyeprocess_process_item_profile` *Aggregate process channels by item*

Description

Aggregate process channels by item

Usage

```
eyeprocess_process_item_profile(data, item, channels)
```

Arguments

`data`	Input data frame, matrix, or compatible analysis object.
`item`	Name of the item identifier column.
`channels`	Names or definitions of measurement channels.

Value

A tabular R object containing aggregate process channels by item; rows represent analysis units and columns contain the returned quantities.

eyeprocess_process_missingness_pattern

Summarise missingness patterns across response and process channels

Description

Summarise missingness patterns across response and process channels

Usage

```
eyeprocess_process_missingness_pattern(data, response, channels)
```

Arguments

data	Input data frame, matrix, or compatible analysis object.
response	Observed item response or response variable.
channels	Names or definitions of measurement channels.

Value

A data frame containing missingness patterns across response and process channels. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_process_person_profile

Aggregate process channels by person

Description

Aggregate process channels by person

Usage

```
eyeprocess_process_person_profile(data, person, channels)
```

Arguments

data	Input data frame, matrix, or compatible analysis object.
person	Name of the person identifier column.
channels	Names or definitions of measurement channels.

Value

A tabular R object containing aggregate process channels by person; rows represent analysis units and columns contain the returned quantities.

eyeprocess_recovery_evidence_table

Build a paper-ready parameter-recovery table

Description

Build a paper-ready parameter-recovery table

Usage

```
eyeprocess_recovery_evidence_table(x, digits = 4L)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
digits	Number of decimal digits used for presentation.

Value

An R object containing a paper-ready parameter-recovery table. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

eyeprocess_reliability_evidence_plan

Declare reliability evidence targets

Description

Declare reliability evidence targets

Usage

```
eyeprocess_reliability_evidence_plan(
  metrics = c("split_half", "icc", "temporal_stability", "bland_altman"),
  bootstrap = 200L,
  seed = 20260811L
)
```

Arguments

metrics	Reliability metrics requested by the evidence plan.
bootstrap	Number of bootstrap replicates or bootstrap configuration.
seed	Random-number seed for reproducible execution.

Value

An object of class "eye_reliability_evidence_plan", stored as a named list, with components "metrics", "bootstrap", "seed", "guardrail". It contains declare reliability evidence targets and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_reliability_evidence_table

Build a paper-ready reliability table

Description

Build a paper-ready reliability table

Usage

```
eyeprocess_reliability_evidence_table(x, digits = 4L)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
digits	Number of decimal digits used for presentation.

Value

An R object containing a paper-ready reliability table. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

eyeprocess_response_time_profile

Summarise response-time structure for joint IRT work

Description

Summarise response-time structure for joint IRT work

Usage

```
eyeprocess_response_time_profile(data, person, item, response_time)
```

Arguments

data	Input data frame, matrix, or compatible analysis object.
person	Name of the person identifier column.
item	Name of the item identifier column.
response_time	Response-time variable or values.

Value

An object of class "eye_response_time_profile", stored as a named list, with components "item", "person", "n". It contains response-time structure for joint IRT work and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_sbc_evidence_table

Build a paper-ready SBC table

Description

Build a paper-ready SBC table

Usage

```
eyeprocess_sbc_evidence_table(x, digits = 4L)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
digits	Number of decimal digits used for presentation.

Value

An R object containing a paper-ready SBC table. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

eyeprocess_speed_accuracy_profile

Describe speed-accuracy association without causal interpretation

---

Description

Describe speed-accuracy association without causal interpretation

Usage

```
eyeprocess_speed_accuracy_profile(data, person, response, response_time)
```

Arguments

data	Input data frame, matrix, or compatible analysis object.
person	Name of the person identifier column.
response	Observed item response or response variable.
response_time	Response-time variable or values.

Value

An object of class "eye_speed_accuracy_profile", stored as a named list, with components "person", "pooled_correlation", "guardrail". It contains describe speed-accuracy association without causal interpretation and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_stress_evidence_plan

Declare the Milestone #2 measurement-quality stress evidence plan

---

Description

Declare the Milestone #2 measurement-quality stress evidence plan

Usage

```
eyeprocess_stress_evidence_plan(
  missing_gaze = c(0, 0.05, 0.15, 0.3),
  pupil_dropout = c(0, 0.05, 0.15),
  calibration_offset = c(0, 0.01, 0.03, 0.06),
  sampling_jitter = c(0, 0.05, 0.15),
  aoi_label_noise = c(0, 0.02, 0.1),
  device_shift = c(0, 0.02, 0.05),
  trial_imbalance = c(0, 0.1, 0.25),
  seed = 20260811L
)
```

Arguments

`missing_gaze`	Severity level for synthetic gaze missingness.
`pupil_dropout`	Severity level for synthetic pupil dropout.
`calibration_offset`	Magnitude of synthetic calibration offset.
`sampling_jitter`	Magnitude of synthetic sampling-time jitter.
`aoi_label_noise`	Rate of synthetic AOI-label corruption.
`device_shift`	Magnitude of synthetic device shift.
`trial_imbalance`	Severity of synthetic trial imbalance.
`seed`	Random-number seed for reproducible execution.

Value

An object of class "eye_stress_evidence_plan", stored as a named list, with components "seed". It contains declare the Milestone #2 measurement-quality stress evidence plan and associated metadata or diagnostics needed to interpret the result.

eyeprocess_stress_evidence_table

Build a paper-ready stress-test table

Description

Build a paper-ready stress-test table

Usage

```
eyeprocess_stress_evidence_table(x, digits = 4L)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
digits	Number of decimal digits used for presentation.

Value

An R object containing a paper-ready stress-test table. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

eyeprocess_validation_atlas_gaps

Summarise gaps in a validation evidence atlas

Description

Summarise gaps in a validation evidence atlas

Usage

```
eyeprocess_validation_atlas_gaps(atlas)
```

Arguments

atlas	Validation-evidence atlas object.

Value

A named list with components "missing_components", "unresolved_claims", "complete", containing gaps in a validation evidence atlas and associated metadata or diagnostics.

eyeprocess_validation_claim_matrix

Build a machine-readable validation claim/evidence matrix

Description

Build a machine-readable validation claim/evidence matrix

Usage

```
eyeprocess_validation_claim_matrix(
  claim_id,
  claim,
  evidence_id,
  evidence_type,
  status = "qualified",
  boundary = NA_character_
)
```

Arguments

claim_id	Unique identifier for the claim.
claim	Text of the software-validation claim.
evidence_id	Identifier of evidence supporting or testing the claim.
evidence_type	Type or class of evidence.
status	Evidence, model, or governance status.
boundary	Explicit interpretation or scope boundary for the claim.

Value

A data frame containing a machine-readable validation claim/evidence matrix. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

eyeprocess_validation_evidence_atlas

Assemble a validation evidence atlas

Description

The atlas is an organizational object. It preserves links between claims, software-validation results, figures, tables, and provenance; it does not upgrade software-validation evidence into construct-validity evidence.

Usage

```
eyeprocess_validation_evidence_atlas(
  claims,
  recovery = NULL,
  sbc = NULL,
  stress = NULL,
  reliability = NULL,
  negative_controls = NULL,
  irt = NULL,
  provenance = NULL,
  artifacts = NULL
)
```

Arguments

`claims`	Claim-evidence mapping table.
`recovery`	Parameter-recovery evidence object or table.
`sbc`	Simulation-based-calibration evidence object or table.
`stress`	Measurement-stress evidence object or table.
`reliability`	Reliability or repeatability evidence object or table.
`negative_controls`	Negative-control evidence object or table.
`irt`	IRT-specific evidence object or table.
`provenance`	Provenance metadata or provenance object.
`artifacts`	Artifact table or file-index information.

Value

An object of class "eye_validation_evidence_atlas", stored as a named list, with components "claims", "components", "component_status", "coverage", "hash", "guardrail". It contains assemble a validation evidence atlas and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_validation_evidence_grade

Grade the completeness of validation evidence

Description

Grade the completeness of validation evidence

Usage

```
eyeprocess_validation_evidence_grade(
  components,
  required = c("design", "execution", "summary", "provenance", "hash")
)
```

Arguments

`components`	Named evidence components.
`required`	Required evidence components or requirements.

Value

An object of class "eye_validation_evidence_grade", stored as a named list, with components "grade", "required", "present", "coverage". It contains grade the completeness of validation evidence and associated metadata or diagnostics needed to interpret the result.

`eyeprocess_validation_evidence_index` *Create an index over frozen validation evidence artifacts*

Description

Create an index over frozen validation evidence artifacts

Usage

```
eyeprocess_validation_evidence_index(root, recursive = TRUE)
```

Arguments

`root`	Root directory for evidence indexing.
`recursive`	Whether evidence files are indexed recursively.

Value

A data frame containing an index over frozen validation evidence artifacts. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`eyeprocess_validation_evidence_manifest` *Create an evidence manifest from files and in-memory objects*

Description

Create an evidence manifest from files and in-memory objects

Usage

```
eyeprocess_validation_evidence_manifest(
  files = character(),
  objects = list(),
  source_commit = NA_character_,
  label = "eyeprocess-0.9-m2"
)
```

Arguments

`files`	File paths to include in the evidence manifest.
`objects`	Objects to include in the evidence manifest.
`source_commit`	Source-control commit associated with the evidence.
`label`	Human-readable label.

Value

An object of class "eye_validation_evidence_manifest", stored as a named list, with components "label", "source_commit", "files", "objects", "generated_at". It contains an evidence manifest from files and in-memory objects and associated metadata or diagnostics needed to interpret the result.

---

eyeprocess_validation_plan

Declare an eyeprocess validation-evidence plan

Description

Creates a deterministic validation plan. The plan describes software-validation scenarios and does not constitute evidence for the construct validity of any gaze, pupil, response-time, or psychometric measure.

Usage

```
eyeprocess_validation_plan(
  families = c("recovery", "sbc", "stress", "reliability", "negative_control"),
  sample_size = c(250L, 750L),
  n_items = c(12L, 24L),
  missing_rate = c(0, 0.15),
  noise_level = c("reference", "elevated"),
  specification = c("correct", "misspecified"),
  replications = 20L,
  seed = 20260811L,
  label = "eyeprocess-0.9-m2"
)
```

Arguments

`families`	Validation-evidence families to include.
`sample_size`	Validation sample size or vector of sample sizes.
`n_items`	Number of items.
`missing_rate`	Proportion of responses or observations set missing.
`noise_level`	Declared simulation noise regime.
`specification`	Whether the validation scenario is correctly specified or deliberately misspecified.
`replications`	Number of simulation or validation replications.
`seed`	Random-number seed for reproducible execution.
`label`	Human-readable label.

Value

An object of class "eye_validation_evidence_plan", stored as a named list, with components "families", "sample_size", "n_items", "missing_rate", "noise_level", "specification", "replications", "seed", "label". It contains declare an eyeprocess validation-evidence plan and associated metadata or diagnostics needed to interpret the result.

`eyeprocess_validation_readiness` *Evaluate readiness of a Milestone #2 validation evidence bundle*

Description

Evaluate readiness of a Milestone #2 validation evidence bundle

Usage

```
eyeprocess_validation_readiness(
  x,
 required = c("design", "recovery", "stress", "reliability", "negative_controls",
    "claims", "provenance")
)
```

Arguments

`x`	Object to validate, summarize, verify, or otherwise process.
`required`	Required evidence components or requirements.

Value

An object of class "eye_validation_readiness", stored as a named list, with components "ready", "table", "hash_valid", "source_commit". It contains readiness of a Milestone #2 validation evidence bundle and associated metadata or diagnostics needed to interpret the result.

eyeprocess_validation_release_gate

Apply a conservative software-release evidence gate

Description

Apply a conservative software-release evidence gate

Usage

```
eyeprocess_validation_release_gate(
  readiness,
  acceptance = NULL,
  require_hash = TRUE
)
```

Arguments

readiness	Validation-readiness result.
acceptance	Acceptance-rule results.
require_hash	Whether a verified integrity hash is required.

Value

An object of class "eye_validation_release_gate", stored as a named list, with components "pass", "readiness", "acceptance", "hash", "interpretation". It contains a conservative software-release evidence gate and associated metadata or diagnostics needed to interpret the result.

eyeprocess_validation_seed

Derive a deterministic bounded validation seed

Description

Derive a deterministic bounded validation seed

Usage

```
eyeprocess_validation_seed(master_seed, index, stream = 0L)
```

Arguments

master_seed	Master random-number seed.
index	Deterministic substream index.
stream	Named random-number stream.

Value

A numeric value or vector containing a deterministic bounded validation seed.

---

facet_effects *Extract facet effects from a many-facet process model*

Description

Extract facet effects from a many-facet process model

Usage

```
facet_effects(object, channel = c("response", "process"))
```

Arguments

object	A fitted eyeprocess model or audit object.
channel	Measurement channel to inspect.

Value

A named list with components "random_effects", "variance_components", containing facet effects from a many-facet process model and associated metadata or diagnostics.

---

field_fidelity_report *Field-level semantic fidelity report*

Description

Classifies canonical fields after a semantic round trip. Character fields are compared exactly after NA preservation; numeric fields are compared directly and also tested for a stable affine transform.

Usage

```
field_fidelity_report(
  source,
  roundtrip,
  fields = NULL,
  mapping = NULL,
  key = NULL,
  tolerance = 1e-08,
  spec = semantic_fidelity_spec()
)
```

Arguments

`source`	Original canonical data.
`roundtrip`	Canonical data reconstructed after an interchange round trip.
`fields`	Fields to compare. Defaults to common fields.
`mapping`	Optional named character vector mapping source field names to round-trip field names.
`key`	Optional unique row-alignment fields.
`tolerance`	Numeric equality tolerance.
`spec`	A ‘semantic_fidelity_spec()‘ object.

Value

An object of class ‘eye_field_fidelity_report‘.

`file_hash_manifest` *Build a file hash manifest*

Description

Build a file hash manifest

Usage

```
file_hash_manifest(paths, algorithm = c("md5", "sha256"))
```

Arguments

`paths`	File paths.
`algorithm`	Hash algorithm; currently ‘md5‘ uses base R, ‘sha256‘ uses openssl when available.

Value

A data frame containing a file hash manifest. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

filter_eye_signal *Filter a one-dimensional eye signal robustly*

Description

Filter a one-dimensional eye signal robustly

Usage

```
filter_eye_signal(
  signal,
  width = 9L,
  method = c("auto", "robfilter", "runmed"),
  online = TRUE
)
```

Arguments

signal	Numeric signal.
width	Median-filter width.
method	‘auto‘, ‘robfilter‘, or ‘runmed‘.
online	Passed to ‘robfilter::med.filter()‘ when used.

Value

An ‘eye_signal_filter_audit‘ object.

filter_pupil_signal *Filter pupil signal robustly*

Description

Filter pupil signal robustly

Usage

```
filter_pupil_signal(...)
```

Arguments

...	Additional arguments passed to the underlying method or helper.

Value

An R object containing filter pupil signal robustly. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

find_process_measures *Find process measures by channel, level, status, or text*

Description

Find process measures by channel, level, status, or text

Usage

```
find_process_measures(
  registry = process_measure_registry(),
  channel = NULL,
  level = NULL,
  status = NULL,
  query = NULL
)
```

Arguments

registry	Registry.
channel	Optional channel filter.
level	Optional level pattern.
status	Optional status filter.
query	Optional text query.

Value

A tabular R object containing find process measures by channel, level, status, or text; rows represent analysis units and columns contain the returned quantities.

fingerprint_validation_case *Fingerprint every file in a validation case*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fingerprint_validation_case(path, algorithms = c("md5", "sha256"),
  include_hidden = FALSE)
```

Arguments

`path`	File or directory.
`algorithms`	Hash algorithms. Base R always supplies MD5; SHA-256 is
`include_hidden`	Include hidden files.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`fit_aoi_growth_curve` *Fit a single AOI growth curve*

Description

Fit a single AOI growth curve

Usage

```
fit_aoi_growth_curve(data, time, outcome, degree = 3L)
```

Arguments

`data`	Data frame.
`time`	Time column.
`outcome`	Numeric AOI proportion/indicator column.
`degree`	Polynomial degree.

Value

An object of class "eye_aoi_growth_curve", stored as a named list, with components "model", "time", "outcome", "degree", "poly", "range", "status". It contains a single AOI growth curve and associated metadata or diagnostics needed to interpret the result.

fit_brms_adapter *fit brms adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_brms_adapter(formula, data, purpose, ...)
```

Arguments

formula	Value for ‘formula‘. See the function description and relevant article for constraints.
data	Value for ‘data‘. See the function description and relevant article for constraints.
purpose	Value for ‘purpose‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_censored_normal_process_irt *Conditional censored-normal calibration for bounded process measurements*

Description

Fits the 2026 censored-normal response form item-by-item conditional on a supplied latent score. This is a useful calibration/diagnostic engine for bounded continuous process variables such as AOI proportions. It is NOT the paper's full marginal EM estimator and should therefore remain experimental.

Usage

```
fit_censored_normal_process_irt(
  response_matrix,
  theta,
  lower = 0,
  upper = 1,
  control = list(maxit = 1000)
)
```

Arguments

`response_matrix`	Person x item bounded continuous matrix.
`theta`	Supplied person latent scores on the calibration scale.
`lower, upper`	Observable bounds.
`control`	‘optim()‘ control list.

Value

An object of class "eye_censored_normal_process_irt", stored as a named list, with components "coefficients", "fits", "theta", "lower", "upper", "engine", "status", "citation", "caveat". It contains conditional censored-normal calibration for bounded process measurements and associated metadata or diagnostics needed to interpret the result.

`fit_changepoint_multimodal_irt` *Fit a multimodal change-point IRT workflow*

Description

Fit a multimodal change-point IRT workflow

Usage

```
fit_changepoint_multimodal_irt(
  data,
  ...,
  gaze = "fixation_count",
  refit = TRUE
)
```

Arguments

`data`	Input data frame or compatible tabular object.
`...`	Additional arguments passed to the selected model, engine, or method.
`gaze`	Gaze/process variable or column name.
`refit`	Whether the model is refitted after segmentation.

Value

An object of class "eye_changepoint_multimodal_irt", stored as a named list, with components "changepoints", "refit_requested", "status". It contains a multimodal change-point IRT workflow and associated metadata or diagnostics needed to interpret the result.

fit_changepoint_rt_irt

Fit a change-point RT IRT workflow

Description

Fit a change-point RT IRT workflow

Usage

```
fit_changepoint_rt_irt(data, ..., refit = TRUE)
```

Arguments

data	Input data frame or compatible tabular object.
...	Additional arguments passed to the selected model, engine, or method.
refit	Whether the model is refitted after segmentation.

Value

An object of class "eye_changepoint_rt_irt", stored as a named list, with components "changepoints", "refit_requested", "status". It contains a change-point RT IRT workflow and associated metadata or diagnostics needed to interpret the result.

fit_cognitive_diagnosis_process

Cognitive-diagnosis model with process indicators

Description

Uses GDINA for the response layer when available and retains process features as a parallel diagnostic channel. Process/mastery associations are reported descriptively and do not redefine the Q-matrix or skill labels.

Usage

```
fit_cognitive_diagnosis_process(
  response_matrix,
  q_matrix,
  process_data = NULL,
  process_features = NULL,
  person_id = NULL,
  engine = c("GDINA", "external"),
  external_engine = NULL,
  ...
)
```

Arguments

`response_matrix`
: Person-by-item response matrix.

`q_matrix`
: Q-matrix for cognitive-diagnosis modeling.

`process_data`
: Process-data input used by the model.

`process_features`
: Names of process-derived features.

`person_id`
: Person or participant identifier.

`engine`
: Estimation engine.

`external_engine`
: Validated external fitting function.

`...`
: Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_cognitive_diagnosis_process", stored as a named list, with components "response_model", "process_summary", "process_mastery_correlation", "q_matrix", "status". It contains cognitive-diagnosis model with process indicators and associated metadata or diagnostics needed to interpret the result.

---

fit_continuous_time_irt

Continuous-time IRT external-engine gate

Description

Continuous-time IRT external-engine gate

Usage

```
fit_continuous_time_irt(data, external_engine = NULL, ...)
```

Arguments

`data`
: Input data frame or compatible tabular object.

`external_engine`
: Validated external fitting function.

`...`
: Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_continuous_time_irt", stored as a named list, with components "model", "status". It contains continuous-time IRT external-engine gate and associated metadata or diagnostics needed to interpret the result.

fit_crossclassified_process_irt

Cross-classified process IRT reference model

Description

Treats the process outcome as repeated evidence crossed by person and item, with optional contextual grouping factors. This is useful when process events themselves, not only item summaries, are the observations.

Usage

```
fit_crossclassified_process_irt(
  data,
  outcome,
  person = "participant_id",
  item = "item_id",
  context = NULL,
  family = c("gaussian", "binomial", "poisson", "negative_binomial"),
  fixed = NULL
)
```

Arguments

`data`	Input data frame or compatible tabular object.
`outcome`	Outcome variable.
`person`	Person or participant identifier column.
`item`	Item identifier, name, or item column.
`context`	Context or grouping variable.
`family`	Statistical family used by the channel or model.
`fixed`	Fixed-effects specification.

Value

An object of class "eye_crossclassified_process_irt", stored as a named list, with components "model", "family", "person", "item", "context", "status". It contains cross-classified process IRT reference model and associated metadata or diagnostics needed to interpret the result.

fit_crossclassified_process_irt_mhrm

Create a gated scalable cross-classified MH-RM process IRT interface

Description

Create a gated scalable cross-classified MH-RM process IRT interface

Usage

```
fit_crossclassified_process_irt_mhrm(data, engine = NULL, ...)
```

Arguments

data	Data supplied to an optional external engine.
engine	Optional estimator implementing the intended scalable MH-RM model.
...	Passed to engine.

Value

An object of class "eye_gated_process_model", stored as a named list, with components "id", "purpose", "required_evidence", "engine", "fit", "status", "notes", "caveat". It contains a gated scalable cross-classified MH-RM process IRT interface and associated metadata or diagnostics needed to interpret the result.

fit_device_linking

Cross-device and cross-vendor metric linking

Description

Cross-device and cross-vendor metric linking. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
fit_device_linking(x, metric, reference_device, method = c("mixed_bland_altman",
  "hierarchical", "equipercentile"), device_col = "device", id_cols = c("person_id",
  "item_id"))
apply_device_linking(x, linking_model, metric = NULL, device_col = NULL,
  output_col = NULL)
audit_device_equivalence(x, equivalence_margin, by = c("metric", "task", "aoi"))
estimate_device_specific_error(x)
plot_device_agreement(x, ...)
plot_device_bias_by_magnitude(x, ...)
```

```
plot_device_transfer_curve(x, ...)
plot_device_equivalence_intervals(x, ...)
plot_cross_vendor_metric_matrix(x, ...)
```

Arguments

- `x` Input object or data structure appropriate for the selected analysis.
- `metric` Argument controlling ‘metric‘; see the function usage and returned audit metadata.
- `reference_device` Argument controlling ‘reference_device‘; see the function usage and returned audit metadata.
- `method` Argument controlling ‘method‘; see the function usage and returned audit metadata.
- `device_col` Argument controlling ‘device_col‘; see the function usage and returned audit metadata.
- `id_cols` Argument controlling ‘id_cols‘; see the function usage and returned audit metadata.
- `linking_model` Argument controlling ‘linking_model‘; see the function usage and returned audit metadata.
- `output_col` Argument controlling ‘output_col‘; see the function usage and returned audit metadata.
- `equivalence_margin` Argument controlling ‘equivalence_margin‘; see the function usage and returned audit metadata.
- `by` Argument controlling ‘by‘; see the function usage and returned audit metadata.
- `...` Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

fit_diffirt_adapter *Fit a diffusion IRT adapter*

Description

Fit a diffusion IRT adapter

Usage

```
fit_diffirt_adapter(x, model = c("D", "Q"), ...)
```

Arguments

x	An ‘eye_dataset‘.
model	Diffusion IRT model, ‘"D"‘ or ‘"Q"‘.
...	Passed to ‘diffIRT::diffIRT()‘.

Value

An ‘eyeprocess_model‘.

fit_diffirt_engine_adapter *fit diffirt engine adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_diffirt_engine_adapter(data, purpose, ...)
```

Arguments

data	Value for ‘data‘. See the function description and relevant article for constraints.
purpose	Value for ‘purpose‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_dynamic_gpirt *Dynamic GPIRT external-engine gate*

Description

Dynamic GPIRT external-engine gate

Usage

```
fit_dynamic_gpirt(data, external_engine = NULL, ...)
```

Arguments

data	Input data frame or compatible tabular object.
external_engine	Validated external fitting function.
...	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_dynamic_gpirt", stored as a named list, with components "model", "engine", "status". It contains dynamic GPIRT external-engine gate and associated metadata or diagnostics needed to interpret the result.

fit_dynamic_irtree *Fit a dynamic gaze-state response-tree model*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_dynamic_irtree(x, spec = dynamic_irtree_spec(), min_transitions = 10L, seed = 1L,
  ...)
```

Arguments

x	An ‘eye_dataset‘ or transition/long-state data frame.
spec	Dynamic IRTree specification.
min_transitions	Minimum support per destination for baseline logits.
seed	Random seed for probabilistic engines.
...	Engine-specific arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

fit_dynamic_irtree_stan *Fit an optional CmdStan dynamic-transition model*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_dynamic_irtree_stan(design, spec, seed = 1L, refresh = 0L, output_dir = NULL, ...)
```

Arguments

design	Transition design.
spec	Dynamic IRTree specification.
seed	Random seed.
refresh	CmdStan refresh interval.
output_dir	Optional CmdStan output directory.
...	Additional arguments to ‘CmdStanModel$sample()‘.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

fit_event_time_irt *Fit an event-time IRT reference workflow*

Description

The built-in Cox reference conditions on an already supplied theta and is therefore an event-time *measurement diagnostic*, not a full continuous-time latent-trait estimator. A validated exact implementation can be supplied via ‘external_engine‘.

Usage

```
fit_event_time_irt(
  data,
  event_time = "event_time",
  event = "event",
  theta = "theta",
  person = "participant_id",
  item = "item_id",
  engine = c("cox_reference", "external"),
  external_engine = NULL,
  ...
)
```

Arguments

`data`	Long event/item data.
`event_time`	Time-to-event column.
`event`	Event indicator (1 event, 0 censored).
`theta`	Supplied latent-trait column for the reference engine.
`person`, `item`	Person and item identifiers.
`engine`	‘cox_reference‘ or ‘external‘.
`external_engine`	Function implementing a study-specific event-time IRT.
`...`	Additional arguments passed to the external engine.

Value

An object of class "eye_event_time_irt", stored as a named list, with components "model", "engine", "theta_conditioned", "status", "note". It contains an event-time IRT reference workflow and associated metadata or diagnostics needed to interpret the result.

`fit_external_engine` *Fit an external model engine through a stable adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_external_engine(engine, data, specification = NULL, purpose, ...)
```

Arguments

`engine`	Engine name.
`data`	Engine-ready data.
`specification`	Engine-specific specification.
`purpose`	Declared scientific purpose.
`...`	Engine arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`fit_eyeprocess_erm` *Fit an eRm Rasch-family model without fallback substitution*

Description

Fit an eRm Rasch-family model without fallback substitution

Usage

```
fit_eyeprocess_erm(data, model = c("RM", "PCM"), ..., engine = "eRm")
```

Arguments

`data`	Input data frame, matrix, or compatible analysis object.
`model`	Model specification passed to the selected external engine.
`...`	Additional arguments passed to the selected method or external engine.
`engine`	Requested estimation or analysis engine.

Value

An object of class "eye_external_irt_fit", stored as a named list, with components "status", "engine", "fit", "call". It contains an eRm Rasch-family model without fallback substitution and associated metadata or diagnostics needed to interpret the result.

fit_eyeprocess_gdina *Fit a G-DINA cognitive-diagnosis model without fallback substitution*

Description

Fit a G-DINA cognitive-diagnosis model without fallback substitution

Usage

```
fit_eyeprocess_gdina(dat, Q, model = "GDINA", ..., engine = "GDINA")
```

Arguments

dat	Response data supplied to the GDINA engine.
Q	Binary item-by-attribute Q-matrix.
model	Model specification passed to the selected external engine.
...	Additional arguments passed to the selected method or external engine.
engine	Requested estimation or analysis engine.

Value

An object of class "eye_external_irt_fit", stored as a named list, with components "status", "engine", "fit", "call". It contains a G-DINA cognitive-diagnosis model without fallback substitution and associated metadata or diagnostics needed to interpret the result.

fit_eyeprocess_lnirt *Fit a joint response/response-time LNIRT model without fallback substitution*

Description

Fit a joint response/response-time LNIRT model without fallback substitution

Usage

```
fit_eyeprocess_lnirt(Y, RT, quadratic = FALSE, ..., engine = "LNIRT")
```

Arguments

Y	Item-response matrix supplied to LNIRT.
RT	Response-time matrix supplied to LNIRT.
quadratic	Whether the LNIRT quadratic option is requested.
...	Additional arguments passed to the selected method or external engine.
engine	Requested estimation or analysis engine.

Value

An object of class "eye_external_irt_fit", stored as a named list, with components "status", "engine", "fit", "call", "rt_scale". It contains a joint response/response-time LNIRT model without fallback substitution and associated metadata or diagnostics needed to interpret the result.

---

fit_eyeprocess_mirt *Fit a model with mirt without substituting another estimator*

Description

Fit a model with mirt without substituting another estimator

Usage

```
fit_eyeprocess_mirt(data, model = 1, itemtype = "2PL", ..., engine = "mirt")
```

Arguments

data	Input data frame, matrix, or compatible analysis object.
model	Model specification passed to the selected external engine.
itemtype	Item type specification for mirt.
...	Additional arguments passed to the selected method or external engine.
engine	Requested estimation or analysis engine.

Value

An object of class "eye_external_irt_fit", stored as a named list, with components "status", "engine", "fit", "call". It contains a model with mirt without substituting another estimator and associated metadata or diagnostics needed to interpret the result.

---

fit_eyeprocess_tam *Fit a TAM model without substituting another estimator*

Description

Fit a TAM model without substituting another estimator

Usage

```
fit_eyeprocess_tam(
  resp,
  model = c("rasch", "2pl", "gpcm"),
  ...,
  engine = "TAM"
)
```

Arguments

`resp`	Response matrix supplied to TAM.
`model`	Model specification passed to the selected external engine.
`...`	Additional arguments passed to the selected method or external engine.
`engine`	Requested estimation or analysis engine.

Value

An object of class "eye_external_irt_fit", stored as a named list, with components "status", "engine", "fit", "call". It contains a TAM model without substituting another estimator and associated metadata or diagnostics needed to interpret the result.

`fit_eyetrackingr_adapter` *fit eyetrackingr adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_eyetrackingr_adapter(data, purpose, ...)
```

Arguments

`data`	Value for ‘data‘. See the function description and relevant article for constraints.
`purpose`	Value for ‘purpose‘. See the function description and relevant article for constraints.
`...`	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_fixation_point_process

Spatio-temporal fixation point-process models

Description

Spatio-temporal fixation point-process models. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
fit_fixation_point_process(x, spatial_covariates = NULL, temporal_covariates = NULL,
  interaction = c("none", "self_exciting"), x_col = "x", y_col = "y",
  time_col = "time", grid_size = 20)
fit_marked_gaze_process(x, marks = c("duration", "pupil", "saccade_amplitude"),
  x_col = "x", y_col = "y", time_col = "time")
predict_fixation_intensity(model, new_stimulus = NULL)
diagnose_gaze_point_process(model)
plot_fixation_intensity(x, ...)
plot_spatial_residuals(x, ...)
plot_temporal_excitation_kernel(x, ...)
plot_covariate_effect_surface(x, ...)
plot_observed_expected_fixations(x, ...)
```

Arguments

`x` Input object or data structure appropriate for the selected analysis.

`spatial_covariates` Argument controlling ‘spatial_covariates‘; see the function usage and returned audit metadata.

`temporal_covariates` Argument controlling ‘temporal_covariates‘; see the function usage and returned audit metadata.

`interaction` Argument controlling ‘interaction‘; see the function usage and returned audit metadata.

`x_col` Argument controlling ‘x_col‘; see the function usage and returned audit metadata.

`y_col` Argument controlling ‘y_col‘; see the function usage and returned audit metadata.

`time_col` Argument controlling ‘time_col‘; see the function usage and returned audit metadata.

`grid_size` Argument controlling ‘grid_size‘; see the function usage and returned audit metadata.

`marks`	Argument controlling ‘marks‘; see the function usage and returned audit metadata.
`model`	Argument controlling ‘model‘; see the function usage and returned audit metadata.
`new_stimulus`	Argument controlling ‘new_stimulus‘; see the function usage and returned audit metadata.
`...`	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

`fit_flow_mirt` *Flow-MIRT external-engine gate*

Description

Flow-MIRT external-engine gate

Usage

```
fit_flow_mirt(response_matrix, external_engine = NULL, ...)
```

Arguments

`response_matrix`	Person-by-item response matrix.
`external_engine`	Validated external fitting function.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_flow_mirt", stored as a named list, with components "model", "status", "engine". It contains flow-MIRT external-engine gate and associated metadata or diagnostics needed to interpret the result.

fit_functional_pupil_stan

Fit the bundled joint functional pupil-IRT Stan model

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_functional_pupil_stan(prepared, basis_matrix = NULL, seed = 1L, refresh = 0L,
  output_dir = NULL, ...)
```

Arguments

prepared	Prepared functional pupil data.
basis_matrix	Functional basis matrix.
seed	Random seed.
refresh	CmdStan refresh interval.
output_dir	Optional CmdStan output directory.
...	Additional sampling arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_gaze_anchored_3pl_audit

Fit a standard 3PL and audit lower-asymptote alignment with process evidence

Description

Fits a conventional 3PL response model with ‘mirt‘, then aligns the fitted lower-asymptote parameter with item-level gaze/pupil/RT summaries. The alignment is descriptive and diagnostic. It must not be interpreted as a confirmatory detector of guessing, rapid responding, disengagement, or any other latent behavior without independent validation.

Usage

```
fit_gaze_anchored_3pl_audit(
  response_matrix,
  process_data = NULL,
  item = "item_id",
  process_features = c("ttff_ms", "dwell_ms", "pupil_bc", "pupil_peak", "rt_ms",
    "accuracy"),
  model = 1,
  SE = FALSE
)
```

Arguments

response_matrix	Person x item dichotomous response matrix.
process_data	Optional trial/person-item process table.
item	Item identifier in ‘process_data‘.
process_features	Candidate numeric process features.
model	mirt model specification.
SE	Request standard errors from ‘mirt‘.

Value

An ‘eye_gaze_anchored_3pl_audit‘ object.

---

fit_gaze_diffusion_irt

Fit a gaze-informed diffusion model

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_gaze_diffusion_irt(data, spec = gaze_diffusion_spec(), seed = 1L, ...)
```

Arguments

data	Trial-level data.
spec	Diffusion specification.
seed	Seed.
...	Engine arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

fit_gaze_diffusion_stan

Fit the CmdStan Wiener diffusion model

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_gaze_diffusion_stan(prepared, seed = 1L, refresh = 0L, output_dir = NULL, ...)
```

Arguments

prepared	Prepared data.
seed	Seed.
refresh	CmdStan refresh interval.
output_dir	Optional output directory.
...	Additional sampling arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

fit_gaze_informed_missingness_irt

Fit a gaze-informed missingness IRT diagnostic

Description

Fits a transparent two-part reference model: (1) whether an item response is missing and (2) the observed response, both conditional on a supplied latent trait (or a clearly labelled person-score proxy), item, and visual exposure. This is a diagnostic bridge to joint MNAR/process IRT, not a substitute for a fully joint latent missingness model.

Usage

```
fit_gaze_informed_missingness_irt(
  data,
  response = "response",
  person = "participant_id",
  item = "item_id",
  gaze_exposure = "gaze_exposure",
  theta = NULL,
  reached = NULL
)
```

Arguments

data	Long person-item data.
response	Response column; missing values identify omissions.
person, item	Person and item identifiers.
gaze_exposure	Non-negative visual-exposure measure.
theta	Optional latent-trait column. If ‘NULL‘, a smoothed person proportion-correct logit is used as an explicit proxy.
reached	Optional reached/not-reached indicator.

Value

An ‘eye_gaze_informed_missingness_irt‘ object.

---

fit_gdina_adapter *fit gdina adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_gdina_adapter(data, Q, model = "GDINA", purpose = "cognitive diagnosis", ...)
```

Arguments

data	Value for ‘data‘. See the function description and relevant article for constraints.
Q	Q-matrix with one row per item.
model	GDINA model specification used for eye-dataset inputs.
purpose	Declared scientific purpose for the external-engine contract.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

fit_gpirt *GPIRT model-criticism interface*

Description

‘external‘ is the only exact GPIRT path. ‘spline_reference‘ fits flexible logistic spline IRFs solely as a nonparametric stress test for conventional logistic IRF shape; it is deliberately not described as a Gaussian process.

Usage

```
fit_gpirt(
  response_matrix,
  engine = c("spline_reference", "external"),
  external_engine = NULL,
  spline_df = 5L,
  ...
)
```

Arguments

`response_matrix`	Person-by-item response matrix.
`engine`	Estimation engine.
`external_engine`	Validated external fitting function.
`spline_df`	Degrees of freedom for the spline reference model.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_gpirt", stored as a named list, with components "response_matrix", "models", "theta_proxy", "engine", "exact_gpirt", "status", "note". It contains gPIRT model-criticism interface and associated metadata or diagnostics needed to interpret the result.

fit_irt_model *Fit a registered multimodal IRT model*

Description

Fit a registered multimodal IRT model

Usage

```
fit_irt_model(spec, data, ..., allow_experimental = FALSE)
```

Arguments

spec	IRT model or validation specification.
data	Input data frame or compatible tabular object.
...	Additional arguments passed to the selected model, engine, or method.
allow_experimental	Whether experimental models are permitted.

Value

An R object containing a registered multimodal IRT model. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

fit_item_parameter_seed_model *Fit an experimental pre-pilot item-parameter seeding model*

Description

Estimates screening predictions for item difficulty/discrimination from item design/process features. Predictions are not calibrated operational parameters.

Usage

```
fit_item_parameter_seed_model(
  item_data,
  difficulty = "irt_difficulty",
  discrimination = "irt_discrimination",
  predictors,
  engine = c("auto", "ranger", "lm"),
  seed = 2221
)
```

Arguments

`item_data`	Calibrated item-level training data.
`difficulty`, `discrimination`	Target columns.
`predictors`	Design/process predictors.
`engine`	‘auto‘, ‘ranger‘, or ‘lm‘.
`seed`	Seed.

Value

An object of class "eye_item_parameter_seed", stored as a named list, with components "difficulty_model", "discrimination_model", "difficulty", "discrimination", "predictors", "engine", "training_data", "status", "caveat". It contains an experimental pre-pilot item-parameter seeding model and associated metadata or diagnostics needed to interpret the result.

`fit_joint_functional_pupil_irt` *Fit a functional pupil-informed IRT workflow*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_joint_functional_pupil_irt(x, spec = functional_pupil_irt_spec(), seed = 1L, ...)
```

Arguments

`x`	Eye dataset or long pupil data.
`spec`	Functional pupil specification.
`seed`	Random seed.
`...`	Engine-specific arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_joint_gaze_rt_irt *Joint response, response-time, and gaze-process IRT*

Description

The reference engine fits crossed person/item submodels for accuracy, log-response-time, and a gaze process, then returns person- and item-side latent-score covariance summaries. The ‘brms‘ engine uses multivariate formulas with shared group-level IDs so person/item random effects can be correlated across channels.

Usage

```
fit_joint_gaze_rt_irt(
  data,
  response = "response",
  rt = "rt",
  gaze = "fixation_count",
  person = "participant_id",
  item = "item_id",
  gaze_family = c("negative_binomial", "poisson"),
  engine = c("reference", "brms"),
  iter = 2000,
  chains = 4,
  cores = 1,
  seed = 1,
  ...
)
```

Arguments

`data`	Long person-by-item data.
`response`	Binary response variable.
`rt`	Positive response-time variable.
`gaze`	Gaze process variable, usually fixation count or dwell count.
`person`, `item`	Person and item identifiers.
`gaze_family`	Poisson or negative-binomial reference channel.
`engine`	‘reference‘ or ‘brms‘.
`iter`, `chains`, `cores`	Passed to brms.
`seed`	Random seed.
`...`	Additional arguments to the selected engine.

Value

An ‘eye_joint_gaze_rt_irt‘ object.

fit_joint_graded_rt_process_irt

Joint graded-response, RT, and process reference model

Description

Extends the 2026 graded-response/RT direction with an optional gaze/process channel. The bundled reference engine uses proportional-odds plus crossed RT and process submodels; it is explicitly experimental rather than a claim to reproduce the published SAEM estimator.

Usage

```
fit_joint_graded_rt_process_irt(
  data,
  response = "response",
  rt = "rt",
  process = "fixation_count",
  person = "participant_id",
  item = "item_id",
  engine = c("reference", "brms"),
  process_family = c("negative_binomial", "poisson", "gaussian"),
  iter = 2000,
  chains = 4,
  cores = 1,
  seed = 1,
  ...
)
```

Arguments

`data`	Input data frame or compatible tabular object.
`response`	Response variable or response-column name.
`rt`	Response-time variable or column name.
`process`	Process variable or column name.
`person`	Person or participant identifier column.
`item`	Item identifier, name, or item column.
`engine`	Estimation engine.
`process_family`	Distributional family for the process channel.
`iter`	Number of estimation iterations.
`chains`	Number of Bayesian chains.
`cores`	Number of processor cores.
`seed`	Random-number seed.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_joint_graded_rt_process_irt", stored as a named list, with components "engine", "response_model", "rt_model", "process_model", "data_n", "status", "note". It contains joint graded-response, RT, and process reference model and associated metadata or diagnostics needed to interpret the result.

---

fit_kde_latent_distribution_irt

Create a gated KDE latent-distribution IRT interface

Description

Create a gated KDE latent-distribution IRT interface

Usage

```
fit_kde_latent_distribution_irt(response_matrix, engine = NULL, ...)
```

Arguments

`response_matrix`	Response data supplied to an optional external engine.
`engine`	Optional function implementing the exact/nonparametric marginal likelihood estimator. If omitted, a gated specification is returned.
`...`	Passed to ‘engine‘ when supplied.

Value

An object of class "eye_gated_process_model", stored as a named list, with components "id", "purpose", "required_evidence", "engine", "fit", "status", "notes", "caveat". It contains a gated KDE latent-distribution IRT interface and associated metadata or diagnostics needed to interpret the result.

---

fit_latent_class_process_irt

Latent process-class IRT reference model

Description

Latent process-class IRT reference model

Usage

```
fit_latent_class_process_irt(
  data,
  response = "response",
  process_features,
  person = "participant_id",
  item = "item_id",
  n_classes = 2L,
  seed = 1
)
```

Arguments

data	Input data frame or compatible tabular object.
response	Response variable or response-column name.
process_features	Names of process-derived features.
person	Person or participant identifier column.
item	Item identifier, name, or item column.
n_classes	Number of latent classes.
seed	Random-number seed.

Value

An object of class "eye_latent_class_process_irt", stored as a named list, with components "response_model", "class", "centers", "data", "process_features", "status". It contains latent process-class IRT reference model and associated metadata or diagnostics needed to interpret the result.

---

fit_latent_space_irt *Fit a latent-space IRT model using LSMjml*

Description

Fit a latent-space IRT model using LSMjml

Usage

```
fit_latent_space_irt(
  response_matrix,
  dimensions = 2L,
  penalty = NULL,
  constraint = NULL,
  starts = NULL,
  tol = 0.001,
  silent = TRUE
)
```

Arguments

`response_matrix`	Person-by-item matrix with lowest score coded zero.
`dimensions`	Latent-space dimensionality.
`penalty`	Optional L2 penalty passed to ‘LSMjml::LSMfit()‘.
`constraint`	Optional norm constraint ‘C‘ passed to ‘LSMfit()‘.
`starts`	Starting-value strategy.
`tol`	Numerical convergence tolerance.
`silent`	Whether engine messages are suppressed.

Value

An object of class "eye_latent_space_irt", stored as a named list, with components "model", "person_coordinates", "item_coordinates", "person_intercept", "item_intercept", "dimensions", "engine", "status". It contains a latent-space IRT model using LSMjml and associated metadata or diagnostics needed to interpret the result.

`fit_lnirt_adapter` *fit lnirt adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_lnirt_adapter(data, purpose, ...)
```

Arguments

`data`	Value for ‘data‘. See the function description and relevant article for constraints.
`purpose`	Value for ‘purpose‘. See the function description and relevant article for constraints.
`...`	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_manyfacet_process_irt

Many-facet process IRT reference model

Description

Fits crossed random effects for available person, item, device, session, site, algorithm, and AOI-definition facets. For a binary response this is a generalized many-facet reference model; it is not marketed as a FACETS software replica.

Usage

```
fit_manyfacet_process_irt(
  data,
  response = "response",
  process = NULL,
  person = "participant_id",
  item = "item_id",
  device = NULL,
  session = NULL,
  site = NULL,
  algorithm = NULL,
  aoi_definition = NULL,
  process_family = c("gaussian", "poisson", "negative_binomial")
)
```

Arguments

data	Input data frame or compatible tabular object.
response	Response variable or response-column name.
process	Process variable or column name.
person	Person or participant identifier column.
item	Item identifier, name, or item column.
device	Device identifier or device facet.
session	Session identifier or session facet.
site	Site identifier or site facet.
algorithm	Algorithm identifier or algorithm facet.
aoi_definition	Value supplied to ‘aoi_definition‘; see Details for its model-specific role.
process_family	Distributional family for the process channel.

Value

An object of class "eye_manyfacet_process_irt", stored as a named list, with components "response_model", "process_model", "facets", "process_family", "status". It contains many-facet process IRT reference model and associated metadata or diagnostics needed to interpret the result.

fit_mirt_adapter *fit mirt adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_mirt_adapter(data, model = 1L, purpose, ...)
```

Arguments

data	Value for ‘data‘. See the function description and relevant article for constraints.
model	Value for ‘model‘. See the function description and relevant article for constraints.
purpose	Value for ‘purpose‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_mixture_irt_process_classes *Fit a true mirt mixture-IRT response model*

Description

This is distinct from the existing two-stage process-class reference model: the response distribution itself is calibrated using mirt's mixture density. Process features may then be compared with the fitted response classes only when a defensible class-membership extraction is available.

Usage

```
fit_mixture_irt_process_classes(
  response_matrix,
  n_classes = 2L,
  model = 1,
  itemtype = "2PL",
  SE = FALSE
)
```

Arguments

response_matrix	Person x item response matrix.
n_classes	Number of mixture classes. The currently verified internal route supports two classes (‘mixture-2‘).
model	mirt model specification, default one dimension.
itemtype	Item type.
SE	Request standard errors.

Value

An object of class "eye_mixture_irt_process", stored as a named list, with components "model", "coefficients", "n_classes", "itemtype", "status", "caveat". It contains a true mirt mixture-IRT response model and associated metadata or diagnostics needed to interpret the result.

---

fit_multiblock_process_map

Fit a multiblock psychometric/gaze/pupil/quality structure map

---

Description

Uses FactoMineR MFA when available/requested. A block-standardized PCA fallback is available as a transparent exploratory reference and is explicitly labeled.

Usage

```
fit_multiblock_process_map(
  x,
  blocks = NULL,
  id = NULL,
  engine = c("auto", "FactoMineR", "pca_block_scaled"),
  ncp = 5L
)
```

Arguments

x	A ‘process_feature_blocks()‘ object or data frame.
blocks	Required if ‘x‘ is a data frame.
id	Optional identifier.
engine	‘auto‘, ‘FactoMineR‘, or ‘pca_block_scaled‘.
ncp	Number of components retained where supported.

Value

An object of class "eye_multiblock_process_map", stored as a named list, with components "model", "person_coordinates", "variable_coordinates", "block_coordinates", "blocks", "engine", "status", "caveat". It contains a multiblock psychometric/gaze/pupil/quality structure map and associated metadata or diagnostics needed to interpret the result.

---

fit_multimodal_m2 *Fit the M2 response + RT + gaze reference model*

Description

Fits the likelihood-faithful M2 reference model with CmdStanR. There is no silent fallback. Missing observations are omitted from their channel-specific likelihood under an explicit ignorable missingness assumption; the person and item structural layers remain joint across the observed channels.

Usage

```
fit_multimodal_m2(
  x,
  person = "person_id",
  item = "item_id",
  response = "response",
  rt = "rt",
  gaze = "gaze",
  prior_profile = c("regularized", "paper_centered"),
  chains = 4L,
  parallel_chains = chains,
  iter_warmup = 1000L,
  iter_sampling = 1000L,
  seed = 20260814L,
  adapt_delta = 0.95,
  max_treedepth = 12L,
  refresh = 100L,
  quiet_compile = TRUE
)
```

Arguments

`x`	Data frame, ‘eye_multimodal_m2_simulation‘, or compatible eyeprocess multimodal measurement object.
`person`, `item`, `response`, `rt`, `gaze`	Column names.
`prior_profile`	Prior profile.
`chains`, `parallel_chains`, `iter_warmup`, `iter_sampling`	CmdStan sampling controls.
`seed`	Reproducibility seed.

`adapt_delta`, `max_treedepth`, `refresh`
: CmdStan controls.

`quiet_compile`
: Suppress CmdStan compilation messages.

Value

An ‘eye_multimodal_m2_fit‘.

`fit_multimodal_m3` *Fit the M3 response + RT + gaze + pupil reference model*

Description

Fits the four-channel reference likelihood using CmdStanR. Pupil summaries are standardized by default for a scale-stable reference parameterization; the transformation is retained in the returned data object. No missing nuisance values are silently imputed when the corresponding nuisance column is supplied.

Usage

```
fit_multimodal_m3(
  x,
  person = "person_id",
  item = "item_id",
  response = "response",
  rt = "rt",
  gaze = "gaze",
  pupil = "pupil",
  baseline = "pupil_baseline",
  luminance = "luminance",
  gaze_x = "gaze_x",
  gaze_y = "gaze_y",
  quality = "pupil_quality",
  time_on_task = "time_on_task",
  blink = "pupil_blink",
  interpolated = "pupil_interpolated",
  device = "device",
  session = "session",
  sampling_rate = "sampling_rate_hz",
  pupil_scale = c("z", "raw"),
  prior_profile = c("regularized", "paper_centered"),
  nuisance = stats::setNames(rep(TRUE, 8L), .ep10_m3_nuisance_names),
  chains = 4L,
  parallel_chains = chains,
  iter_warmup = 1000L,
  iter_sampling = 1000L,
  seed = 20260815L,
```

```
  adapt_delta = 0.95,
  max_treedepth = 12L,
  refresh = 100L,
  quiet_compile = TRUE,
  init = 0
)
```

Arguments

- `x` — Data frame, M3 simulation, or compatible measurement object.
- `person`, `item`, `response`, `rt`, `gaze`, `pupil` — Column names.
- `baseline`, `luminance`, `gaze_x`, `gaze_y`, `quality`, `time_on_task` — Optional nuisance columns.
- `blink`, `interpolated` — Optional pupil nuisance/audit indicators.
- `device`, `session`, `sampling_rate` — Optional measurement-context audit columns.
- `pupil_scale` — ‘"z"‘ or ‘"raw"‘.
- `prior_profile` — Prior profile.
- `nuisance` — Named logical vector selecting the eight explicit pupil measurement nuisance terms.
- `chains`, `parallel_chains`, `iter_warmup`, `iter_sampling` — CmdStan sampling controls.
- `seed`, `adapt_delta`, `max_treedepth`, `refresh`, `quiet_compile` — CmdStan controls.
- `init` — CmdStan initialization; default zero initializes Cholesky factors at an interior identity point.

Value

An ‘eye_multimodal_m3_fit‘.

`fit_multimodal_m4` *Fit the M4 latent response-process state model*

Description

Fits the marginalized M4 state model using CmdStanR. Sequence order is validated but never silently changed. The latent state contributes only to selected process channels in the reference implementation; the scored-response Rasch equation remains exactly state-independent.

Usage

```
fit_multimodal_m4(
  x,
  spec = NULL,
  person = "person_id",
  item = "item_id",
  response = "response",
  rt = "rt",
  gaze = "gaze",
  pupil = "pupil",
  sequence = "sequence_id",
  order = "trial_index",
  baseline = "pupil_baseline",
  luminance = "luminance",
  gaze_x = "gaze_x",
  gaze_y = "gaze_y",
  quality = "pupil_quality",
  time_on_task = "time_on_task",
  blink = "pupil_blink",
  interpolated = "pupil_interpolated",
  device = "device",
  session = "session",
  sampling_rate = "sampling_rate_hz",
  pupil_scale = c("z", "raw"),
  n_states = 2L,
  state_channels = c("rt", "gaze", "pupil"),
  transition_structure = c("markov", "iid"),
  trait_conditioning = c("theta", "tau"),
  initial_trait_conditioning = TRUE,
  min_sequence_length = 2L,
  prior_profile = c("regularized", "paper_centered"),
  nuisance = stats::setNames(rep(TRUE, 8L), .ep10_m3_nuisance_names),
  chains = 4L,
  parallel_chains = chains,
  iter_warmup = 1000L,
  iter_sampling = 1000L,
  seed = 20260820L,
  adapt_delta = 0.97,
  max_treedepth = 13L,
  refresh = 100L,
  quiet_compile = TRUE,
  init = 0
)
```

Arguments

x	Data frame, M4 simulation, or compatible eyeprocess object.
spec	Optional ‘multimodal_m4_spec()‘. When omitted, a conservative two-state spec-

ification is created from the explicit arguments.

`person`, `item`, `response`, `rt`, `gaze`, `pupil`
: Column names.

`sequence`, `order` Sequence identifier and within-sequence order columns.

`baseline`, `luminance`, `gaze_x`, `gaze_y`, `quality`, `time_on_task`, `blink`, `interpolated`
: Optional M3 pupil nuisance columns.

`device`, `session`, `sampling_rate`
: Optional measurement-context columns.

`pupil_scale` ‘"z"‘ or ‘"raw"‘.

`n_states`, `state_channels`, `transition_structure`, `trait_conditioning`
: Used only when ‘spec‘ is null.

`initial_trait_conditioning`, `min_sequence_length`
: Used only when ‘spec‘ is null.

`prior_profile`, `nuisance`
: Used only when ‘spec‘ is null.

`chains`, `parallel_chains`, `iter_warmup`, `iter_sampling`
: Sampling controls.

`seed`, `adapt_delta`, `max_treedepth`, `refresh`, `quiet_compile`, `init`
: CmdStan controls.

Value

An ‘eye_multimodal_m4_fit‘ retaining data, sequence audit, specification, Stan data, sampling controls, and provenance.

`fit_multimodal_trait_irt` *Multimodal trait-model convenience wrapper*

Description

Extends the gaze/RT architecture to noncognitive or other latent traits by allowing caller-defined semantic labels. The statistical engine is delegated to ‘fit_joint_gaze_rt_irt()‘; interpretation remains the researcher's job.

Usage

```
fit_multimodal_trait_irt(
  data,
  response,
  rt,
  gaze,
  person,
  item,
```

```
  trait_label = "trait",
  process_label = "process",
  ...
)
```

Arguments

data	Input data frame or compatible tabular object.
response	Response variable or response-column name.
rt	Response-time variable or column name.
gaze	Gaze/process variable or column name.
person	Person or participant identifier column.
item	Item identifier, name, or item column.
trait_label	Value supplied to ‘trait_label‘; see Details for its model-specific role.
process_label	Value supplied to ‘process_label‘; see Details for its model-specific role.
...	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_joint_gaze_rt_irt", stored as a named list, with components "engine", "response_model", "rt_model", "gaze_model", "person_scores", "item_scores", "person_covariance", "item_covariance", "data_n", "gaze_family", "columns", "status", and additional components. It contains multimodal trait-model convenience wrapper and associated metadata or diagnostics needed to interpret the result.

---

fit_multinomial_transition

Fit a penalized multinomial transition model

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_multinomial_transition(design, ridge = 1e-4, reference_state = NULL,
  control = list(maxit = 1000L, reltol = 1e-9))
```

Arguments

design	Transition design.
ridge	Ridge penalty.
reference_state	Reference destination state.
control	Passed to ‘optim()‘.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

fit_multiple_response_process_irt

Fit a multiple-response process-IRT reference model

Description

The bundled reference treats option selections as repeated binary outcomes with option-specific random difficulty/discrimination and optional gaze. This preserves option-level observations but does **not** reproduce the 2026 MRM/MRM-LD likelihood. Use ‘engine = "external"‘ for a validated exact implementation of a multiple-response model with inter-option dependence.

Usage

```
fit_multiple_response_process_irt(
  data,
  selected = "selected",
  theta = "theta",
  person = "participant_id",
  item = "item_id",
  option = "option_id",
  gaze = NULL,
  engine = c("reference", "external"),
  external_engine = NULL,
  ...
)
```

Arguments

`data`	Long person-item-option table.
`selected`	Binary option-selection indicator.
`theta`	Supplied latent-trait estimate/score.
`person`, `item`, `option`	Identifiers.
`gaze`	Optional option-level process measure.
`engine`	‘reference‘ or ‘external‘.
`external_engine`	Validated external fitter.
`...`	Arguments passed to the external engine.

Value

An object of class "eye_multiple_response_process_irt", stored as a named list, with components "model", "data", "gaze", "engine", "exact_multiple_response", "status", "note". It contains a multiple-response process-IRT reference model and associated metadata or diagnostics needed to interpret the result.

---

fit_nominal_gaze_irt *Nominal/distractor IRT with option-level gaze*

Description

The bundled estimator is a transparent two-stage process-augmented nominal model: participant ability may be supplied, or a shrinkage logit accuracy proxy is estimated; option-level gaze proportions then enter a multinomial response model. This is intended for validation and exploratory distractor research, not as a replacement for a fully latent nominal-response model.

Usage

```
fit_nominal_gaze_irt(
  data,
  response_option = "response_option",
  option_gaze,
  person = "participant_id",
  item = "item_id",
  ability = NULL,
  correct_option = NULL,
  add_item_effects = TRUE,
  ...
)
```

Arguments

`data`	Input data frame or compatible tabular object.
`response_option`	Column identifying the selected response option.
`option_gaze`	Character vector naming one gaze column per response option. Names should correspond to option labels when possible.
`person`	Person or participant identifier column.
`item`	Item identifier, name, or item column.
`ability`	Optional existing ability score column.
`correct_option`	Optional scalar or column name identifying correct option.
`add_item_effects`	Whether item effects are included.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_nominal_gaze_irt", stored as a named list, with components "model", "baseline_model", "data", "option_gaze", "gaze_proportion_columns", "ability", "person", "item", "logLik_gain", "status", "note". It contains nominal/distractor IRT with option-level gaze and associated metadata or diagnostics needed to interpret the result.

---

fit_nonignorable_missing_irt

Create a gated Bayesian nonignorable-missing IRT interface

Description

Create a gated Bayesian nonignorable-missing IRT interface

Usage

```
fit_nonignorable_missing_irt(data, engine = NULL, ...)
```

Arguments

`data`	Response/missingness data.
`engine`	Optional externally validated Bayesian estimator.
`...`	Passed to ‘engine‘.

Value

An object of class "eye_gated_process_model", stored as a named list, with components "id", "purpose", "required_evidence", "engine", "fit", "status", "notes", "caveat". It contains a gated Bayesian nonignorable-missing IRT interface and associated metadata or diagnostics needed to interpret the result.

---

fit_omission_survival_irt

Response/RT/omission survival IRT reference model

Description

Fits a response model among reached/answered observations and cause-specific survival models for omission and not-reached processes. The function keeps the missingness mechanisms distinct by construction.

Usage

```
fit_omission_survival_irt(
  data,
  response = "response",
  response_time = "response_time",
  omission_time = NULL,
  reached = "reached",
  person = "participant_id",
  item = "item_id",
  gaze_exposure = NULL,
  first_fixation_latency = NULL,
  ...
)
```

Arguments

`data`	Input data frame or compatible tabular object.
`response`	Response variable or response-column name.
`response_time`	Response-time variable or column name.
`omission_time`	Time associated with an omitted response.
`reached`	Indicator that the item was reached.
`person`	Person or participant identifier column.
`item`	Item identifier, name, or item column.
`gaze_exposure`	Gaze-based exposure measure.
`first_fixation_latency`	Latency to first fixation.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_omission_survival_irt", stored as a named list, with components "response_model", "omission_model", "not_reached_model", "classified_data", "state_counts", "status", "note". It contains response/RT/omission survival IRT reference model and associated metadata or diagnostics needed to interpret the result.

`fit_openmx_adapter` *fit openmx adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_openmx_adapter(model, purpose, ...)
```

Arguments

`model`	Value for ‘model‘. See the function description and relevant article for constraints.
`purpose`	Value for ‘purpose‘. See the function description and relevant article for constraints.
`...`	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`fit_openmx_process_model` *Fit a user-defined OpenMx process model*

Description

Fit a user-defined OpenMx process model

Usage

```
fit_openmx_process_model(x, model_builder, include_features = TRUE, ...)
```

Arguments

`x`	An ‘eye_dataset‘.
`model_builder`	Function receiving model data and returning an OpenMx model.
`include_features`	Whether to merge process features.
`...`	Passed to ‘OpenMx::mxRun()‘.

Value

An ‘eyeprocess_model‘.

fit_persistence_gaze_diffusion_irt

Create a gated persistence-augmented gaze-diffusion IRT interface

Description

Create a gated persistence-augmented gaze-diffusion IRT interface

Usage

```
fit_persistence_gaze_diffusion_irt(data, engine = NULL, ...)
```

Arguments

data	Response/RT/process data.
engine	Optional externally validated estimator function.
...	Passed to ‘engine‘.

Value

An object of class "eye_gated_process_model", stored as a named list, with components "id", "purpose", "required_evidence", "engine", "fit", "status", "notes", "caveat". It contains a gated persistence-augmented gaze-diffusion IRT interface and associated metadata or diagnostics needed to interpret the result.

fit_process_dif

Dynamic process-DIF and fairness drift

Description

Dynamic process-DIF and fairness drift. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
fit_process_dif(x, response, process, group, item, ability = NULL)
monitor_dif_drift(x, time, group, metrics, item = NULL)
decompose_dif_evidence(psychometric, process = NULL, design_features = NULL)
audit_fairness_transportability(x, context = "device", effect = "process_dif",
  item = "item_id")
plot_group_icc_process_overlay(x, ...)
plot_process_dif_forest(x, ...)
plot_dif_drift_heatmap(x, ...)
plot_fairness_transport_matrix(x, ...)
plot_item_group_process_curves(x, ...)
```

Arguments

`x`	Input object or data structure appropriate for the selected analysis.
`response`	Argument controlling ‘response‘; see the function usage and returned audit metadata.
`process`	Argument controlling ‘process‘; see the function usage and returned audit metadata.
`group`	Argument controlling ‘group‘; see the function usage and returned audit metadata.
`item`	Argument controlling ‘item‘; see the function usage and returned audit metadata.
`ability`	Argument controlling ‘ability‘; see the function usage and returned audit metadata.
`time`	Argument controlling ‘time‘; see the function usage and returned audit metadata.
`metrics`	Argument controlling ‘metrics‘; see the function usage and returned audit metadata.
`psychometric`	Argument controlling ‘psychometric‘; see the function usage and returned audit metadata.
`design_features`	Argument controlling ‘design_features‘; see the function usage and returned audit metadata.
`context`	Argument controlling ‘context‘; see the function usage and returned audit metadata.
`effect`	Argument controlling ‘effect‘; see the function usage and returned audit metadata.
`...`	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

fit_process_gstudy *Process reliability and Generalizability Theory*

Description

Process reliability and Generalizability Theory. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
fit_process_gstudy(x, metric, facets = c("person", "item", "session", "device"),
  design = c("crossed", "nested"))
process_variance_components(x)
design_process_dstudy(gstudy, persons = NULL, items = seq(5, 50, 5), sessions = 1:5,
  devices = 1)
audit_process_reliability(x, metrics, method = c("icc", "gtheory", "split_half",
  "bootstrap"), person_col = "person_id", item_col = "item_id", draws = 250)
plot_variance_components(x, ...)
plot_dependability_surface(x, ...)
plot_reliability_by_metric(x, ...)
plot_session_stability(x, ...)
plot_item_sampling_reliability(x, ...)
```

Arguments

x	Input object or data structure appropriate for the selected analysis.
metric	Argument controlling ‘metric‘; see the function usage and returned audit metadata.
facets	Argument controlling ‘facets‘; see the function usage and returned audit metadata.
design	Argument controlling ‘design‘; see the function usage and returned audit metadata.
gstudy	Argument controlling ‘gstudy‘; see the function usage and returned audit metadata.
persons	Argument controlling ‘persons‘; see the function usage and returned audit metadata.
items	Argument controlling ‘items‘; see the function usage and returned audit metadata.
sessions	Argument controlling ‘sessions‘; see the function usage and returned audit metadata.
devices	Argument controlling ‘devices‘; see the function usage and returned audit metadata.
metrics	Argument controlling ‘metrics‘; see the function usage and returned audit metadata.

method	Argument controlling ‘method‘; see the function usage and returned audit metadata.
person_col	Argument controlling ‘person_col‘; see the function usage and returned audit metadata.
item_col	Argument controlling ‘item_col‘; see the function usage and returned audit metadata.
draws	Argument controlling ‘draws‘; see the function usage and returned audit metadata.
...	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

---

fit_process_hmm_irt *Process-state HMM with an IRT response layer*

Description

Fits a diagonal-Gaussian HMM to standardized process features within each sequence, then uses state occupancy as explicit process evidence in a response model. This two-stage reference engine is deliberately interpretable and should be distinguished from a fully joint HMM-IRT likelihood.

Usage

```
fit_process_hmm_irt(
  data,
  sequence_id = "trial_id",
  order = "timestamp",
  process_features = c("x", "y"),
  response = "response",
  person = "participant_id",
  item = "item_id",
  n_states = 3L,
  max_iter = 100L,
```

```
  tol = 1e-05,
  seed = 1
)
```

Arguments

data	Input data frame or compatible tabular object.
sequence_id	Sequence identifier.
order	Within-sequence ordering variable.
process_features	Names of process-derived features.
response	Response variable or response-column name.
person	Person or participant identifier column.
item	Item identifier, name, or item column.
n_states	Number of latent process states.
max_iter	Maximum number of iterations.
tol	Numerical convergence tolerance.
seed	Random-number seed.

Value

An object of class "eye_process_hmm_irt", stored as a named list, with components "pi", "transition", "means", "sds", "posterior_state", "state", "row_data", "occupancy", "summary_data", "response_model", "logLik", "logLik_history", and additional components. It contains process-state HMM with an IRT response layer and associated metadata or diagnostics needed to interpret the result.

---

fit_process_missingness_model

Measurement-intelligence compatibility adapters

Description

Measurement-intelligence compatibility adapters. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
fit_process_missingness_model(x, observed, predictors, random = c("person", "item"))
crossmodal_recurrence_model(x, y, outcome = NULL, channels = c("gaze_pupil",
  "gaze_eda", "pupil_eda"), radius = NULL, covariates = NULL)
```

Arguments

`x`	Input object or data structure appropriate for the selected analysis.
`observed`	Argument controlling ‘observed‘; see the function usage and returned audit metadata.
`predictors`	Argument controlling ‘predictors‘; see the function usage and returned audit metadata.
`random`	Argument controlling ‘random‘; see the function usage and returned audit metadata.
`y`	Argument controlling ‘y‘; see the function usage and returned audit metadata.
`outcome`	Argument controlling ‘outcome‘; see the function usage and returned audit metadata.
`channels`	Argument controlling ‘channels‘; see the function usage and returned audit metadata.
`radius`	Argument controlling ‘radius‘; see the function usage and returned audit metadata.
`covariates`	Argument controlling ‘covariates‘; see the function usage and returned audit metadata.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

`fit_process_norms` *Conditional process reference centiles*

Description

Conditional process reference centiles. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
fit_process_norms(x, metric, covariates, family = c("auto", "gaussian",
  "lognormal"))
predict_process_centiles(model, newdata, centiles = c(2.5, 10, 25, 50, 75, 90,
  97.5))
score_process_deviation(model, newdata, type = c("z", "centile",
  "tail_probability"))
audit_norm_transportability(model, new_sample)
plot_process_centiles(x, ...)
plot_normative_fan(x, ...)
plot_person_normative_profile(x, ...)
plot_item_normative_deviation(x, ...)
```

Arguments

`x`	Input object or data structure appropriate for the selected analysis.
`metric`	Argument controlling ‘metric‘; see the function usage and returned audit metadata.
`covariates`	Argument controlling ‘covariates‘; see the function usage and returned audit metadata.
`family`	Argument controlling ‘family‘; see the function usage and returned audit metadata.
`model`	Argument controlling ‘model‘; see the function usage and returned audit metadata.
`newdata`	Argument controlling ‘newdata‘; see the function usage and returned audit metadata.
`centiles`	Argument controlling ‘centiles‘; see the function usage and returned audit metadata.
`type`	Argument controlling ‘type‘; see the function usage and returned audit metadata.
`new_sample`	Argument controlling ‘new_sample‘; see the function usage and returned audit metadata.
`...`	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

fit_process_observation_model

Informative missingness and MNAR sensitivity

Description

Informative missingness and MNAR sensitivity. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
fit_process_observation_model(x, observed, predictors, random = c("person", "item"))
fit_joint_signal_missingness(outcome, observation, method = c("selection",
  "shared_parameter"), x = NULL, predictors = NULL)
process_pattern_mixture(x, delta = seq(-1, 1, 0.1), metric = NULL, estimand = mean)
sensitivity_mnar_process(x, estimand = mean, null = 0, ...)
plot_observation_probability(x, ...)
plot_missingness_by_time(x, ...)
plot_missingness_by_aoi(x, ...)
plot_mnar_tipping_point(x, ...)
plot_complete_case_sensitivity(x, ...)
```

Arguments

x	Input object or data structure appropriate for the selected analysis.
observed	Argument controlling ‘observed‘; see the function usage and returned audit metadata.
predictors	Argument controlling ‘predictors‘; see the function usage and returned audit metadata.
random	Argument controlling ‘random‘; see the function usage and returned audit metadata.
outcome	Argument controlling ‘outcome‘; see the function usage and returned audit metadata.
observation	Argument controlling ‘observation‘; see the function usage and returned audit metadata.
method	Argument controlling ‘method‘; see the function usage and returned audit metadata.
delta	Argument controlling ‘delta‘; see the function usage and returned audit metadata.
metric	Argument controlling ‘metric‘; see the function usage and returned audit metadata.
estimand	Argument controlling ‘estimand‘; see the function usage and returned audit metadata.
null	Argument controlling ‘null‘; see the function usage and returned audit metadata.
...	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

---

fit_process_profile_mixture

Fit exploratory process profiles

Description

Fit exploratory process profiles

Usage

```
fit_process_profile_mixture(
  data,
  variables,
  k = 3L,
  id = "person_id",
  engine = c("auto", "tidyLPA", "kmeans_reference"),
  seed = 777
)
```

Arguments

`data`	Person-level process data.
`variables`	Continuous process variables.
`k`	Number of profiles.
`id`	Optional person identifier.
`engine`	‘auto‘, ‘tidyLPA‘, or ‘kmeans_reference‘.
`seed`	Random seed.

Value

An object of class "eye_process_profile_mixture", stored as a named list, with components "model", "assignment", "summary", "variables", "k", "engine", "scaled_data", "status", "caveat". It contains exploratory process profiles and associated metadata or diagnostics needed to interpret the result.

fit_process_rasch_tree

Fit a process-informed Rasch tree

Description

Fit a process-informed Rasch tree

Usage

```
fit_process_rasch_tree(
  response_matrix,
  covariates,
  formula = NULL,
  maxit = 60L
)
```

Arguments

response_matrix	Person x item dichotomous response matrix.
covariates	Person-level response-process covariates.
formula	Optional splitting formula. If omitted, all covariates are used.
maxit	Maximum model iterations.

Value

An object of class "eye_process_rasch_tree", stored as a named list, with components "model", "covariates", "formula", "status", "caveat". It contains a process-informed Rasch tree and associated metadata or diagnostics needed to interpret the result.

fit_pupil_confound_model

Fit a luminance/fatigue/process confound model for pupil response

Description

Fit a luminance/fatigue/process confound model for pupil response

Usage

```
fit_pupil_confound_model(
  data,
  pupil = "pupil_peak",
  luminance = "screen_luminance",
  trial_order = "trial_sequence",
  theta = NULL,
  person = "person_id",
  item = "item_id",
  engine = c("auto", "mgcv", "lm")
)
```

Arguments

`data`	Trial-level data.
`pupil`, `luminance`, `trial_order`	Column names.
`theta`	Optional latent-score column.
`person`, `item`	Optional identifiers.
`engine`	‘auto‘, ‘mgcv‘, or ‘lm‘.

Value

An ‘eye_pupil_confound_model‘ object containing raw and adjusted values.

---

fit_pupil_event_deconvolution

Fit transparent event-related pupil deconvolution models

Description

Fits a linear superposition model of overlapping event kernels. This is a transparent reference deconvolution layer, not a universal physiological model.

Usage

```
fit_pupil_event_deconvolution(
  data,
  by = c("person_id", "trial_id"),
  time = "time_ms",
  pupil = "pupil_bc",
  events = list(stimulus = 0),
  tmax_ms = 930,
  shape = 10.1,
  min_samples = 20L
)
```

Arguments

`data`	Sample-level pupil data.
`by`	Grouping columns, typically person and trial.
`time`, `pupil`	Column names.
`events`	Named list mapping event labels to scalar event times or columns.
`tmax_ms`, `shape`	Kernel parameters.
`min_samples`	Minimum usable samples per group.

Value

An object of class "eye_pupil_deconvolution", stored as a named list, with components "fits", "effects", "fitted", "events", "tmax_ms", "shape", "by", "status", "caveat". It contains transparent event-related pupil deconvolution models and associated metadata or diagnostics needed to interpret the result.

`fit_pupillometryr_adapter` *fit pupillometryr adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_pupillometryr_adapter(data, purpose, ...)
```

Arguments

`data`	Value for ‘data‘. See the function description and relevant article for constraints.
`purpose`	Value for ‘purpose‘. See the function description and relevant article for constraints.
`...`	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_response_process_embedding_irt

Fit an IRT response model augmented by sequence embeddings

Description

Fit an IRT response model augmented by sequence embeddings

Usage

```
fit_response_process_embedding_irt(
  data,
  sequences,
  response = "response",
  person = "participant_id",
  item = "item_id",
  dimensions = 5L,
  n = c(1L, 2L, 3L)
)
```

Arguments

data	Input data frame or compatible tabular object.
sequences	Sequence inputs.
response	Response variable or response-column name.
person	Person or participant identifier column.
item	Item identifier, name, or item column.
dimensions	Number of embedding dimensions.
n	Requested count or n-gram order, depending on context.

Value

An object of class "eye_response_process_embedding_irt", stored as a named list, with components "model", "embedding", "data", "status". It contains an IRT response model augmented by sequence embeddings and associated metadata or diagnostics needed to interpret the result.

fit_revisit_process_cdm

Fit a revisiting-aware cognitive-diagnosis process workflow

Description

Convenience adapter motivated by current work combining response time and item revisiting with cognitive diagnosis. The response layer is delegated to ‘fit_cognitive_diagnosis_process()‘; revisiting/RT/gaze remain process evidence and do not redefine attributes or the Q-matrix.

Usage

```
fit_revisit_process_cdm(
  response_matrix,
  q_matrix,
  process_data,
  person_id = "participant_id",
  revisited = "revisited",
  rt = "response_time",
  gaze = NULL,
  ...
)
```

Arguments

response_matrix	Person-by-item responses.
q_matrix	Item-by-attribute Q-matrix.
process_data	Long process data.
person_id	Person identifier in ‘process_data‘.
revisited	Revisit indicator/count column.
rt	Response-time column.
gaze	Optional gaze process columns.
...	Passed to ‘fit_cognitive_diagnosis_process()‘.

Value

An object of class "eye_cognitive_diagnosis_process", stored as a named list, with components "response_model", "process_summary", "process_mastery_correlation", "q_matrix", "status". It contains a revisiting-aware cognitive-diagnosis process workflow and associated metadata or diagnostics needed to interpret the result.

fit_seqhmm_adapter *fit seqhmm adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_seqhmm_adapter(data, purpose, ...)
```

Arguments

data	Value for ‘data‘. See the function description and relevant article for constraints.
purpose	Value for ‘purpose‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_speed_accuracy_engagement_irt *Speed-accuracy-engagement IRT convenience wrapper*

Description

Speed-accuracy-engagement IRT convenience wrapper

Usage

```
fit_speed_accuracy_engagement_irt(data, ..., engine = c("reference", "brms"))
```

Arguments

data	Input data frame or compatible tabular object.
...	Additional arguments passed to the selected model, engine, or method.
engine	Estimation engine.

Value

An object of class "eye_joint_gaze_rt_irt", stored as a named list, with components "engine", "response_model", "rt_model", "gaze_model", "person_scores", "item_scores", "person_covariance", "item_covariance", "data_n", "gaze_family", "columns", "status", and additional components. It contains speed-accuracy-engagement IRT convenience wrapper and associated metadata or diagnostics needed to interpret the result.

---

fit_strategy_mixture_em

Fit the deterministic multi-start EM baseline

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_strategy_mixture_em(prepared, starts = prepared$spec$multiple_starts,
  max_iter = 300L, tolerance = 1e-7, seed = 1L)
```

Arguments

prepared	Prepared strategy data.
starts	Number of starts.
max_iter	Maximum EM iterations.
tolerance	Relative log-likelihood tolerance.
seed	Seed.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

fit_strategy_mixture_stan

Fit the probabilistic strategy-mixture engine

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_strategy_mixture_stan(prepared, seed = 1L, refresh = 0L, output_dir = NULL, ...)
```

Arguments

`prepared`	Prepared strategy data.
`seed`	Seed.
`refresh`	CmdStan refresh interval.
`output_dir`	Optional output directory.
`...`	Additional CmdStan sampling arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`fit_tam_adapter` *fit tam adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_tam_adapter(data, purpose, ...)
```

Arguments

`data`	Value for ‘data‘. See the function description and relevant article for constraints.
`purpose`	Value for ‘purpose‘. See the function description and relevant article for constraints.
`...`	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_theory_strategy_irt

Fit a theory-constrained strategy mixture

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_theory_strategy_irt(data, spec, seed = 1L, response = NULL, participant = NULL,
  item = NULL, ...)
```

Arguments

data	Trial-level data.
spec	Strategy specification.
seed	Seed.
response	Value for ‘response‘. See the function description and relevant article for constraints.
participant	Value for ‘participant‘. See the function description and relevant article for constraints.
item	Value for ‘item‘. See the function description and relevant article for constraints.
...	Engine arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

fit_traminer_adapter *fit traminer adapter*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
fit_traminer_adapter(data, purpose, ...)
```

Arguments

`data`	Value for ‘data‘. See the function description and relevant article for constraints.
`purpose`	Value for ‘purpose‘. See the function description and relevant article for constraints.
`...`	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`fit_validation_replicate` *Fit one model-validation replicate*

Description

Fit one model-validation replicate

Usage

```
fit_validation_replicate(
  replicate,
  generator,
  fitter,
  extractor,
  scenario = "baseline",
  engine = "unspecified"
)
```

Arguments

`replicate`	Replicate id.
`generator`	Function ‘(replicate, scenario)‘ returning simulated data; the simulation should expose truth via ‘extract_parameter_truth()‘.
`fitter`	Function accepting the simulated data (or its ‘$data‘ member).
`extractor`	Function ‘(fit, simulation)‘ returning estimates with at least ‘parameter‘ and ‘estimate‘; optional ‘lower‘/‘upper‘ are retained.
`scenario`	Scenario label/object passed to the generator.
`engine`	Engine label.

Value

A logical value or vector indicating one model-validation replicate.

fit_variational_irt *Variational IRT external-engine gate*

Description

Variational IRT external-engine gate

Usage

```
fit_variational_irt(response_matrix, external_engine = NULL, ...)
```

Arguments

`response_matrix` Person-by-item response matrix.

`external_engine` Validated external fitting function.

`...` Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_variational_irt", stored as a named list, with components "model", "status", "engine". It contains variational IRT external-engine gate and associated metadata or diagnostics needed to interpret the result.

fit_visual_context_irt *Fit an explicit visual-context/testlet IRT model*

Description

Fit an explicit visual-context/testlet IRT model

Usage

```
fit_visual_context_irt(
  response_matrix,
  registry,
  context = NULL,
  itemtype = "2PL",
  model_dimension = "Ability",
  context_dimension = "VisualContextFactor",
  SE = FALSE
)
```

Arguments

response_matrix	Person x item response matrix.
registry	‘visual_context_registry()‘ object.
context	Optional context identifier to model; defaults to the first shared context.
itemtype	mirt item type.
model_dimension	Name for the primary latent dimension.
context_dimension	Name for the context/testlet dimension.
SE	Request standard errors from mirt.

Value

An object of class "eye_visual_context_irt", stored as a named list, with components "base_model", "context_model", "comparison", "registry", "context", "positions", "itemtype", "model_string", "status", "caveat". It contains an explicit visual-context/testlet IRT model and associated metadata or diagnostics needed to interpret the result.

---

fixation_boundary_uncertainty

Distance to nearest rectangular AOI boundary

Description

Distance to nearest rectangular AOI boundary

Usage

```
fixation_boundary_uncertainty(data, aois, x = "gaze_x", y = "gaze_y")
```

Arguments

data	Gaze samples.
aois	Rectangular AOIs.
x, y	Coordinates.

Value

A tabular R object containing distance to nearest rectangular AOI boundary; rows represent analysis units and columns contain the returned quantities.

freeze_eyeprocess_irt_reference

Freeze IRT validation reference summaries

Description

Freeze IRT validation reference summaries

Usage

```
freeze_eyeprocess_irt_reference(
  recovery_summary = NULL,
  sbc = NULL,
  failures = NULL,
  metadata = list()
)
```

Arguments

recovery_summary	Parameter-recovery summary object or table.
sbc	Simulation-based-calibration evidence object or table.
failures	Failure records or failure summary.
metadata	Named metadata to store with the frozen object.

Value

A named list with components "recovery_summary", "sbc", "failures", "metadata", "scientific_scope", containing freeze IRT validation reference summaries and associated metadata or diagnostics.

freeze_eyeprocess_validation_atlas

Freeze a validation atlas with a reproducibility fingerprint

Description

Freeze a validation atlas with a reproducibility fingerprint

Usage

```
freeze_eyeprocess_validation_atlas(atlas, metadata = list())
```

Arguments

atlas	Validation-evidence atlas object.
metadata	Named metadata to store with the frozen object.

Value

An object of class "eye_validation_atlas_freeze", stored as a named list, with components "payload", "hash", "frozen". It contains freeze a validation atlas with a reproducibility fingerprint and associated metadata or diagnostics needed to interpret the result.

---

freeze_eyeprocess_validation_evidence

Freeze a complete Milestone #2 evidence bundle

Description

Freeze a complete Milestone #2 evidence bundle

Usage

```
freeze_eyeprocess_validation_evidence(
  design,
  recovery = NULL,
  sbc = NULL,
  stress = NULL,
  reliability = NULL,
  negative_controls = NULL,
  irt = NULL,
  claims = NULL,
  provenance = NULL,
  source_commit = NA_character_
)
```

Arguments

design	Validation or simulation design object.
recovery	Parameter-recovery evidence object or table.
sbc	Simulation-based-calibration evidence object or table.
stress	Measurement-stress evidence object or table.
reliability	Reliability or repeatability evidence object or table.
negative_controls	Negative-control evidence object or table.
irt	IRT-specific evidence object or table.
claims	Claim-evidence mapping table.
provenance	Provenance metadata or provenance object.
source_commit	Source-control commit associated with the evidence.

Value

An object of class "eye_validation_evidence_freeze", stored as a named list, with components "components", "presence", "source_commit", "frozen_at", "scientific_scope". It contains freeze a complete Milestone #2 evidence bundle and associated metadata or diagnostics needed to interpret the result.

---

freeze_software_paper_evidence

Freeze software-paper evidence to an RDS with a hash

Description

Freeze software-paper evidence to an RDS with a hash

Usage

```
freeze_software_paper_evidence(x, path)
```

Arguments

x	Evidence bundle.
path	Output path.

Value

A data frame containing freeze software-paper evidence to an RDS with a hash. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

freeze_validation_reference

Freeze a compact validation reference for regression testing

Description

Freeze a compact validation reference for regression testing

Usage

```
freeze_validation_reference(x, path = NULL, digits = 8L)
```

Arguments

x	Validation result.
path	Optional RDS path.
digits	Numeric rounding applied before hashing.

Value

An object of class "eye_validation_reference", stored as a named list, with components "summary", "failure_profile", "design_hash", "summary_hash", "created_at", "status". It contains freeze a compact validation reference for regression testing and associated metadata or diagnostics needed to interpret the result.

---

functional_pupil_basis

Construct a functional basis for pupil trajectories

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
functional_pupil_basis(x, df = 6L, basis = c("natural_spline", "bspline"),
  degree = 3L, boundary_knots = NULL, knots = NULL)
```

Arguments

`x`	Prepared functional pupil data or numeric time vector.
`df`	Degrees of freedom.
`basis`	Natural spline or B-spline.
`degree`	B-spline polynomial degree; ignored for natural splines.
`boundary_knots`	Optional boundary knots.
`knots`	Optional internal knots.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

functional_pupil_diagnostics

Diagnose functional pupil model and preprocessing quality

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
functional_pupil_diagnostics(x)
```

Arguments

x	Functional pupil fit.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

functional_pupil_irt_spec

Specify a functional pupil-IRT model

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
functional_pupil_irt_spec(df = 6L, basis = c("natural_spline", "bspline"),
  response = "score", engine = c("two_stage_glm", "two_stage_lme4", "brms", "stan"),
   alignment = c("trial", "event"), event_time_column = NULL, latency_ms = 200,
  baseline_window = c(-200, 0), baseline_method = c("subtract", "percent", "zscore"),
   min_baseline_samples = 3L, drop_invalid_baseline = TRUE, time_window = NULL,
  pupil_column = NULL, time_column = NULL, participant_column = "participant_id",
   item_column = "item_id", trial_column = "trial_id", luminance_column = NULL,
   gaze_x_column = NULL, gaze_y_column = NULL, blink_column = NULL,
   interpolated_column = NULL, max_interpolated_fraction = 0.20,
   nuisance_by_participant = FALSE, include_response_time = TRUE, ar1 = TRUE,
   participant_effect = TRUE, item_effect = TRUE, chains = 4L,
   parallel_chains = chains, iter_warmup = 1000L, iter_sampling = 1000L,
   adapt_delta = 0.95, max_treedepth = 12L)
```

Arguments

- `df` Basis degrees of freedom.
- `basis` Natural spline or B-spline basis.
- `response` Response field.
- `engine` Two-stage baseline, multilevel baseline, brms bridge, or
- `alignment` Trial- or event-aligned time.
- `event_time_column` Event timestamp column required for event alignment.
- `latency_ms` Physiological latency shift applied before basis creation.
- `baseline_window` Numeric time window used for baseline correction.
- `baseline_method` Subtract, percent change, or z score.
- `min_baseline_samples` Minimum finite baseline samples per trial.
- `drop_invalid_baseline` Whether to exclude trials with invalid baselines.
- `time_window` Optional analysis time window.
- `pupil_column` Column names.
- `time_column` Column names.
- `participant_column` Column names.
- `item_column` Column names.
- `trial_column` Column names.
- `luminance_column` Optional nuisance columns.
- `gaze_x_column` Optional nuisance columns.
- `gaze_y_column` Optional nuisance columns.
- `blink_column` Optional quality columns.
- `interpolated_column` Optional quality columns.
- `max_interpolated_fraction` Maximum interpolated fraction per trial.
- `nuisance_by_participant` Whether nuisance residualization includes participant fixed effects.
- `include_response_time` Include response time in supported joint bridges.
- `ar1` Include trial-wise AR(1) residual structure in Stan.
- `participant_effect` Include participant/item pupil effects.
- `item_effect` Include participant/item pupil effects.

`chains`	CmdStan controls.
`parallel_chains`	CmdStan controls.
`iter_warmup`	CmdStan controls.
`iter_sampling`	CmdStan controls.
`adapt_delta`	CmdStan sampler controls.
`max_treedepth`	CmdStan sampler controls.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`gaze_anchored_3pl_alignment`
Return the process-alignment table from a gaze-anchored 3PL audit

---

Description

Return the process-alignment table from a gaze-anchored 3PL audit

Usage

```
gaze_anchored_3pl_alignment(x)
```

Arguments

`x`	An ‘eye_gaze_anchored_3pl_audit‘.

Value

An R object containing return the process-alignment table from a gaze-anchored 3PL audit. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

gaze_data_quality_profile

Empirical gaze data-quality profile

Description

Empirical gaze data-quality profile

Usage

```
gaze_data_quality_profile(
  data,
  x = "gaze_x",
  y = "gaze_y",
  time = "timestamp_ms",
  target_x = NULL,
  target_y = NULL,
  valid = NULL,
  by = NULL,
  time_unit = c("ms", "s", "us")
)
```

Arguments

`data`	Gaze samples.
`x, y`	Gaze coordinates.
`time`	Timestamp column.
`target_x, target_y`	Optional known target coordinates.
`valid`	Optional validity indicator column.
`by`	Optional grouping columns.
`time_unit`	Timestamp unit.

Value

An object of class "eye_data_quality_profile", stored as a named list, with components "table", "coordinate_units", "caveat". It contains empirical gaze data-quality profile and associated metadata or diagnostics needed to interpret the result.

gaze_diffusion_spec *Define a gaze-informed diffusion model*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
gaze_diffusion_spec(response = "score", response_time = "response_time",
  participant = "participant_id", item = "item_id", drift_features = character(),
   boundary_features = character(), nondecision_features = character(),
   starting_features = character(), censor_column = NULL, contaminant = TRUE,
   engine = c("baseline", "stan", "ez_regression", "diffIRT", "brms"),
   gaze_features = NULL, chains = 4L, parallel_chains = min(4L, chains),
  iter_warmup = 1000L, iter_sampling = 1000L, adapt_delta = 0.97, max_treedepth = 13L)
```

Arguments

response	Binary response column.
response_time	Response-time column in seconds.
participant	Participant identifier.
item	Item identifier.
drift_features	Features assigned a priori to drift rate.
boundary_features	Features assigned a priori to boundary separation.
nondecision_features	Features assigned a priori to non-decision time.
starting_features	Features assigned a priori to starting-point bias.
censor_column	Optional censoring column with ‘observed‘, ‘left‘, or ‘right‘.
contaminant	Whether to estimate a uniform contaminant mixture.
engine	Baseline approximation or Stan Wiener model.
gaze_features	Value for ‘gaze_features‘. See the function description and relevant article for constraints.
chains	Stan controls.
parallel_chains	Stan controls.
iter_warmup	Stan controls.
iter_sampling	Stan controls.
adapt_delta	Stan controls.
max_treedepth	Stan controls.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

gaze_precision_rms_s2s *Estimate RMS successive-sample gaze imprecision*

Description

Estimate RMS successive-sample gaze imprecision

Usage

```
gaze_precision_rms_s2s(
  data,
  x = "gaze_x",
  y = "gaze_y",
  time = NULL,
  by = NULL
)
```

Arguments

data	Gaze samples.
x, y	Gaze-coordinate columns.
time	Optional timestamp column used to order samples.
by	Optional grouping columns.

Value

A logical value or vector indicating rMS successive-sample gaze imprecision.

---

gaze_recurrence *Recurrence and cross-recurrence analysis*

Description

Recurrence and cross-recurrence analysis. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
gaze_recurrence(x, representation = c("coordinates", "aoi", "velocity"),
  x_col = "x", y_col = "y", aoi_col = "aoi", radius = NULL)
cross_recurrence(x, y, channels = c("gaze_pupil", "gaze_eda", "pupil_eda"),
  radius = NULL)
windowed_recurrence(x, window, step)
recurrence_features(x, minimum_line = 2L)
plot_recurrence_matrix(x, ...)
plot_windowed_recurrence(x, ...)
plot_diagonal_recurrence_profile(x, ...)
plot_crossmodal_recurrence(x, ...)
plot_recurrence_network(x, ...)
```

Arguments

`x`	Input object or data structure appropriate for the selected analysis.
`representation`	Argument controlling ‘representation‘; see the function usage and returned audit metadata.
`x_col`	Argument controlling ‘x_col‘; see the function usage and returned audit metadata.
`y_col`	Argument controlling ‘y_col‘; see the function usage and returned audit metadata.
`aoi_col`	Argument controlling ‘aoi_col‘; see the function usage and returned audit metadata.
`radius`	Argument controlling ‘radius‘; see the function usage and returned audit metadata.
`y`	Argument controlling ‘y‘; see the function usage and returned audit metadata.
`channels`	Argument controlling ‘channels‘; see the function usage and returned audit metadata.
`window`	Argument controlling ‘window‘; see the function usage and returned audit metadata.
`step`	Argument controlling ‘step‘; see the function usage and returned audit metadata.
`minimum_line`	Argument controlling ‘minimum_line‘; see the function usage and returned audit metadata.
`...`	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

---

gaze_uncertainty_ellipse

Uncertainty ellipse implied by an empirical calibration-error model

---

Description

Uncertainty ellipse implied by an empirical calibration-error model

Usage

```
gaze_uncertainty_ellipse(model, level = 0.95, center = NULL)
```

Arguments

`model`	Calibration error model.
`level`	Probability level.
`center`	Optional center; defaults to model mean error.

Value

A data frame containing uncertainty ellipse implied by an empirical calibration-error model. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

gazepoint_analysis_tables

Build person-by-item-by-trial analysis tables

Description

Build person-by-item-by-trial analysis tables

Usage

```
gazepoint_analysis_tables(x)
```

Arguments

`x`	A processed ‘eye_dataset‘ with workflow features.

Value

A named list containing trial, AOI, fixation, pupil, biometric, process, and feature-dictionary tables.

gazepoint_irt_tables *Create IRT-ready response and process tables*

Description

This function does not manufacture responses. When no responses have been supplied, it returns a complete response template and marks the outcome as process-ready but response-pending.

Usage

```
gazepoint_irt_tables(x, process_table = NULL)
```

Arguments

x	A processed ‘eye_dataset‘.
process_table	Optional process table from ‘gazepoint_analysis_tables()‘.

Value

A list containing a response template, process covariates, long IRT table, optional matrices, and a readiness assessment.

gazepoint_workflow_spec *Specify an integrated Gazepoint downstream workflow*

Description

Creates a declarative specification for the end-to-end Gazepoint workflow. The defaults preserve vendor fixations, interpolate only short pupil gaps, apply a small median pupil filter, and avoid automatic pupil baseline correction when no pre-stimulus baseline is available.

Usage

```
gazepoint_workflow_spec(
  expected_sampling_rate = 60,
  sampling_tolerance_hz = 5,
  minimum_valid_gaze = 0.8,
  minimum_valid_pupil = 0.7,
  pupil_interpolation = "linear",
  pupil_max_gap_ms = 150,
  pupil_filter = "median",
  pupil_window = 5L,
  pupil_baseline = "none",
  pupil_baseline_window = c(0, 0.5),
```

```
  detect_blinks = TRUE,
 biometric_channels = c("eda", "skin_conductance_level", "skin_conductance_response",
    "heart_rate", "interbeat_interval", "engagement_dial"),
  create_plots = TRUE,
  create_html_report = TRUE,
  retain_raw = TRUE
)
```

Arguments

`expected_sampling_rate`
: Expected gaze sampling rate in hertz.

`sampling_tolerance_hz`
: Allowed absolute sampling-rate deviation.

`minimum_valid_gaze`
: Minimum acceptable valid-gaze fraction.

`minimum_valid_pupil`
: Minimum acceptable valid-pupil fraction.

`pupil_interpolation`
: Pupil interpolation method.

`pupil_max_gap_ms`
: Maximum pupil gap eligible for interpolation.

`pupil_filter`
: Pupil smoothing method.

`pupil_window`
: Smoothing window in samples.

`pupil_baseline`
: Baseline correction method. The default is ‘"none"‘.

`pupil_baseline_window`
: Baseline window relative to media/trial onset.

`detect_blinks`
: Whether to derive blink episodes from missing pupil data.

`biometric_channels`
: Channels to retain in workflow plots and tables.

`create_plots`
: Whether to create the complete plot suite.

`create_html_report`
: Whether to render an HTML copy of the report when ‘rmarkdown‘ and Pandoc are available.

`retain_raw`
: Whether imported native exports are retained in the object.

Value

An ‘eye_gazepoint_workflow_spec‘ object.

generalizability_process_study

Generalizability-style variance decomposition for a process measure

Description

Useful before many-facet IRT: quantifies how much variance comes from person, item, device, session, algorithm, and residual sources.

Usage

```
generalizability_process_study(data, outcome, facets, REML = TRUE)
```

Arguments

data	Input data frame or compatible tabular object.
outcome	Outcome variable.
facets	Facet variables included in the analysis.
REML	Whether restricted maximum likelihood is used.

Value

An object of class "eye_process_g_study", stored as a named list, with components "model", "variance_components", "facets", "outcome". It contains generalizability-style variance decomposition for a process measure and associated metadata or diagnostics needed to interpret the result.

get_irt_model

Retrieve a registered multimodal IRT model

Description

Retrieve a registered multimodal IRT model

Usage

```
get_irt_model(id)
```

Arguments

id	Stable identifier.

Value

An R object containing retrieve a registered multimodal IRT model. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

grade_model_evidence *Grade model evidence against an explicit validation contract*

Description

This is intentionally conservative: failure of any required criterion caps the evidence grade. It does not convert exploratory evidence into a claim of substantive validity.

Usage

```
grade_model_evidence(
  recovery,
  spec = irt_validation_spec("unspecified"),
  external_validation = NULL,
  sbc = NULL,
  ppc = NULL,
  semantic_roundtrip = NULL
)
```

Arguments

`recovery`	Value supplied to ‘recovery‘; see Details for its model-specific role.
`spec`	IRT model or validation specification.
`external_validation`	Value supplied to ‘external_validation‘; see Details for its model-specific role.
`sbc`	Value supplied to ‘sbc‘; see Details for its model-specific role.
`ppc`	Value supplied to ‘ppc‘; see Details for its model-specific role.
`semantic_roundtrip`	Value supplied to ‘semantic_roundtrip‘; see Details for its model-specific role.

Value

An object of class "eye_irt_evidence_grade", stored as a named list, with components "model_id", "grade", "checks", "recovery", "contract", "warning". It contains grade model evidence against an explicit validation contract and associated metadata or diagnostics needed to interpret the result.

grouped_cv *Evaluate a model with grouped cross-validation*

Description

Evaluate a model with grouped cross-validation

Usage

```
grouped_cv(
  data,
  formula,
  family = stats::binomial(),
  group = "participant_id",
  v = 5L,
  metric = c("log_loss", "brier", "accuracy"),
  seed = 1L
)
```

Arguments

data	Data frame.
formula	Model formula.
family	GLM family.
group	Grouping columns.
v	Number of folds.
metric	Metric: log loss, Brier score, or accuracy.
seed	Random seed.

Value

An ‘eye_grouped_cv‘ object.

---

grouped_folds *Create grouped cross-validation folds*

Description

Create grouped cross-validation folds

Usage

```
grouped_folds(data, group = c("participant_id"), v = 5L, seed = 1L)
```

Arguments

data	Data frame.
group	Grouping columns that must not cross folds.
v	Number of folds.
seed	Random seed.

Value

An ‘eye_grouped_folds‘ object.

import_benchmark_study

Build an eye dataset from the public benchmark

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
import_benchmark_study(study = eyeprocess_benchmark_study())
```

Arguments

study	Benchmark object or path.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

import_eye_bids

Import Eye-Tracking-BIDS physiological recordings

Description

Import Eye-Tracking-BIDS physiological recordings

Usage

```
import_eye_bids(path, validate = TRUE)
```

Arguments

path	BIDS dataset root.
validate	Whether to validate the resulting canonical dataset.

Value

An ‘eye_dataset‘.

incremental_process_validity *Extract incremental process validity*

Description

Extract incremental process validity

Usage

```
incremental_process_validity(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A data frame containing incremental process validity. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

init_vendor_corpus *Create or validate a multi-vendor corpus directory*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
init_vendor_corpus(path, overwrite = FALSE)
```

Arguments

path	Corpus directory.
overwrite	Reinitialize an existing empty corpus.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

inject_aoi_label_noise

Inject AOI label noise

Description

Inject AOI label noise

Usage

```
inject_aoi_label_noise(data, aoi = "aoi", proportion, seed = 1L)
```

Arguments

data	Data.
aoi	AOI label column.
proportion	Proportion reassigned to another observed label.
seed	Seed.

Value

An R object containing inject AOI label noise. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

inject_calibration_offset

Inject additive gaze calibration offset in coordinate units

Description

Inject additive gaze calibration offset in coordinate units

Usage

```
inject_calibration_offset(
  data,
  x = "gaze_x",
  y = "gaze_y",
  offset_x = 0,
  offset_y = 0
)
```

Arguments

`data`	Data.
`x, y`	Gaze coordinate columns.
`offset_x, offset_y`	Additive offsets in the same units as x/y.

Value

An R object containing inject additive gaze calibration offset in coordinate units. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

`inject_device_shift` *Inject an additive device/site shift in a numeric feature*

Description

Inject an additive device/site shift in a numeric feature

Usage

```
inject_device_shift(data, column, shift, rows = NULL)
```

Arguments

`data`	Data.
`column`	Numeric column.
`shift`	Additive shift.
`rows`	Optional logical/index rows affected.

Value

An R object containing inject an additive device/site shift in a numeric feature. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

inject_eye_missingness

Inject generic missingness into selected columns

Description

Inject generic missingness into selected columns

Usage

```
inject_eye_missingness(data, columns, proportion, seed = 1L)
```

Arguments

data	Data.
columns	Columns.
proportion	Missingness proportion.
seed	Seed.

Value

An R object containing inject generic missingness into selected columns. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

inject_pupil_dropout

Inject pupil dropout

Description

Inject pupil dropout

Usage

```
inject_pupil_dropout(data, pupil = "pupil", proportion, seed = 1L)
```

Arguments

data	Data.
pupil	Pupil column.
proportion	Dropout proportion.
seed	Seed.

Value

An R object containing inject pupil dropout. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

inject_sampling_jitter

Inject timestamp jitter

Description

Inject timestamp jitter

Usage

```
inject_sampling_jitter(data, time = "timestamp_ms", sd, seed = 1L)
```

Arguments

data	Data.
time	Timestamp column.
sd	Jitter standard deviation in timestamp units.
seed	Seed.

Value

An R object containing inject timestamp jitter. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

inject_trial_imbalance

Inject trial/row imbalance by dropping observations

Description

Inject trial/row imbalance by dropping observations

Usage

```
inject_trial_imbalance(data, proportion, seed = 1L)
```

Arguments

data	Data.
proportion	Proportion dropped.
seed	Seed.

Value

A tabular R object containing inject trial/row imbalance by dropping observations; rows represent analysis units and columns contain the returned quantities.

irt_compositional_channel

Compositional AOI channel

Description

Compositional AOI channel

Usage

```
irt_compositional_channel(
  parts,
  family = c("logratio_gaussian", "dirichlet"),
  latent = "process",
  options = list()
)
```

Arguments

parts	Compositional parts.
family	Statistical family used by the channel or model.
latent	Latent variable or latent-variable labels.
options	Additional channel/model options.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing compositional AOI channel and associated metadata or diagnostics.

irt_continuous_channel

Continuous/bounded process channel for multimodal IRT

Description

Continuous/bounded process channel for multimodal IRT

Usage

```
irt_continuous_channel(
  family = c("censored_normal", "beta", "gaussian"),
  value = "process_value",
  lower = 0,
  upper = 1,
  latent = "process",
  options = list()
)
```

Arguments

family	Continuous response family.
value	Variable name.
lower, upper	Bounds where applicable.
latent	Latent dimension.
options	Additional channel metadata.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing continuous/bounded process channel for multimodal IRT and associated metadata or diagnostics.

---

irt_count_channel *Count-valued process channel for multimodal IRT*

Description

Count-valued process channel for multimodal IRT

Usage

```
irt_count_channel(
  family = c("negative_binomial", "poisson"),
  value = "fixation_count",
  latent = "engagement",
  options = list()
)
```

Arguments

family	Statistical family used by the channel or model.
value	Process-value column or values.
latent	Latent variable or latent-variable labels.
options	Additional channel/model options.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing count-valued process channel for multimodal IRT and associated metadata or diagnostics.

irt_functional_channel *Functional trajectory channel*

Description

Functional trajectory channel

Usage

```
irt_functional_channel(
  value = "pupil",
  time = "time",
  family = c("basis_gaussian", "functional_factor"),
  latent = "process",
  options = list()
)
```

Arguments

`value`	Process-value column or values.
`time`	Time values.
`family`	Statistical family used by the channel or model.
`latent`	Latent variable or latent-variable labels.
`options`	Additional channel/model options.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing functional trajectory channel and associated metadata or diagnostics.

irt_model_spec *Define a multimodal IRT model specification*

Description

Define a multimodal IRT model specification

Usage

```
irt_model_spec(
  id,
  latent,
  channels,
  status = c("experimental", "reference", "gated"),
  fit_fun = NULL,
  simulate_fun = NULL,
  validate_fun = NULL,
  citation = character(),
  description = NULL,
  requirements = character(),
  metadata = list()
)
```

Arguments

id	Stable model identifier.
latent	Named or unnamed latent dimensions.
channels	Named list of channel objects.
status	One of reference, experimental, or gated.
fit_fun	Optional fitting function.
simulate_fun	Optional simulator.
validate_fun	Optional model-specific validation function.
citation	Character vector of citations/DOIs.
description	Human-readable model description.
requirements	Optional packages/engines.
metadata	Additional metadata.

Value

An ‘eye_irt_model_spec‘.

---

irt_nominal_channel *Nominal response/process channel*

Description

Nominal response/process channel

Usage

```
irt_nominal_channel(
  choice = "response_option",
  categories = NULL,
  latent = "ability",
  options = list()
)
```

Arguments

choice	Observed nominal choice.
categories	Nominal response categories.
latent	Latent variable or latent-variable labels.
options	Additional channel/model options.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing nominal response/process channel and associated metadata or diagnostics.

---

irt_response_channel *Binary/ordinal response channel for multimodal IRT*

Description

Binary/ordinal response channel for multimodal IRT

Usage

```
irt_response_channel(
  family = c("2pl", "rasch", "graded", "partial_credit"),
  response = "response",
  latent = "ability",
  options = list()
)
```

Arguments

family	Statistical family used by the channel or model.
response	Response variable or response-column name.
latent	Latent variable or latent-variable labels.
options	Additional channel/model options.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing binary/ordinal response channel for multimodal IRT and associated metadata or diagnostics.

irt_rt_channel *Response-time channel for multimodal IRT*

Description

Response-time channel for multimodal IRT

Usage

```
irt_rt_channel(
  family = c("lognormal", "gaussian_log", "shifted_lognormal"),
  rt = "rt",
  latent = "speed",
  options = list()
)
```

Arguments

family	Statistical family used by the channel or model.
rt	Response-time variable or column name.
latent	Latent variable or latent-variable labels.
options	Additional channel/model options.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing response-time channel for multimodal IRT and associated metadata or diagnostics.

irt_sequence_channel *Sequence/process-state channel*

Description

Sequence/process-state channel

Usage

```
irt_sequence_channel(
  sequence = "sequence",
  family = c("ngram", "hmm", "embedding"),
  latent = "strategy",
  options = list()
)
```

Arguments

`sequence`	Sequence input.
`family`	Statistical family used by the channel or model.
`latent`	Latent variable or latent-variable labels.
`options`	Additional channel/model options.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing sequence/process-state channel and associated metadata or diagnostics.

`irt_survival_channel` *Survival/event-time channel for multimodal IRT*

Description

Survival/event-time channel for multimodal IRT

Usage

```
irt_survival_channel(
  family = c("cox", "weibull", "exponential"),
  time = "time",
  event = "event",
  latent = NULL,
  options = list()
)
```

Arguments

`family`	Statistical family used by the channel or model.
`time`	Time values.
`event`	Event indicator or event column.
`latent`	Latent variable or latent-variable labels.
`options`	Additional channel/model options.

Value

A named list with components "type", "family", "role", "link", "variables", "latent", "options", containing survival/event-time channel for multimodal IRT and associated metadata or diagnostics.

irt_validation_spec *Specify a validation programme for a process-IRT model*

Description

Creates an evidence contract rather than executing a particular estimator. The object can be passed to stress-test and evidence-grading helpers.

Usage

```
irt_validation_spec(
  model_id,
  replications = 250L,
  parameters = NULL,
  metrics = c("bias", "rmse", "coverage", "interval_width", "convergence"),
  grouped_validation = c("device", "session", "site"),
  preprocessing_variants = NULL,
  misspecification_scenarios = NULL,
  thresholds = list(max_abs_bias = 0.1, max_rmse = 0.3, min_coverage = 0.9,
    max_failure_rate = 0.05, min_external_folds = 2L),
  seed = 20260808L,
  notes = NULL
)
```

Arguments

`model_id`	Stable model identifier.
`replications`	Number of simulation replications planned.
`parameters`	Parameter families expected to be recovered.
`metrics`	Recovery metrics to require.
`grouped_validation`	Grouping variables for transport validation.
`preprocessing_variants`	Optional named preprocessing variants.
`misspecification_scenarios`	Optional named scenarios.
`thresholds`	Named evidence thresholds.
`seed`	Reproducibility seed.
`notes`	Free-text scientific notes.

Value

An object of class "eye_irt_validation_spec", stored as a named list, with components "model_id", "replications", "parameters", "metrics", "grouped_validation", "preprocessing_variants", "misspecification_scenarios", "thresholds", "seed", "notes", "contract_version", "created_with". It contains specify a validation programme for a process-IRT model and associated metadata or diagnostics needed to interpret the result.

---

item_objective_spec *Multi-objective item-bank optimization*

Description

Multi-objective item-bank optimization. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
item_objective_spec(information, process_burden, fairness, exposure,
  content_constraints = NULL, weights = c(information = 1, process_burden = 1,
  fairness = 1, exposure = 1), directions = c(information = "max",
  process_burden = "min", fairness = "min", exposure = "min"))
item_pareto_front(x, objectives)
optimize_item_bank(x, n_items, objectives, constraints = NULL, method = c("integer",
  "evolutionary"), iterations = 500, seed = 20260807)
audit_bank_decision_stability(x, draws = 1000, noise_sd = 0.1, seed = 20260807)
plot_item_pareto(x, ...)
plot_objective_tradeoffs(x, ...)
plot_bank_information_coverage(x, ...)
plot_decision_stability(x, ...)
plot_selected_bank_profile(x, ...)
```

Arguments

`information` Argument controlling ‘information‘; see the function usage and returned audit metadata.

`process_burden` Argument controlling ‘process_burden‘; see the function usage and returned audit metadata.

`fairness` Argument controlling ‘fairness‘; see the function usage and returned audit metadata.

`exposure` Argument controlling ‘exposure‘; see the function usage and returned audit metadata.

`content_constraints` Argument controlling ‘content_constraints‘; see the function usage and returned audit metadata.

`weights`	Argument controlling ‘weights‘; see the function usage and returned audit metadata.
`directions`	Argument controlling ‘directions‘; see the function usage and returned audit metadata.
`x`	Input object or data structure appropriate for the selected analysis.
`objectives`	Argument controlling ‘objectives‘; see the function usage and returned audit metadata.
`n_items`	Argument controlling ‘n_items‘; see the function usage and returned audit metadata.
`constraints`	Argument controlling ‘constraints‘; see the function usage and returned audit metadata.
`method`	Argument controlling ‘method‘; see the function usage and returned audit metadata.
`iterations`	Argument controlling ‘iterations‘; see the function usage and returned audit metadata.
`seed`	Argument controlling ‘seed‘; see the function usage and returned audit metadata.
`draws`	Argument controlling ‘draws‘; see the function usage and returned audit metadata.
`noise_sd`	Argument controlling ‘noise_sd‘; see the function usage and returned audit metadata.
`...`	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

latent_distribution_stress_test

Stress-test IRT estimators across latent distributions

Description

Public roadmap alias for ‘stress_test_latent_distribution()‘.

Usage

```
latent_distribution_stress_test(...)
```

Arguments

`...`	Additional arguments passed to the selected model, engine, or method.

Value

An R object containing stress-test IRT estimators across latent distributions. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

latent_trait_trajectory

Estimate a descriptive continuous-time latent trajectory

Description

Estimate a descriptive continuous-time latent trajectory

Usage

```
latent_trait_trajectory(time, theta, spar = NULL)
```

Arguments

`time`	Time values.
`theta`	Latent-trait values.
`spar`	Value supplied to ‘spar‘; see Details for its model-specific role.

Value

An object of class "eye_latent_trait_trajectory", stored as a named list, with components "model", "time", "theta". It contains a descriptive continuous-time latent trajectory and associated metadata or diagnostics needed to interpret the result.

leave_device_out_validation

Leave device out validation

Description

Leave device out validation

Usage

```
leave_device_out_validation(data, device, fitter, predictor, scorer)
```

Arguments

data	Input data frame or compatible tabular object.
device	Device identifier or device facet.
fitter	Model-fitting function.
predictor	Prediction function.
scorer	Function that scores predictions.

Value

An object of class "eye_leave_device_out_validation", "data.frame", stored as a data frame, containing leave device out validation and associated metadata needed to interpret the result.

leave_item_out_validation

Leave item out validation

Description

Leave item out validation

Usage

```
leave_item_out_validation(data, item, fitter, predictor, scorer)
```

Arguments

data	Input data frame or compatible tabular object.
item	Item identifier, name, or item column.
fitter	Model-fitting function.
predictor	Prediction function.
scorer	Function that scores predictions.

Value

An object of class "eye_leave_item_out_validation", "data.frame", stored as a data frame, containing leave item out validation and associated metadata needed to interpret the result.

---

leave_session_out_validation

Leave session out validation

Description

Leave session out validation

Usage

```
leave_session_out_validation(data, session, fitter, predictor, scorer)
```

Arguments

data	Input data frame or compatible tabular object.
session	Session identifier or session facet.
fitter	Model-fitting function.
predictor	Prediction function.
scorer	Function that scores predictions.

Value

An object of class "eye_leave_session_out_validation", "data.frame", stored as a data frame, containing leave session out validation and associated metadata needed to interpret the result.

---

leave_site_out_validation

Leave site out validation

Description

Leave site out validation

Usage

```
leave_site_out_validation(data, site, fitter, predictor, scorer)
```

Arguments

`data`	Input data frame or compatible tabular object.
`site`	Site identifier or site facet.
`fitter`	Model-fitting function.
`predictor`	Prediction function.
`scorer`	Function that scores predictions.

Value

An object of class "eye_leave_site_out_validation", "data.frame", stored as a data frame, containing leave site out validation and associated metadata needed to interpret the result.

`list_irt_models` *List registered multimodal IRT models*

Description

List registered multimodal IRT models

Usage

```
list_irt_models()
```

Value

A tabular R object containing list registered multimodal IRT models; rows represent analysis units and columns contain the returned quantities.

`lock_decision_manifest` *Lock a decision manifest by content hash*

Description

Lock a decision manifest by content hash

Usage

```
lock_decision_manifest(x, label = "analysis_decisions")
```

Arguments

`x`	Manifest.
`label`	Optional lock label.

Value

An object of class "eye_decision_manifest_lock", stored as a named list, with components "manifest", "manifest_hash", "label", "locked_at", "status". It contains lock a decision manifest by content hash and associated metadata or diagnostics needed to interpret the result.

---

map_latent_classes_to_process_profiles

Map supplied latent-class memberships to process summaries

Description

Map supplied latent-class memberships to process summaries

Usage

```
map_latent_classes_to_process_profiles(
  class_membership,
  process_data,
  person = "person_id",
  class_col = "class",
  process_features
)
```

Arguments

`class_membership` Data containing person/class assignments or probabilities.

`process_data` Person-level or trial-level process data.

`person` Person identifier present in both objects.

`class_col` Class-assignment column.

`process_features` Numeric process features.

Value

An object of class "eye_latent_process_alignment", stored as a named list, with components "data", "summary", "process_features", "class_col", "caveat". It contains supplied latent-class memberships to process summaries and associated metadata or diagnostics needed to interpret the result.

measurement_error_budget

Build a non-collapsed measurement-error budget

Description

Build a non-collapsed measurement-error budget

Usage

```
measurement_error_budget(
  accuracy = NA_real_,
  precision = NA_real_,
  data_loss = NA_real_,
  effective_hz = NA_real_,
  calibration_drift = NA_real_,
  units = NULL
)
```

Arguments

accuracy	Measurement inaccuracy/offset metric.
precision	Measurement imprecision metric.
data_loss	Data-loss proportion.
effective_hz	Effective sampling frequency.
calibration_drift	Optional drift metric.
units	Optional named units.

Value

A data frame containing a non-collapsed measurement-error budget. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

migrate_eye_storage_schema

Migrate a storage schema through an atomic rewrite

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
migrate_eye_storage_schema(storage, target_path, target_version = "2.0.0",
  format = NULL, overwrite = FALSE)
```

Arguments

storage	Storage object or path.
target_path	Destination.
target_version	Target schema version.
format	Target format.
overwrite	Whether to replace target.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

model_promotion_spec *Specify evidence gates for model promotion*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
model_promotion_spec(model_families = c("dynamic_irtree", "functional_pupil_irt",
  "theory_strategy_irt", "gaze_diffusion_irt"), require_completion = TRUE,
  require_sbc = TRUE, require_misspecification = TRUE,
  require_grouped_validation = TRUE, require_engine_equivalence = TRUE,
 require_empirical_reproduction = TRUE, require_preprocessing_sensitivity = TRUE,
  require_multi_vendor = FALSE)
```

Arguments

model_families	Model families to audit.
require_completion	Require complete Monte Carlo evidence.
require_sbc	Require simulation-based calibration.
require_misspecification	Require declared misspecification studies.
require_grouped_validation	Require grouped out-of-sample validation.
require_engine_equivalence	Require external-engine comparison.

`require_empirical_reproduction`
: Require an empirical reproduction.

`require_preprocessing_sensitivity`
: Require preprocessing/AOI sensitivity.

`require_multi_vendor`
: Require independent multi-vendor evidence.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`model_validation_spec` *Specify a model-validation programme*

Description

Specify a model-validation programme

Usage

```
model_validation_spec(
  replications = 100L,
  confidence = 0.95,
  max_abs_bias = 0.1,
  min_coverage = 0.9,
  max_failure_rate = 0.05
)
```

Arguments

`replications` Number of Monte Carlo replications.

`confidence` Confidence level for interval coverage.

`max_abs_bias` Maximum acceptable absolute bias.

`min_coverage` Minimum acceptable interval coverage.

`max_failure_rate`
: Maximum acceptable estimation failure rate.

Value

An ‘eye_model_validation_spec‘.

model_validation_summary

Summarize model validation

Description

Summarize model validation

Usage

```
model_validation_summary(x)
```

Arguments

x	An ‘eye_model_validation‘ object.

Value

Scenario-by-parameter validation metrics.

multiblock_contributions

Extract multiblock block contributions/coordinates

Description

Extract multiblock block contributions/coordinates

Usage

```
multiblock_contributions(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

An R object containing multiblock block contributions/coordinates. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

multiblock_person_coordinates

Extract multiblock person coordinates

Description

Extract multiblock person coordinates

Usage

```
multiblock_person_coordinates(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

An R object containing multiblock person coordinates. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

multiblock_variable_coordinates

Extract multiblock variable coordinates

Description

Extract multiblock variable coordinates

Usage

```
multiblock_variable_coordinates(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

An R object containing multiblock variable coordinates. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

multimodal_backend_status *Report multimodal backend availability*

Description

Report multimodal backend availability

Usage

```
multimodal_backend_status()
```

Value

A data.frame describing optional backend availability.

multimodal_irt_spec *Consolidated multimodal IRT specification*

Description

This is a thin multimodal adapter over the established ‘irt_model_spec()‘ / ‘eye_irt_model_spec‘ architecture. It composes existing ‘eye_irt_channel‘ objects and does not define a parallel channel or model-specification ecosystem.

Usage

```
multimodal_irt_spec(
  response = NULL,
  rt = NULL,
  gaze = NULL,
  pupil = NULL,
  model = c("M0", "M1", "M2", "M3"),
  backend = c("cmdstanr", "existing"),
  identification = list(),
  priors = list()
)
```

Arguments

response, rt, gaze, pupil	Existing ‘eye_irt_channel‘ objects or NULL.
model	Development model identifier.
backend	Requested backend.
identification	Named identification settings retained as explicit multimodal metadata.
priors	Named prior settings retained as explicit multimodal metadata.

Value

An ‘eye_multimodal_irt_spec‘ convenience subclass of the established ‘eye_irt_model_spec‘.

---

multimodal_m2_ablation

Fit M0, M1, and M2 as a response-target ablation sequence

Description

Fits response-only (M0), response+RT (M1), and response+RT+gaze (M2) with compatible hierarchical Stan implementations. The sequence is designed for response-target comparison rather than for asserting that information from distinct channels is algebraically additive.

Usage

```
multimodal_m2_ablation(x, ...)
```

Arguments

x	Data accepted by [fit_multimodal_m2()].
...	Sampling arguments forwarded to the internal reference fitters.

Value

An ‘eye_multimodal_m2_ablation‘.

---

multimodal_m2_negative_controls

Generate M2 alignment negative controls

Description

Generates deterministic within-item permutations that preserve each item’s marginal channel distribution while breaking person-level alignment for gaze, RT, or response. These are falsification controls, not causal interventions and not misconduct detectors.

Usage

```
multimodal_m2_negative_controls(x, seed = 20260814L)
```

Arguments

x	M2-compatible data.
seed	Seed for deterministic permutations.

Value

An ‘eye_multimodal_m2_negative_controls‘.

multimodal_m2_ppc *Posterior predictive checks for the M2 three-way model*

Description

Reproduces the channel-specific discrepancy logic used in the published three-way framework: response W, response-time L, and fixation-count M residual statistics, aggregated by item.

Usage

```
multimodal_m2_ppc(x)
```

Arguments

x	An ‘eye_multimodal_m2_fit‘ with ‘model == "M2"‘.

Value

An ‘eye_multimodal_m2_ppc‘.

multimodal_m2_process_information *Quantify response-target process information in the M0-M2 sequence*

Description

Computes two complementary quantities on a common response target: response-target PSIS-LOO ELPD and posterior variance of person ability. This avoids simply summing channel Fisher information under a joint correlated model.

Usage

```
multimodal_m2_process_information(x)
```

Arguments

x	An ‘eye_multimodal_m2_ablation‘.

Value

An ‘eye_multimodal_m2_information‘.

multimodal_m2_recovery

Run repeated M2 estimator recovery

Description

Repeatedly simulates from the M2 generating model, fits the M2 CmdStan reference estimator, and computes bias, RMSE, posterior standard deviation, and 95 dispersion, correlation, and hyperparameter families.

Usage

```
multimodal_m2_recovery(
  n_rep = 10L,
  n_person = 100L,
  n_item = 10L,
  dropout = c(response = 0, rt = 0, gaze = 0),
  base_seed = 20260814L,
  chains = 4L,
  parallel_chains = chains,
  iter_warmup = 1000L,
  iter_sampling = 1000L,
  prior_profile = c("regularized", "paper_centered"),
  adapt_delta = 0.95,
  max_treedepth = 12L,
  refresh = 0L
)
```

Arguments

`n_rep`	Number of simulation/fit replications.
`n_person`, `n_item`	Simulation size.
`dropout`	Channel dropout probabilities.
`base_seed`	Base seed.
`chains`, `parallel_chains`, `iter_warmup`, `iter_sampling`	CmdStan controls.
`prior_profile`	Prior profile.
`adapt_delta`, `max_treedepth`, `refresh`	CmdStan controls.

Details

This is intentionally computationally expensive and is not executed during ordinary package tests.

Value

An ‘eye_multimodal_m2_recovery‘.

`multimodal_m2_spec` *M2 response + RT + gaze reference specification*

Description

Creates a thin M2 specialization of the established [multimodal_irt_spec()] / ‘irt_model_spec()‘ architecture. The measurement likelihood follows Man, Harring, and Zhan (2022): Rasch response, lognormal response time, and negative-binomial gaze-fixation counts. Priors are implemented in Stan using either a regularized profile or a paper-centered profile; the latter is not claimed to reproduce every published hyperprior exactly.

Usage

```
multimodal_m2_spec(
  backend = "cmdstanr",
  prior_profile = c("regularized", "paper_centered"),
  missingness = "ignorable"
)
```

Arguments

`backend`	Currently ‘"cmdstanr"‘ only.
`prior_profile`	‘"regularized"‘ or ‘"paper_centered"‘.
`missingness`	Currently ‘"ignorable"‘ only. Channel-specific missing observations contribute no level-1 likelihood term.

Value

An ‘eye_multimodal_m2_spec‘, inheriting the established ‘eye_multimodal_irt_spec‘ and ‘eye_irt_model_spec‘ classes.

`multimodal_m3_ablation` *Fit the complete M3 response-anchored channel-ablation lattice*

Description

Fits all eight response-anchored combinations of RT, gaze and pupil. Models use one common subset-likelihood implementation to make the target and prior family explicit. This is inferential ablation, not a causal intervention on sensors.

Usage

```
multimodal_m3_ablation(
  x,
  models = NULL,
  nuisance = stats::setNames(rep(TRUE, 8L), .ep10_m3_nuisance_names),
  ...
)
```

Arguments

x	M3-compatible data.
models	Optional subset of the eight model identifiers.
nuisance	Named logical vector selecting pupil nuisance terms. The same selection is applied to every ablation model containing pupil.
...	Sampling controls forwarded to the subset fitter.

Value

An ‘eye_multimodal_m3_ablation‘.

---

multimodal_m3_functional_bridge

Bridge existing functional pupil outputs into the scalar M3 reference layer

---

Description

This bridge deliberately requires an analyst-supplied, already-derived trial-level functional score. It does not silently reduce a raw time series. Existing ‘functional_pupil_irt_spec()‘, deconvolution, and confound tools remain the authoritative trajectory-level machinery.

Usage

```
multimodal_m3_functional_bridge(
  data,
  score,
  pupil = "pupil",
  provenance = NULL
)
```

Arguments

data	Trial-level M3 data.
score	Trial-level functional/trajectory score or its column name.
pupil	Name of the output pupil column.
provenance	Free-text derivation/provenance note.

Value

An ‘eye_multimodal_m3_functional_bridge‘ data object.

---

multimodal_m3_negative_controls *Generate M3 multimodal falsification controls*

Description

Includes within-item RT/gaze/pupil permutations, within-person pupil permutation across items, pupil phase randomization, luminance-only pseudo-pupil, and an irrelevant synthetic channel. Controls preserve selected marginals while deliberately breaking alignment; they are not causal interventions or misconduct detectors.

Usage

```
multimodal_m3_negative_controls(x, seed = 20260815L)
```

Arguments

x	M3-compatible data.
seed	Deterministic seed.

Value

An ‘eye_multimodal_m3_negative_controls‘.

---

multimodal_m3_ppc *Posterior predictive checks for the M3 four-channel model*

Description

Extends the M2 W/L/M discrepancy family with a standardized pupil residual discrepancy P. Tail flags are diagnostics, not construct validation.

Usage

```
multimodal_m3_ppc(x)
```

Arguments

x	An M3 fit.

Value

An ‘eye_multimodal_m3_ppc‘.

multimodal_m3_process_information

Quantify M3 process information, pupil increment, redundancy and sensor value

Description

Uses response-target PSIS-LOO and posterior ability variance across the eight-channel ablation lattice. It additionally reports paired pupil gains, a non-additivity/redundancy contrast, a channel-conflict screen, and optional information per usable pupil observation or sensor cost. Positive values do not establish construct validity or causal sensor value.

Usage

```
multimodal_m3_process_information(x, pupil_cost = 1, decisive_z = 2)
```

Arguments

x	An M3 ablation object.
pupil_cost	Optional positive relative pupil-sensor cost.
decisive_z	Absolute delta/SE ratio used only as a descriptive evidence flag.

Value

An ‘eye_multimodal_m3_information‘ object.

multimodal_m3_recovery

Run M3 parameter-recovery and stress evidence

Description

Repeatedly simulates and fits M3 across pupil-signal and pupil-missingness scenarios, summarizing bias, RMSE, posterior SD, interval coverage and MCMC diagnostics. Small ‘reps‘ values are smoke tests; scientific promotion requires a predeclared larger grid.

Usage

```
multimodal_m3_recovery(
  reps = 3L,
  pupil_signal = c("informative", "weak", "null", "redundant", "confounded"),
  pupil_missingness = c("mcar", "quality", "device"),
  n_person = 80L,
  n_item = 10L,
  seed = 20260815L,
```

```
  fit_args = list(chains = 2L, parallel_chains = 2L, iter_warmup = 500L, iter_sampling =
     300L, refresh = 0L, init = 0)
)
```

Arguments

`reps`	Replications per design cell.
`pupil_signal`, `pupil_missingness`	Scenario vectors.
`n_person`, `n_item`	Design size.
`seed`	Base seed.
`fit_args`	Named sampling arguments for ‘fit_multimodal_m3()‘.

Value

An ‘eye_multimodal_m3_recovery‘ object.

`multimodal_m3_spec` *M3 response + RT + gaze + pupil specification*

Description

Extends the established eyeprocess multimodal IRT specification with a continuous pupil-responsivity channel. The summary representation is fitted by the bundled four-channel Stan model. ‘functional_score‘ records that the pupil input was derived from a trajectory/functional workflow; it does not silently turn the scalar reference likelihood into a functional likelihood.

Usage

```
multimodal_m3_spec(
  backend = "cmdstanr",
  prior_profile = c("regularized", "paper_centered"),
  missingness = "ignorable",
  pupil_representation = c("summary", "functional_score"),
  nuisance = stats::setNames(rep(TRUE, 8L), .ep10_m3_nuisance_names)
)
```

Arguments

`backend`	Currently ‘"cmdstanr"‘ only.
`prior_profile`	Prior profile.
`missingness`	Currently ‘"ignorable"‘ only.
`pupil_representation`	‘"summary"‘ or ‘"functional_score"‘.
`nuisance`	Named logical vector selecting baseline, luminance, gaze X/Y, quality, blink, interpolation and time-on-task nuisance terms. Availability is also audited from data.

Value

An ‘eye_multimodal_m3_spec‘ inheriting the established multimodal and IRT spec classes.

---

multimodal_m4_ablation

Plan or fit the focused M3-to-M4 ablation set

Description

The default is plan-only. The essential lattice compares M3, formal K=1, reference K=2, K=2 without trait conditioning, and K=2 with iid states. Optional RT-anchored channel ablations are available but are not part of the default development burden. A no-RT K>1 model is intentionally excluded because the reference label-identification policy orders RT state deviations.

Usage

```
multimodal_m4_ablation(
  x,
  run = FALSE,
  include_channel_ablations = FALSE,
  m3_fit = NULL,
  m4_fit = NULL,
  fit_args = list()
)
```

Arguments

`x`	Data or M4 simulation.
`run`	Whether to fit models. Default ‘FALSE‘.
`include_channel_ablations`	Add RT-only, no-gaze, and no-pupil state models.
`m3_fit`, `m4_fit`	Optional already fitted baseline/reference objects to reuse.
`fit_args`	Sampling arguments shared across new fits.

Value

An ‘eye_multimodal_m4_ablation‘.

multimodal_m4_negative_controls

Construct M4 temporal, nuisance, device, and overfitting negative controls

Description

Controls are transformations/stress designs by default and therefore do not incur backend fitting. Set ‘run = TRUE‘ only when explicit fitted comparisons are needed.

Usage

```
multimodal_m4_negative_controls(
  x,
  controls = c("order_shuffle", "process_shuffle", "state_independent",
   "nuisance_pseudostate", "device_session_pseudostate", "overfit_state_count"),
  seed = 20260820L,
  run = FALSE,
  fit_args = list()
)
```

Arguments

x	Data or M4 simulation.
controls	Control names.
seed	Deterministic seed.
run	Whether to fit the generated controls.
fit_args	Arguments for optional M4 fits.

Value

An ‘eye_multimodal_m4_negative_controls‘.

multimodal_m4_ppc

Posterior predictive checks for M4 measurement and sequential behavior

Description

Compares observed process summaries with posterior-replicated summaries and reports replicated latent-state dynamics separately. Because states are latent, inferred state labels are never treated as observed ground truth.

Usage

```
multimodal_m4_ppc(x)
```

Arguments

x	An M4 fit.

Value

An ‘eye_multimodal_m4_ppc‘.

---

multimodal_m4_process_information

Quantify incremental response-target information supplied by M4 state structure

---

Description

Uses commensurate response-target PSIS-LOO and ability-posterior uncertainty to compare M3 with focused M4 variants. It explicitly allows no benefit, redundancy, or destabilization and does not sum channel Fisher information.

Usage

```
multimodal_m4_process_information(x, decisive_z = 2)
```

Arguments

x	Executed M4 ablation object.
decisive_z	Descriptive absolute delta/SE threshold.

Value

An ‘eye_multimodal_m4_information‘.

multimodal_m4_recovery

Evaluate deterministic M4 parameter and state recovery

Description

Recovery aligns latent-state labels before scoring multichannel state effects, and emphasizes posterior-probability calibration, occupancy, and transition recovery rather than treating MAP classification accuracy as the primary criterion. By default the function returns a small five-scenario design and does not launch expensive fitting.

Usage

```
multimodal_m4_recovery(
  simulation = NULL,
  fit = NULL,
 scenarios = c("clear", "weak", "null", "trait_conditioned", "nuisance_confounded"),
  run = FALSE,
  simulation_args = list(n_person = 60L, n_item = 10L),
  fit_args = list()
)
```

Arguments

simulation	Optional single M4 simulation.
fit	Optional already-fitted M4 model corresponding to ‘simulation‘.
scenarios	Deterministic development battery used when ‘run = TRUE‘.
run	Whether to execute the small recovery battery. Default ‘FALSE‘.
simulation_args	Named arguments forwarded to simulation.
fit_args	Named arguments forwarded to ‘fit_multimodal_m4()‘.

Value

An ‘eye_multimodal_m4_recovery‘.

multimodal_m4_sensitivity

Plan or run M4 state-count and modelling sensitivity analyses

Description

The default returns a transparent sensitivity design without fitting. It covers K, priors, trait conditioning, transition structure, state channels, nuisance adjustment, and sequence-length threshold. No automatic ‘best_K‘ is declared.

Usage

```
multimodal_m4_sensitivity(x, n_states = 1:4, run = FALSE, fit_args = list())
```

Arguments

x	Data or simulation.
n_states	Candidate state counts, default 1:4.
run	Whether to execute K-sensitivity fits. Other sensitivity dimensions remain explicit design rows rather than an automatic combinatorial grid.
fit_args	Optional fitting arguments.

Value

An ‘eye_multimodal_m4_sensitivity‘.

multimodal_m4_spec

Specify M4 trait-conditioned latent response-process states

Description

Defines the M4 sequential extension of the validated M3 response + RT + gaze + pupil model. The reference implementation keeps the scored-response Rasch equation state-independent and lets latent states shift selected RT, gaze, and pupil process channels. State labels are statistical identification labels only and do not imply psychological constructs.

Usage

```
multimodal_m4_spec(
  n_states = 2L,
  state_channels = c("rt", "gaze", "pupil"),
  transition_structure = c("markov", "iid"),
  trait_conditioning = c("theta", "tau"),
  initial_trait_conditioning = TRUE,
  min_sequence_length = 2L,
```

```
  identification = c("ordered_rt_effect"),
  prior_profile = c("regularized", "paper_centered"),
  missingness = "ignorable",
  nuisance = stats::setNames(rep(TRUE, 8L), .ep10_m3_nuisance_names),
  backend = "cmdstanr"
)
```

Arguments

- `n_states` Number of latent states, from 1 through 4. ‘1‘ is the formal null state model and should be treated as scientifically meaningful.
- `state_channels` Subset of ‘"rt"‘, ‘"gaze"‘, and ‘"pupil"‘ receiving state-dependent deviations.
- `transition_structure` ‘"markov"‘ for first-order transitions or ‘"iid"‘ for independent state membership over ordered trials.
- `trait_conditioning` Subset of ‘theta‘, ‘tau‘, ‘omega‘, and ‘rho‘ used to condition transition logits. The conservative default is ‘theta + tau‘.
- `initial_trait_conditioning` Whether the same selected traits condition initial-state probabilities.
- `min_sequence_length` Minimum sequence length required by the structural audit for fitting. No rows are silently removed when sequences are shorter.
- `identification` State-label identification policy. The reference policy orders centered RT state deviations; this is a label convention only.
- `prior_profile` Prior profile inherited from M3.
- `missingness` Currently ‘"ignorable"‘ only.
- `nuisance` Named pupil-nuisance selection vector inherited from M3.
- `backend` Currently ‘"cmdstanr"‘ only.

Value

An ‘eye_multimodal_m4_spec‘ inheriting the canonical eyeprocess multimodal/IRT specification classes.

`multimodal_m4_state_diagnostics` *Summarize M4 latent-state uncertainty and dynamics*

Description

Returns posterior state probabilities, entropy, occupancy, MAP-run summaries, transition probabilities, and posterior-weighted process-channel profiles. MAP states are explicitly secondary summaries of posterior probabilities.

Usage

```
multimodal_m4_state_diagnostics(x)
```

Arguments

x	M4 fit or M4 simulation. Simulation diagnostics use known synthetic truth and are labelled accordingly.

Value

An ‘eye_multimodal_m4_states‘ object.

---

multimodal_ppc *Posterior predictive checks for multimodal development fits*

Description

Posterior predictive checks for multimodal development fits

Usage

```
multimodal_ppc(object, variables = NULL)
```

Arguments

object	An ‘eye_multimodal_irt_fit‘.
variables	Optional generated-quantity variable names.

Value

An ‘eye_multimodal_ppc‘.

---

negative_control_concordance *Concordance of multiple negative-control families*

Description

Concordance of multiple negative-control families

Usage

```
negative_control_concordance(x, effect = "effect", tolerance = 0.05)
```

Arguments

`x`	Negative-control result.
`effect`	Effect column.
`tolerance`	Absolute mean-effect tolerance.

Value

A named list with components "summary", "all_within_tolerance", "tolerance", containing concordance of multiple negative-control families and associated metadata or diagnostics.

`negative_control_process_test` *Negative-control test for an allegedly informative process channel*

Description

The user supplies a complete evaluation callback. eyeprocess permutes the named process columns, optionally within grouping strata, and compares the observed score with the permutation distribution.

Usage

```
negative_control_process_test(
  data,
  process_columns,
  evaluator,
  within = NULL,
  permutations = 100L,
  higher_is_better = TRUE,
  seed = 20260808L
)
```

Arguments

`data`	Input data.
`process_columns`	Columns to permute.
`evaluator`	Function returning one scalar out-of-sample score.
`within`	Optional grouping columns within which permutation occurs.
`permutations`	Number of negative-control permutations.
`higher_is_better`	Score direction.
`seed`	Random-number seed.

Value

An object of class "eye_process_negative_control", stored as a named list, with components "observed", "null", "p_value", "permutations", "process_columns", "within", "higher_is_better", "seed". It contains negative-control test for an allegedly informative process channel and associated metadata or diagnostics needed to interpret the result.

---

object_hash — *Hash an R object reproducibly within an R serialization version*

Description

Hash an R object reproducibly within an R serialization version

Usage

```
object_hash(x)
```

Arguments

x	R object.

Value

An R object containing hash an R object reproducibly within an R serialization version. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

object_schema — *Describe a stable object schema*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
object_schema(object = c("eye_dataset", "eyeprocess_model", "validation_plan",
  "validation_collection", "vendor_corpus", "eye_storage"))
```

Arguments

object	Object or schema name.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

open_eye_storage *Open an eyeprocess storage handle*

Description

Open an eyeprocess storage handle

Usage

```
open_eye_storage(path, format = NULL)
```

Arguments

path	Storage path.
format	Optional explicit format.

Value

An ‘eye_storage‘ handle without collecting all tables.

open_partitioned_eye_storage *Open partitioned eye storage*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
open_partitioned_eye_storage(path)
```

Arguments

path	Storage directory.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

option_process_information

Quantify option-process information from a nominal gaze model

Description

Quantify option-process information from a nominal gaze model

Usage

```
option_process_information(object)
```

Arguments

object	A fitted eyeprocess model or audit object.

Value

An object of class "eye_option_process_information", "data.frame", stored as a data frame, containing quantify option-process information from a nominal gaze model and associated metadata needed to interpret the result.

outcome_blind_feature_audit

Audit whether candidate predictors can be constructed without an outcome column

Description

Audit whether candidate predictors can be constructed without an outcome column

Usage

```
outcome_blind_feature_audit(data, outcome, feature_fun)
```

Arguments

data	Data frame.
outcome	Outcome column name.
feature_fun	Function receiving outcome-hidden data and returning features.

Value

A named list with components "status", "outcome", "feature_result", "error", "warnings", "input_columns", "interpretation", containing whether candidate predictors can be constructed without an outcome column and associated metadata or diagnostics.

outcome_blind_snapshot

Create an outcome-blind data snapshot

Description

Create an outcome-blind data snapshot

Usage

```
outcome_blind_snapshot(data, outcome, id = NULL)
```

Arguments

data	Data frame.
outcome	Outcome column(s) to remove from the analysis snapshot.
id	Optional identifier columns retained in the snapshot.

Value

An object of class "eye_outcome_blind_snapshot", stored as a named list, with components "data", "removed_outcomes", "id", "source_columns", "blinded_columns", "blinded_hash", "created_at", "caveat". It contains an outcome-blind data snapshot and associated metadata or diagnostics needed to interpret the result.

package_reproducibility_manifest

Create a reproducibility manifest for files and software

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
package_reproducibility_manifest(paths, include_session = TRUE)
```

Arguments

paths	Files/directories.
include_session	Whether to capture session information.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

paper_reproducibility_manifest *Create a compact paper reproducibility manifest*

Description

Create a compact paper reproducibility manifest

Usage

```
paper_reproducibility_manifest(
  evidence,
  manuscript = NULL,
  figures = NULL,
  tables = NULL
)
```

Arguments

evidence	Evidence bundle.
manuscript	Optional manuscript path.
figures	Optional figure paths.
tables	Optional table paths.

Value

A named list with components "evidence_hash", "manuscript", "files", "reproducibility", "generated_utc", containing a compact paper reproducibility manifest and associated metadata or diagnostics.

partition_eye_storage *Create a partition specification*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
partition_eye_storage(by = c("participant_id", "session_id", "recording_id"),
  format = c("parquet", "csv", "rds"), compression = "zstd", max_rows = 1000000L)
```

Arguments

`by`	Partition columns.
`format`	Storage format.
`compression`	Compression codec for Parquet.
`max_rows`	Maximum rows per physical file.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`pipeline_failures` *Return failed pipeline steps*

Description

Return failed pipeline steps

Usage

```
pipeline_failures(x)
```

Arguments

`x`	Pipeline run.

Value

A data frame containing return failed pipeline steps. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`pipeline_result` *Extract a pipeline result by step name*

Description

Extract a pipeline result by step name

Usage

```
pipeline_result(x, step)
```

Arguments

`x`	Pipeline run.
`step`	Step name.

Value

An R object containing a pipeline result by step name. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

pipeline_step_status *Pipeline step status table*

Description

Pipeline step status table

Usage

```
pipeline_step_status(x)
```

Arguments

x	Pipeline run.

Value

A data frame containing pipeline step status table. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

placebo_window_audit *Audit a placebo/pre-event window*

Description

Audit a placebo/pre-event window

Usage

```
placebo_window_audit(data, time, value, window, expected = 0, by = NULL)
```

Arguments

data	Data frame.
time	Time column.
value	Value column.
window	Two-element placebo window.
expected	Optional expected mean, typically zero.
by	Optional grouping columns.

Value

An R object containing a placebo/pre-event window. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

plot.eye_adapter_regression_audit

Plot eye adapter regression audit

Description

Plot eye adapter regression audit

Usage

```
## S3 method for class 'eye_adapter_regression_audit'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot eye adapter regression audit.

---

plot.eye_aoi_growth_curve

Plot aoi growth curve diagnostics

Description

Plot aoi growth curve diagnostics

Usage

```
## S3 method for class 'eye_aoi_growth_curve'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot aoi growth curve diagnostics.

---

plot.eye_aoi_trajectory

Plot aoi trajectory diagnostics

Description

Plot aoi trajectory diagnostics

Usage

```
## S3 method for class 'eye_aoi_trajectory'
plot(x, type = c("coefficients", "profiles"), ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
type	Type of summary or visual representation to produce.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot aoi trajectory diagnostics.

---

plot.eye_bayesian_process_dashboard

Plot bayesian process dashboard diagnostics

Description

Plot bayesian process dashboard diagnostics

Usage

```
## S3 method for class 'eye_bayesian_process_dashboard'
plot(x, type = c("loo", "rhat", "ess"), ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
type	Type of summary or visual representation to produce.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot bayesian process dashboard diagnostics.

---

plot.eye_bids_roundtrip

Plot eye bids roundtrip

Description

Plot eye bids roundtrip

Usage

```
## S3 method for class 'eye_bids_roundtrip'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot eye bids roundtrip.

---

plot.eye_biometric_imputation_sensitivity

Plot biometric imputation sensitivity diagnostics

Description

Plot biometric imputation sensitivity diagnostics

Usage

```
## S3 method for class 'eye_biometric_imputation_sensitivity'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot biometric imputation sensitivity diagnostics.

---

plot.eye_biometric_preflight

Plot biometric preflight diagnostics

Description

Plot biometric preflight diagnostics

Usage

```
## S3 method for class 'eye_biometric_preflight'
plot(x, type = c("heatmap", "decision_counts"), ...)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`type`	Type of summary or visual representation to produce.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot biometric preflight diagnostics.

---

plot.eye_candidate_item_bank_audit

Plot candidate item bank audit diagnostics

Description

Plot candidate item bank audit diagnostics

Usage

```
## S3 method for class 'eye_candidate_item_bank_audit'
plot(x, ...)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot candidate item bank audit diagnostics.

---

plot.eye_compatibility_evidence_matrix

Plot detailed compatibility evidence

Description

Plot detailed compatibility evidence

Usage

```
## S3 method for class 'eye_compatibility_evidence_matrix'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot detailed compatibility evidence.

---

plot.eye_decision_process_proxy

Plot decision process proxy diagnostics

Description

Plot decision process proxy diagnostics

Usage

```
## S3 method for class 'eye_decision_process_proxy'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot decision process proxy diagnostics.

---

plot.eye_dynamic_irtree *plot eye dynamic irtree*

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_dynamic_irtree'
plot(x, type = c("observed", "fitted", "residual"), ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
type	Value for ‘type‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

plot.eye_dynamic_ppc *plot eye dynamic ppc*

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_dynamic_ppc'
plot(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_event_roundtrip_audit

Plot eye event roundtrip audit

Description

Plot eye event roundtrip audit

Usage

```
## S3 method for class 'eye_event_roundtrip_audit'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot eye event roundtrip audit.

plot.eye_event_time_irt

Plot eye event time irt

Description

Plot eye event time irt

Usage

```
## S3 method for class 'eye_event_time_irt'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot eye event time irt.

plot.eye_functional_pupil_diagnostics

plot eye functional pupil diagnostics

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_functional_pupil_diagnostics'
plot(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_functional_pupil_irt

plot eye functional pupil irt

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_functional_pupil_irt'
plot(x, type = c("trajectories", "coefficients",
  "recovery"), ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
type	Value for ‘type‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_functional_pupil_sensitivity

plot eye functional pupil sensitivity

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_functional_pupil_sensitivity'
plot(x, parameter = NULL, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
parameter	Value for ‘parameter‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_gated_process_model

Plot gated process model diagnostics

Description

Plot gated process model diagnostics

Usage

```
## S3 method for class 'eye_gated_process_model'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot gated process model diagnostics.

plot.eye_gaze_anchored_3pl_audit

Plot gaze anchored 3pl audit diagnostics

Description

Plot gaze anchored 3pl audit diagnostics

Usage

```
## S3 method for class 'eye_gaze_anchored_3pl_audit'
plot(
  x,
  type = c("lower_asymptote", "process_alignment", "difficulty_discrimination"),
  feature = NULL,
  ...
)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`type`	Type of summary or visual representation to produce.
`feature`	Process feature to evaluate or display.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot gaze anchored 3pl audit diagnostics.

plot.eye_gaze_informed_missingness_irt

Plot eye gaze informed missingness irt

Description

Plot eye gaze informed missingness irt

Usage

```
## S3 method for class 'eye_gaze_informed_missingness_irt'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot eye gaze informed missingness irt.

---

plot.eye_gpirt *Plot flexible IRF shape diagnostics*

Description

Plot flexible IRF shape diagnostics

Usage

```
## S3 method for class 'eye_gpirt'
plot(x, item = NULL, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
item	Item identifier, name, or item column.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot flexible IRF shape diagnostics.

---

plot.eye_incremental_information_audit *Plot incremental process-channel information by fold*

Description

Plot incremental process-channel information by fold

Usage

```
## S3 method for class 'eye_incremental_information_audit'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot incremental process-channel information by fold.

---

plot.eye_irt_changepoints *Plot detected process changepoints*

Description

Plot detected process changepoints

Usage

```
## S3 method for class 'eye_irt_changepoints'
plot(x, person = NULL, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
person	Person or participant identifier column.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot detected process changepoints.

---

plot.eye_irt_equating *Plot an IRT linking/equating transformation*

Description

Plot an IRT linking/equating transformation

Usage

```
## S3 method for class 'eye_irt_equating'
plot(x, theta = seq(-4, 4, length.out = 201), ...)
```

Arguments

`x`	Object to print, plot, summarize, or audit.
`theta`	Latent-trait values.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot an IRT linking/equating transformation.

`plot.eye_irt_ppc` *Plot posterior predictive discrepancy tail probabilities*

Description

Plot posterior predictive discrepancy tail probabilities

Usage

```
## S3 method for class 'eye_irt_ppc'
plot(x, ...)
```

Arguments

`x`	Object to print, plot, summarize, or audit.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot posterior predictive discrepancy tail probabilities.

`plot.eye_irt_recovery_summary` *Plot parameter-recovery bias or RMSE*

Description

Plot parameter-recovery bias or RMSE

Usage

```
## S3 method for class 'eye_irt_recovery_summary'
plot(x, metric = c("rmse", "absolute_bias", "coverage"), ...)
```

Arguments

`x`	Object to print, plot, summarize, or audit.
`metric`	Metric to calculate or audit.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot parameter-recovery bias or RMSE.

`plot.eye_irt_sbc` *Plot SBC rank histograms by parameter*

Description

Plot SBC rank histograms by parameter

Usage

```
## S3 method for class 'eye_irt_sbc'
plot(x, parameter = NULL, breaks = 10L, ...)
```

Arguments

`x`	Object to print, plot, summarize, or audit.
`parameter`	Value supplied to ‘parameter‘; see Details for its model-specific role.
`breaks`	Histogram or discretization breaks.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot SBC rank histograms by parameter.

plot.eye_item_parameter_seed

Plot item parameter seed diagnostics

Description

Plot item parameter seed diagnostics

Usage

```
## S3 method for class 'eye_item_parameter_seed'
plot(x, candidate_data = NULL, ...)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`candidate_data`	Optional candidate-item data used for the requested display.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot item parameter seed diagnostics.

plot.eye_item_reduction_sensitivity

Plot item reduction sensitivity diagnostics

Description

Plot item reduction sensitivity diagnostics

Usage

```
## S3 method for class 'eye_item_reduction_sensitivity'
plot(x, ...)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot item reduction sensitivity diagnostics.

plot.eye_joint_gaze_rt_irt

Plot a joint gaze-response-time IRT fit

Description

Plot a joint gaze-response-time IRT fit

Usage

```
## S3 method for class 'eye_joint_gaze_rt_irt'
plot(x, type = c("latent", "components"), ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
type	Plot or result type.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot a joint gaze-response-time IRT fit.

plot.eye_joint_graded_rt_process_irt

Plot a graded response + RT/process fit

Description

Plot a graded response + RT/process fit

Usage

```
## S3 method for class 'eye_joint_graded_rt_process_irt'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot a graded response + RT/process fit.

plot.eye_latent_distribution_comparison

Plot eye latent distribution comparison

Description

Plot eye latent distribution comparison

Usage

```
## S3 method for class 'eye_latent_distribution_comparison'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot eye latent distribution comparison.

plot.eye_latent_process_alignment

Plot latent process alignment diagnostics

Description

Plot latent process alignment diagnostics

Usage

```
## S3 method for class 'eye_latent_process_alignment'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot latent process alignment diagnostics.

plot.eye_latent_space_irt

Plot a latent-space IRT adapter fit

Description

Plot a latent-space IRT adapter fit

Usage

```
## S3 method for class 'eye_latent_space_irt'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot a latent-space IRT adapter fit.

plot.eye_manyfacet_process_irt

Plot many-facet process IRT effects

Description

Plot many-facet process IRT effects

Usage

```
## S3 method for class 'eye_manyfacet_process_irt'
plot(x, facet = NULL, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
facet	Facet to display or extract.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot many-facet process IRT effects.

plot.eye_mixture_irt_process

Plot mixture irt process diagnostics

Description

Plot mixture irt process diagnostics

Usage

```
## S3 method for class 'eye_mixture_irt_process'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot mixture irt process diagnostics.

plot.eye_model_promotion_audit

plot eye model promotion audit

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_model_promotion_audit'
plot(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_multiblock_process_map

Plot multiblock process map diagnostics

Description

Plot multiblock process map diagnostics

Usage

```
## S3 method for class 'eye_multiblock_process_map'
plot(x, type = c("individuals", "variables", "blocks", "contributions"), ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
type	Type of summary or visual representation to produce.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot multiblock process map diagnostics.

plot.eye_nominal_gaze_irt

Plot nominal-response gaze results

Description

Plot nominal-response gaze results

Usage

```
## S3 method for class 'eye_nominal_gaze_irt'
plot(x, type = c("distractor_map", "coefficients"), ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
type	Plot or result type.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot nominal-response gaze results.

plot.eye_nonparametric_rasch_audit

Plot nonparametric rasch audit diagnostics

Description

Plot nonparametric rasch audit diagnostics

Usage

```
## S3 method for class 'eye_nonparametric_rasch_audit'
plot(x, method = names(x$tests)[1L], ...)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`method`	Method used for the requested diagnostic or summary.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot nonparametric rasch audit diagnostics.

plot.eye_omission_survival_irt

Plot omission/not-reached survival IRT diagnostics

Description

Plot omission/not-reached survival IRT diagnostics

Usage

```
## S3 method for class 'eye_omission_survival_irt'
plot(x, type = c("survival", "missingness"), ...)
```

Arguments

`x`	Object to print, plot, summarize, or audit.
`type`	Plot or result type.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot omission/not-reached survival IRT diagnostics.

plot.eye_preaction_process_features

Plot preaction process features diagnostics

Description

Plot preaction process features diagnostics

Usage

```
## S3 method for class 'eye_preaction_process_features'
plot(x, feature = "pupil_mean", ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
feature	Process feature to evaluate or display.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot preaction process features diagnostics.

plot.eye_presentation_accessibility

Plot presentation accessibility diagnostics

Description

Plot presentation accessibility diagnostics

Usage

```
## S3 method for class 'eye_presentation_accessibility'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot presentation accessibility diagnostics.

plot.eye_presentation_fairness_comparison

Plot presentation fairness comparison diagnostics

Description

Plot presentation fairness comparison diagnostics

Usage

```
## S3 method for class 'eye_presentation_fairness_comparison'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot presentation fairness comparison diagnostics.

plot.eye_process_anomaly_audit

Plot process anomaly audit diagnostics

Description

Plot process anomaly audit diagnostics

Usage

```
## S3 method for class 'eye_process_anomaly_audit'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process anomaly audit diagnostics.

plot.eye_process_cat_simulation

Plot CAT simulation information accumulation

Description

Plot CAT simulation information accumulation

Usage

```
## S3 method for class 'eye_process_cat_simulation'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot CAT simulation information accumulation.

plot.eye_process_channel_ablation

Plot process-channel ablation

Description

Plot process-channel ablation

Usage

```
## S3 method for class 'eye_process_channel_ablation'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process-channel ablation.

plot.eye_process_dependent_discrimination

Plot process-dependent discrimination

Description

Plot process-dependent discrimination

Usage

```
## S3 method for class 'eye_process_dependent_discrimination'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process-dependent discrimination.

plot.eye_process_drift_audit

Plot process drift audit diagnostics

Description

Plot process drift audit diagnostics

Usage

```
## S3 method for class 'eye_process_drift_audit'
plot(
  x,
  type = c("trajectory", "delta", "heatmap", "control"),
  metric = NULL,
  item = NULL,
  ...
)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`type`	Type of summary or visual representation to produce.
`metric`	Metric to evaluate or display.
`item`	Optional item identifier used to restrict or highlight results.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process drift audit diagnostics.

`plot.eye_process_external_validity` *Plot process external validity diagnostics*

Description

Plot process external validity diagnostics

Usage

```
## S3 method for class 'eye_process_external_validity'
plot(
  x,
  type = c("associations", "incremental", "observed_fitted", "residuals"),
  ...
)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`type`	Type of summary or visual representation to produce.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process external validity diagnostics.

plot.eye_process_facet_effects

Plot eye process facet effects

Description

Plot eye process facet effects

Usage

```
## S3 method for class 'eye_process_facet_effects'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot eye process facet effects.

plot.eye_process_feature_blocks

Plot process feature blocks diagnostics

Description

Plot process feature blocks diagnostics

Usage

```
## S3 method for class 'eye_process_feature_blocks'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process feature blocks diagnostics.

plot.eye_process_g_study

Plot process-measure variance components

Description

Plot process-measure variance components

Usage

```
## S3 method for class 'eye_process_g_study'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process-measure variance components.

plot.eye_process_hmm_irt

Plot a process-HMM IRT fit

Description

Plot a process-HMM IRT fit

Usage

```
## S3 method for class 'eye_process_hmm_irt'
plot(x, type = c("occupancy", "transition"), ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
type	Plot or result type.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot a process-HMM IRT fit.

plot.eye_process_local_dependence_audit

Plot process/local-dependence diagnostics

Description

Plot process/local-dependence diagnostics

Usage

```
## S3 method for class 'eye_process_local_dependence_audit'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process/local-dependence diagnostics.

plot.eye_process_negative_control

Plot a process-channel negative-control distribution

Description

Plot a process-channel negative-control distribution

Usage

```
## S3 method for class 'eye_process_negative_control'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot a process-channel negative-control distribution.

plot.eye_process_person_fit

Plot process person-fit discrepancies

Description

Plot process person-fit discrepancies

Usage

```
## S3 method for class 'eye_process_person_fit'
plot(x, top = 25L, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
top	Number of highest-ranked cases to display.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process person-fit discrepancies.

plot.eye_process_profile_mixture

Plot process profile mixture diagnostics

Description

Plot process profile mixture diagnostics

Usage

```
## S3 method for class 'eye_process_profile_mixture'
plot(x, type = c("profiles", "posterior", "scatter", "parallel"), ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
type	Type of summary or visual representation to produce.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process profile mixture diagnostics.

plot.eye_process_rasch_tree

Plot process rasch tree diagnostics

Description

Plot process rasch tree diagnostics

Usage

```
## S3 method for class 'eye_process_rasch_tree'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process rasch tree diagnostics.

plot.eye_process_window_sensitivity

Plot process window sensitivity diagnostics

Description

Plot process window sensitivity diagnostics

Usage

```
## S3 method for class 'eye_process_window_sensitivity'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process window sensitivity diagnostics.

plot.eye_process_windows

Plot process windows diagnostics

Description

Plot process windows diagnostics

Usage

```
## S3 method for class 'eye_process_windows'
plot(x, feature = "pupil_mean", group = NULL, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
feature	Process feature to evaluate or display.
group	Optional grouping variable.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot process windows diagnostics.

plot.eye_pupil_confound_model

Plot pupil confound model diagnostics

Description

Plot pupil confound model diagnostics

Usage

```
## S3 method for class 'eye_pupil_confound_model'
plot(
  x,
  type = c("luminance", "trial_order", "raw_adjusted", "theta_luminance_surface"),
  ...
)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`type`	Type of summary or visual representation to produce.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot pupil confound model diagnostics.

`plot.eye_pupil_deconvolution` *Plot pupil deconvolution diagnostics*

Description

Plot pupil deconvolution diagnostics

Usage

```
## S3 method for class 'eye_pupil_deconvolution'
plot(x, type = c("observed_fitted", "effects", "residuals", "kernels"), ...)
```

Arguments

`x`	Object to process, inspect, compare, or plot.
`type`	Type of summary or visual representation to produce.
`...`	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot pupil deconvolution diagnostics.

plot.eye_pupil_fatigue_drift

Plot pupil fatigue drift diagnostics

Description

Plot pupil fatigue drift diagnostics

Usage

```
## S3 method for class 'eye_pupil_fatigue_drift'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot pupil fatigue drift diagnostics.

plot.eye_pupil_frequency_features

Plot pupil frequency features diagnostics

Description

Plot pupil frequency features diagnostics

Usage

```
## S3 method for class 'eye_pupil_frequency_features'
plot(x, type = c("features", "power_relationship"), ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
type	Type of summary or visual representation to produce.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot pupil frequency features diagnostics.

plot.eye_pupil_frequency_stability

Plot pupil frequency stability diagnostics

Description

Plot pupil frequency stability diagnostics

Usage

```
## S3 method for class 'eye_pupil_frequency_stability'
plot(x, feature = "pupil_frequency_contrast", ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
feature	Process feature to evaluate or display.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot pupil frequency stability diagnostics.

plot.eye_roundtrip_loss_audit

plot eye roundtrip loss audit

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_roundtrip_loss_audit'
plot(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_sbc_audit *Plot SBC audit summaries*

Description

Plot SBC audit summaries

Usage

```
## S3 method for class 'eye_sbc_audit'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot SBC audit summaries.

plot.eye_semantic_roundtrip *Plot semantic round-trip fidelity*

Description

Plot semantic round-trip fidelity

Usage

```
## S3 method for class 'eye_semantic_roundtrip'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot semantic round-trip fidelity.

plot.eye_signal_filter_audit

Plot signal filter audit diagnostics

Description

Plot signal filter audit diagnostics

Usage

```
## S3 method for class 'eye_signal_filter_audit'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot signal filter audit diagnostics.

plot.eye_storage_benchmark

plot eye storage benchmark

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_storage_benchmark'
plot(x, metric = c("write_seconds", "read_seconds",
  "bytes"), ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
metric	Value for ‘metric‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_strategy_aoi_sensitivity

plot eye strategy aoi sensitivity

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_strategy_aoi_sensitivity'
plot(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_streaming_score

Plot streaming score diagnostics

Description

Plot streaming score diagnostics

Usage

```
## S3 method for class 'eye_streaming_score'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot streaming score diagnostics.

plot.eye_transition_diagnostics

plot eye transition diagnostics

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_transition_diagnostics'
plot(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_validation_bundle

Plot validation bundle diagnostics

Description

Plot validation bundle diagnostics

Usage

```
## S3 method for class 'eye_validation_bundle'
plot(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot validation bundle diagnostics.

plot.eye_vendor_compatibility_matrix

plot eye vendor compatibility matrix

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_vendor_compatibility_matrix'
plot(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot.eye_vendor_semantic_validation

Plot eye vendor semantic validation

Description

Plot eye vendor semantic validation

Usage

```
## S3 method for class 'eye_vendor_semantic_validation'
plot(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot eye vendor semantic validation.

plot.eye_visual_context_irt

Plot visual context irt diagnostics

Description

Plot visual context irt diagnostics

Usage

```
## S3 method for class 'eye_visual_context_irt'
plot(x, type = c("loadings", "difficulty_change", "context_registry"), ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
type	Type of summary or visual representation to produce.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the plotting result when available; the primary effect is drawing plot visual context irt diagnostics.

plot_aoi_transition_matrix

Plot an AOI transition matrix

Description

Plot an AOI transition matrix

Usage

```
plot_aoi_transition_matrix(
  data,
  from = "from",
  to = "to",
  normalize = c("from", "all", "none"),
  ...
)
```

Arguments

`data`	Transition-pair data.
`from, to`	Column names.
`normalize`	Normalize within from-AOI, globally, or not at all.
`...`	Additional arguments passed to the underlying method or helper.

Value

An R object containing plot an AOI transition matrix. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

plot_aoi_transition_rank

Plot top AOI transitions by probability/count

Description

Plot top AOI transitions by probability/count

Usage

```
plot_aoi_transition_rank(
  data,
  from = "from",
  to = "to",
  normalize = c("from", "all", "none"),
  top_n = 20L,
  ...
)
```

Arguments

`data`	Data frame containing the required process variables.
`from`	Name of the column identifying the transition origin.
`to`	Name of the column identifying the transition destination.
`normalize`	Normalization rule applied to transition counts or weights.
`top_n`	Maximum number of highest-ranked entries to display.
`...`	Additional arguments passed to the underlying method or helper.

Value

An R object containing plot top AOI transitions by probability/count. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

plot_distractor_information

Plot option-level distractor information

Description

Plot option-level distractor information

Usage

```
plot_distractor_information(object, ...)
```

Arguments

object	An ‘eye_nominal_gaze_irt‘ object or a data frame returned by ‘distractor_process_map()‘.
...	Graphical arguments passed to base graphics.

Value

The plotted distractor map, invisibly.

plot_gazepoint_workflow

Generate the complete Gazepoint workflow plot suite

Description

Generate the complete Gazepoint workflow plot suite

Usage

```
plot_gazepoint_workflow(x, directory, channels = NULL, expected_hz = 60)
```

Arguments

x	A processed ‘eye_dataset‘.
directory	Destination directory.
channels	Biometric channels to plot.
expected_hz	Expected gaze sampling rate shown in diagnostics.

Value

A plot manifest data frame.

plot_interval_coverage *Plot interval coverage*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
plot_interval_coverage(x, target = 0.95, engine = c("auto", "ggplot2", "base"), ...)
```

Arguments

x	Validation collection or recovery summary.
target	Nominal coverage target.
engine	Plot engine.
...	Additional plotting arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot_irf_uncertainty *Plot uncertainty for flexible item response functions*

Description

For the bundled spline-reference engine, standard errors are derived on the logit scale from the fitted GLM and transformed to response probabilities. Exact GPIRT engines should supply their own posterior uncertainty summaries.

Usage

```
plot_irf_uncertainty(
  object,
  item = 1L,
  theta_grid = seq(-4, 4, length.out = 101),
  level = 0.95,
  ...
)
```

Arguments

`object`	An ‘eye_gpirt‘ object.
`item`	Item name or index.
`theta_grid`	Trait grid.
`level`	Pointwise confidence level for the spline-reference diagnostic.
`...`	Graphical arguments.

Value

A data frame containing plot uncertainty for flexible item response functions. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`plot_parameter_recovery` *Plot parameter recovery*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
plot_parameter_recovery(x, parameter = NULL, engine = c("auto", "ggplot2", "base"),
  ...)
```

Arguments

`x`	Validation collection or estimates data frame.
`parameter`	Optional parameter subset.
`engine`	Plot engine.
`...`	Additional plotting arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot_person_item_space

Plot person/item latent-space coordinates

Description

Plot person/item latent-space coordinates

Usage

```
plot_person_item_space(object, dimensions = c(1L, 2L), labels = FALSE, ...)
```

Arguments

object	Fitted ‘eye_latent_space_irt‘ object.
dimensions	Two coordinate dimensions to display.
labels	Whether to add entity labels.
...	Graphical arguments.

Value

A named list with components "person", "item", "dimensions", containing plot person/item latent-space coordinates and associated metadata or diagnostics.

plot_process_changepoint

Plot detected process change points

Description

Plot detected process change points

Usage

```
plot_process_changepoint(object, ...)
```

Arguments

object	An ‘eye_irt_changepoints‘, ‘eye_changepoint_rt_irt‘, or ‘eye_changepoint_multimodal_irt‘ object.
...	Graphical arguments.

Value

An R object containing plot detected process change points. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

plot_process_channel_ablation_delta

Plot channel-ablation delta from a full/reference model

Description

Plot channel-ablation delta from a full/reference model

Usage

```
plot_process_channel_ablation_delta(
  x = NULL,
  table = NULL,
  channel_col = "channel",
  metric_col = "metric",
  value_col = "value",
  full_label = "full",
  metric = NULL,
  ...
)
```

Arguments

`x`	‘eye_process_channel_ablation‘ object or compatible table.
`table`	Optional explicit table.
`channel_col`, `metric_col`, `value_col`	Column names.
`full_label`	Full/reference channel label.
`metric`	Metric to evaluate or display.
`...`	Additional arguments passed to the underlying method or helper.

Value

A data frame containing plot channel-ablation delta from a full/reference model. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

plot_process_feature_stability

Plot process-feature stability across resamples/splits

Description

Plot process-feature stability across resamples/splits

Usage

```
plot_process_feature_stability(
  data,
  feature = "feature",
  stability = "selection_rate",
  top_n = 20L,
  ...
)
```

Arguments

data	Table with feature and stability/rank information.
feature	Feature column.
stability	Stability/selection-rate column.
top_n	Maximum features shown.
...	Additional arguments passed to the underlying method or helper.

Value

An R object containing plot process-feature stability across resamples/splits. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

plot_process_window_sensitivity

Explicit wrapper for process-window sensitivity plotting

Description

Explicit wrapper for process-window sensitivity plotting

Usage

```
plot_process_window_sensitivity(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

An R object containing explicit wrapper for process-window sensitivity plotting. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

plot_pupil_activity_sensitivity

Plot pupil activity sensitivity to window length

Description

Plot pupil activity sensitivity to window length

Usage

```
plot_pupil_activity_sensitivity(x, feature = "pupil_frequency_contrast", ...)
```

Arguments

x	‘eye_pupil_frequency_stability‘ object.
feature	Feature name.
...	Additional arguments passed to the underlying method or helper.

Value

An R object containing plot pupil activity sensitivity to window length. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

plot_pupil_activity_windows *Plot pupil activity features across windows/groups*

Description

Plot pupil activity features across windows/groups

Usage

```
plot_pupil_activity_windows(x, feature = "pupil_frequency_contrast", ...)
```

Arguments

x	‘eye_pupil_frequency_features‘ or ‘eye_pupil_frequency_stability‘ object.
feature	Activity feature.
...	Additional arguments passed to the underlying method or helper.

Value

An R object containing plot pupil activity features across windows/groups. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

plot_pupil_band_power *Plot pupil low/high-band power summaries*

Description

Plot pupil low/high-band power summaries

Usage

```
plot_pupil_band_power(x, ...)
```

Arguments

x	‘eye_pupil_frequency_features‘ object.
...	Additional arguments passed to the underlying method or helper.

Value

An R object containing plot pupil low/high-band power summaries. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

plot_pupil_components *Plot tonic/phasic pupil components*

Description

Plot tonic/phasic pupil components

Usage

```
plot_pupil_components(
  data,
  time = "time_ms",
  smoothed = "pupil_smoothed",
  tonic = "pupil_tonic",
  phasic = "pupil_phasic",
  ...
)
```

Arguments

`data`	Data frame containing the required process variables.
`time`	Time values or name of the time variable.
`smoothed`	Name of the smoothed pupil-signal column.
`tonic`	Name of the tonic pupil-component column.
`phasic`	Name of the phasic pupil-component column.
`...`	Additional arguments passed to the underlying method or helper.

Value

A tabular R object containing plot tonic/phasic pupil components; rows represent analysis units and columns contain the returned quantities.

plot_pupil_preprocessing_audit *Plot raw-to-processed pupil preprocessing stages*

Description

Plot raw-to-processed pupil preprocessing stages

Usage

```
plot_pupil_preprocessing_audit(
  data,
  time = "time_ms",
  signals = c("pupil_raw", "pupil_interpolated", "pupil_smoothed", "pupil_bc"),
  ...
)
```

Arguments

`data`	Sample-level data.
`time`	Time column.
`signals`	Signal columns to overlay.
`...`	Additional arguments passed to the underlying method or helper.

Value

A tabular R object containing plot raw-to-processed pupil preprocessing stages; rows represent analysis units and columns contain the returned quantities.

`plot_pupil_spectrum` *Plot a pupil-signal power spectrum*

Description

Plot a pupil-signal power spectrum

Usage

```
plot_pupil_spectrum(signal, sampling_rate_hz, max_hz = sampling_rate_hz/2, ...)
```

Arguments

`signal`	Numeric pupil signal.
`sampling_rate_hz`	Sampling rate.
`max_hz`	Maximum frequency shown; defaults to Nyquist.
`...`	Additional arguments passed to the underlying method or helper.

Value

A data frame containing plot a pupil-signal power spectrum. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

plot_sbc_rank *Plot SBC rank histograms*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
plot_sbc_rank(x, parameter = NULL, bins = 10L, engine = c("auto", "ggplot2", "base"),
  ...)
```

Arguments

x	Validation collection or draw data frame.
parameter	Optional parameter.
bins	Number of bins.
engine	Plot engine.
...	Additional plotting arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot_validation_failures *Plot validation failure rates*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
plot_validation_failures(x, engine = c("auto", "ggplot2", "base"), ...)
```

Arguments

x	Validation collection or failure summary.
engine	Plot engine.
...	Additional plotting arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

plot_validation_runtime

Plot validation runtime

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
plot_validation_runtime(x, engine = c("auto", "ggplot2", "base"), ...)
```

Arguments

x	Validation collection or job table.
engine	Plot engine.
...	Additional plotting arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

posterior_predictive_discrepancies

Posterior predictive discrepancy table

Description

Posterior predictive discrepancy table

Usage

```
posterior_predictive_discrepancies(
  observed,
  replicated,
  discrepancies = list(mean = function(x) mean(x, na.rm = TRUE), sd = function(x)
   stats::sd(x, na.rm = TRUE), zero_rate = function(x) mean(x == 0, na.rm = TRUE))
)
```

Arguments

observed	Observed vector/data object.
replicated	List of replicated datasets, or matrix with one replicate per row.
discrepancies	Named list of functions mapping a dataset to one number.

Value

An object of class "eye_irt_ppc", "data.frame", stored as a data frame, containing posterior predictive discrepancy table and associated metadata needed to interpret the result.

---

posterior_sbc_contract

Define a posterior-SBC replication contract

Description

Posterior SBC is deliberately callback-driven: conditioning/augmentation differs by model, and eyeprocess does not pretend that re-running ordinary prior SBC on an observed-data neighbourhood is posterior SBC.

Usage

```
posterior_sbc_contract(replication)
```

Arguments

`replication`	Function ‘(replicate, observed_data)‘ returning ‘list(truth=named_numeric, draws=matrix_or_data_frame The callback is responsible for the conditional posterior-SBC construction appropriate to the model, including fitting to the observed data and the required self-consistency experiment.

Value

An object of class "eye_posterior_sbc_contract", stored as a named list, with components "replication", "requirement". It contains define a posterior-SBC replication contract and associated metadata or diagnostics needed to interpret the result.

---

preaction_process_features

Build pre-action process features

Description

Build pre-action process features

Usage

```
preaction_process_features(
  data,
  by = c("person_id", "trial_id"),
  time = "time_ms",
  response_time = "response_time_ms",
  windows_ms = c(500, 1000, 2000),
  aoi = "aoi",
  pupil = "pupil_bc",
  blink = "blink"
)
```

Arguments

`data`	Sample-level data.
`by`	Grouping columns.
`time`, `response_time`	Time and response-event columns.
`windows_ms`	Positive look-back windows before action.
`aoi`, `pupil`, `blink`	Optional feature columns.

Value

An object of class "eye_preaction_process_features", stored as a named list, with components "data", "windows_ms", "by", "status", "caveat". It contains pre-action process features and associated metadata or diagnostics needed to interpret the result.

---

predict.eye_censored_normal_process_irt

Predict expected bounded response from a censored-normal process IRT fit

---

Description

Predict expected bounded response from a censored-normal process IRT fit

Usage

```
## S3 method for class 'eye_censored_normal_process_irt'
predict(object, theta = object$theta, items = NULL, ...)
```

Arguments

`object`	A fitted eyeprocess model or audit object.
`theta`	Latent-trait values.
`items`	Items to include.
`...`	Additional arguments passed to the selected model, engine, or method.

Value

A vector or matrix containing expected bounded response from a censored-normal process IRT fit, with shape determined by the supplied analysis units.

---

predict.eye_multinomial_transition

Predict destination-state probabilities

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_multinomial_transition'
predict(object, newdata = NULL,
  type = c("probability", "class", "link"), ...)
```

Arguments

`object`	Multinomial transition model.
`newdata`	Optional prepared transition data.
`type`	Probability, class, or linear predictor.
`...`	Unused.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

predict_aoi_trajectory

Predict from an AOI growth curve

Description

Predict from an AOI growth curve

Usage

```
predict_aoi_trajectory(object, time = NULL)
```

Arguments

`object`	Object supplied to the S3 method.
`time`	Time values or name of the time variable.

Value

A data frame containing from an AOI growth curve. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

predict_item_parameter_priors *Predict pre-pilot item-parameter priors*

Description

Predict pre-pilot item-parameter priors

Usage

```
predict_item_parameter_priors(object, newdata)
```

Arguments

`object`	Seed model.
`newdata`	Candidate item feature data.

Value

An R object containing pre-pilot item-parameter priors. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

predict_theta_at_time *Predict a latent trait at arbitrary times*

Description

Predict a latent trait at arbitrary times

Usage

```
predict_theta_at_time(object, time)
```

Arguments

`object`	A fitted eyeprocess model or audit object.
`time`	Time values.

Value

An R object containing a latent trait at arbitrary times. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

preflight_decisions *Extract pre-flight decisions*

Description

Extract pre-flight decisions

Usage

```
preflight_decisions(x)
```

Arguments

x	An ‘eye_biometric_preflight‘ object.

Value

An R object containing pre-flight decisions. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

preflight_exclusion_manifest *Create an explicit pre-flight exclusion/review manifest*

Description

The manifest records recommendations only. It does not remove observations.

Usage

```
preflight_exclusion_manifest(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A tabular R object containing an explicit pre-flight exclusion/review manifest; rows represent analysis units and columns contain the returned quantities.

preflight_failures *Extract pre-flight failures/review cases*

Description

Extract pre-flight failures/review cases

Usage

```
preflight_failures(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A tabular R object containing pre-flight failures/review cases; rows represent analysis units and columns contain the returned quantities.

preflight_passed *Extract pre-flight passes*

Description

Extract pre-flight passes

Usage

```
preflight_passed(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A tabular R object containing pre-flight passes; rows represent analysis units and columns contain the returned quantities.

prepare_dynamic_irtree_data

Prepare ordered transition data for dynamic IRTree models

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
prepare_dynamic_irtree_data(x, spec = dynamic_irtree_spec(),
  person = "participant_id", item = "item_id", trial = "trial_id", state = "state",
   time = NULL, from = "from_state", to = "to_state", states = NULL)
```

Arguments

x	An ‘eye_dataset‘ or data frame.
spec	Dynamic IRTree specification.
person	Column names for long state data.
item	Column names for long state data.
trial	Column names for long state data.
state	Column names for long state data.
time	Column names for long state data.
from	Existing transition columns for transition-format data.
to	Existing transition columns for transition-format data.
states	Optional complete state vocabulary.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

prepare_functional_pupil_data

Prepare aligned, corrected functional pupil data

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
prepare_functional_pupil_data(x, spec = functional_pupil_irt_spec())
```

Arguments

x	Eye dataset or long pupil data.
spec	Functional pupil specification.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

prepare_gaze_diffusion_data

Prepare joint accuracy-response-time data

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
prepare_gaze_diffusion_data(data, spec, minimum_rt = 0.05)
```

Arguments

data	Trial-level data.
spec	Diffusion specification.
minimum_rt	Minimum admissible RT in seconds.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

prepare_multimodal_irt_data

Prepare a canonical multimodal person-item-trial measurement object

Description

Creates a loss-aware person-item-trial table for response, response time, gaze, and pupil channels while retaining references to optional sample-level or sequence payloads. No time series are silently aggregated.

Usage

```
prepare_multimodal_irt_data(
  data,
  person,
  item,
  trial = NULL,
  response = NULL,
  rt = NULL,
  gaze = NULL,
  pupil = NULL,
  quality = character(),
  device = NULL,
  payloads = list(),
  provenance = list()
)
```

Arguments

`data`	A data.frame containing one row per intended person-item-trial.
`person`, `item`, `trial`	Column names identifying the measurement keys.
`response`, `rt`, `gaze`, `pupil`	Optional column names for channel summaries.
`quality`	Optional character vector of quality-field names.
`device`	Optional list or data.frame of device metadata.
`payloads`	Named list of sample-level/sequence payloads.
`provenance`	Optional provenance list.

Value

An ‘eye_multimodal_measurement‘ object.

prepare_strategy_mixture_data

Prepare data for a strategy-mixture model

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
prepare_strategy_mixture_data(data, spec, standardize = TRUE)
```

Arguments

data	Trial-level data.
spec	Strategy specification.
standardize	Whether to standardize process features.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

prepare_structured_unstructured_process_features

Prepare leakage-safe structured/unstructured process representations

Description

Prepare leakage-safe structured/unstructured process representations

Usage

```
prepare_structured_unstructured_process_features(
  structured,
  unstructured = NULL,
  fold = NULL,
  builder = NULL,
  id = c("person_id", "item_id"),
  ...
)
```

Arguments

structured	Structured person/item/window features.
unstructured	Optional sequence/sample object.
fold	Fold identifier. If supplied, representation builders are applied fold-locally using ‘builder‘.
builder	Optional function ‘(train_structured, train_unstructured, test_structured, test_unstructured, fold_value, ...)‘ returning a fold result.
id	Optional identifier columns retained in the representation contract.
...	Passed to ‘builder‘.

Value

An object of class "eye_structured_unstructured_process_features", stored as a named list, with components "contract", "folds", "status". It contains leakage-safe structured/unstructured process representations and associated metadata or diagnostics needed to interpret the result.

---

preprocessing_multiverse

Run a preprocessing or AOI multiverse

Description

Run a preprocessing or AOI multiverse

Usage

```
preprocessing_multiverse(
  x,
  specifications,
  transform,
  analyse,
  extract = function(z) as.data.frame(z)
)
```

Arguments

x	Input object.
specifications	Named list of specification objects.
transform	Function receiving ‘x‘ and one specification.
analyse	Analysis function receiving the transformed object.
extract	Function converting an analysis result to a data frame.

Value

An ‘eye_multiverse‘ object.

print.eye_benchmark_reproduction

print eye benchmark reproduction

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_benchmark_reproduction'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_benchmark_study

print eye benchmark study

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_benchmark_study'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_benchmark_validation

print eye benchmark validation

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_benchmark_validation'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_diffusion_diagnostics

print eye diffusion diagnostics

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_diffusion_diagnostics'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_diffusion_identification_study

print eye diffusion identification study

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_diffusion_identification_study'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_dynamic_irtree

print eye dynamic irtree

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_dynamic_irtree'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_dynamic_ppc *print eye dynamic ppc*

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_dynamic_ppc'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_dynamic_recovery *print eye dynamic recovery*

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_dynamic_recovery'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_engine_adapter_result

print eye engine adapter result

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_engine_adapter_result'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_functional_pupil_data

print eye functional pupil data

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_functional_pupil_data'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_functional_pupil_diagnostics

print eye functional pupil diagnostics

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_functional_pupil_diagnostics'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_functional_pupil_irt

print eye functional pupil irt

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_functional_pupil_irt'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_functional_pupil_sensitivity

print eye functional pupil sensitivity

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_functional_pupil_sensitivity'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_functional_scalar_comparison

print eye functional scalar comparison

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_functional_scalar_comparison'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_gated_process_model

Print a gated process model object

Description

Print a gated process model object

Usage

```
## S3 method for class 'eye_gated_process_model'
print(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_gaze_diffusion_data

print eye gaze diffusion data

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_gaze_diffusion_data'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_gaze_diffusion_irt

print eye gaze diffusion irt

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_gaze_diffusion_irt'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_gaze_diffusion_spec

print eye gaze diffusion spec

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_gaze_diffusion_spec'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_irt_evidence_grade

Print eye irt evidence grade

Description

Print eye irt evidence grade

Usage

```
## S3 method for class 'eye_irt_evidence_grade'
print(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_irt_model_spec

Print a multimodal IRT model specification

Description

Print a multimodal IRT model specification

Usage

```
## S3 method for class 'eye_irt_model_spec'
print(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_irt_validation_spec

Print eye irt validation spec

Description

Print eye irt validation spec

Usage

```
## S3 method for class 'eye_irt_validation_spec'
print(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_model_contract_validation

print eye model contract validation

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_model_contract_validation'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_model_promotion_audit

print eye model promotion audit

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_model_promotion_audit'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_multinomial_transition

print eye multinomial transition

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_multinomial_transition'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_partition_spec

print eye partition spec

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_partition_spec'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_partitioned_storage

print eye partitioned storage

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_partitioned_storage'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_process_drift_spec

Print a process drift spec object

Description

Print a process drift spec object

Usage

```
## S3 method for class 'eye_process_drift_spec'
print(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_process_negative_control

Print eye process negative control

Description

Print eye process negative control

Usage

```
## S3 method for class 'eye_process_negative_control'
print(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_process_preflight_spec

Print a process preflight spec object

Description

Print a process preflight spec object

Usage

```
## S3 method for class 'eye_process_preflight_spec'
print(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_process_window_spec

Print a process window spec object

Description

Print a process window spec object

Usage

```
## S3 method for class 'eye_process_window_spec'
print(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_redaction_result

print eye redaction result

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_redaction_result'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_roundtrip_loss_audit

print eye roundtrip loss audit

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_roundtrip_loss_audit'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_strategy_data

print eye strategy data

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_strategy_data'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_strategy_manipulation_validation

print eye strategy manipulation validation

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_strategy_manipulation_validation'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_theory_strategy_irt

print eye theory strategy irt

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_theory_strategy_irt'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_theory_strategy_spec

print eye theory strategy spec

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_theory_strategy_spec'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_transition_design

print eye transition design

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_transition_design'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_transition_diagnostics

print eye transition diagnostics

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_transition_diagnostics'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_validation_bundle

Print a validation bundle object

Description

Print a validation bundle object

Usage

```
## S3 method for class 'eye_validation_bundle'
print(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_validation_case_fingerprint

print eye validation case fingerprint

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_validation_case_fingerprint'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_validation_collection

print eye validation collection

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_validation_collection'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_validation_completion_audit

print eye validation completion audit

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_validation_completion_audit'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_validation_job_plan

print eye validation job plan

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_validation_job_plan'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_validation_run

print eye validation run

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_validation_run'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_vendor_case *print eye vendor case*

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_vendor_case'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_vendor_compatibility_matrix *print eye vendor compatibility matrix*

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_vendor_compatibility_matrix'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_vendor_schema_contract

Print eye vendor schema contract

Description

Print eye vendor schema contract

Usage

```
## S3 method for class 'eye_vendor_schema_contract'
print(x, ...)
```

Arguments

x	Object to print, plot, summarize, or audit.
...	Additional arguments passed to the selected model, engine, or method.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

print.eye_vendor_semantic_comparison

print eye vendor semantic comparison

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_vendor_semantic_comparison'
print(x, ...)
```

Arguments

x	Value for ‘x‘. See the function description and relevant article for constraints.
...	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

print.eye_visual_context_registry

Print a visual context registry object

Description

Print a visual context registry object

Usage

```
## S3 method for class 'eye_visual_context_registry'
print(x, ...)
```

Arguments

x	Object to process, inspect, compare, or plot.
...	Additional arguments passed to the underlying method or helper.

Value

Invisibly returns the input object after printing its summary; the object's class and contents are unchanged.

probabilistic_aoi_assignment

Probabilistic AOI assignment under empirical calibration uncertainty

Description

Probabilistic AOI assignment under empirical calibration uncertainty

Usage

```
probabilistic_aoi_assignment(
  data,
  aois,
  model,
  x = "gaze_x",
  y = "gaze_y",
  draws = 500L,
  seed = 1L,
  min_probability = 0.5
)
```

Arguments

`data`	Gaze samples.
`aois`	Rectangular AOI table.
`model`	Calibration error model.
`x, y`	Gaze-coordinate columns.
`draws`	Monte Carlo draws.
`seed`	Seed.
`min_probability`	Minimum probability for assignment; lower maxima become ‘NA‘.

Value

An object of class "eye_probabilistic_aoi_assignment", stored as a named list, with components "assignments", "probabilities", "aois", "model", "min_probability", "caveat". It contains probabilistic AOI assignment under empirical calibration uncertainty and associated metadata or diagnostics needed to interpret the result.

`process_anomaly_distance` *Extract multivariate process anomaly distances*

Description

Extract multivariate process anomaly distances

Usage

```
process_anomaly_distance(x)
```

Arguments

`x`	Object to process, inspect, compare, or plot.

Value

An R object containing multivariate process anomaly distances. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

process_bland_altman *Bland-Altman repeatability summary for two sessions*

Description

Bland-Altman repeatability summary for two sessions

Usage

```
process_bland_altman(data, person, session, measure, sessions = NULL)
```

Arguments

data	Long data.
person	Participant column.
session	Session column containing exactly two selected sessions.
measure	Measure column.
sessions	Optional two session labels.

Value

An object of class "eye_process_bland_altman", stored as a named list, with components "pairs", "summary", "sessions". It contains bland-Altman repeatability summary for two sessions and associated metadata or diagnostics needed to interpret the result.

process_channel_ablation *Ablate process channels under a common out-of-sample evaluator*

Description

Ablate process channels under a common out-of-sample evaluator

Usage

```
process_channel_ablation(
  data,
  channels,
  evaluator,
  baseline = character(),
  higher_is_better = TRUE
)
```

Arguments

`data`	Input data.
`channels`	Named list whose elements are character vectors of columns.
`evaluator`	Function ‘(data, active_columns, channel_name)‘ returning a scalar out-of-sample score. The evaluator owns all fitting/splitting logic.
`baseline`	Character vector of always-active columns.
`higher_is_better`	Direction of the score.

Value

An object of class "eye_process_channel_ablation", "data.frame", stored as a data frame, containing ablate process channels under a common out-of-sample evaluator and associated metadata needed to interpret the result.

`process_criterion_associations` *Extract process-criterion associations*

Description

Extract process-criterion associations

Usage

```
process_criterion_associations(x)
```

Arguments

`x`	Object to process, inspect, compare, or plot.

Value

An R object containing process-criterion associations. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

process_dependent_discrimination_audit

Audit process-dependent item discrimination

Description

Residualises a process variable against person/item baselines, then tests whether the theta-response slope changes with that residual process value. This is a transparent diagnostic inspired by 2026 evidence on conditional response-time/discrimination dependencies, not an exact reproduction of the published meta-analytic model.

Usage

```
process_dependent_discrimination_audit(
  data,
  response,
  theta,
  process,
  person,
  item,
  nonlinear = TRUE
)
```

Arguments

`data`	Long-format response data.
`response`	Binary response column.
`theta`	Person latent-score column.
`process`	RT/gaze/process measure.
`person`, `item`	Identifier columns.
`nonlinear`	If TRUE and mgcv is installed, additionally estimate a smooth theta-by-process diagnostic surface.

Value

An object of class "eye_process_dependent_discrimination", stored as a named list, with components "process_model", "response_model", "interaction", "smooth_model", "residual_process", "status", "caveat". It contains process-dependent item discrimination and associated metadata or diagnostics needed to interpret the result.

process_dif_nuisance_surrogate *Construct a process-data nuisance surrogate for DIF analysis*

Description

Construct a process-data nuisance surrogate for DIF analysis

Usage

```
process_dif_nuisance_surrogate(
  data,
  process_features,
  person = "participant_id",
  aggregate = TRUE
)
```

Arguments

data	Input data frame or compatible tabular object.
process_features	Names of process-derived features.
person	Person or participant identifier column.
aggregate	Aggregation rule for process features.

Value

A data frame containing a process-data nuisance surrogate for DIF analysis. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

process_drift_alerts *Extract drift alerts*

Description

Extract drift alerts

Usage

```
process_drift_alerts(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A logical value or vector indicating drift alerts.

---

process_drift_spec *Specify a process-deployment drift audit*

Description

Specify a process-deployment drift audit

Usage

```
process_drift_spec(
  baseline = c("first_batch", "reference_batch"),
  difficulty_limit = 0.4,
  discrimination_limit = 0.35,
  gaze_validity_drop = 0.1,
  luminance_limit = 25,
  relative_metric_quantile = 0.9,
  min_batches = 2L
)
```

Arguments

`baseline` Baseline rule: first observed batch or an explicitly supplied reference batch.

`difficulty_limit` Absolute item-difficulty change triggering review.

`discrimination_limit` Absolute discrimination change triggering review.

`gaze_validity_drop` Maximum tolerated decrease in gaze validity.

`luminance_limit` Absolute luminance change triggering review.

`relative_metric_quantile` Quantile of absolute deltas used for process metrics without an externally meaningful absolute threshold.

`min_batches` Minimum number of batches per item for drift assessment.

Value

An ‘eye_process_drift_spec‘ object.

process_feature_blocks

Define conceptual process-feature blocks

Description

Define conceptual process-feature blocks

Usage

```
process_feature_blocks(data, blocks, id = NULL, drop_constant = TRUE)
```

Arguments

data	Data frame.
blocks	Named list of column names for conceptual blocks.
id	Optional identifier column.
drop_constant	Remove non-varying columns.

Value

An object of class "eye_process_feature_blocks", stored as a named list, with components "data", "blocks", "id", "block_sizes", "status". It contains define conceptual process-feature blocks and associated metadata or diagnostics needed to interpret the result.

process_feature_family_registry

Registry of process-feature families and interpretation guardrails

Description

Registry of process-feature families and interpretation guardrails

Usage

```
process_feature_family_registry()
```

Value

A data frame containing registry of process-feature families and interpretation guardrails. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

process_feature_stability

Summarize process-feature stability across repeated analyses

Description

Summarize process-feature stability across repeated analyses

Usage

```
process_feature_stability(
  data,
  feature = "feature",
  split = "split",
  importance = "importance",
  top_n = 20L
)
```

Arguments

data	Long table containing feature names and ranks/importance values.
feature	Feature column.
split	Split/resample column.
importance	Importance column, where larger is better.
top_n	Number of top features counted per split.

Value

A data frame containing process-feature stability across repeated analyses. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

process_feature_time_provenance

Declare temporal provenance for process features

Description

Declare temporal provenance for process features

Usage

```
process_feature_time_provenance(
  feature,
  available_at,
  outcome_at,
  source = NA_character_,
  transformation = NA_character_,
  unit = "ms"
)
```

Arguments

feature	Feature names.
available_at	Earliest time at which each feature is available.
outcome_at	Time at which the modeled outcome becomes available.
source	Optional source labels.
transformation	Optional transformation descriptions.
unit	Time unit label.

Value

A provenance table.

---

process_icc *Absolute-agreement ICC(A,1) for repeated process measures*

Description

Absolute-agreement ICC(A,1) for repeated process measures

Usage

```
process_icc(data, person, session, measure)
```

Arguments

data	Long data.
person	Participant column.
session	Session/repetition column.
measure	Measure column.

Value

A data frame containing absolute-agreement ICC(A,1) for repeated process measures. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

process_information *Quantify incremental process information*

Description

Compares posterior draws for the same latent target under a baseline and an augmented model. This implementation intentionally uses posterior uncertainty metrics rather than assuming Fisher information is additively decomposable across heterogeneous channels.

Usage

```
process_information(
  baseline,
  augmented,
  metric = c("variance_reduction", "precision_gain", "entropy_reduction")
)
```

Arguments

`baseline, augmented`
: Numeric posterior draws. Rows are draws and columns are matched latent targets.

`metric`
: ‘variance_reduction‘, ‘precision_gain‘, or ‘entropy_reduction‘.

Value

An ‘eye_process_information‘ data.frame.

process_item_information *2PL response item information*

Description

2PL response item information

Usage

```
process_item_information(
  theta,
  a,
  b,
  process_information = 0,
  rt_information = 0,
  weights = c(response = 1, rt = 0, process = 0),
  expected_time = 0,
  burden_weight = 0
)
```

Arguments

theta	Latent-trait values.
a	Item discrimination parameter or parameters.
b	Item difficulty/location parameter or parameters.
process_information	Information supplied by the process channel.
rt_information	Information supplied by response time.
weights	Weights used to combine information components.
expected_time	Expected response time or burden.
burden_weight	Penalty applied to expected burden.

Value

An object of class "eye_process_item_information", stored as a named list, with components "theta", "response_information", "utility". It contains 2PL response item information and associated metadata or diagnostics needed to interpret the result.

---

process_measure_card *Return a one-measure process card*

Description

Return a one-measure process card

Usage

```
process_measure_card(name, registry = process_measure_registry())
```

Arguments

name	Measure name.
registry	Registry.

Value

An object of class "eye_process_measure_card", stored as a named list, containing return a one-measure process card and associated metadata needed to interpret the result.

process_measure_coverage

Process-measure coverage for an observed dataset

Description

Process-measure coverage for an observed dataset

Usage

```
process_measure_coverage(data, registry = process_measure_registry())
```

Arguments

data	Data frame.
registry	Registry.

Value

A data frame containing process-measure coverage for an observed dataset. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

process_measure_guardrails

Process-measure guardrail table

Description

Process-measure guardrail table

Usage

```
process_measure_guardrails(registry = process_measure_registry())
```

Arguments

registry	Registry.

Value

An R object containing process-measure guardrail table. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

process_measure_lineage

Process-measure lineage table

Description

Process-measure lineage table

Usage

```
process_measure_lineage(
  measure,
  inputs,
  transformations = character(),
  output_level = NA_character_
)
```

Arguments

measure	Measure name.
inputs	Required input variable names.
transformations	Ordered transformation labels.
output_level	Output aggregation level.

Value

An object of class "eye_process_measure_lineage", stored as a named list, with components "measure", "inputs", "transformations", "output_level", "lineage_hash". It contains process-measure lineage table and associated metadata or diagnostics needed to interpret the result.

process_measure_registry

Unified process-measure registry

Description

Unified process-measure registry

Usage

```
process_measure_registry(include_experimental = TRUE)
```

Arguments

`include_experimental`
: Include experimental registry entries.

Value

A data frame containing unified process-measure registry. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`process_measure_units` *List units used by registered process measures*

Description

List units used by registered process measures

Usage

```
process_measure_units(registry = process_measure_registry())
```

Arguments

`registry` Registry.

Value

An R object containing list units used by registered process measures. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

`process_negative_control_permute` *Permutation negative control*

Description

Permutation negative control

Usage

```
process_negative_control_permute(data, outcome, seed = 1L, within = NULL)
```

Arguments

`data`	Data frame.
`outcome`	Outcome column.
`seed`	Random seed.
`within`	Optional grouping columns within which to permute.

Value

An R object containing permutation negative control. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

`process_negative_control_shift` *Temporal-shift negative control*

Description

Temporal-shift negative control

Usage

```
process_negative_control_shift(data, column, lag = 1L, by = NULL)
```

Arguments

`data`	Data frame.
`column`	Column to shift.
`lag`	Number of rows to shift within each group.
`by`	Optional grouping columns.

Value

An R object containing temporal-shift negative control. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

process_ngram_features

N-gram features from process sequences

Description

N-gram features from process sequences

Usage

```
process_ngram_features(sequence, n = c(1L, 2L, 3L), separator = ">")
```

Arguments

sequence	Sequence input.
n	Requested count or n-gram order, depending on context.
separator	Sequence-token separator.

Value

An object of class "matrix", stored as an R object, containing n-gram features from process sequences and associated metadata needed to interpret the result.

process_null_benchmark

Compare an observed effect against a negative-control null distribution

Description

Compare an observed effect against a negative-control null distribution

Usage

```
process_null_benchmark(observed, controls, effect = "effect")
```

Arguments

observed	Observed scalar effect.
controls	Negative-control result or numeric vector.
effect	Effect column when controls is an object.

Value

A named list with components "observed", "n_null", "null_mean", "null_sd", "percentile", "two_sided_tail", "standardized_distance", containing an observed effect against a negative-control null distribution and associated metadata or diagnostics.

process_person_fit *Joint response-process person-fit diagnostic*

Description

Produces model-discrepancy evidence; it never labels a participant as dishonest, impaired, disengaged, or otherwise psychologically categorized.

Usage

```
process_person_fit(
  object,
  data = NULL,
  person = NULL,
  response_weight = 1,
  rt_weight = 1,
  process_weight = 1
)
```

Arguments

`object`	A fitted eyeprocess model or audit object.
`data`	Input data frame or compatible tabular object.
`person`	Person or participant identifier column.
`response_weight`	Weight assigned to response discrepancy.
`rt_weight`	Weight assigned to response-time discrepancy.
`process_weight`	Weight assigned to process discrepancy.

Value

An object of class "eye_process_person_fit", "data.frame", stored as a data frame, containing joint response-process person-fit diagnostic and associated metadata needed to interpret the result.

process_preflight_spec *Specify a biometric process pre-flight gate*

Description

Defines transparent, review-oriented thresholds for incoming gaze/pupil data. The specification is a data-quality governance object, not a behavioral or clinical classifier.

Usage

```
process_preflight_spec(
  min_gaze_validity = 0.8,
  min_pupil_validity = 0.7,
  max_gaze_missingness = 0.25,
  max_pupil_missingness = 0.3,
  min_valid_trial_fraction = 0.7,
  trial_gaze_validity_threshold = 0.75,
  min_rt_ms = 200,
  max_rt_ms = 10000,
  sampling_rate_tolerance = 0.2,
  blink_quantile = 0.95,
  caution_flags = 1L,
  review_flags = 2L
)
```

Arguments

`min_gaze_validity`
: Minimum mean gaze-validity proportion.

`min_pupil_validity`
: Minimum mean pupil-validity proportion.

`max_gaze_missingness`
: Maximum mean gaze-missingness proportion.

`max_pupil_missingness`
: Maximum mean pupil-missingness proportion.

`min_valid_trial_fraction`
: Minimum fraction of trials meeting the trial-level gaze-validity threshold.

`trial_gaze_validity_threshold`
: Gaze-validity threshold used to count an acceptable trial.

`min_rt_ms`, `max_rt_ms`
: Plausible mean response-time bounds in milliseconds.

`sampling_rate_tolerance`
: Fractional deviation from the cohort median sampling rate that triggers review.

`blink_quantile`
: Cohort quantile used for an extreme blink-cluster flag.

`caution_flags`
: Number of flags yielding ‘use_with_caution‘.

`review_flags`
: Number of flags yielding ‘review_or_exclude_from_biometric_models‘.

Value

An ‘eye_process_preflight_spec‘ object.

process_profile_probabilities

Extract process-profile probabilities

Description

Extract process-profile probabilities

Usage

```
process_profile_probabilities(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

An R object containing process-profile probabilities. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

process_profile_summary

Summarize process profiles

Description

Summarize process profiles

Usage

```
process_profile_summary(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

An R object containing process profiles. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

process_reliability_profile *Test-retest process reliability profile*

Description

Test-retest process reliability profile

Usage

```
process_reliability_profile(data, person, session, measure)
```

Arguments

data	Long data.
person, session, measure	Column names.

Value

An object of class "eye_process_reliability_profile", stored as a named list, with components "measure", "icc", "bland_altman", "caveat". It contains test-retest process reliability profile and associated metadata or diagnostics needed to interpret the result.

process_residual_map *Return person/item latent-space coordinates*

Description

Return person/item latent-space coordinates

Usage

```
process_residual_map(object, entity = c("both", "person", "item"))
```

Arguments

object	A fitted eyeprocess model or audit object.
entity	Entity type to map or validate.

Value

A tabular R object containing return person/item latent-space coordinates; rows represent analysis units and columns contain the returned quantities.

process_sensitivity_grid

Construct an explicit process-analysis sensitivity grid

Description

Construct an explicit process-analysis sensitivity grid

Usage

```
process_sensitivity_grid(
  ...,
  label = "process_sensitivity",
  max_specifications = 100000L
)
```

Arguments

`...`	Named vectors of defensible analysis options.
`label`	Grid label.
`max_specifications`	Safety cap.

Value

A tabular R object containing an explicit process-analysis sensitivity grid; rows represent analysis units and columns contain the returned quantities.

process_sequence_embedding

Low-dimensional embedding of response-process sequences

Description

Uses TF-IDF-weighted n-gram features and truncated SVD. This is a transparent classical embedding; sequence autoencoders can be supplied later through an external engine without changing the downstream contract.

Usage

```
process_sequence_embedding(sequence, n = c(1L, 2L, 3L), dimensions = 5L)
```

Arguments

`sequence`	Sequence input.
`n`	Requested count or n-gram order, depending on context.
`dimensions`	Number of embedding dimensions.

Value

An R object containing low-dimensional embedding of response-process sequences. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

`process_state_occupancy` *Summarize HMM state occupancy*

Description

Summarize HMM state occupancy

Usage

```
process_state_occupancy(object)
```

Arguments

`object`	A fitted eyeprocess model or audit object.

Value

An R object containing hMM state occupancy. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

`process_state_transition_summary` *Summarize HMM process-state transitions*

Description

Summarize HMM process-state transitions

Usage

```
process_state_transition_summary(object)
```

Arguments

`object`	A fitted eyeprocess model or audit object.

Value

A data frame containing hMM process-state transitions. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`process_temporal_stability` *Pairwise temporal stability across sessions*

Description

Pairwise temporal stability across sessions

Usage

```
process_temporal_stability(
  data,
  person,
  session,
  measure,
  method = c("pearson", "spearman")
)
```

Arguments

`data`	Long data.
`person`, `session`, `measure`	Column names.
`method`	Correlation method.

Value

A logical value or vector indicating pairwise temporal stability across sessions.

process_uncertainty_spec

Process measurement-uncertainty budgets

Description

Process measurement-uncertainty budgets. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
process_uncertainty_spec(calibration = TRUE, aoi_assignment = TRUE,
  preprocessing = TRUE, sampling = TRUE, model = TRUE, source_sd = NULL,
  draws = 1000, seed = 20260807)
estimate_process_uncertainty(x, spec = process_uncertainty_spec(), metrics = NULL,
  cluster = NULL)
propagate_process_uncertainty(x, estimand = function(data) mean(data, na.rm = TRUE),
  method = c("bootstrap", "simulation", "posterior"), draws = NULL, seed = NULL)
uncertainty_budget(x)
compare_uncertainty_budgets(...)
plot_uncertainty_waterfall(x, ...)
plot_uncertainty_tornado(x, ...)
plot_uncertainty_by_item(x, ...)
plot_uncertainty_by_stage(x, ...)
```

Arguments

calibration	Argument controlling ‘calibration‘; see the function usage and returned audit metadata.
aoi_assignment	Argument controlling ‘aoi_assignment‘; see the function usage and returned audit metadata.
preprocessing	Argument controlling ‘preprocessing‘; see the function usage and returned audit metadata.
sampling	Argument controlling ‘sampling‘; see the function usage and returned audit metadata.
model	Argument controlling ‘model‘; see the function usage and returned audit metadata.
source_sd	Argument controlling ‘source_sd‘; see the function usage and returned audit metadata.
draws	Argument controlling ‘draws‘; see the function usage and returned audit metadata.
seed	Argument controlling ‘seed‘; see the function usage and returned audit metadata.

x	Input object or data structure appropriate for the selected analysis.
spec	Argument controlling ‘spec‘; see the function usage and returned audit metadata.
metrics	Argument controlling ‘metrics‘; see the function usage and returned audit metadata.
cluster	Argument controlling ‘cluster‘; see the function usage and returned audit metadata.
estimand	Argument controlling ‘estimand‘; see the function usage and returned audit metadata.
method	Argument controlling ‘method‘; see the function usage and returned audit metadata.
...	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

---

process_validation_design

Define an empirical process-validation design

Description

The design is intentionally explicit. It records measurement conditions under which recovery, uncertainty, convergence, and failure behavior will be evaluated. It does not imply that every combination is appropriate for every estimator.

Usage

```
process_validation_design(
  n_persons = c(50L, 150L, 500L),
  n_trials = c(10L, 30L, 80L),
  missingness = c(0, 0.05, 0.15, 0.3),
  sampling_rate_hz = c(60, 120, 300, 1000),
  aoi_error = c("low", "moderate", "severe"),
```

```
  calibration_error = c(0, 0.5, 1),
  pupil_dropout = c(0, 0.1, 0.3),
  heterogeneity = c("low", "moderate"),
  model_misspecification = c(FALSE, TRUE),
  replications = 100L,
  seed = 1L,
  label = "process_validation"
)
```

Arguments

`n_persons`	Participant counts.
`n_trials`	Trial/item counts per participant.
`missingness`	Proportion of generic process observations made missing.
`sampling_rate_hz`	Nominal sampling rates.
`aoi_error`	AOI uncertainty regimes.
`calibration_error`	Calibration-error regimes in user-defined units.
`pupil_dropout`	Pupil-specific dropout proportions.
`heterogeneity`	Participant-heterogeneity regimes.
`model_misspecification`	Logical regimes indicating deliberate mismatch.
`replications`	Monte Carlo replications per condition.
`seed`	Master simulation seed.
`label`	Optional design label.

Value

An ‘eye_process_validation_design‘ object.

`process_window_spec` *Specify temporal process windows*

Description

Specify temporal process windows

Usage

```
process_window_spec(
  width_ms = 1000,
  step_ms = 500,
  start_ms = 0,
  end_ms = 3000,
  align = c("stimulus", "response", "custom"),
  min_samples = 5L
)
```

Arguments

`width_ms`	Window width in milliseconds.
`step_ms`	Step between successive windows.
`start_ms`, `end_ms`	Analysis range relative to the chosen alignment origin.
`align`	Alignment label, e.g. stimulus, response, or custom.
`min_samples`	Minimum samples required within a window.

Value

An ‘eye_process_window_spec‘ object.

`promote_irt_model` *Promote an IRT model after evidence gates are met*

Description

Promotion is an evidence record, not a mutable global status change unless ‘update_registry = TRUE‘ is requested.

Usage

```
promote_irt_model(
  spec,
  evidence,
  target = c("experimental", "reference"),
  update_registry = FALSE
)
```

Arguments

`spec`	IRT model or validation specification.
`evidence`	Validation evidence used for promotion.
`target`	Target evidence/status level.
`update_registry`	Whether the in-memory registry is updated.

Value

An object of class "eye_irt_promotion", stored as a named list, with components "model", "from", "to", "evidence_grade", "evidence_pass", "timestamp". It contains promote an IRT model after evidence gates are met and associated metadata or diagnostics needed to interpret the result.

---

promote_vendor_support

Promote a case support level only when evidence is supplied

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
promote_vendor_support(corpus_path, case_id, level = c("fixture-tested",
  "empirically-validated"), validation, reviewer, notes = NA_character_)
```

Arguments

corpus_path	Corpus directory.
case_id	Case identifier.
level	New support level.
validation	Validation result/audit.
reviewer	Reviewer identifier.
notes	Notes.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

propagate_calibration_uncertainty

Propagate empirical calibration uncertainty around gaze samples

---

Description

Propagate empirical calibration uncertainty around gaze samples

Usage

```
propagate_calibration_uncertainty(
  data,
  model,
  x = "gaze_x",
  y = "gaze_y",
  draws = 500L,
  seed = 1L
)
```

Arguments

`data`	Gaze samples.
`model`	Calibration error model.
`x, y`	Gaze-coordinate columns.
`draws`	Monte Carlo draws per sample.
`seed`	Seed.

Value

An R object containing propagate empirical calibration uncertainty around gaze samples. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

`provenance_edge_table` *Build a provenance edge table*

Description

Build a provenance edge table

Usage

```
provenance_edge_table(from, to, relation = "wasDerivedFrom")
```

Arguments

`from, to`	Node identifiers.
`relation`	PROV-like relation labels.

Value

A data frame containing a provenance edge table. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

provenance_lineage_table

Build a provenance lineage node table

Description

Build a provenance lineage node table

Usage

```
provenance_lineage_table(
  id,
  type = "entity",
  label = id,
  value = NA_character_
)
```

Arguments

id	Node identifiers.
type	Node types such as entity, activity, agent.
label	Human-readable labels.
value	Optional values/locations.

Value

A data frame containing a provenance lineage node table. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

prune_validation_checkpoints

Remove obsolete or corrupt validation checkpoints

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
prune_validation_checkpoints(path, statuses = c("corrupt", "locked"), dry_run = TRUE)
```

Arguments

`path`	Validation output directory.
`statuses`	Statuses to remove.
`dry_run`	Report without deleting.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`public_validation_corpus` *Public validation-corpus registry*

Description

Returns conservative metadata only. The package deliberately does not auto-download third-party human-participant data; users must review the source licence/terms and obtain data from the authoritative repository.

Usage

```
public_validation_corpus()
```

Value

A data frame containing public validation-corpus registry. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`pupil_activity_index` *Compute a transparent pupil activity index*

Description

Compute a transparent pupil activity index

Usage

```
pupil_activity_index(
  y,
  time_ms = seq_along(y),
  sampling_rate_hz = NULL,
  method = c("velocity", "frequency_contrast", "ripa_proxy"),
  low_band = c(0.05, 0.5),
  high_band = c(0.5, 4),
  fast_window_ms = 250,
  slow_window_ms = 750
)
```

Arguments

- `y` Pupil signal.
- `time_ms` Time vector.
- `sampling_rate_hz` Sampling rate for frequency methods.
- `method` ‘velocity‘, ‘frequency_contrast‘, or ‘ripa_proxy‘.
- `low_band`, `high_band` Frequency bands for frequency contrast.
- `fast_window_ms`, `slow_window_ms` Smoothing windows for the RIPA-style proxy.

Value

A numeric value or vector containing a transparent pupil activity index.

`pupil_band_power` *Compute pupil signal power in a frequency band*

Description

Compute pupil signal power in a frequency band

Usage

```
pupil_band_power(y, sampling_rate_hz, lower_hz, upper_hz, detrend = TRUE)
```

Arguments

- `y` Pupil signal.
- `sampling_rate_hz` Sampling rate in Hz.
- `lower_hz`, `upper_hz` Frequency-band limits.
- `detrend` Remove the mean before FFT.

Value

A numeric value or vector containing pupil signal power in a frequency band.

pupil_baseline_sensitivity

Evaluate pupil baseline-window sensitivity

Description

Evaluate pupil baseline-window sensitivity

Usage

```
pupil_baseline_sensitivity(
  data,
  time = "time_ms",
  pupil = "pupil",
  windows,
  by = NULL,
  correction = c("subtractive", "divisive")
)
```

Arguments

data	Pupil data.
time	Time column.
pupil	Pupil column.
windows	Named list of two-element baseline windows.
by	Optional grouping columns.
correction	‘subtractive‘ or ‘divisive‘.

Value

An R object containing pupil baseline-window sensitivity. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

pupil_confound_effects

Extract pupil confound-model effects

Description

Extract pupil confound-model effects

Usage

```
pupil_confound_effects(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A numeric coefficient table: the smooth-term table for ‘mgcv::gam()‘ fits or the coefficient matrix for ‘stats::lm()‘ fits.

---

pupil_event_effects *Extract event effects from pupil deconvolution*

Description

Extract event effects from pupil deconvolution

Usage

```
pupil_event_effects(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

An R object containing event effects from pupil deconvolution. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

pupil_event_regressor *Build an event-locked pupil regressor*

Description

Build an event-locked pupil regressor

Usage

```
pupil_event_regressor(time_ms, event_time_ms, tmax_ms = 930, shape = 10.1)
```

Arguments

time_ms	Sample times.
event_time_ms	Event onset.
tmax_ms, shape	Kernel parameters.

Value

A numeric value or vector containing an event-locked pupil regressor.

---

pupil_frequency_features

Extract pupil frequency-domain and activity features by group

---

Description

Extract pupil frequency-domain and activity features by group

Usage

```
pupil_frequency_features(
  data,
  by = c("person_id", "trial_id"),
  time = "time_ms",
  pupil = "pupil_bc",
  sampling_rate_hz = 60,
  low_band = c(0.05, 0.5),
  high_band = c(0.5, 4)
)
```

Arguments

`data`	Sample-level data.
`by`	Grouping columns, e.g. person and trial/window.
`time`, `pupil`	Column names.
`sampling_rate_hz`	Either a scalar or a column name.
`low_band`, `high_band`	Frequency bands.

Value

An object of class "eye_pupil_frequency_features", stored as a named list, with components "features", "low_band", "high_band", "by", "pupil", "time", "caveat". It contains pupil frequency-domain and activity features by group and associated metadata or diagnostics needed to interpret the result.

pupil_latency_sensitivity

Pupil latency estimator sensitivity and resolvability audit

Description

Estimates pupil-response latency using a sustained threshold, maximum-slope tangent intersection, and piecewise breakpoint. The result reports estimator spread and a sampling/noise-aware resolvability label rather than treating a single latency estimate as algorithm- or hardware-independent.

Usage

```
pupil_latency_sensitivity(
  time,
  pupil,
  event_time = 0,
  baseline_window = c(-0.5, 0),
  search_window = c(0, 2),
  direction = c("constriction", "dilation"),
  threshold_sigma = 3,
  sustain_ms = 40
)
```

Arguments

`time`	Numeric sample times in seconds.
`pupil`	Numeric pupil values.
`event_time`	Nominal event time in seconds.
`baseline_window`	Two-element window relative to ‘event_time‘.
`search_window`	Two-element search window relative to ‘event_time‘.
`direction`	‘"constriction"‘ or ‘"dilation"‘.
`threshold_sigma`	Robust-noise multiples used by the sustained threshold.
`sustain_ms`	Required duration above threshold in milliseconds.

Value

A list of estimator-specific latencies, spread, signal diagnostics, resolvability, and provenance.

pupil_preprocessing_grid

Create a preprocessing sensitivity grid for pupil analysis

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
pupil_preprocessing_grid(baseline_windows = list(c(-200, 0), c(-500, 0)),
  latency_ms = c(100, 200, 300), basis_df = c(4L, 6L, 8L),
 baseline_methods = c("subtract", "percent"), max_interpolated_fraction = c(0.10,
  0.20))
```

Arguments

`baseline_windows`
: List of baseline windows.

`latency_ms`
: Latency shifts.

`basis_df`
: Basis degrees of freedom.

`baseline_methods`
: Baseline corrections.

`max_interpolated_fraction`
: Interpolation thresholds.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

pupil_preprocessing_sensitivity

Run functional pupil preprocessing sensitivity analysis

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
pupil_preprocessing_sensitivity(x, grid = pupil_preprocessing_grid(),
  base_spec = functional_pupil_irt_spec(engine = "two_stage_glm"), fit = TRUE,
 extractor = extract_functional_pupil_parameters, continue_on_error = TRUE, ...)
```

Arguments

`x`	Eye dataset or long pupil data.
`grid`	Sensitivity grid.
`base_spec`	Base functional pupil specification.
`fit`	Whether to fit each specification.
`extractor`	Optional result extractor.
`continue_on_error`	Record errors rather than stopping.
`...`	Passed to model fitting.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`pupil_response_kernel` *Canonical gamma-shaped pupil response kernel*

Description

Canonical gamma-shaped pupil response kernel

Usage

```
pupil_response_kernel(
  time_since_event_ms,
  tmax_ms = 930,
  shape = 10.1,
  normalize = TRUE
)
```

Arguments

`time_since_event_ms`	Time relative to event onset.
`tmax_ms`	Approximate response peak time.
`shape`	Shape parameter.
`normalize`	Normalize peak to one.

Value

A numeric value or vector containing canonical gamma-shaped pupil response kernel.

pupil_unit_fidelity_audit

Pupil-unit semantic-fidelity audit

Description

Pupil-unit semantic-fidelity audit

Usage

```
pupil_unit_fidelity_audit(
  source,
  roundtrip,
  source_pupil = "pupil_size",
  roundtrip_pupil = source_pupil,
  key = NULL,
  tolerance = 1e-06,
  correlation_floor = 0.995
)
```

Arguments

`source`	Original/source representation.
`roundtrip`	Round-tripped or comparison representation.
`source_pupil`	Source pupil-measure column.
`roundtrip_pupil`	Round-tripped pupil-measure column.
`key`	Column or columns used to align records.
`tolerance`	Numerical tolerance used by the comparison.
`correlation_floor`	Minimum correlation treated as compatible.

Value

An object of class "eye_pupil_fidelity", stored as a named list, with components "status", "matched_n", "correlation", "estimated_scale_ratio", "scaled_max_error", "tolerance". It contains pupil-unit semantic-fidelity audit and associated metadata or diagnostics needed to interpret the result.

pupil_velocity_activity

Derivative-based pupil activity magnitude

Description

Derivative-based pupil activity magnitude

Usage

```
pupil_velocity_activity(y, time_ms)
```

Arguments

y	Pupil signal.
time_ms	Time in milliseconds.

Value

A numeric value or vector containing derivative-based pupil activity magnitude.

quantify_process_leakage

Quantify leakage from row-wise rather than grouped validation

Description

Quantify leakage from row-wise rather than grouped validation

Usage

```
quantify_process_leakage(
  data,
  formula,
  group = c("participant_id", "item_id"),
  v = 5L,
  seed = 1L
)
```

Arguments

data	Data frame.
formula	Binary-outcome formula.
group	Grouping columns.
v	Number of folds.
seed	Random seed.

Value

Comparison table.

---

query_eye_storage *Query partitioned eye storage lazily where possible*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
query_eye_storage(storage, table, filters = list(), columns = NULL, collect = TRUE)
```

Arguments

storage	Storage object or path.
table	Canonical table.
filters	Named list of equality filters.
columns	Optional selected columns.
collect	Whether to collect an Arrow query.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

raven_reproduction_spec *Specify a published Raven strategy-model reproduction*

Description

Specify a published Raven strategy-model reproduction

Usage

```
raven_reproduction_spec(
  data_path,
  response,
  strategy_features,
  published_targets = NULL,
  licence_reviewed = FALSE,
  citation = "10.1016/j.intell.2023.101782"
)
```

Arguments

`data_path` Path to the exact public data/materials.

`response` Response field.

`strategy_features` Theory-defined eye-tracking strategy indicators.

`published_targets` Optional named target estimates.

`licence_reviewed` Whether data and code reuse has been reviewed.

`citation` Citation or DOI for the reproduced analysis.

Value

An ‘eye_raven_reproduction_spec‘.

---

read_api_lifecycle_registry *Read API lifecycle registry from CSV*

Description

Read API lifecycle registry from CSV

Usage

```
read_api_lifecycle_registry(path)
```

Arguments

`path` CSV path.

Value

An R object containing aPI lifecycle registry from CSV. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

read_benchmark_table *Read a benchmark table*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
read_benchmark_table(study = eyeprocess_benchmark_study(), table)
```

Arguments

study	Benchmark object or path.
table	Table name.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

read_decision_manifest *Read a decision manifest written by eyeprocess*

Description

Read a decision manifest written by eyeprocess

Usage

```
read_decision_manifest(path, format = NULL)
```

Arguments

path	Input path.
format	Optional format; inferred from extension when omitted.

Value

A logical value or vector indicating a decision manifest written by eyeprocess.

read_eyeprocess_validation_evidence

Read and verify a frozen evidence bundle

Description

Read and verify a frozen evidence bundle

Usage

```
read_eyeprocess_validation_evidence(path, verify = TRUE)
```

Arguments

path	File path for reading or writing.
verify	Whether integrity verification is performed when reading.

Value

An R object containing and verify a frozen evidence bundle. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

read_reproducibility_fingerprint

Read a reproducibility fingerprint

Description

Read a reproducibility fingerprint

Usage

```
read_reproducibility_fingerprint(path, format = NULL)
```

Arguments

path	Input path.
format	Optional format.

Value

An R object containing a reproducibility fingerprint. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

read_validation_job_manifest

Read a validation manifest

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
read_validation_job_manifest(path)
```

Arguments

path	Manifest directory.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

read_validation_scenario_manifest

Read a validation scenario manifest

Description

Read a validation scenario manifest

Usage

```
read_validation_scenario_manifest(path)
```

Arguments

path	File path for reading or writing.

Value

An R object containing a validation scenario manifest. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

read_vendor_registry *Read the multi-vendor case registry*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
read_vendor_registry(corpus_path)
```

Arguments

corpus_path	Corpus directory.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

recalibrate_after_changepoint *Iteratively detect, clean, and recalibrate after process change points*

Description

Iteratively detect, clean, and recalibrate after process change points

Usage

```
recalibrate_after_changepoint(
  data,
  fitter,
  person = "participant_id",
  order = "item_order",
  policy = c("flag", "exclude_post_change", "add_regime"),
  ...
)
```

Arguments

data	Input data frame or compatible tabular object.
fitter	Function accepting a data frame and returning a calibration fit.
person	Person or participant identifier column.
order	Within-sequence ordering variable.
policy	‘flag‘, ‘exclude_post_change‘, or ‘add_regime‘.
...	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_changepoint_recalibration", stored as a named list, with components "changepoints", "data", "fit", "policy". It contains iteratively detect, clean, and recalibrate after process change points and associated metadata or diagnostics needed to interpret the result.

---

recommended_validation_replications

Approximate simulation replications needed for a target Monte Carlo error

---

Description

Approximate simulation replications needed for a target Monte Carlo error

Usage

```
recommended_validation_replications(
  target_mcse = 0.01,
  metric = c("coverage", "mean"),
  anticipated_sd = 1,
  anticipated_probability = 0.95,
  minimum = 100L
)
```

Arguments

`target_mcse`	Target Monte Carlo standard error.
`metric`	Metric to calculate or audit.
`anticipated_sd`	Anticipated standard deviation.
`anticipated_probability`	Anticipated probability for a binary metric.
`minimum`	Minimum acceptable value or threshold.

Value

A numeric value or vector containing approximate simulation replications needed for a target Monte Carlo error.

redact_validation_case

Redact a validation case without inventing replacement data

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
redact_validation_case(source_path, output_path, id_columns = c("participant_id",
  "subject", "participant", "recording_id", "session_id"), remove_columns = c("name",
  "email", "address", "birthdate", "date_of_birth"), text_redactor = NULL, salt,
  copy_non_tabular = FALSE, overwrite = FALSE)
```

Arguments

source_path	Source file/directory.
output_path	Redacted output directory.
id_columns	Identifier columns to pseudonymize.
remove_columns	Columns to remove.
text_redactor	Optional function applied to character columns.
salt	Required project-specific salt.
copy_non_tabular	Copy unsupported files unchanged.
overwrite	Replace output.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

register_eye_api_status

Add or update API lifecycle metadata without global mutation

Description

Add or update API lifecycle metadata without global mutation

Usage

```
register_eye_api_status(
  registry = eye_api_lifecycle(),
  name,
  status,
  canonical = NA_character_,
  replacement = NA_character_,
  since = "0.9.0.9000",
  notes = NA_character_
)
```

Arguments

registry	Existing lifecycle registry.
name	API name.
status	Lifecycle status.
canonical	Canonical API for the same concept, if applicable.
replacement	Replacement for deprecated/superseded API.
since	Version in which status applies.
notes	Notes.

Value

An R object containing add or update API lifecycle metadata without global mutation. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

register_irt_model *Register a multimodal IRT model*

Description

Register a multimodal IRT model

Usage

```
register_irt_model(spec, overwrite = FALSE)
```

Arguments

spec	An ‘irt_model_spec()‘.
overwrite	Whether to replace an existing model with the same id.

Value

An R object containing a multimodal IRT model. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

register_process_measure *Add a process measure to a registry without global mutation*

Description

Add a process measure to a registry without global mutation

Usage

```
register_process_measure(
  registry = process_measure_registry(),
  name,
  channel,
  unit,
  level,
  interpretation,
  guardrail,
  status = "user_defined"
)
```

Arguments

`registry` Registry.

`name`, `channel`, `unit`, `level`, `interpretation`, `guardrail`, `status` Measure metadata.

Value

A tabular R object containing add a process measure to a registry without global mutation; rows represent analysis units and columns contain the returned quantities.

register_pupil_curves *Pupil phase-amplitude registration*

Description

Pupil phase-amplitude registration. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
register_pupil_curves(x, time, pupil, anchor = c("stimulus", "response", "event"),
  method = c("elastic", "landmark"), id_col = "person_id", grid_size = 101)
decompose_pupil_phase_amplitude(x, components = 3)
fit_phase_amplitude_irt(responses, phase_scores, amplitude_scores = NULL,
  person_id = NULL, family = c("gaussian", "binomial"), ...)
audit_pupil_registration(x)
plot_pupil_registration(x, ...)
plot_warping_functions(x, ...)
plot_phase_amplitude_scores(x, ...)
plot_item_phase_delay(x, ...)
plot_registered_pupil_effects(x, ...)
```

Arguments

`x`	Input object or data structure appropriate for the selected analysis.
`time`	Argument controlling ‘time‘; see the function usage and returned audit metadata.
`pupil`	Argument controlling ‘pupil‘; see the function usage and returned audit metadata.
`anchor`	Argument controlling ‘anchor‘; see the function usage and returned audit metadata.
`method`	Argument controlling ‘method‘; see the function usage and returned audit metadata.
`id_col`	Argument controlling ‘id_col‘; see the function usage and returned audit metadata.
`grid_size`	Argument controlling ‘grid_size‘; see the function usage and returned audit metadata.
`components`	Argument controlling ‘components‘; see the function usage and returned audit metadata.
`responses`	Argument controlling ‘responses‘; see the function usage and returned audit metadata.
`phase_scores`	Argument controlling ‘phase_scores‘; see the function usage and returned audit metadata.
`amplitude_scores`	Argument controlling ‘amplitude_scores‘; see the function usage and returned audit metadata.
`person_id`	Argument controlling ‘person_id‘; see the function usage and returned audit metadata.
`family`	Argument controlling ‘family‘; see the function usage and returned audit metadata.
`...`	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

`register_validation_case`

Register an independent validation case

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
register_validation_case(corpus_path, source_path, vendor, device_model,
  software_name, software_version, hardware_version = NA_character_,
  export_profile = NA_character_, sampling_rate_hz = NA_real_,
  coordinate_system = NA_character_, timebase = NA_character_,
  event_semantics = NA_character_, ocular_structure = NA_character_,
  missingness_convention = NA_character_, vendor_fixations = NA_character_,
  package_transformations = NA_character_, unsupported_fields = NA_character_,
 independent_source = TRUE, licence_reviewed = FALSE, redistribution_allowed = FALSE,
  support_level = c("declared", "fixture-tested", "empirically-validated"),
  mode = c("reference", "copy"), case_id = NULL, notes = NA_character_)
```

Arguments

`corpus_path`	Corpus directory.
`source_path`	Real export file or directory.
`vendor`	Vendor name.
`device_model`	Hardware model.
`software_name`	Export software and version.
`software_version`	Export software and version.

`hardware_version`
: Optional hardware/firmware version.

`export_profile` Export options/profile.

`sampling_rate_hz`
: Nominal or observed rate.

`coordinate_system`
: Semantics metadata.

`timebase` Semantics metadata.

`event_semantics`
: Semantics metadata.

`ocular_structure`
: Monocular/binocular structure.

`missingness_convention`
: Vendor missing-value convention.

`vendor_fixations`
: Description of vendor-derived fixation fields.

`package_transformations`
: Declared package transformations.

`unsupported_fields`
: Known unsupported fields.

`independent_source`
: Whether independently obtained.

`licence_reviewed`
: Whether licensing review is complete.

`redistribution_allowed`
: Whether redacted material may be redistributed.

`support_level` Declared support level.

`mode` Reference source in place or copy it into the private corpus.

`case_id` Optional explicit identifier.

`notes` Notes.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`register_vendor_semantics`
Register vendor-field semantics

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
register_vendor_semantics(corpus_path, vendor, native_field, native_meaning,
 canonical_table, canonical_field, unit = NA_character_, transformation = "identity",
  loss_risk = c("none", "low", "moderate", "high", "unsupported"),
  evidence_case_id = NA_character_)
```

Arguments

corpus_path	Corpus directory.
vendor	Vendor.
native_field	Native field and meaning.
native_meaning	Native field and meaning.
canonical_table	Canonical destination.
canonical_field	Canonical destination.
unit	Unit.
transformation	Transformation description.
loss_risk	None, low, moderate, high, or unsupported.
evidence_case_id	Supporting case.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

reporting_guideline_audit *Audit reporting-guideline coverage*

Description

Audit reporting-guideline coverage

Usage

```
reporting_guideline_audit(x, model = NULL, sensitivity = NULL)
```

Arguments

x	An ‘eye_dataset‘.
model	Optional ‘eyeprocess_model‘.
sensitivity	Optional ‘eye_multiverse‘ sensitivity result.

Value

An ‘eye_reporting_audit‘ data frame.

representative_scanpath

Representative scanpaths and scanpath distributions

Description

Representative scanpaths and scanpath distributions. These functions form the eyeprocess 0.6.0.9000 measurement-intelligence programme and use dependency-free reference implementations with explicit evidence limits.

Usage

```
representative_scanpath(x, method = c("medoid", "barycenter", "consensus"),
  id_col = "person_id", aoi_col = "aoi", x_col = "x", y_col = "y",
  distance = c("multimatch", "edit", "transport"))
scanpath_dispersion(x)
compare_scanpath_distributions(x, group, distance = c("multimatch", "edit",
  "transport"), permutations = 499)
bootstrap_representative_scanpath(x, draws = 250, seed = 20260807)
plot_scanpath_atlas(x, ...)
plot_representative_scanpath(x, ...)
plot_scanpath_dispersion(x, ...)
plot_group_scanpath_transport(x, ...)
plot_scanpath_similarity_matrix(x, ...)
```

Arguments

x	Input object or data structure appropriate for the selected analysis.
method	Argument controlling ‘method‘; see the function usage and returned audit metadata.
id_col	Argument controlling ‘id_col‘; see the function usage and returned audit metadata.
aoi_col	Argument controlling ‘aoi_col‘; see the function usage and returned audit metadata.
x_col	Argument controlling ‘x_col‘; see the function usage and returned audit metadata.
y_col	Argument controlling ‘y_col‘; see the function usage and returned audit metadata.
distance	Argument controlling ‘distance‘; see the function usage and returned audit metadata.
group	Argument controlling ‘group‘; see the function usage and returned audit metadata.
permutations	Argument controlling ‘permutations‘; see the function usage and returned audit metadata.

draws	Argument controlling ‘draws‘; see the function usage and returned audit metadata.
seed	Argument controlling ‘seed‘; see the function usage and returned audit metadata.
...	Additional arguments passed to the underlying method or plotting function.

Details

The APIs return auditable S3 objects. Plot wrappers call registered base-graphics methods. Experimental or approximate engines are labelled in object status fields and should be validated before confirmatory or operational use.

Value

An eyeprocess result object, data frame, model object, plot, or audit table as documented by the individual function.

See Also

`plot_diagnostics()`, `plot_evidence()`, and `plot_sensitivity()`.

---

resume_eye_pipeline *Resume a governed pipeline from a prior run*

Description

Resume a governed pipeline from a prior run

Usage

```
resume_eye_pipeline(x, previous, context = list(), stop_on_error = TRUE)
```

Arguments

x	Pipeline.
previous	Prior pipeline run.
context	Context used for new steps.
stop_on_error	Stop on non-optional error.

Value

An object of class "eye_pipeline_run", stored as a named list, with components "pipeline", "pipeline_hash", "outputs", "records", "errors", "warnings", "context_hash", "completed", "created_at", "status". It contains resume a governed pipeline from a prior run and associated metadata or diagnostics needed to interpret the result.

resume_validation_jobs

Resume incomplete or failed validation jobs

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
resume_validation_jobs(plan, output_dir, retry = c("missing", "failed",
  "nonconverged", "locked", "corrupt"), ...)
```

Arguments

`plan`	Validation plan or manifest path.
`output_dir`	Validation output directory.
`retry`	Which statuses to re-run.
`...`	Passed to ‘run_validation_jobs()‘.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

roundtrip_eye_bids

Execute and audit an Eye-Tracking-BIDS round trip

Description

This is a callback harness so it remains stable even if the package’s BIDS writer/reader signatures evolve. ‘exporter‘ receives the source object plus ‘export_args‘; ‘importer‘ receives the exporter result plus ‘import_args‘.

Usage

```
roundtrip_eye_bids(
  source,
  exporter,
  importer,
  export_args = list(),
  import_args = list(),
  extract_samples = .ep07_roundtrip_extract_samples,
  audit_args = list()
)
```

Arguments

`source` Source eyeprocess object/table.

`exporter` Function that writes/exports BIDS and returns a locator or object consumable by ‘importer‘.

`importer` Function that reconstructs an eyeprocess object/table.

`export_args`, `import_args` Named argument lists.

`extract_samples` Function extracting the canonical sample table from source and reconstructed objects.

`audit_args` Arguments forwarded to ‘semantic_roundtrip_audit()‘.

Value

An object of class "eye_bids_roundtrip", stored as a named list, with components "exported", "reconstructed", "audit", "status". It contains execute and audit an Eye-Tracking-BIDS round trip and associated metadata or diagnostics needed to interpret the result.

`run_benchmark_reproduction` *Derive reproducible benchmark summaries*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
run_benchmark_reproduction(study = eyeprocess_benchmark_study())
```

Arguments

`study` Benchmark object or path.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

run_eye_benchmark *Run a computational scaling benchmark*

Description

Run a computational scaling benchmark

Usage

```
run_eye_benchmark(
  design = eye_benchmark_design(),
  generator = .ep09_default_benchmark_generator,
  operation = .ep09_default_benchmark_operation,
  gc_before = TRUE,
  progress = interactive()
)
```

Arguments

design	Benchmark design.
generator	Function ‘(n, row)‘ returning benchmark input.
operation	Function ‘(data, row)‘ representing the operation under test.
gc_before	Run garbage collection before timing.
progress	Print progress.

Value

An object of class "eye_benchmark_result", stored as a named list, with components "design", "results", "created_at", "status", "caveat". It contains a computational scaling benchmark and associated metadata or diagnostics needed to interpret the result.

run_eye_pipeline *Run a governed eyeprocess pipeline*

Description

Run a governed eyeprocess pipeline

Usage

```
run_eye_pipeline(x, context = list(), stop_on_error = TRUE, previous = NULL)
```

Arguments

`x`	Pipeline.
`context`	Initial named context available as ‘.context‘.
`stop_on_error`	Stop on a non-optional step error.
`previous`	Optional prior ‘eye_pipeline_run‘ used for resumption.

Value

An object of class "eye_pipeline_run", stored as a named list, with components "pipeline", "pipeline_hash", "outputs", "records", "errors", "warnings", "context_hash", "completed", "created_at", "status". It contains a governed eyeprocess pipeline and associated metadata or diagnostics needed to interpret the result.

`run_eyeprocess_equateirt` *Run a named equateIRT linking/equating function without fallback substitution*

Description

The caller supplies an exported equateIRT function name and its arguments. eyeprocess does not replace the requested equating estimator when the engine is unavailable.

Usage

```
run_eyeprocess_equateirt(function_name, ..., engine = "equateIRT")
```

Arguments

`function_name`	Name of the external equateIRT function to call.
`...`	Additional arguments passed to the selected method or external engine.
`engine`	Requested estimation or analysis engine.

Value

An object of class "eye_external_irt_fit", stored as a named list, with components "status", "engine", "function_name", "fit", "call". It contains a named equateIRT linking/equating function without fallback substitution and associated metadata or diagnostics needed to interpret the result.

run_eyeprocess_irt_ability_sbc

Run simulation-based calibration for known-item IRT ability scoring

Description

Simulates abilities from the declared normal prior, responses from the known item-response model, and posterior draws from the same grid-based scoring algorithm used by ‘eyeprocess_irt_eap_score()‘. This validates computational calibration of the scoring workflow under the declared generative model; it does not establish empirical adequacy or construct validity.

Usage

```
run_eyeprocess_irt_ability_sbc(
  items,
  replications = 200L,
  posterior_draws = 99L,
  theta_grid = seq(-5, 5, length.out = 401),
  prior_mean = 0,
  prior_sd = 1,
  interval = 0.95,
  seed = 20260811L,
  D = 1
)
```

Arguments

`items`	Item-parameter data frame or item collection.
`replications`	Number of simulation or validation replications.
`posterior_draws`	Number of posterior draws generated per SBC replication.
`theta_grid`	Grid of latent-trait values used for numerical scoring or integration.
`prior_mean`	Mean of the normal latent-trait prior.
`prior_sd`	Standard deviation of the normal latent-trait prior.
`interval`	Central posterior interval probability used for coverage assessment.
`seed`	Random-number seed for reproducible execution.
`D`	Logistic scaling constant.

Value

An object of class "eye_irt_sbc_evidence", stored as a named list, with components "diagnostics", "ecdf_deviation", "n", "n_draws". It contains simulation-based calibration for known-item IRT ability scoring and associated metadata or diagnostics needed to interpret the result.

run_eyeprocess_irt_recovery

Run IRT parameter recovery with the exact mirt engine

Description

When mirt is unavailable the function returns a gated result rather than a substitute estimator.

Usage

```
run_eyeprocess_irt_recovery(design, engine = "mirt", verbose = TRUE)
```

Arguments

design	Validation or simulation design object.
engine	Requested estimation or analysis engine.
verbose	Value supplied for the verbose argument.

Value

An object of class "eye_irt_recovery_result", stored as a named list, with components "design", "estimates", "failures", "engine". It contains iRT parameter recovery with the exact mirt engine and associated metadata or diagnostics needed to interpret the result.

run_eyeprocess_mirtcat

Run a mirtCAT adaptive-testing workflow without fallback substitution

Description

Run a mirtCAT adaptive-testing workflow without fallback substitution

Usage

```
run_eyeprocess_mirtcat(..., engine = "mirtCAT")
```

Arguments

...	Additional arguments passed to the selected method or external engine.
engine	Requested estimation or analysis engine.

Value

An object of class "eye_external_irt_fit", stored as a named list, with components "status", "engine", "fit", "call". It contains a mirtCAT adaptive-testing workflow without fallback substitution and associated metadata or diagnostics needed to interpret the result.

run_eyeprocess_stress_evidence

Execute a declared measurement-stress evidence plan

Description

‘corruptors‘ is a named list of functions accepting ‘(data, severity, seed)‘. ‘metric_fun‘ must return a named finite/numeric vector (NA is allowed for metrics that are undefined in a scenario). The executor records software behavior under declared corruptions and does not define universal data-quality thresholds.

Usage

```
run_eyeprocess_stress_evidence(data, plan, corruptors, metric_fun)
```

Arguments

data	Input data frame, matrix, or compatible analysis object.
plan	Validation or stress-evidence plan object.
corruptors	Named list of corruption functions used by the stress programme.
metric_fun	Function used to compute the stress-programme evaluation metric.

Value

An object of class "eye_stress_evidence_result", stored as a named list, with components "plan", "scenarios", "baseline", "results", "failures", "guardrail". It contains execute a declared measurement-stress evidence plan and associated metadata or diagnostics needed to interpret the result.

run_eyeprocess_validation_program

Run the complete validation-release programme

Description

Run the complete validation-release programme

Usage

```
run_eyeprocess_validation_program(
  corpus,
  output_dir,
  model_jobs = list(),
  sbc_jobs = list(),
  engine_jobs = list(),
```

```
  reproduction_jobs = list(),
  grouped_jobs = list(),
  leakage_jobs = list(),
  multiverse_jobs = list(),
  benchmark_jobs = list(),
  reporting_dataset = NULL,
  public_benchmark_dataset = NULL,
  public_benchmark_include_samples = FALSE,
  advanced_evidence = list(),
  evidence_spec = advanced_model_evidence_spec(),
  overwrite = FALSE
)
```

Arguments

`corpus` Validation corpus or manifest.

`output_dir` Output directory.

`model_jobs` Named list of model-validation job specifications. Each job supplies ‘simulator‘, ‘fitter‘, ‘extractor‘, ‘truth_extractor‘, and optional ‘grid‘ and ‘spec‘.

`sbc_jobs` Named list of simulation-based-calibration job specifications.

`engine_jobs` Named list of equivalent-engine comparison jobs.

`reproduction_jobs` Named list of licensed empirical-reproduction jobs.

`grouped_jobs` Named list of grouped-validation jobs. Set ‘crossed = TRUE‘ in a job to call ‘crossed_grouped_cv()‘.

`leakage_jobs` Named list of leakage-quantification jobs.

`multiverse_jobs` Named list of preprocessing-multiverse jobs.

`benchmark_jobs` Named list of zero-argument functions or benchmark argument lists.

`reporting_dataset` Optional ‘eye_dataset‘ for reporting-guideline coverage.

`public_benchmark_dataset` Optional ‘eye_dataset‘ from which to write a de-identified public benchmark bundle.

`public_benchmark_include_samples` Whether the public benchmark retains sample-level tables.

`advanced_evidence` Optional named evidence records keyed by model function.

`evidence_spec` Advanced-model promotion-gate specification.

`overwrite` Whether to replace the output directory.

Value

An ‘eye_validation_program‘ object.

run_gazepoint_workflow

Run the complete Gazepoint downstream workflow

Description

Imports a real Gazepoint folder, constructs a canonical ‘eye_dataset‘, runs QC, reconstructs media trials, processes pupil and biometric streams, derives gaze/AOI/pupil/biometric features, creates analysis and IRT tables, generates plots, exports every stage, and writes a reproducible report.

Usage

```
run_gazepoint_workflow(
  path,
  output_dir = file.path(getwd(), "eyeprocess-gazepoint-workflow"),
  responses = NULL,
  score_key = NULL,
  item_map = NULL,
  spec = gazepoint_workflow_spec(),
  overwrite = FALSE,
  quiet = FALSE
)
```

Arguments

path	Gazepoint export folder.
output_dir	Destination directory.
responses	Optional response data frame or CSV path.
score_key	Optional named vector of correct responses by item id.
item_map	Optional stimulus-to-item map.
spec	Workflow specification from ‘gazepoint_workflow_spec()‘.
overwrite	Replace an existing output directory.
quiet	Suppress progress messages.

Value

An ‘eye_gazepoint_workflow‘ object.

run_model_validation *Run parameter-recovery, coverage, and misspecification validation*

Description

The fitter may return a model or throw an error. The extractor must return a data frame with ‘parameter‘, ‘estimate‘, and optionally ‘std_error‘, ‘lower‘, and ‘upper‘. The truth extractor must return a named numeric vector.

Usage

```
run_model_validation(
  simulator,
  fitter,
  extractor,
  truth_extractor,
  grid = NULL,
  spec = model_validation_spec(),
  seed = 1L,
  continue_on_error = TRUE
)
```

Arguments

simulator	Simulation function.
fitter	Estimation function receiving the simulation result.
extractor	Parameter extraction function.
truth_extractor	Truth extraction function.
grid	Scenario grid.
spec	Validation specification.
seed	Random seed.
continue_on_error	Record rather than stop on estimation errors.

Value

An ‘eye_model_validation‘ object.

run_posterior_sbc *Run posterior simulation-based calibration from an explicit contract*

Description

Run posterior simulation-based calibration from an explicit contract

Usage

```
run_posterior_sbc(
  observed_data,
  contract,
  replications = 100L,
  seed = 20260808L
)
```

Arguments

observed_data	Observed dataset used by the calibration procedure.
contract	Posterior-SBC or validation contract.
replications	Number of simulation or validation replications.
seed	Random-number seed.

Value

An object of class "eye_posterior_sbc", "eye_irt_sbc", stored as a named list, with components "ranks", "failures", "replications", "seed", "method", "requirement". It contains posterior simulation-based calibration from an explicit contract and associated metadata or diagnostics needed to interpret the result.

run_process_negative_controls *Run repeated process negative controls*

Description

Run repeated process negative controls

Usage

```
run_process_negative_controls(
  data,
  outcome,
  analysis_fun,
  controls = c("permutation", "shift"),
  replications = 100L,
  seed = 1L,
  extract_fun = .ep09_default_control_extract,
  shift_lags = c(-3L, -2L, -1L, 1L, 2L, 3L),
  within = NULL
)
```

Arguments

data	Data frame.
outcome	Outcome column.
analysis_fun	Function applied to each negative-control dataset.
controls	Character vector among ‘permutation‘ and ‘shift‘.
replications	Number of controls per type.
seed	Seed.
extract_fun	Function converting analysis result to a data.frame.
shift_lags	Lags sampled for shift controls.
within	Optional permutation groups.

Value

A named list with components "results", "outcome", "controls", "replications", "seed", "interpretation", containing repeated process negative controls and associated metadata or diagnostics.

---

run_process_sensitivity

Run an explicit process-analysis multiverse

Description

Run an explicit process-analysis multiverse

Usage

```
run_process_sensitivity(
  data,
  grid,
  analysis_fun,
  extract_fun = .ep09_default_sensitivity_extract,
  progress = interactive()
)
```

Arguments

data	Analysis data.
grid	Sensitivity grid.
analysis_fun	Function ‘(data, specification)‘.
extract_fun	Function ‘(fit, specification)‘ returning one or more rows.
progress	Print progress.

Value

An object of class "eye_process_sensitivity", stored as a named list, with components "grid", "results", "failures", "warnings", "grid_hash", "created_at", "status", "caveat". It contains an explicit process-analysis multiverse and associated metadata or diagnostics needed to interpret the result.

---

run_process_validation

Run an empirical process-validation programme

Description

Run an empirical process-validation programme

Usage

```
run_process_validation(
  design,
  simulate_fun = simulate_process_validation_data,
  fit_fun = .ep09_default_validation_fit,
  extract_fun = .ep09_default_validation_extract,
  max_conditions = Inf,
  progress = interactive()
)
```

Arguments

design	Validation design or expanded condition table.
simulate_fun	Function ‘(condition, replication, seed)‘ returning a simulation object.
fit_fun	Function ‘(simulated, condition)‘ returning a fitted object.
extract_fun	Function ‘(fit, simulated, condition)‘ returning one or more rows with estimates.
max_conditions	Optional cap on conditions actually run.
progress	Print compact progress messages.

Value

An ‘eye_process_validation_result‘ object.

run_raven_reproduction

Execute a licensed published-model reproduction

Description

Execute a licensed published-model reproduction

Usage

```
run_raven_reproduction(spec, importer, fitter, extractor, tolerance = 0.05)
```

Arguments

spec	Reproduction specification.
importer	Function receiving ‘spec$data_path‘.
fitter	Function receiving imported data and ‘spec‘.
extractor	Function returning named estimates or a parameter/estimate data frame.
tolerance	Absolute target tolerance.

Value

An ‘eye_empirical_reproduction‘ object.

run_sbc

Run generic simulation-based calibration

Description

Run generic simulation-based calibration

Usage

```
run_sbc(
  simulator,
  fitter,
  posterior_draws,
  replications = 100L,
  seed = 20260808L
)
```

Arguments

simulator	Function ‘simulator(replicate)‘ returning ‘list(data, truth)‘; ‘truth‘ must be a named numeric vector.
fitter	Function ‘fitter(data)‘ returning a fitted object.
posterior_draws	Function returning a draws matrix/data frame whose columns match names in ‘truth‘.
replications	Number of SBC replications.
seed	RNG seed.

Value

An object of class "eye_irt_sbc", stored as a named list, with components "ranks", "failures", "replications", "seed", "method". It contains generic simulation-based calibration and associated metadata or diagnostics needed to interpret the result.

---

run_validation_jobs *Run validation jobs with checkpointing and deterministic seeds*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
run_validation_jobs(plan, simulator, fitter, extractor, truth_extractor, output_dir,
  workers = 1L, backend = c("auto", "sequential", "future"), isolation = c("auto",
   "in_process", "callr"), timeout_seconds = Inf, memory_limit_mb = Inf,
   stale_lock_seconds = 3600, overwrite = FALSE, fail_fast = FALSE,
  progress = interactive(), job_ids = NULL, chunks = NULL, simulation_args = list(),
   fit_args = list(), diagnostics_extractor = NULL, draws_extractor = NULL,
   predictions_extractor = NULL, confidence = 0.95, run_metadata = list())
```

Arguments

plan	Validation plan or manifest directory.
simulator	Simulation function.
fitter	Fitting function receiving the simulated object first.
extractor	Function extracting parameter estimates.
truth_extractor	Function extracting named true parameter values.
output_dir	Validation output directory.
workers	Number of workers.

backend	Sequential or optional ‘future‘ backend.
isolation	In-process execution or optional ‘callr‘ isolation.
timeout_seconds	Per-job timeout. Enforced only with ‘callr‘ isolation.
memory_limit_mb	Best-effort per-job memory limit.
stale_lock_seconds	Age after which an abandoned job lock may be reclaimed.
overwrite	Re-run completed checkpoints.
fail_fast	Stop after the first failed/nonconverged job.
progress	Display progress in sequential mode.
job_ids	Optional subset of job identifiers.
chunks	Optional subset of chunk identifiers.
simulation_args	Additional simulator arguments.
fit_args	Additional fitter arguments.
diagnostics_extractor	Optional diagnostics extractor.
draws_extractor	Optional posterior-draw extractor.
predictions_extractor	Optional prediction extractor.
confidence	Confidence level used when standard errors are supplied.
run_metadata	Named metadata included in the runner fingerprint; use it to record code, prior, or engine variants captured outside function bodies.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`sbc_ecdf_deviation` *ECDF deviation summary for SBC ranks*

Description

ECDF deviation summary for SBC ranks

Usage

```
sbc_ecdf_deviation(x, n_draws = NULL)
```

Arguments

x	SBC diagnostics or ranks.
n_draws	Required if x is ranks.

Value

An R object containing eCDF deviation summary for SBC ranks. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

sbc_rank_diagnostics *Build SBC rank diagnostics*

Description

Build SBC rank diagnostics

Usage

```
sbc_rank_diagnostics(ranks, n_draws, bins = NULL)
```

Arguments

ranks	Integer rank statistics from 0 through ‘n_draws‘.
n_draws	Number of posterior draws used per rank.
bins	Histogram bins; defaults to a bounded square-root rule.

Value

‘eye_sbc_diagnostics‘ object.

---

sbc_summary *Summarize simulation-based calibration*

Description

Summarize simulation-based calibration

Usage

```
sbc_summary(x)
```

Arguments

x	An ‘eye_sbc‘ object.

Value

Parameter-level rank and standardized-bias summaries.

---

score_partial_response_pattern *Score a partial response pattern from a calibrated mirt model*

Description

Score a partial response pattern from a calibrated mirt model

Usage

```
score_partial_response_pattern(
  model,
  response_pattern,
  method = c("MAP", "EAP"),
  ...
)
```

Arguments

model	Calibrated ‘mirt‘ model.
response_pattern	Full-length response vector with future/unobserved items as NA.
method	mirt scoring method, typically MAP or EAP.
...	Passed to ‘mirt::fscores()‘.

Value

A data frame containing a partial response pattern from a calibrated mirt model. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

score_response_stream *Score a response stream cumulatively*

Description

Score a response stream cumulatively

Usage

```
score_response_stream(
  model,
  response_pattern,
  observed_order = NULL,
  method = c("MAP", "EAP"),
  ...
)
```

Arguments

`model`	Calibrated ‘mirt‘ model.
`response_pattern`	Complete or partial response vector in item order.
`observed_order`	Order in which observed items arrive. Defaults to sequence.
`method`	MAP or EAP.
`...`	Passed to ‘mirt::fscores()‘.

Value

An ‘eye_streaming_score‘ object.

`select_next_item_process` *Select the next item using response/process utility*

Description

Select the next item using response/process utility

Usage

```
select_next_item_process(
  theta,
  item_bank,
  used = character(),
  weights = c(response = 1, rt = 0, process = 0),
  burden_weight = 0
)
```

Arguments

`theta`	Latent-trait values.
`item_bank`	Value supplied to ‘item_bank‘; see Details for its model-specific role.
`used`	Items already used or unavailable for selection.
`weights`	Weights used to combine information components.
`burden_weight`	Penalty applied to expected burden.

Value

A named list with components "item_id", "utility", "row", "all_utilities", containing the next item using response/process utility and associated metadata or diagnostics.

---

semantic_fidelity_spec *Semantic fidelity specification*

Description

Semantic fidelity specification

Usage

```
semantic_fidelity_spec(
  timestamp_tolerance = 1e-06,
  coordinate_tolerance = 1e-06,
  pupil_tolerance = 1e-06,
  missingness_tolerance = 1e-06,
  correlation_floor = 0.999,
  allow_row_reorder = TRUE
)
```

Arguments

`timestamp_tolerance`
: Absolute tolerance after time-unit normalization.

`coordinate_tolerance`
: Absolute tolerance after coordinate normalization.

`pupil_tolerance`
: Absolute tolerance after pupil-unit normalization.

`missingness_tolerance`
: Maximum tolerated absolute change in missingness.

`correlation_floor`
: Correlation floor used when deciding whether a numeric transformation remains semantically equivalent.

`allow_row_reorder`
: Whether row reordering is permitted when a key is supplied.

Value

An object of class ‘eye_semantic_fidelity_spec‘.

semantic_loss_map *Convert a semantic round-trip audit into a loss map*

Description

Convert a semantic round-trip audit into a loss map

Usage

```
semantic_loss_map(x)
```

Arguments

x	Object to print, plot, summarize, or audit.

Value

A tabular R object containing a semantic round-trip audit into a loss map; rows represent analysis units and columns contain the returned quantities.

semantic_roundtrip_audit *Audit a complete semantic round trip*

Description

Audit a complete semantic round trip

Usage

```
semantic_roundtrip_audit(
  source,
  roundtrip,
  key = NULL,
  fields = NULL,
  timestamp = list(),
  coordinates = list(),
  pupil = NULL,
  eye = NULL,
  source_events = NULL,
  roundtrip_events = NULL,
  event_args = list()
)
```

Arguments

`source`	Original canonical samples.
`roundtrip`	Canonical samples reconstructed after interchange.
`key`	Optional row identity key.
`fields`	Fields for field-level comparison.
`timestamp`	Optional list of arguments forwarded to ‘timestamp_fidelity_audit()‘.
`coordinates`	Optional list of arguments forwarded to ‘coordinate_fidelity_audit()‘.
`pupil`	Optional list of arguments forwarded to ‘pupil_unit_fidelity_audit()‘.
`eye`	Optional list of arguments forwarded to ‘eye_stream_fidelity_audit()‘.
`source_events`, `roundtrip_events`	Optional event tables.
`event_args`	Optional event-audit arguments.

Value

An ‘eye_semantic_roundtrip‘ object.

`sensitivity_branch_fingerprint` *Stable fingerprint of a sensitivity branch*

Description

Stable fingerprint of a sensitivity branch

Usage

```
sensitivity_branch_fingerprint(specification)
```

Arguments

`specification`	One-row specification table or named list.

Value

An R object containing stable fingerprint of a sensitivity branch. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

sensitivity_decision_leverage

Decision leverage of each analytical choice

Description

Leverage is descriptive variation in mean effect across option levels; it is not causal attribution of researcher decisions.

Usage

```
sensitivity_decision_leverage(x, effect = "effect")
```

Arguments

x	Sensitivity result.
effect	Effect column.

Value

A tabular R object containing decision leverage of each analytical choice; rows represent analysis units and columns contain the returned quantities.

sensitivity_fragility_index

Fragility index across analysis specifications

Description

Fragility index across analysis specifications

Usage

```
sensitivity_fragility_index(x, effect = "effect", threshold = 0)
```

Arguments

x	Sensitivity result.
effect	Effect column.
threshold	Decision threshold.

Value

A numeric value or vector containing fragility index across analysis specifications.

sensitivity_multiverse_manifest

Machine-readable multiverse manifest

Description

Machine-readable multiverse manifest

Usage

```
sensitivity_multiverse_manifest(x)
```

Arguments

x	Sensitivity result.

Value

A data frame containing machine-readable multiverse manifest. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

sensitivity_rank_stability

Rank stability across specifications

Description

Rank stability across specifications

Usage

```
sensitivity_rank_stability(x, id = NULL, rank = NULL, specification = NULL)
```

Arguments

x	Data frame or list of ranking vectors.
id	Optional item identifier when x is a long data frame.
rank	Optional rank/value column when x is a long data frame.
specification	Optional specification column.

Value

An R object containing rank stability across specifications. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

sensitivity_sign_stability

Effect-sign stability across specifications

Description

Effect-sign stability across specifications

Usage

```
sensitivity_sign_stability(x, effect = "effect")
```

Arguments

x	Sensitivity result.
effect	Effect column.

Value

A numeric value or vector containing effect-sign stability across specifications.

sensitivity_significance_stability

Significance-decision stability across specifications

Description

Significance-decision stability across specifications

Usage

```
sensitivity_significance_stability(x, p_value = "p_value", alpha = 0.05)
```

Arguments

x	Sensitivity result.
p_value	P-value column.
alpha	Decision threshold.

Value

A numeric value or vector containing significance-decision stability across specifications.

sensitivity_threshold_stability

Substantive-threshold stability across specifications

Description

Substantive-threshold stability across specifications

Usage

```
sensitivity_threshold_stability(
  x,
  effect = "effect",
  threshold = 0,
  direction = c("above", "below", "absolute")
)
```

Arguments

x	Sensitivity result.
effect	Effect column.
threshold	Threshold.
direction	‘above‘, ‘below‘, or ‘absolute‘.

Value

A numeric value or vector containing substantive-threshold stability across specifications.

sequence_interoperability

Convert scanpaths to process/sequence package contracts

Description

Convert scanpaths to process/sequence package contracts

Usage

```
as_procdata_sequence(
  x,
  source = c("visits", "fixations", "samples"),
  collapse_consecutive = TRUE
)
```

```
as_traminer_sequence(
  x,
  source = c("visits", "fixations", "samples"),
  collapse_consecutive = TRUE,
  create_object = FALSE
)

as_seqhmm_data(
  x,
  source = c("visits", "fixations", "samples"),
  collapse_consecutive = TRUE
)
```

Arguments

`x`	An ‘eye_dataset‘.
`source`	AOI sequence source.
`collapse_consecutive`	Whether to collapse repeated adjacent states.
`create_object`	For ‘as_traminer_sequence()‘, whether to return a native ‘TraMineR‘ sequence object instead of the package-neutral wide table.

Value

A package-compatible representation.

`session_facet_effects` *Extract session facet effects*

Description

Extract session facet effects

Usage

```
session_facet_effects(object, channel = c("response", "process"))
```

Arguments

`object`	A fitted eyeprocess model or audit object.
`channel`	Measurement channel to inspect.

Value

An object of class "eye_process_facet_effects", stored as a named list, with components "facet", "column", "channel", "random_effects", "variance_component". It contains session facet effects and associated metadata or diagnostics needed to interpret the result.

simulate_advanced_process_data

Simulate advanced response-process data

Description

Generates accuracy, response time, process features, theory-defined strategy, dynamic AOI states, pupil trajectories, measurement error, missing process data, DIF, and local dependence for validation studies.

Usage

```
simulate_advanced_process_data(
  n_person = 100L,
  n_item = 20L,
  n_time = 30L,
  n_states = 3L,
  ability_speed_correlation = -0.3,
  gaze_effect = 0.35,
  feature_reliability = 0.7,
  missing_process = 0,
  state_misclassification = 0,
  pupil_ar1 = 0.6,
  luminance_effect = 0,
  dif_effect = 0,
  local_dependence = 0,
  seed = 1L
)
```

Arguments

`n_person` Number of persons.

`n_item` Number of items.

`n_time` Pupil time bins.

`n_states` Number of AOI states.

`ability_speed_correlation` Correlation between ability and speed.

`gaze_effect` Process-feature coefficient in the response model.

`feature_reliability` Reliability of observed gaze features.

`missing_process` Fraction of process observations set missing.

`state_misclassification` Probability of AOI-state misclassification.

`pupil_ar1` AR(1) coefficient for pupil noise.

`luminance_effect`
: Effect of simulated luminance on pupil size.

`dif_effect`
: Logit-scale DIF effect for the focal group on flagged items.

`local_dependence`
: Shared testlet-effect standard deviation.

`seed`
: Random seed.

Value

A list with trial data, state data, pupil data, and truth.

`simulate_dynamic_irtree_data`
Simulate observed dynamic-state transitions

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
simulate_dynamic_irtree_data(n_person = 100L, n_item = 20L,
  transitions_per_trial = 8L, states = c("prompt", "evidence", "options"),
  beta_response = 0.5, person_sd = 0.4, item_sd = 0.3, irregular_time = TRUE,
 state_misclassification = 0, missing_state = 0, structural_zeros = NULL, seed = 1L)
```

Arguments

`n_person`
: Number of persons and items.

`n_item`
: Number of persons and items.

`transitions_per_trial`
: Number of transitions per person-item trial.

`states`
: State labels.

`beta_response`
: Response effect on transitions.

`person_sd`
: Person/item heterogeneity.

`item_sd`
: Person/item heterogeneity.

`irregular_time`
: Whether to generate irregular time gaps.

`state_misclassification`
: Destination-state error probability.

`missing_state`
: Missing destination-state probability.

`structural_zeros`
: Optional forbidden transitions.

`seed`
: Random seed.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

simulate_eyeprocess_catr

Run a catR adaptive-testing simulation without fallback substitution

---

Description

Run a catR adaptive-testing simulation without fallback substitution

Usage

```
simulate_eyeprocess_catr(itemBank, trueTheta = 0, ..., engine = "catR")
```

Arguments

`itemBank`	Item bank supplied to catR.
`trueTheta`	Known true latent-trait value used for CAT simulation.
`...`	Additional arguments passed to the selected method or external engine.
`engine`	Requested estimation or analysis engine.

Value

An object of class "eye_external_irt_fit", stored as a named list, with components "status", "engine", "fit", "call". It contains a catR adaptive-testing simulation without fallback substitution and associated metadata or diagnostics needed to interpret the result.

---

simulate_eyeprocess_irt_binary

Simulate dichotomous IRT responses with optional local dependence and missingness

---

Description

Simulate dichotomous IRT responses with optional local dependence and missingness

Usage

```
simulate_eyeprocess_irt_binary(
  n_persons = 500L,
  items,
  theta = NULL,
  missing_rate = 0,
  testlet_sd = 0,
  seed = 1L,
  D = 1
)
```

Arguments

`n_persons`	Number of persons.
`items`	Item-parameter data frame or item collection.
`theta`	Latent-trait value or vector of latent-trait values.
`missing_rate`	Proportion of responses or observations set missing.
`testlet_sd`	Standard deviation of simulated testlet effects.
`seed`	Random-number seed for reproducible execution.
`D`	Logistic scaling constant.

Value

An object of class "eye_irt_simulation", stored as a named list, with components "responses", "probabilities", "theta", "items", "missing_rate", "testlet_sd", "seed". It contains dichotomous IRT responses with optional local dependence and missingness and associated metadata or diagnostics needed to interpret the result.

`simulate_from_model` *Simulate data from a model or registered model specification*

Description

Simulate data from a model or registered model specification

Usage

```
simulate_from_model(model, ...)
```

Arguments

`model`	Registered model id/specification, simulation function, or an object exposing a ‘simulate_fun‘ function.
`...`	Arguments passed to the simulator.

Value

An R object containing data from a model or registered model specification. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

simulate_gaze_diffusion_data

Simulate a hierarchical gaze-diffusion study

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
simulate_gaze_diffusion_data(n_person = 80L, n_item = 20L, trials_per_item = 1L,
  gaze_effect = 0.35, contaminant_fraction = 0.02, time_step = 0.002,
  max_decision_time = 10, seed = 1L)
```

Arguments

`n_person`	Number of participants/items.
`n_item`	Number of participants/items.
`trials_per_item`	Replications per person-item.
`gaze_effect`	Drift effect of gaze feature.
`contaminant_fraction`	Contaminant fraction.
`time_step`	Time step for the built-in Wiener discretization fallback.
`max_decision_time`	Maximum fallback decision time in seconds.
`seed`	Seed.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

simulate_irt_model *Simulate from a registered multimodal IRT model*

Description

Simulate from a registered multimodal IRT model

Usage

```
simulate_irt_model(spec, ..., allow_experimental = TRUE)
```

Arguments

spec	IRT model or validation specification.
...	Additional arguments passed to the selected model, engine, or method.
allow_experimental	Whether experimental models are permitted.

Value

An R object containing from a registered multimodal IRT model. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

simulate_multimodal_irt *Simulate multimodal IRT process data*

Description

Generates deterministic synthetic person-item observations for staged M0-M3 development. Gaze is a non-negative count process and pupil is a neutral pupil-responsivity channel with explicit nuisance effects.

Usage

```
simulate_multimodal_irt(
  n_person = 120L,
  n_item = 20L,
  seed = 42L,
  latent_cor = diag(4L),
  rt_sd = 0.3,
  gaze_size = 8,
  pupil_sd = 0.2,
  pupil_luminance = -0.2,
```

```
  gaze_x_effect = 0.08,
  gaze_y_effect = -0.05,
  missing_fraction = 0
)
```

Arguments

`n_person`, `n_item`
: Positive integers.

`seed`
: Random seed.

`latent_cor`
: 4x4 correlation matrix for ability, speed, gaze process, and pupil responsivity.

`rt_sd`
: Residual log-RT SD.

`gaze_size`
: Negative-binomial size.

`pupil_sd`
: Residual pupil-channel SD.

`pupil_luminance`, `gaze_x_effect`, `gaze_y_effect`
: Nuisance coefficients.

`missing_fraction`
: Independent channel dropout fraction used for a baseline stress condition.

Value

An ‘eye_multimodal_simulation‘.

`simulate_multimodal_m2`
Simulate from the M2 response + RT + gaze generative model

Description

Simulates the same level-1 likelihood used by [fit_multimodal_m2()] and retains all person/item hyperparameters and realized latent parameters as truth. Channel-specific dropout is applied only after the complete generative data have been created.

Usage

```
simulate_multimodal_m2(
  n_person = 100L,
  n_item = 10L,
  mu_item = c(difficulty = 0, time_intensity = 4, gaze_intensity = 3.5),
  sd_person = c(ability = 1, speed = 0.5, gaze_process = 0.5),
 cor_person = matrix(c(1, 0.3, -0.3, 0.3, 1, -0.25, -0.3, -0.25, 1), 3L, 3L, byrow =
    TRUE),
  sd_item = c(difficulty = 0.75, time_intensity = 0.35, gaze_intensity = 0.6),
 cor_item = matrix(c(1, 0.25, 0.2, 0.25, 1, 0.3, 0.2, 0.3, 1), 3L, 3L, byrow = TRUE),
  nu_range = c(0.5, 0.8),
  gaze_shape = c(shape = 2, scale = 6),
```

```
  dropout = c(response = 0, rt = 0, gaze = 0),
  seed = 20260814L
)
```

Arguments

n_person	Number of persons.
n_item	Number of items.
mu_item	Means for item difficulty, log-time intensity, and log-gaze intensity.
sd_person	Person-side standard deviations for ability, speed, and gaze-process propensity.
cor_person	Person-side correlation matrix.
sd_item	Item-side standard deviations.
cor_item	Item-side correlation matrix.
nu_range	Uniform range for item time-discrimination parameters.
gaze_shape	Shape/scale parameters for inverse-gamma generation of negative-binomial shape parameters.
dropout	Named probabilities for response, RT, and gaze missingness.
seed	Reproducibility seed.

Value

An ‘eye_multimodal_m2_simulation‘.

---

simulate_multimodal_m3

Simulate the M3 response + RT + gaze + pupil generative model

---

Description

Generates a four-dimensional correlated person process and four-dimensional correlated item process, explicit pupil nuisance variables, complete-data truth, device/session metadata, blink/interpolation indicators and pupil dropout. Pupil scenarios include informative, weak, null, redundant and confound-only conditions so that validation includes cases where pupil should add no defensible psychometric information.

Usage

```
simulate_multimodal_m3(
  n_person = 120L,
  n_item = 12L,
  pupil_signal = c("informative", "weak", "null", "redundant", "confounded"),
  pupil_missingness = c("mcar", "quality", "gaze", "ability", "device", "none"),
 mu_item = c(difficulty = 0, time_intensity = 4, gaze_intensity = 3.5, pupil_intensity =
    0),
```

```
  sd_person = c(ability = 1, speed = 0.5, gaze_process = 0.5, pupil_responsivity = 0.55),
  cor_person = matrix(c(1, 0.3, -0.3, 0.2, 0.3, 1, -0.25, -0.15, -0.3, -0.25, 1, 0.25,
     0.2, -0.15, 0.25, 1), 4L, 4L, byrow = TRUE),
   sd_item = c(difficulty = 0.75, time_intensity = 0.35, gaze_intensity = 0.6,
     pupil_intensity = 0.4),
  cor_item = matrix(c(1, 0.25, 0.2, 0.1, 0.25, 1, 0.3, 0.15, 0.2, 0.3, 1, 0.2, 0.1, 0.15,
     0.2, 1), 4L, 4L, byrow = TRUE),
   nu_range = c(0.5, 0.8),
   gaze_shape = c(shape = 2, scale = 6),
   pupil_noise = 0.65,
  confound_strength = c(baseline = 0.25, luminance = -0.35, gaze_x = 0.12, gaze_y = -0.1,
     quality = 0.2, blink = -0.18, interpolated = -0.12, time_on_task = 0.15),
   dropout = c(response = 0, rt = 0, gaze = 0.05, pupil = 0.12),
   device_effect = 0,
   session_effect = 0,
   seed = 20260815L
)
```

Arguments

`n_person`, `n_item`
: Design size.

`pupil_signal`
: Pupil signal scenario.

`pupil_missingness`
: Missingness stress mechanism.

`mu_item`
: Named numeric vector of population means for item difficulty, response-time intensity, gaze intensity, and pupil intensity.

`sd_person`
: Named positive numeric vector of population standard deviations for person ability, speed, gaze-process propensity, and pupil responsivity.

`cor_person`
: A 4 x 4 correlation matrix for person ability, speed, gaze-process, and pupil-responsivity effects, in that order.

`sd_item`
: Named positive numeric vector of population standard deviations for item difficulty, response-time intensity, gaze intensity, and pupil intensity.

`cor_item`
: A 4 x 4 correlation matrix for item difficulty, response-time intensity, gaze intensity, and pupil intensity, in that order.

`nu_range`
: Length-two positive increasing numeric vector giving the lower and upper bounds for the item-specific response-time inverse-scale parameter ‘nu‘; the log-response-time residual standard deviation is ‘1 / nu‘.

`gaze_shape`
: Named positive numeric vector with elements ‘shape‘ and ‘scale‘ defining the inverse-gamma generator for item-specific negative-binomial gaze dispersion.

`pupil_noise`
: Residual SD for the pupil channel.

`confound_strength`
: Named standardized nuisance coefficients.

`dropout`
: Named base dropout probabilities for response, RT, gaze, pupil.

`device_effect`, `session_effect`
: Additive pupil measurement shifts.

`seed`
: Reproducibility seed.

Value

An ‘eye_multimodal_m3_simulation‘ retaining complete truth.

---

simulate_multimodal_m4

Simulate M4 multimodal sequential measurement data

Description

Generates deterministic synthetic response, RT, gaze, pupil, nuisance, and ordered latent-state data for software validation and methodological stress testing. Synthetic state labels are known truth for recovery only and are not psychological constructs.

Usage

```
simulate_multimodal_m4(
  n_person = 80L,
  n_item = 12L,
  n_session = 1L,
  n_states = 2L,
  scenario = c("clear", "weak", "null", "persistent", "rapid_switch",
    "trait_conditioned", "rt_redundant", "gaze_redundant", "pupil_redundant",
    "nuisance_confounded", "device_confounded"),
  missingness = c("none", "mcar", "quality", "gaze", "pupil_quality", "device",
    "state_dependent"),
  missing_rate = 0.08,
  seed = 20260820L
)
```

Arguments

`n_person`, `n_item`	Number of persons and total item trials per person.
`n_session`	Number of non-overlapping ordered sessions per person.
`n_states`	True latent-state count. May be 1 through 4.
`scenario`	State/data-generating scenario: ‘clear‘, ‘weak‘, ‘null‘, ‘persistent‘, ‘rapid_switch‘, ‘trait_conditioned‘, ‘rt_redundant‘, ‘gaze_redundant‘, ‘pupil_redundant‘, ‘nuisance_confounded‘, or ‘device_confounded‘.
`missingness`	Missingness stress mechanism.
`missing_rate`	Base channel-missingness probability.
`seed`	Deterministic random seed.

Value

An ‘eye_multimodal_m4_simulation‘ containing ‘data‘, full generating ‘truth‘, scenario metadata, and interpretation boundary.

simulate_presentation_variants

Simulate pre-registered presentation variants for review

Description

Simulate pre-registered presentation variants for review

Usage

```
simulate_presentation_variants(
  audit,
  line_spacing_multiplier = 1.25,
  key_term_highlighting = TRUE
)
```

Arguments

audit	An accessibility audit.
line_spacing_multiplier	Example line-spacing multiplier for flagged rows.
key_term_highlighting	Whether the simulated review variant highlights key terms.

Value

An R object containing pre-registered presentation variants for review. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

simulate_process_cat

Simulate a simple process-aware CAT policy

Description

This is a design simulator, not a production testing engine.

Usage

```
simulate_process_cat(
  item_bank,
  true_theta = 0,
  n_items = 10L,
  weights = c(response = 1, rt = 0, process = 0),
  burden_weight = 0,
  seed = 1
)
```

Arguments

item_bank	Value supplied to ‘item_bank‘; see Details for its model-specific role.
true_theta	Simulated true latent-trait value or values.
n_items	Number of items.
weights	Weights used to combine information components.
burden_weight	Penalty applied to expected burden.
seed	Random-number seed.

Value

An object of class "eye_process_cat_simulation", "data.frame", stored as a data frame, containing a simple process-aware CAT policy and associated metadata needed to interpret the result.

---

simulate_process_validation_data

Simulate a generic multimodal validation dataset with known truth

---

Description

This simulator is a neutral software-validation fixture, not a substantive psychological data-generating model. The generated process channels should not be interpreted as mental-state measurements.

Usage

```
simulate_process_validation_data(
  condition,
  replication = 1L,
  seed = NULL,
  beta = 0.35
)
```

Arguments

condition	One-row validation condition.
replication	Replication index.
seed	Optional seed override.
beta	Known effect of ‘x‘ on the generic process outcome.

Value

List with ‘data‘ and ‘truth‘.

simulate_strategy_mixture_data

Simulate a theory-defined strategy-mixture study

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
simulate_strategy_mixture_data(n_person = 100L, n_item = 20L, signatures,
  trials_per_item = 1L, strategy_prevalence = NULL, feature_sd = 0.6, seed = 1L)
```

Arguments

`n_person`	Number of participants.
`n_item`	Number of items.
`signatures`	Strategy signature matrix.
`trials_per_item`	Trials per person-item combination.
`strategy_prevalence`	Strategy prevalence.
`feature_sd`	Feature residual SD.
`seed`	Seed.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

simulation_based_calibration

Run simulation-based calibration

Description

Run simulation-based calibration

Usage

```
simulation_based_calibration(
  simulator,
  fitter,
  posterior_draws,
  truth_extractor,
  replications = 100L,
  seed = 1L,
  ...
)
```

Arguments

`simulator`	Function returning simulated data and named truth.
`fitter`	Function receiving one simulation result.
`posterior_draws`	Function returning a numeric matrix/data frame whose columns are named parameters.
`truth_extractor`	Function returning a named numeric truth vector.
`replications`	Number of simulated data sets.
`seed`	Random seed.
`...`	Passed to ‘simulator()‘.

Value

An ‘eye_sbc‘ object with parameter ranks and calibration summaries.

`simulation_rank_statistic` *Compute a simulation-based calibration rank statistic*

Description

Compute a simulation-based calibration rank statistic

Usage

```
simulation_rank_statistic(truth, draws, seed = NULL)
```

Arguments

`truth`	Scalar simulated truth.
`draws`	Posterior draws for the same parameter.
`seed`	Seed used only to randomize ties.

Value

A numeric value or vector containing a simulation-based calibration rank statistic.

---

software_paper_claim_matrix

Create or normalize a software-paper claim matrix

Description

Create or normalize a software-paper claim matrix

Usage

```
software_paper_claim_matrix(
  claim,
  evidence_id = NA_character_,
  evidence_type = NA_character_,
  status = "pending",
  scope = NA_character_,
  source = NA_character_
)
```

Arguments

`claim`	Claim text.
`evidence_id`	Evidence identifiers.
`evidence_type`	Evidence type.
`status`	Status such as supported, qualified, pending, or unsupported.
`scope`	Explicit scope/qualification.
`source`	Optional source/location.

Value

A data frame containing or normalize a software-paper claim matrix. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

software_paper_coverage

Compute descriptive evidence coverage

Description

Compute descriptive evidence coverage

Usage

```
software_paper_coverage(x, supported = c("supported", "qualified"))
```

Arguments

x	Evidence bundle or claim matrix.
supported	Status labels counted as covered.

Value

A data frame containing descriptive evidence coverage. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

software_paper_evidence_bundle

Construct a software-paper evidence bundle

Description

Construct a software-paper evidence bundle

Usage

```
software_paper_evidence_bundle(
  claims = NULL,
  validation = NULL,
  examples = NULL,
  articles = NULL,
  benchmarks = NULL,
  reproducibility = NULL,
  metadata = list()
)
```

Arguments

`claims`	Claim table or list.
`validation`	Validation evidence table/list.
`examples`	Optional example inventory.
`articles`	Optional article inventory.
`benchmarks`	Optional benchmark evidence.
`reproducibility`	Optional reproducibility fingerprint.
`metadata`	Optional metadata.

Value

A named list with components "schema_version", "claims", "validation", "examples", "articles", "benchmarks", "reproducibility", "metadata", "created_utc", containing a software-paper evidence bundle and associated metadata or diagnostics.

`software_paper_gap_analysis` *Identify gaps in a software-paper evidence bundle*

Description

Identify gaps in a software-paper evidence bundle

Usage

```
software_paper_gap_analysis(x)
```

Arguments

`x`	Evidence bundle.

Value

A named list with components "requirement_gaps", "claim_gaps", containing gaps in a software-paper evidence bundle and associated metadata or diagnostics.

software_paper_readiness

Descriptive software-paper readiness audit

Description

Readiness is defined only against caller-specified requirements; it is not a journal acceptance prediction.

Usage

```
software_paper_readiness(
  x,
  required_statuses = c("supported", "qualified"),
  require_validation = TRUE,
  require_reproducibility = TRUE,
  require_examples = TRUE,
  require_articles = TRUE
)
```

Arguments

`x` Evidence bundle.

`required_statuses` Statuses allowed for claims.

`require_validation` Require non-empty validation evidence.

`require_reproducibility` Require a reproducibility fingerprint.

`require_examples` Require examples.

`require_articles` Require articles.

Value

A named list with components "ready", "checks", "interpretation", containing descriptive software-paper readiness audit and associated metadata or diagnostics.

software_paper_validation_table

Summarise validation evidence for a software paper

Description

Summarise validation evidence for a software paper

Usage

```
software_paper_validation_table(x)
```

Arguments

x	Validation result/evidence matrix/table.

Value

An R object containing validation evidence for a software paper. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

specification_coverage

Fraction of planned specifications successfully evaluated

Description

Fraction of planned specifications successfully evaluated

Usage

```
specification_coverage(x)
```

Arguments

x	Sensitivity result.

Value

A numeric value or vector containing fraction of planned specifications successfully evaluated.

specification_curve_data

Prepare ordered specification-curve data

Description

Prepare ordered specification-curve data

Usage

```
specification_curve_data(x, effect = "effect", lower = NULL, upper = NULL)
```

Arguments

x	Sensitivity result.
effect	Effect column.
lower	Optional lower interval column.
upper	Optional upper interval column.

Value

A tabular R object containing ordered specification-curve data; rows represent analysis units and columns contain the returned quantities.

split_half_process_reliability

Split-half reliability for a trial-level process measure

Description

Split-half reliability for a trial-level process measure

Usage

```
split_half_process_reliability(
  data,
  person,
  trial,
  measure,
  split = c("odd_even", "random"),
  repetitions = 100L,
  seed = 1L,
  aggregate_fun = mean
)
```

Arguments

`data`	Long trial-level data.
`person`	Participant column.
`trial`	Trial column.
`measure`	Measure column.
`split`	Odd/even or repeated random split.
`repetitions`	Number of random splits.
`seed`	Seed.
`aggregate_fun`	Within-half aggregation function.

Value

A tabular R object containing split-half reliability for a trial-level process measure; rows represent analysis units and columns contain the returned quantities.

`split_validation_plan` *Split a validation plan into independent chunks*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
split_validation_plan(plan, chunks = NULL)
```

Arguments

`plan`	Validation plan.
`chunks`	Optional chunk identifiers.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

storage_transaction_manifest

Return the transaction manifest

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
storage_transaction_manifest(storage)
```

Arguments

storage	Storage object or path.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

strategy_aoi_sensitivity

Assess sensitivity to alternative AOI feature definitions

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
strategy_aoi_sensitivity(datasets, spec, seed = 1L, ...)
```

Arguments

datasets	Named list of alternative trial-level datasets.
spec	Strategy specification.
seed	Seed.
...	Fit arguments.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

strategy_classification_uncertainty

Quantify strategy-classification uncertainty

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
strategy_classification_uncertainty(object, threshold = 0.70)
```

Arguments

`object`	Strategy fit.
`threshold`	Minimum modal probability.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

strategy_label_switching_diagnostics

Diagnose label stability across multiple starts

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
strategy_label_switching_diagnostics(object, tolerance = 1e-4)
```

Arguments

`object`	Strategy fit.
`tolerance`	Log-likelihood tolerance for equivalent starts.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

strategy_posterior_probabilities

Posterior strategy probabilities

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
strategy_posterior_probabilities(object)
```

Arguments

object	Strategy fit.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

streaming_score_history

Extract streaming score history

Description

Extract streaming score history

Usage

```
streaming_score_history(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

An R object containing streaming score history. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

stress_test_latent_distribution

Stress test latent distribution

Description

Stress test latent distribution

Usage

```
stress_test_latent_distribution(runner, replications = 50L, seed = 20260808L)
```

Arguments

runner	Function that executes one stress-test scenario.
replications	Number of simulation or validation replications.
seed	Random-number seed.

Value

An object of class "eye_irt_stress_test", "data.frame", stored as a data frame, containing stress test latent distribution and associated metadata needed to interpret the result.

stress_test_local_dependence

Stress test local dependence

Description

Stress test local dependence

Usage

```
stress_test_local_dependence(
  runner,
  strengths = c(0, 0.2, 0.5, 0.8),
  replications = 50L,
  seed = 20260808L
)
```

Arguments

runner	Function that executes one stress-test scenario.
strengths	Local-dependence strengths to evaluate.
replications	Number of simulation or validation replications.
seed	Random-number seed.

Value

An object of class "eye_irt_stress_test", "data.frame", stored as a data frame, containing stress test local dependence and associated metadata needed to interpret the result.

---

stress_test_missingness

Stress test missingness

Description

Stress test missingness

Usage

```
stress_test_missingness(
  runner,
  mechanisms = c("MCAR", "MAR", "MNAR_omission", "not_reached"),
  rates = c(0.05, 0.15, 0.3),
  replications = 50L,
  seed = 20260808L
)
```

Arguments

`runner`	Function that executes one stress-test scenario.
`mechanisms`	Missingness mechanisms to evaluate.
`rates`	Missingness rates to evaluate.
`replications`	Number of simulation or validation replications.
`seed`	Random-number seed.

Value

An object of class "eye_irt_stress_test", "data.frame", stored as a data frame, containing stress test missingness and associated metadata needed to interpret the result.

stress_test_misspecification

Run a generic misspecification stress-test grid

Description

Run a generic misspecification stress-test grid

Usage

```
stress_test_misspecification(
  scenarios,
  runner,
  replications = 50L,
  seed = 20260808L
)
```

Arguments

scenarios	Data frame or named list describing scenarios.
runner	Function ‘runner(scenario, replicate)‘ returning a one-row or tidy data frame. Errors are retained as classified failures.
replications	Number of simulation or validation replications.
seed	Random-number seed.

Value

An object of class "eye_irt_stress_test", "data.frame", stored as a data frame, containing a generic misspecification stress-test grid and associated metadata needed to interpret the result.

stress_test_preprocessing

Stress test preprocessing

Description

Stress test preprocessing

Usage

```
stress_test_preprocessing(
  runner,
  variants,
  replications = 25L,
  seed = 20260808L
)
```

Arguments

runner	Function that executes one stress-test scenario.
variants	Preprocessing variants to evaluate.
replications	Number of simulation or validation replications.
seed	Random-number seed.

Value

An object of class "eye_irt_stress_test", "data.frame", stored as a data frame, containing stress test preprocessing and associated metadata needed to interpret the result.

---

stress_test_process_pipeline

Stress-test an analysis under explicit synthetic corruptions

Description

Stress-test an analysis under explicit synthetic corruptions

Usage

```
stress_test_process_pipeline(
  data,
  plans,
  analysis_fun,
  metric_fun = .ep09_default_sensitivity_extract,
  ...
)
```

Arguments

data	Baseline data.
plans	List of corruption plans.
analysis_fun	Function ‘(data, plan)‘.
metric_fun	Function ‘(analysis_result, plan)‘ returning scalar/list/data.frame metrics.
...	Passed to ‘apply_synthetic_corruption()‘.

Value

An object of class "eye_process_stress_test", stored as a named list, with components "plans", "results", "baseline_hash", "created_at", "caveat". It contains stress-test an analysis under explicit synthetic corruptions and associated metadata or diagnostics needed to interpret the result.

stress_test_speededness *Stress test speededness*

Description

Stress test speededness

Usage

```
stress_test_speededness(
  runner,
  proportions = c(0, 0.1, 0.25, 0.4),
  replications = 50L,
  seed = 20260808L
)
```

Arguments

runner	Function that executes one stress-test scenario.
proportions	Speededness proportions to evaluate.
replications	Number of simulation or validation replications.
seed	Random-number seed.

Value

An object of class "eye_irt_stress_test", "data.frame", stored as a data frame, containing stress test speededness and associated metadata needed to interpret the result.

stress_test_summary *Summarise stress-test metrics*

Description

Summarise stress-test metrics

Usage

```
stress_test_summary(x, metric = "effect")
```

Arguments

x	Stress-test result.
metric	Numeric metric column.

Value

A data frame containing stress-test metrics. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

stress_tolerance_frontier

Identify the empirical stress frontier for a metric

Description

Identify the empirical stress frontier for a metric

Usage

```
stress_tolerance_frontier(x, severity, metric, acceptable)
```

Arguments

x	Stress-test result.
severity	Numeric corruption/severity column.
metric	Metric column.
acceptable	Function returning TRUE/FALSE for metric values.

Value

A data frame containing the empirical stress frontier for a metric. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

---

structural_transition_mask

Define structural-zero and allowed transition masks

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
structural_transition_mask(states, forbidden = NULL, allowed = NULL,
  allow_self = TRUE, structural_zeros = NULL, allowed_transitions = NULL)
```

Arguments

`states` State labels.

`forbidden` Two-column data frame/matrix of forbidden from-to pairs.

`allowed` Two-column data frame/matrix of explicitly allowed pairs.

`allow_self` Whether self transitions are allowed by default.

`structural_zeros`
Alias for ‘forbidden‘.

`allowed_transitions`
Alias for ‘allowed‘.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

summarise_eye_benchmark *Summarise benchmark timing and memory by problem size*

Description

Summarise benchmark timing and memory by problem size

Usage

```
summarise_eye_benchmark(x)
```

Arguments

`x` Benchmark result.

Value

A logical value or vector indicating benchmark timing and memory by problem size.

summarise_eyeprocess_stress_evidence

Summarise executed measurement-stress evidence

Description

Summarise executed measurement-stress evidence

Usage

```
summarise_eyeprocess_stress_evidence(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

A tabular R object containing executed measurement-stress evidence; rows represent analysis units and columns contain the returned quantities.

summarise_process_negative_controls

Summarise process negative controls

Description

Summarise process negative controls

Usage

```
summarise_process_negative_controls(x, effect = "effect", threshold = 0)
```

Arguments

x	Negative-control result.
effect	Effect column.
threshold	Optional absolute effect threshold.

Value

A logical value or vector indicating process negative controls.

summarise_process_sensitivity

Summarise process sensitivity results

Description

Summarise process sensitivity results

Usage

```
summarise_process_sensitivity(
  x,
  effect = "effect",
  p_value = NULL,
  threshold = 0,
  alpha = 0.05
)
```

Arguments

x	Sensitivity result.
effect	Effect column.
p_value	Optional p-value column.
threshold	Optional substantive effect threshold.
alpha	Significance threshold used only when ‘p_value‘ is supplied.

Value

A data frame containing process sensitivity results. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

summarise_process_validation

Summarise a process-validation result

Description

Summarise a process-validation result

Usage

```
summarise_process_validation(x, by = NULL)
```

Arguments

x	Validation result.
by	Optional grouping variables in addition to parameter.

Value

A tabular R object containing a process-validation result; rows represent analysis units and columns contain the returned quantities.

---

summarise_validation_acceptance

Summarise an acceptance matrix

Description

Summarise an acceptance matrix

Usage

```
summarise_validation_acceptance(x, by = character())
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
by	Grouping variables or aggregation level.

Value

A tabular R object containing an acceptance matrix; rows represent analysis units and columns contain the returned quantities.

---

summarize_parameter_recovery

Summarise parameter recovery

Description

Summarise parameter recovery

Usage

```
summarize_parameter_recovery(
  results,
  by = c("scenario", "engine", "parameter"),
  interval_level = 0.95
)
```

Arguments

`results`	Canonical or raw recovery results.
`by`	Grouping columns.
`interval_level`	Nominal interval level, used only for labelling.

Value

A tabular R object containing parameter recovery; rows represent analysis units and columns contain the returned quantities.

---

summarize_process_windows

Summarize extracted process windows

Description

Summarize extracted process windows

Usage

```
summarize_process_windows(x, by = NULL)
```

Arguments

`x`	‘eye_process_windows‘ object.
`by`	Optional grouping columns present in the extracted table.

Value

An R object containing extracted process windows. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

---

summary.eye_validation_bundle

Summarize a validation bundle object

Description

Summarize a validation bundle object

Usage

```
## S3 method for class 'eye_validation_bundle'
summary(object, ...)
```

Arguments

`object`	Object supplied to the S3 method.
`...`	Additional arguments passed to the underlying method or helper.

Value

A named list with components "model_name", "manifest", "report", containing a validation bundle object and associated metadata or diagnostics.

---

summary.eye_validation_job_plan

summary eye validation job plan

Description

S3 method supporting a research-scale eyeprocess object.

Usage

```
## S3 method for class 'eye_validation_job_plan'
summary(object, ...)
```

Arguments

`object`	Value for ‘object‘. See the function description and relevant article for constraints.
`...`	Additional arguments passed to the selected engine or method.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

synthetic_corruption_plan

Define synthetic measurement corruptions for stress testing

Description

Define synthetic measurement corruptions for stress testing

Usage

```
synthetic_corruption_plan(
  missingness = 0,
  pupil_dropout = 0,
  gaze_offset_x = 0,
  gaze_offset_y = 0,
  sampling_jitter_sd = 0,
  aoi_label_noise = 0,
  device_shift = 0,
  trial_drop = 0,
  seed = 1L
)
```

Arguments

`missingness` Generic missingness proportion.

`pupil_dropout` Pupil dropout proportion.

`gaze_offset_x, gaze_offset_y` Additive gaze-coordinate offsets.

`sampling_jitter_sd` Timestamp jitter SD in timestamp units.

`aoi_label_noise` Proportion of AOI labels randomly reassigned.

`device_shift` Additive shift for a declared device-sensitive numeric column.

`trial_drop` Proportion of rows/trials removed.

`seed` Seed.

Value

An object of class "eye_synthetic_corruption_plan", stored as a named list, with components "missingness", "pupil_dropout", "gaze_offset_x", "gaze_offset_y", "sampling_jitter_sd", "aoi_label_noise", "device_shift", "trial_drop", "seed", "status". It contains define synthetic measurement corruptions for stress testing and associated metadata or diagnostics needed to interpret the result.

`theory_strategy_spec` *Define a theory-constrained strategy-mixture model*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
theory_strategy_spec(strategies = NULL, feature_columns = NULL, response = "score",
  participant = "participant_id", item = "item_id", condition = NULL,
  item_availability = NULL, engine = c("em", "stan"), multiple_starts = 10L,
  anchor_strength = 3, chains = 4L, parallel_chains = min(4L, chains),
 iter_warmup = 1000L, iter_sampling = 1000L, adapt_delta = 0.95, max_treedepth = 12L,
  prototypes = NULL, feature_sd = NULL, prior = NULL)
```

Arguments

`strategies`	Named list of strategy signatures. Each signature is a named
`feature_columns`	Process-feature columns.
`response`	Binary response column.
`participant`	Participant identifier.
`item`	Item identifier.
`condition`	Optional condition column.
`item_availability`	Optional item-by-strategy availability matrix or data frame.
`engine`	Estimation engine.
`multiple_starts`	Number of starts for the EM baseline.
`anchor_strength`	Prior/penalty strength anchoring classes to signatures.
`chains`	Stan controls.
`parallel_chains`	Stan controls.
`iter_warmup`	Stan controls.
`iter_sampling`	Stan controls.
`adapt_delta`	Stan controls.
`max_treedepth`	Stan controls.
`prototypes`	Value for ‘prototypes‘. See the function description and relevant article for constraints.
`feature_sd`	Value for ‘feature_sd‘. See the function description and relevant article for constraints.
`prior`	Value for ‘prior‘. See the function description and relevant article for constraints.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`timestamp_fidelity_audit` *Timestamp semantic-fidelity audit*

Description

Timestamp semantic-fidelity audit

Usage

```
timestamp_fidelity_audit(
  source,
  roundtrip,
  source_time = "timestamp",
  roundtrip_time = source_time,
  source_unit = "seconds",
  roundtrip_unit = source_unit,
  key = NULL,
  tolerance = 1e-06
)
```

Arguments

`source`	Original data.
`roundtrip`	Round-tripped data.
`source_time`	Source timestamp column.
`roundtrip_time`	Round-trip timestamp column.
`source_unit`, `roundtrip_unit`	One of seconds, milliseconds, microseconds, or nanoseconds.
`key`	Optional alignment key.
`tolerance`	Seconds-scale tolerance after normalization.

Value

An ‘eye_timestamp_fidelity‘ object.

transition_residual_diagnostics *Compute transition residual diagnostics*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
transition_residual_diagnostics(object, type = c("pearson", "deviance", "randomized"))
```

Arguments

object	Dynamic IRTree fit.
type	Pearson, deviance, or randomized quantile residuals.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

update_person_score *Update a partial person score with one new response*

Description

Update a partial person score with one new response

Usage

```
update_person_score(
  model,
  current_pattern,
  item_position,
  response,
  method = c("MAP", "EAP"),
  ...
)
```

Arguments

`model`	Calibrated model.
`current_pattern`	Existing full-length partial pattern.
`item_position`	Item receiving the new response.
`response`	New response.
`method`	Scoring method.
`...`	Additional arguments passed to the underlying method or helper.

Value

A named list with components "pattern", "score", containing update a partial person score with one new response and associated metadata or diagnostics.

`upgrade_eye_dataset` *Upgrade a legacy eye dataset*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
upgrade_eye_dataset(x, target_version = "2.0.0", copy = TRUE)
```

Arguments

`x`	Dataset.
`target_version`	Target schema version.
`copy`	Whether to copy before migration.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

upgrade_eyeprocess_model

Upgrade a legacy eyeprocess model

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
upgrade_eyeprocess_model(x, target_version = "1.0.0")
```

Arguments

x	Model object.
target_version	Target model-contract version.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

validate_against_reference

Compare a validation result with a frozen reference

Description

Compare a validation result with a frozen reference

Usage

```
validate_against_reference(x, reference, tolerance = 1e-06)
```

Arguments

x	Validation result.
reference	Frozen reference object or RDS path.
tolerance	Numeric tolerance for matched summary values.

Value

An object of class "eye_validation_reference_comparison", stored as a named list, with components "table", "tolerance", "pass", "reference_hash", "current_hash". It contains a validation result with a frozen reference and associated metadata or diagnostics needed to interpret the result.

validate_benchmark_study

Validate benchmark integrity and relational constraints

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validate_benchmark_study(study = eyeprocess_benchmark_study(), verify_hashes = TRUE)
```

Arguments

study	Benchmark object or path.
verify_hashes	Whether to verify MD5 hashes.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

validate_bids_eye_semantics

Validate BIDS eye-tracking semantics

Description

Implements a lightweight contract for BIDS 1.11.1 eye-tracking physiology data. It does not replace the BIDS Validator.

Usage

```
validate_bids_eye_semantics(data, metadata, events_metadata = NULL)
```

Arguments

data	Eye-tracking physiology table.
metadata	Parsed JSON sidecar as a named list.
events_metadata	Optional event-sidecar metadata containing ‘StimulusPresentation‘ information for gaze-on-screen recordings.

Value

An ‘eye_bids_semantic_audit‘ object.

validate_decision_manifest

Validate a research decision manifest

Description

Validate a research decision manifest

Usage

```
validate_decision_manifest(
  x,
 required_domains = c("sampling", "validity", "fixation", "pupil", "aoi", "model",
    "sensitivity", "exclusions"),
  require_nonempty = FALSE
)
```

Arguments

x	Manifest.
required_domains	Domains that must exist.
require_nonempty	If TRUE, required domains must contain at least one decision.

Value

A logical value or vector indicating a research decision manifest.

validate_engine_adapter

Validate an external-engine adapter contract

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validate_engine_adapter(result, require_fit = FALSE)
```

Arguments

result	Adapter result.
require_fit	Require fitted status.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

validate_eye_pipeline *Validate a governed eyeprocess pipeline*

Description

Validate a governed eyeprocess pipeline

Usage

```
validate_eye_pipeline(x)
```

Arguments

x	Pipeline.

Value

A logical value or vector indicating a governed eyeprocess pipeline.

---

validate_eye_prov_graph *Validate a provenance graph*

Description

Validate a provenance graph

Usage

```
validate_eye_prov_graph(x)
```

Arguments

x	Provenance graph.

Value

A logical value or vector indicating a provenance graph.

validate_eye_storage_metadata

Validate storage metadata and partition fingerprints

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validate_eye_storage_metadata(storage, verify_hashes = TRUE)
```

Arguments

storage	Storage object or path.
verify_hashes	Whether to recompute all fingerprints.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

validate_eyeprocess_external_irt_fit

Validate that an external IRT fit used the requested engine

Description

Validate that an external IRT fit used the requested engine

Usage

```
validate_eyeprocess_external_irt_fit(x, engine = NULL)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
engine	Requested estimation or analysis engine.

Value

A logical value or vector indicating that an external IRT fit used the requested engine.

validate_eyeprocess_irt_item_bank

Validate an adaptive IRT item bank

Description

Validate an adaptive IRT item bank

Usage

```
validate_eyeprocess_irt_item_bank(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

A logical value or vector indicating an adaptive IRT item bank.

validate_eyeprocess_irt_model_spec

Validate an eyeprocess IRT model specification

Description

Validate an eyeprocess IRT model specification

Usage

```
validate_eyeprocess_irt_model_spec(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

A logical value or vector indicating an eyeprocess IRT model specification.

validate_eyeprocess_joint_process_irt_spec

Validate a joint process IRT specification

Description

Validate a joint process IRT specification

Usage

```
validate_eyeprocess_joint_process_irt_spec(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

A logical value or vector indicating a joint process IRT specification.

validate_eyeprocess_validation_plan

Validate a validation-evidence plan

Description

Validate a validation-evidence plan

Usage

```
validate_eyeprocess_validation_plan(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

A logical value or vector indicating a validation-evidence plan.

validate_feature_availability

Validate feature availability against an analysis cutoff

Description

Validate feature availability against an analysis cutoff

Usage

```
validate_feature_availability(provenance, cutoff)
```

Arguments

provenance	Feature provenance table.
cutoff	Scalar cutoff or named vector by feature.

Value

A data frame containing feature availability against an analysis cutoff. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

validate_gazepoint_workflow

Validate an integrated Gazepoint workflow result

Description

Validate an integrated Gazepoint workflow result

Usage

```
validate_gazepoint_workflow(x)
```

Arguments

x	An ‘eye_gazepoint_workflow‘ object.

Value

A data frame of workflow checks.

validate_hed_event_semantics *Minimal HED annotation audit for event tables*

Description

This function checks presence, non-empty annotations and balanced grouping. It is deliberately a structural audit rather than a full HED validator; use the official HED validation tooling when formal schema validation is needed.

Usage

```
validate_hed_event_semantics(events, hed_column = "HED")
```

Arguments

events	Value supplied to ‘events‘; see Details for its model-specific role.
hed_column	Column containing HED annotations.

Value

A data frame containing minimal HED annotation audit for event tables. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

validate_irt_model *Validate a registered multimodal IRT model*

Description

Validate a registered multimodal IRT model

Usage

```
validate_irt_model(spec, validation = NULL, ...)
```

Arguments

spec	IRT model or validation specification.
validation	Validation results or validation specification.
...	Additional arguments passed to the selected model, engine, or method.

Value

An object of class "eye_irt_evidence_grade", stored as a named list, with components "model_id", "grade", "checks", "recovery", "contract", "warning". It contains a registered multimodal IRT model and associated metadata or diagnostics needed to interpret the result.

validate_latent_space_process_similarity

Validate latent-space proximity against process similarity

Description

Validate latent-space proximity against process similarity

Usage

```
validate_latent_space_process_similarity(
  object,
  process_matrix,
  entity = c("person", "item")
)
```

Arguments

object	A fitted eyeprocess model or audit object.
process_matrix	Rows correspond to persons or items in the same order as the fitted latent coordinates.
entity	Entity type to map or validate.

Value

An object of class "eye_latent_space_process_validation", stored as a named list, with components "entity", "spearman_distance_correlation", "latent_distance", "process_distance", "interpretation". It contains latent-space proximity against process similarity and associated metadata or diagnostics needed to interpret the result.

validate_model_object

Validate a fitted model against the stable model contract

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validate_model_object(object, strict = FALSE)
```

Arguments

object	Model object.
strict	Whether warnings become errors.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

validate_multimodal_irt

Validate a multimodal IRT development object

Description

Validate a multimodal IRT development object

Usage

```
validate_multimodal_irt(x)
```

Arguments

x	Measurement, fit, simulation, or process-information object.

Value

An ‘eye_multimodal_validation‘.

---

validate_multimodal_m2

Validate an M2 fit or simulation

Description

For simulations, performs data/support and identifiability checks. For fitted models, additionally audits MCMC diagnostics and optionally channel-specific posterior predictive checks.

Usage

```
validate_multimodal_m2(x, include_ppc = TRUE, rhat_max = 1.01, ess_min = 200)
```

Arguments

x	M2 simulation or fit.
include_ppc	Include posterior predictive checks for fitted M2 models.
rhat_max	Maximum acceptable R-hat.
ess_min	Minimum bulk/tail ESS threshold.

Value

An ‘eye_multimodal_m2_validation‘.

validate_multimodal_m3

Validate an M3 simulation or fitted four-channel model

Description

Combines structural support, sampler diagnostics, PPC, pupil-confound availability, device/missingness summaries and explicit interpretive boundaries. Validation of synthetic or computational behavior is not empirical construct validation.

Usage

```
validate_multimodal_m3(
  x,
  include_ppc = TRUE,
  rhat_max = 1.05,
  ess_min = 50,
  ebfmi_min = 0.3
)
```

Arguments

`x`	M3 simulation or fit.
`include_ppc`	Include M3 PPC for fits.
`rhat_max`, `ess_min`, `ebfmi_min`	Diagnostic thresholds.

Value

An ‘eye_multimodal_m3_validation‘.

validate_multimodal_m4

Validate M4 data, computation, state behavior, and evidence

Description

Combines structural identifiability, sampler diagnostics, state uncertainty, PPC, and optionally supplied information/negative-control/sensitivity/recovery evidence into domain-specific statuses. ‘PASS‘ means the declared checks pass; it never means that state labels have substantive psychological validity.

Usage

```
validate_multimodal_m4(
  x,
  information = NULL,
  negative_controls = NULL,
  sensitivity = NULL,
  recovery = NULL,
  include_ppc = TRUE
)
```

Arguments

`x`	M4 fit.
`information`	Optional M4 information object.
`negative_controls`	Optional M4 negative-controls object.
`sensitivity`	Optional M4 sensitivity object.
`recovery`	Optional M4 recovery object.
`include_ppc`	Whether to compute PPC summaries.

Value

An ‘eye_multimodal_m4_validation‘.

---

validate_process_measure_registry *Validate a process-measure registry*

Description

Validate a process-measure registry

Usage

```
validate_process_measure_registry(registry)
```

Arguments

`registry`	Registry data frame.

Value

A logical value or vector indicating a process-measure registry.

validate_process_validation_design

Validate a process-validation design

Description

Validate a process-validation design

Usage

```
validate_process_validation_design(x)
```

Arguments

x	Validation design.

Value

A logical value or vector indicating a process-validation design.

validate_process_windows

Validate a process-window representation

Description

Validate a process-window representation

Usage

```
validate_process_windows(x)
```

Arguments

x	Object to process, inspect, compare, or plot.

Value

A data frame containing a process-window representation. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

validate_strategy_manipulation

Validate strategy posteriors against an experimental manipulation

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validate_strategy_manipulation(object, condition, expected_strategy,
  minimum_contrast = 0)
```

Arguments

`object`	Fitted strategy-mixture object.
`condition`	Condition column in the original trial data.
`expected_strategy`	Named character vector mapping condition values to prespecified strategy labels.
`minimum_contrast`	Minimum mean posterior-probability contrast over alternative strategies.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

validate_vendor_semantics

Validate imported data against a vendor semantic contract

Description

Validate imported data against a vendor semantic contract

Usage

```
validate_vendor_semantics(data, contract, metadata = list())
```

Arguments

`data`	Imported/canonical table.
`contract`	‘eye_vendor_schema_contract‘.
`metadata`	Optional named metadata list.

Value

An object of class "eye_vendor_semantic_validation", stored as a named list, with components "pass", "vendor", "version", "fields", "aliases", "timestamp", "units", "contract". It contains imported data against a vendor semantic contract and associated metadata or diagnostics needed to interpret the result.

---

validate_vendor_timestamp_semantics

Validate vendor-specific timestamp semantics

Description

The audit records expected semantics rather than silently coercing clocks. Tobii data can carry device/system timing; Pupil Labs Neon timestamps are high-resolution UTC nanoseconds in native recordings; Gazepoint may expose native monotonic and media-relative clocks depending on export type.

Usage

```
validate_vendor_timestamp_semantics(
  data,
  vendor,
  device_time = NULL,
  system_time = NULL,
  media_time = NULL
)
```

Arguments

`data`	Input data frame or compatible tabular object.
`vendor`	Vendor identifier.
`device_time`	Device timestamp column.
`system_time`	System timestamp column.
`media_time`	Media/stimulus timestamp column.

Value

An object of class "eye_vendor_timestamp_semantics", stored as a named list, with components "vendor", "pass", "clocks". It contains vendor-specific timestamp semantics and associated metadata or diagnostics needed to interpret the result.

validation_acceptance_matrix

Evaluate a table against named validation rules

Description

Evaluate a table against named validation rules

Usage

```
validation_acceptance_matrix(summary, rules, id_cols = character())
```

Arguments

summary	Validation summary table.
rules	Collection of validation acceptance rules.
id_cols	Columns identifying validation scenarios.

Value

A tabular R object containing a table against named validation rules; rows represent analysis units and columns contain the returned quantities.

validation_acceptance_rule

Define a validation acceptance rule

Description

Define a validation acceptance rule

Usage

```
validation_acceptance_rule(
  metric,
  direction = c("max", "min", "between", "equals"),
  threshold,
  upper = NULL,
  tolerance = 0
)
```

Arguments

`metric`	Metric name or metric column.
`direction`	Direction vector used to project multidimensional information.
`threshold`	Decision or diagnostic threshold.
`upper`	Optional upper threshold for interval-style acceptance rules.
`tolerance`	Numerical or decision tolerance.

Value

An object of class "eye_validation_acceptance_rule", stored as a named list, with components "metric", "direction", "threshold", "upper", "tolerance". It contains define a validation acceptance rule and associated metadata or diagnostics needed to interpret the result.

`validation_bundle_manifest` *Create a machine-readable validation manifest*

Description

Create a machine-readable validation manifest

Usage

```
validation_bundle_manifest(x)
```

Arguments

`x`	Object to process, inspect, compare, or plot.

Value

A data frame containing a machine-readable validation manifest. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

validation_calibration_summary

Summarize prediction calibration

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validation_calibration_summary(x, by = c("model_family", "scenario_id"), bins = 10L)
```

Arguments

x	Validation collection or prediction data frame.
by	Grouping columns.
bins	Number of reliability bins.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

validation_condition_id

Return stable validation condition identifiers

Description

Return stable validation condition identifiers

Usage

```
validation_condition_id(x)
```

Arguments

x	Validation design or expanded condition table.

Value

A character value or vector containing return stable validation condition identifiers.

validation_condition_ranking

Rank validation conditions by a transparent robustness score

Description

Rank validation conditions by a transparent robustness score

Usage

```
validation_condition_ranking(
  x,
  weights = c(rmse = 1, abs_bias = 1, coverage_error = 1, failure_rate = 1)
)
```

Arguments

x	Validation result.
weights	Named weights for rmse, absolute bias, coverage error, and failure rate.

Value

A tabular R object containing rank validation conditions by a transparent robustness score; rows represent analysis units and columns contain the returned quantities.

validation_coverage_table

Interval-coverage table

Description

Interval-coverage table

Usage

```
validation_coverage_table(x, nominal = 0.95, by = NULL)
```

Arguments

x	Validation result.
nominal	Nominal coverage used for deviation reporting.
by	Optional grouping variables.

Value

A tabular R object containing interval-coverage table; rows represent analysis units and columns contain the returned quantities.

validation_evidence_levels

Detailed validation evidence levels

Description

Returns the fine-grained evidence ladder used by the 0.7 validation programme. This is deliberately orthogonal to the existing public support levels (declared / fixture-tested / empirically-validated), so existing compatibility claims remain stable.

Usage

```
validation_evidence_levels()
```

Value

A data frame ordered from weakest to strongest evidence.

validation_evidence_matrix

Create a model-by-evidence validation matrix

Description

Create a model-by-evidence validation matrix

Usage

```
validation_evidence_matrix(...)
```

Arguments

...	Named validation results, bundles, or arbitrary evidence objects.

Value

A tabular R object containing a model-by-evidence validation matrix; rows represent analysis units and columns contain the returned quantities.

validation_failure_profile

Failure profile for a validation programme

Description

Failure profile for a validation programme

Usage

```
validation_failure_profile(x)
```

Arguments

x	Validation result.

Value

A data frame containing failure profile for a validation programme. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

validation_failure_summary

Summarize convergence and execution failures

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validation_failure_summary(x, by = c("model_family", "scenario_id"))
```

Arguments

x	Validation collection or job table.
by	Grouping columns.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

validation_failure_taxonomy

Classify common estimator failures without hiding the original message

Description

Classify common estimator failures without hiding the original message

Usage

```
validation_failure_taxonomy(x)
```

Arguments

x	Error/condition/message vector.

Value

A data frame containing classify common estimator failures without hiding the original message. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

validation_job_plan

Create a deterministic validation job plan

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validation_job_plan(grid = NULL, replications = 100L, base_seed = 1L,
  model_family = "unspecified", plan_id = NULL, chunk_size = 1L, metadata = list())
```

Arguments

grid	Scenario grid or named list of factor levels.
replications	Replications per design cell.
base_seed	Base seed used for deterministic seed allocation.
model_family	Model-family label.
plan_id	Optional explicit plan identifier.
chunk_size	Number of jobs assigned to each chunk.
metadata	Arbitrary plan metadata.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

validation_ladder *Build a measurement-to-generalization validation ladder*

Description

Build a measurement-to-generalization validation ladder

Usage

```
validation_ladder(
  acquisition_qc = "not_assessed",
  analytical_qc = "not_assessed",
  construct_check = "not_assessed",
  within_person = "not_assessed",
  held_out_person = "not_assessed",
  claim = "descriptive"
)
```

Arguments

`acquisition_qc`, `analytical_qc`, `construct_check`, `within_person`, `held_out_person`
: Stage statuses: ‘pass‘, ‘warning‘, ‘fail‘, or ‘not_assessed‘.

`claim`
: Claim type; use ‘generalizable‘ for out-of-person claims.

Value

A structured validation-ladder result.

---

validation_mcse *Monte Carlo standard errors for validation metrics*

Description

Monte Carlo standard errors for validation metrics

Usage

```
validation_mcse(results, metric = c("bias", "rmse", "coverage"))
```

Arguments

`results`	Validation or model results.
`metric`	Metric to calculate or audit.

Value

A data frame containing monte Carlo standard errors for validation metrics. Rows represent the analysis units and columns contain the identifiers, estimates, or diagnostics defined by the function.

`validation_mcse_profile` *Estimate Monte Carlo uncertainty for validation summaries*

Description

Estimate Monte Carlo uncertainty for validation summaries

Usage

```
validation_mcse_profile(x, metric, by = character())
```

Arguments

`x`	Object to validate, summarize, verify, or otherwise process.
`metric`	Metric name or metric column.
`by`	Grouping variables or aggregation level.

Value

A tabular R object containing monte Carlo uncertainty for validation summaries; rows represent analysis units and columns contain the returned quantities.

`validation_recovery_summary` *Summarize parameter recovery*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validation_recovery_summary(x, by = character())
```

Arguments

x	Validation collection or estimates data frame.
by	Additional grouping columns.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

validation_recovery_table

Parameter-recovery table

Description

Parameter-recovery table

Usage

```
validation_recovery_table(x, by = NULL)
```

Arguments

x	Validation result.
by	Optional grouping variables.

Value

A tabular R object containing parameter-recovery table; rows represent analysis units and columns contain the returned quantities.

---

validation_replication_budget

Compute a replication budget from a target MCSE

Description

Compute a replication budget from a target MCSE

Usage

```
validation_replication_budget(
  pilot_sd,
  target_mcse,
  minimum = 20L,
  maximum = 10000L
)
```

Arguments

`pilot_sd`	Pilot estimate of the metric standard deviation.
`target_mcse`	Target Monte Carlo standard error.
`minimum`	Minimum permitted replication count.
`maximum`	Maximum permitted replication count.

Value

A numeric value or vector containing a replication budget from a target MCSE.

`validation_report` *Render a conservative validation report*

Description

Render a conservative validation report

Usage

```
validation_report(x, include_session = TRUE)
```

Arguments

`x`	Validation bundle.
`include_session`	Include abbreviated session provenance.

Value

Character vector of report lines.

`validation_robustness_score` *Overall validation robustness score*

Description

Overall validation robustness score

Usage

```
validation_robustness_score(x)
```

Arguments

x	Validation result.

Value

A single numeric robustness score: the mean finite condition-level robustness score, or ‘NA_real_‘ when no finite score is available.

---

validation_runtime_summary

Summarize validation runtime and checkpoint scale

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validation_runtime_summary(x, by = c("model_family", "scenario_id"))
```

Arguments

x	Validation collection or job table.
by	Grouping columns.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

validation_sbc_summary

Summarize simulation-based calibration ranks

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validation_sbc_summary(x, by = c("model_family", "scenario_id"), bins = 10L)
```

Arguments

`x`	Validation collection or posterior draws data frame.
`by`	Grouping columns.
`bins`	Rank-histogram bins.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

`validation_scenario_manifest` *Create a scenario manifest for frozen validation work*

Description

Create a scenario manifest for frozen validation work

Usage

```
validation_scenario_manifest(
  plan,
  source_commit = NA_character_,
  generated_at = Sys.time()
)
```

Arguments

`plan`	Validation or stress-evidence plan object.
`source_commit`	Source-control commit associated with the evidence.
`generated_at`	Generation timestamp stored in the manifest.

Value

An object of class "eye_validation_scenario_manifest", stored as a named list, with components "label", "plan_hash", "scenarios", "source_commit", "generated_at", "scientific_scope". It contains a scenario manifest for frozen validation work and associated metadata or diagnostics needed to interpret the result.

validation_seed *Allocate a deterministic validation seed*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validation_seed(design, replication, base_seed = 1L, stream = 1L)
```

Arguments

design	A list or one-row data frame describing a design cell.
replication	Positive replication number.
base_seed	Base integer seed.
stream	Optional independent stream number.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

validation_summary_mcse *Monte Carlo standard-error diagnostics for validation summaries*

Description

Monte Carlo standard-error diagnostics for validation summaries

Usage

```
validation_summary_mcse(x, by = NULL)
```

Arguments

x	Validation result.
by	Optional grouping variables.

Value

A tabular R object containing monte Carlo standard-error diagnostics for validation summaries; rows represent analysis units and columns contain the returned quantities.

`validation_thresholds` *Specify completion and scientific-promotion thresholds*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
validation_thresholds(required_replications = 100L, max_failure_rate = 0.05,
 max_absolute_bias = 0.10, max_rmse = Inf, min_coverage = 0.90, max_coverage = 0.99,
 max_rhat = 1.01, min_ess_bulk = 400, max_divergence_rate = 0.01, require_sbc = TRUE,
  require_empirical_reproduction = TRUE)
```

Arguments

`required_replications`
: Required completed replications per scenario.

`max_failure_rate`
: Maximum tolerated job failure rate.

`max_absolute_bias`
: Maximum absolute mean bias.

`max_rmse` Maximum RMSE.

`min_coverage` Minimum interval coverage.

`max_coverage` Maximum interval coverage.

`max_rhat` Maximum acceptable R-hat.

`min_ess_bulk` Minimum bulk effective sample size.

`max_divergence_rate`
: Maximum divergence rate.

`require_sbc` Require passing SBC uniformity evidence.

`require_empirical_reproduction`
: Require empirical-reproduction evidence.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

vendor_schema_contract

Declare a vendor semantic schema contract

Description

Declare a vendor semantic schema contract

Usage

```
vendor_schema_contract(
  vendor,
  version = NA_character_,
  required_fields = character(),
  optional_fields = character(),
  aliases = list(),
  timestamp = list(),
  coordinate = list(),
  units = list(),
  eye_streams = character(),
  event_fields = character()
)
```

Arguments

vendor	Vendor/ecosystem label.
version	Optional format/software version.
required_fields	Fields that must survive import.
optional_fields	Fields that may be present.
aliases	Named list mapping canonical fields to accepted vendor names.
timestamp	Named list describing device/system/media time columns.
coordinate	Named list describing x/y columns and coordinate semantics.
units	Named list of expected units for canonical fields.
eye_streams	Expected eye streams (‘left‘, ‘right‘, ‘cyclopean‘, etc.).
event_fields	Event/annotation fields expected to survive.

Value

An object of class "eye_vendor_schema_contract", stored as a named list, with components "vendor", "version", "required_fields", "optional_fields", "aliases", "timestamp", "coordinate", "units", "eye_streams", "event_fields", "contract_version". It contains declare a vendor semantic schema contract and associated metadata or diagnostics needed to interpret the result.

vendor_validation_spec

Specify multi-vendor empirical validation requirements

Description

Specify multi-vendor empirical validation requirements

Usage

```
vendor_validation_spec(
  required_vendors = c("gazepoint", "tobii", "pupillabs", "eyelink", "smi"),
  min_cases_per_vendor = 2L,
  min_pass_rate = 0.95,
  require_versions = TRUE,
  require_devices = TRUE,
  require_independent_sources = TRUE,
  require_licence_reviewed = TRUE
)
```

Arguments

`required_vendors`
: Vendors that must be represented.

`min_cases_per_vendor`
: Minimum independent cases per vendor.

`min_pass_rate`
: Minimum acceptable pass rate per vendor.

`require_versions`
: Require non-missing software versions.

`require_devices`
: Require non-missing device models.

`require_independent_sources`
: Require each case to be marked as an independently obtained source rather than a duplicated fixture.

`require_licence_reviewed`
: Require each corpus case to have a completed data/code licence and redistribution review.

Value

An ‘eye_vendor_validation_spec‘.

verify_decision_manifest_lock

Verify that a locked manifest has not changed

Description

Verify that a locked manifest has not changed

Usage

```
verify_decision_manifest_lock(x)
```

Arguments

x	Manifest lock.

Value

A logical value or vector indicating verify that a locked manifest has not changed.

verify_eyeprocess_validation_atlas

Verify a frozen validation atlas

Description

Verify a frozen validation atlas

Usage

```
verify_eyeprocess_validation_atlas(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

A logical value or vector indicating verify a frozen validation atlas.

verify_eyeprocess_validation_evidence

Verify the integrity hash of a frozen evidence bundle

Description

Verify the integrity hash of a frozen evidence bundle

Usage

```
verify_eyeprocess_validation_evidence(x)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.

Value

A logical value or vector indicating verify the integrity hash of a frozen evidence bundle.

verify_outcome_blind_snapshot

Verify an outcome-blind snapshot has not changed

Description

Verify an outcome-blind snapshot has not changed

Usage

```
verify_outcome_blind_snapshot(x)
```

Arguments

x	Snapshot.

Value

A logical value or vector indicating verify an outcome-blind snapshot has not changed.

verify_reproducibility_fingerprint

Verify an internally stored fingerprint hash

Description

Verify an internally stored fingerprint hash

Usage

```
verify_reproducibility_fingerprint(x)
```

Arguments

x	Fingerprint.

Value

A logical value or vector indicating verify an internally stored fingerprint hash.

verify_reproducibility_manifest

Verify a reproducibility manifest

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
verify_reproducibility_manifest(manifest)
```

Arguments

manifest	Manifest.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

visual_context_registry

Build an item-to-visual-context registry

Description

Build an item-to-visual-context registry

Usage

```
visual_context_registry(
  item_metadata,
  item = "item_id",
  context = NULL,
 context_candidates = c("visual_anchor_id", "stimulus_id", "stimulus_page", "page_id",
    "layout_id", "screen_id", "diagram_id"),
  min_items_per_context = 3L
)
```

Arguments

item_metadata	Item-level metadata.
item	Item identifier column.
context	Optional explicit context column.
context_candidates	Candidate metadata columns searched in order.
min_items_per_context	Minimum items required for a shared context.

Value

An object of class "eye_visual_context_registry", stored as a named list, with components "mapping", "source_item_column", "source_context_column", "min_items_per_context", "caveat". It contains an item-to-visual-context registry and associated metadata or diagnostics needed to interpret the result.

write_advanced_model_evidence_report

Write an advanced-model evidence report

Description

Write an advanced-model evidence report

Usage

```
write_advanced_model_evidence_report(x, path)
```

Arguments

x	An ‘eye_advanced_evidence_audit‘ object.
path	Markdown output file.

Value

Normalized report path.

---

write_api_lifecycle_registry
Write API lifecycle registry to CSV

Description

Write API lifecycle registry to CSV

Usage

```
write_api_lifecycle_registry(registry, path)
```

Arguments

registry	Lifecycle registry.
path	Output path.

Value

An R object containing aPI lifecycle registry to CSV. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

write_benchmark_data_dictionary

Write the benchmark data dictionary

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
write_benchmark_data_dictionary(study = eyeprocess_benchmark_study(),
  path = "benchmark-data-dictionary.md")
```

Arguments

study	Benchmark object or path.
path	Output Markdown file.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

write_decision_manifest

Write a decision manifest

Description

Write a decision manifest

Usage

```
write_decision_manifest(x, path, format = c("rds", "dput", "json"))
```

Arguments

x	Manifest.
path	Output path.
format	‘rds‘, ‘dput‘, or ‘json‘.

Value

An R object containing a decision manifest. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

write_eye_pipeline_report *Write a conservative pipeline report*

Description

Write a conservative pipeline report

Usage

```
write_eye_pipeline_report(x, path)
```

Arguments

x	Pipeline or run.
path	Output text/markdown path.

Value

A character string or vector giving the path or identifier for a conservative pipeline report.

write_eye_storage *Write an eye dataset to RDS or Arrow/Parquet storage*

Description

Write an eye dataset to RDS or Arrow/Parquet storage

Usage

```
write_eye_storage(
  x,
  path,
  format = c("rds", "parquet", "arrow_dataset"),
  tables = canonical_table_names(),
  partitioning = NULL,
  compression = "zstd",
  overwrite = FALSE,
  retain_metadata = TRUE
)
```

Arguments

`x`	An ‘eye_dataset‘.
`path`	Output path.
`format`	Storage format.
`tables`	Canonical tables to write.
`partitioning`	Optional partition columns for Arrow datasets.
`compression`	Parquet compression codec. For writes, the default ‘"zstd"‘ is preferred; when the argument is omitted and that codec is unavailable, storage falls back to ‘"snappy"‘ and then ‘"uncompressed"‘. An explicitly requested unavailable codec errors.
`overwrite`	Whether to replace an existing target.
`retain_metadata`	Whether to retain raw/vendor metadata in a sidecar RDS.

Value

An ‘eye_storage‘ handle.

`write_eye_targets_template` *Write an explicit ‘_targets.R‘ template from a governed pipeline*

Description

Write an explicit ‘_targets.R‘ template from a governed pipeline

Usage

```
write_eye_targets_template(x, path = "_targets.R")
```

Arguments

`x`	Pipeline.
`path`	Output path.

Value

An R object containing an explicit ‘_targets.R‘ template from a governed pipeline. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

write_eyeprocess_validation_evidence

Write a frozen evidence bundle

Description

Write a frozen evidence bundle

Usage

```
write_eyeprocess_validation_evidence(x, path)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
path	File path for reading or writing.

Value

A character string or vector giving the path or identifier for a frozen evidence bundle.

write_eyeprocess_validation_report

Write a compact Markdown validation report

Description

Write a compact Markdown validation report

Usage

```
write_eyeprocess_validation_report(
  atlas,
  path,
  title = "eyeprocess validation evidence report"
)
```

Arguments

atlas	Validation-evidence atlas object.
path	File path for reading or writing.
title	Report title.

Value

A character string or vector giving the path or identifier for a compact Markdown validation report.

write_gazepoint_workflow_report

Write a reproducible Gazepoint workflow report

Description

Write a reproducible Gazepoint workflow report

Usage

```
write_gazepoint_workflow_report(
  workflow,
  path = file.path(workflow$output_dir, "gazepoint-workflow-report.md"),
  render_html = workflow$spec$create_html_report
)
```

Arguments

workflow	An ‘eye_gazepoint_workflow‘ result.
path	Markdown report destination.
render_html	Render an HTML copy when possible.

Value

The normalized report path.

write_model_promotion_report

Write a model-promotion report

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
write_model_promotion_report(x, path)
```

Arguments

x	Model-promotion audit.
path	Markdown output file.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

write_partitioned_eye_storage

Write an eye dataset as atomic partitioned storage

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
write_partitioned_eye_storage(x, path,
  spec = partition_eye_storage(format = if (requireNamespace("arrow",
  quietly = TRUE)) "parquet" else "rds"), overwrite = FALSE, tables = NULL)
```

Arguments

x	Eye dataset or named list of data frames.
path	Destination directory.
spec	Partition specification.
overwrite	Whether to replace an existing store.
tables	Tables to write.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

write_prov_dot

Return Graphviz DOT for a provenance graph

Description

Return Graphviz DOT for a provenance graph

Usage

```
write_prov_dot(x)
```

Arguments

x	Provenance graph.

Value

A character value or vector containing return Graphviz DOT for a provenance graph.

write_reporting_guideline_report

Write a reporting-guideline audit report

Description

Write a reporting-guideline audit report

Usage

```
write_reporting_guideline_report(x, path)
```

Arguments

x	An ‘eye_reporting_audit‘ object.
path	Markdown output file.

Value

Normalized report path.

write_reproducibility_fingerprint

Write a reproducibility fingerprint

Description

Write a reproducibility fingerprint

Usage

```
write_reproducibility_fingerprint(x, path, format = c("rds", "dput", "json"))
```

Arguments

x	Fingerprint.
path	Output path.
format	‘rds‘, ‘dput‘, or ‘json‘.

Value

A character string or vector giving the path or identifier for a reproducibility fingerprint.

write_software_paper_evidence

Write a human-readable software-paper evidence report

Description

Write a human-readable software-paper evidence report

Usage

```
write_software_paper_evidence(x, path)
```

Arguments

x	Evidence bundle.
path	Markdown output path.

Value

An R object containing a human-readable software-paper evidence report. The concrete class and structure follow the selected method, engine, or input object and are preserved as documented by that workflow.

write_software_paper_reproduction

Write a complete software-paper reproduction scaffold

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
write_software_paper_reproduction(directory, study = eyeprocess_benchmark_study(),
  overwrite = FALSE)
```

Arguments

directory	Output directory.
study	Benchmark study.
overwrite	Whether to replace existing files.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

write_software_paper_scaffold

Write a methodological software-paper scaffold

Description

Write a methodological software-paper scaffold

Usage

```
write_software_paper_scaffold(
  path,
  title = "eyeprocess: Reproducible Psychometric Process Modelling in R",
  author = "Stefanos Balaskas"
)
```

Arguments

path	Output R Markdown file.
title	Paper title.
author	Author string.

Value

The normalized path.

write_validation_job_manifest

Write a machine-readable validation manifest

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
write_validation_job_manifest(plan, path, overwrite = FALSE)
```

Arguments

plan	An ‘eye_validation_job_plan‘.
path	Manifest directory.
overwrite	Replace an existing manifest directory.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

write_validation_release_report

Write a validation release report

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
write_validation_release_report(x, path, completion = NULL, promotion = NULL,
  title = "eyeprocess validation release report", include_session = TRUE)
```

Arguments

`x`	Validation collection.
`path`	Markdown output file.
`completion`	Optional completion audit.
`promotion`	Optional model-promotion audit.
`title`	Report title.
`include_session`	Include session information.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

write_validation_report

Write a validation report to disk

Description

Write a validation report to disk

Usage

```
write_validation_report(x, path, ...)
```

Arguments

x	Validation bundle.
path	Output text-file path.
...	Passed to ‘validation_report()‘.

Value

A character string or vector giving the path or identifier for a validation report to disk.

---

write_validation_scenario_manifest

Write a validation scenario manifest

Description

Write a validation scenario manifest

Usage

```
write_validation_scenario_manifest(x, path)
```

Arguments

x	Object to validate, summarize, verify, or otherwise process.
path	File path for reading or writing.

Value

A character string or vector giving the path or identifier for a validation scenario manifest.

---

write_vendor_case_report

Write a vendor case evidence report

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
write_vendor_case_report(corpus_path, case_id, path, validation = NULL,
  roundtrip = NULL)
```

Arguments

corpus_path	Corpus directory.
case_id	Case identifier.
path	Markdown output path.
validation	Optional validation result.
roundtrip	Optional round-trip audit.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

write_vendor_registry *Write the multi-vendor case registry*

Description

Part of the research-scale validation, advanced-model, interoperability, storage, adapter, or reproducibility programme. Experimental model functions remain subject to declared evidence gates.

Usage

```
write_vendor_registry(x, corpus_path)
```

Arguments

x	Registry data frame.
corpus_path	Corpus directory.

Value

The documented eyeprocess object, data frame, plot, report path, or adapter result.

---

write_vendor_validation_report *Write a multi-vendor validation report*

Description

Write a multi-vendor validation report

Usage

```
write_vendor_validation_report(x, path)
```

Arguments

`x`	An ‘eye_vendor_validation‘ object.
`path`	Markdown output file.

Value

The normalized report path.

Index

∗ **data**
eyeprocess-format-validation, 158
∗ **methods**
assign_aois_probabilistic, 34
build_evidence_graph, 76
derive_aoi_composition, 109
detect_calibration_drift, 111
detect_process_changepoints, 115
eye_plot_spec, 149
eyeprocess-adapters, 155
eyeprocess-class, 155
eyeprocess-coordinates-time, 156
eyeprocess-experimental, 157
eyeprocess-export-report, 157
eyeprocess-features, 158
eyeprocess-format-validation, 158
eyeprocess-import-gazepoint, 159
eyeprocess-import-generic, 160
eyeprocess-import-vendors, 160
eyeprocess-models, 161
eyeprocess-plots, 161
eyeprocess-preprocessing, 162
eyeprocess-quality, 163
eyeprocess-schema, 163
eyeprocess-simulation, 164
eyeprocess-trials-aoi, 164
fit_device_linking, 251
fit_fixation_point_process, 261
fit_process_dif, 289
fit_process_gstudy, 291
fit_process_missingness_model, 293
fit_process_norms, 294
fit_process_observation_model, 296
gaze_recurrence, 319
item_objective_spec, 341
process_uncertainty_spec, 490
register_pupil_curves, 516
representative_scanpath, 521
∗ **package**
eyeprocess-package, 23

ablate_multimodal_channels, 23
add_provenance *(eyeprocess-class)*, 155
add_responses *(eyeprocess-trials-aoi)*, 164
addm_glam_proxy_features, 24
adjust_pupil_confounds, 25
advanced_model_evidence_spec, 25
advanced_validation_grid, 26
algorithm_facet_effects, 27
align_clock *(eyeprocess-coordinates-time)*, 156
align_response_matrices *(eyeprocess-models)*, 161
analysis_decision_entropy, 27
analysis_environment_snapshot, 28
analysis_readiness *(eyeprocess-quality)*, 163
analysis_resolution_guard, 28
anonymize_eye_dataset *(eyeprocess-format-validation)*, 158
aoi_balance_coordinates *(derive_aoi_composition)*, 109
aoi_membership_probability, 29
aoi_trajectory_features, 30
api_family_map, 31
api_lifecycle_diff, 31
api_surface_summary, 32
append_eye_table *(eyeprocess-class)*, 155
apply_clock_transform *(eyeprocess-coordinates-time)*, 156
apply_device_linking *(fit_device_linking)*, 251
apply_offline_recalibration *(detect_calibration_drift)*, 111
apply_preflight_decision, 32

apply_synthetic_corruption, 33
as_eye_biometrics (eyeprocess-export-report), 157
as_eye_dataset (eyeprocess-class), 155
as_eye_dataset.gp3_analysis (eyeprocess-export-report), 157
as_eye_dataset.gp3_data (eyeprocess-export-report), 157
as_eye_dataset.gp3_recording (eyeprocess-export-report), 157
as_eye_dataset.gpbiometrics_data (eyeprocess-export-report), 157
as_eyeprocess_eyeris (external_eye_adapters), 137
as_eyeprocess_eyetools (external_eye_adapters), 137
as_eyeprocess_eyetrackingr (external_eye_adapters), 137
as_eyeprocess_gazer (external_eye_adapters), 137
as_eyeprocess_pupillometryr (external_eye_adapters), 137
as_irt_recovery_results, 33
as_procdata_sequence (sequence_interoperability), 548
as_seqhmm_data (sequence_interoperability), 548
as_traminer_sequence (sequence_interoperability), 548
assign_aois (eyeprocess-trials-aoi), 164
assign_aois_probabilistic, 34
assign_process_feature_family, 36
assign_trials (eyeprocess-trials-aoi), 164
audit_3pl_process_signatures, 36
audit_advanced_model_evidence, 37
audit_aoi_separation (assign_aois_probabilistic), 34
audit_aois (eyeprocess-quality), 163
audit_bank_decision_stability (item_objective_spec), 341
audit_benchmark_release, 38
audit_bias, 38
audit_biometric_imputation, 39
audit_biometric_preflight, 39
audit_candidate_item_bank, 40
audit_channel_incremental_information, 41
audit_clock_sync (eyeprocess-coordinates-time), 156
audit_convergence, 42
audit_coordinate_spaces (eyeprocess-coordinates-time), 156
audit_coverage, 42
audit_decision_provenance, 43
audit_device_equivalence (fit_device_linking), 251
audit_distractor_attention, 44
audit_episodes (eyeprocess-quality), 163
audit_event_order (eyeprocess-quality), 163
audit_evidence_dependencies (build_evidence_graph), 76
audit_eye_api, 44
audit_eye_pipeline, 45
audit_fairness_transportability (fit_process_dif), 289
audit_frontier_model_contract, 45
audit_identifiability, 46
audit_interval_width, 47
audit_irf_shape, 47
audit_item_reduction_sensitivity, 48
audit_latent_distribution, 49
audit_measurement_transportability, 49
audit_missingness (eyeprocess-quality), 163
audit_model_promotion, 50
audit_multimodal_identifiability, 51
audit_multimodal_m2_identifiability, 51
audit_multimodal_m3_identifiability, 52
audit_multimodal_m4_identifiability, 53
audit_multimodal_measurement, 54
audit_multivariate_process_quality, 54
audit_nonparametric_rasch, 55
audit_norm_transportability (fit_process_norms), 294
audit_presentation_accessibility, 55
audit_process_adjusted_dif, 56

audit_process_anomalies, 57
audit_process_drift, 58
audit_process_external_validity, 59
audit_process_local_dependence, 59
audit_process_measurement_invariance, 60
audit_process_reliability (fit_process_gstudy), 291
audit_process_window_sensitivity, 61
audit_pupil_fatigue_drift, 62
audit_pupil_frequency_stability, 62
audit_pupil_preprocessing_order, 63
audit_pupil_quality (eyeprocess-quality), 163
audit_pupil_registration (register_pupil_curves), 516
audit_recalibration (detect_calibration_drift), 111
audit_rmse, 64
audit_roundtrip_loss, 64
audit_sampling_irregularity, 65
audit_sampling_rate (eyeprocess-quality), 163
audit_sbc, 66
audit_signal_filter, 66
audit_signal_quality (eyeprocess-quality), 163
audit_temporal_leakage, 67
audit_timebase (eyeprocess-coordinates-time), 156
audit_trial_coverage (eyeprocess-quality), 163
audit_validation_completion, 67
audit_vendor_field_coverage, 68
audit_vendor_validation, 68
audit_visual_context_dependence, 69
autoplot_eyeprocess (eye_plot_spec), 149

baseline_pupil (eyeprocess-preprocessing), 162
bayesian_process_diagnostic_flags, 69
bayesian_process_diagnostics_dashboard, 70
benchmark_expected_outputs, 71
benchmark_eye_storage, 71
benchmark_eyeprocess, 72
benchmark_memory_estimate, 72
benchmark_scaling_curve, 73
bind_process_windows, 73
biometric_imputation_sensitivity, 74
bootstrap_process_reliability, 74
bootstrap_representative_scanpath (representative_scanpath), 521
build_aoi_visits (eyeprocess-trials-aoi), 164
build_compatibility_matrix, 75
build_evidence_graph, 76
build_gazepoint_media_trials, 77
build_item_responses (eyeprocess-trials-aoi), 164
build_stimulus_intervals (eyeprocess-trials-aoi), 164
build_trials (eyeprocess-trials-aoi), 164

calibration_drift_profile, 78
calibration_error_model, 78
calibration_sensitivity_grid, 79
calibration_transfer_audit, 80
canonical_eye_api, 80
canonical_table_names (eyeprocess-schema), 163
check_feature_level (eyeprocess-quality), 163
check_local_dependence (eyeprocess-models), 161
check_process_leakage (eyeprocess-quality), 163
classify_item_missingness, 81
collect_eye_storage, 81
collect_validation_evidence, 82
collect_validation_jobs, 82
combine_eye_datasets (eyeprocess-adapters), 155
compact_eye_dataset (eyeprocess-class), 155
compare_aoi_compositions (derive_aoi_composition), 109
compare_aoi_definitions (eyeprocess-quality), 163
compare_aoi_methods, 83
compare_aoi_trajectories, 84
compare_bayesian_process_models, 84
compare_decision_manifests, 85
compare_decision_provenance (build_evidence_graph), 76
compare_deployment_batches, 85

compare_diffusion_accuracy_rt, 86
compare_dynamic_transition_models, 87
compare_engine_adapters, 87
compare_episode_structure (detect_process_changepoints), 115
compare_eye_datasets (eyeprocess-format-validation), 158
compare_fixation_methods, 88
compare_functional_scalar_models, 88
compare_hard_probabilistic_aoi, 89
compare_irt_models, 90
compare_latent_distribution_models, 90
compare_model_engines, 91
compare_parametric_nonparametric_irf, 91
compare_preprocessing (eyeprocess-quality), 163
compare_presentation_fairness, 92
compare_process_criterion_models, 93
compare_process_models, 93
compare_process_profile_solutions, 94
compare_pupil_kernels, 94
compare_pupil_preprocessing, 95
compare_raw_adjusted_pupil, 95
compare_reproducibility_fingerprints, 96
compare_scanpath_distributions (representative_scanpath), 521
compare_signal_filters, 96
compare_strategy_heterogeneity, 97
compare_uncertainty_budgets (process_uncertainty_spec), 490
compare_validation_engines, 97
compare_vendor_semantics, 98
compare_visual_context_irt, 98
compatibility_evidence_matrix, 99
context_factor_effects, 99
convert_coordinates (eyeprocess-coordinates-time), 156
convert_xy (eyeprocess-coordinates-time), 156
coordinate_fidelity_audit, 100
coordinate_space (eyeprocess-coordinates-time), 156
coverage_calibration_curve, 101
create_public_benchmark, 101
create_validation_bundle (eyeprocess-format-validation), 158
cross_device_process_equating_audit, 102
cross_recurrence (gaze_recurrence), 319
cross_version_adapter_regression, 103
crossed_grouped_cv, 104
crossed_grouped_folds, 104
crossmodal_recurrence_model (fit_process_missingness_model), 293

data_quality_reporting_table, 105
decision_manifest_diff, 106
decision_manifest_hash, 106
decision_manifest_table, 107
decision_space_coverage, 107
decision_stability, 108
decode_dynamic_states, 108
decompose_dif_evidence (fit_process_dif), 289
decompose_pupil_phase_amplitude (register_pupil_curves), 516
derive_all_features (eyeprocess-features), 158
derive_aoi_composition, 109
derive_biometric_features (eyeprocess-features), 158
derive_gaze_features (eyeprocess-features), 158
derive_gazepoint_workflow_features, 111
derive_pupil_features (eyeprocess-features), 158
derive_rt_features (eyeprocess-features), 158
design_process_dstudy (fit_process_gstudy), 291
detect_blinks (eyeprocess-preprocessing), 162
detect_calibration_drift, 111
detect_corrupt_partitions, 113
detect_eye_format (eyeprocess-adapters), 155

detect_fixations_idt
(eyeprocess-preprocessing), 162
detect_fixations_ivt
(eyeprocess-preprocessing), 162
detect_irt_changepoints, 113
detect_process_changepoint, 114
detect_process_changepoints, 115
detect_saccades
(eyeprocess-preprocessing), 162
device_facet_effects, 116
diagnose_gaze_point_process
(fit_fixation_point_process), 261
diffusion_identification_study, 117
diffusion_parameter_diagnostics, 117
diffusion_posterior_predictive, 118
discover_validation_cases
(eyeprocess-format-validation), 158
distractor_process_map, 118
drift_by_device, 119
drift_by_site, 119
drift_by_stimulus_version, 120
drift_by_vendor, 120
dynamic_irtree_recovery, 121
dynamic_irtree_spec, 121
dynamic_posterior_predictive_check, 123
dynamic_transition_design, 124

effective_sampling_frequency, 124
empty_eye_table (eyeprocess-schema), 163
encode_response_combinations, 125
engine_adapter_status, 126
equate_irt_scales, 126
estimate_calibration_error, 127
estimate_clock_transform
(eyeprocess-coordinates-time), 156
estimate_device_specific_error
(fit_device_linking), 251
estimate_ez_diffusion
(eyeprocess-experimental), 157
estimate_process_uncertainty
(process_uncertainty_spec), 490
estimate_sampling_rate
(eyeprocess-coordinates-time), 156
estimate_visual_exposure_probability, 128
evaluate_validation_acceptance, 128
event_marker_qc, 129
event_roundtrip_audit, 129
event_semantics_audit, 130
expand_eyeprocess_stress_evidence_plan, 131
expand_eyeprocess_validation_plan, 131
expand_process_validation_design, 132
expected_process_information, 132
explain_latent_interaction, 133
export_canonical
(eyeprocess-export-report), 157
export_eye_bids, 133
export_eye_pipeline, 134
export_prov_json, 135
export_ro_crate_metadata, 135
export_validation_bundle, 136
external_eye_adapters, 137
external_model_engines, 137
external_validate_irt, 138
extract_diffusion_parameters, 138
extract_functional_pupil_parameters, 139
extract_parameter_truth, 139
extract_process_windows, 140
eye_analysis_pipeline, 141
eye_analysis_spec, 142
eye_api_inventory, 143
eye_api_lifecycle, 143
eye_api_recommendation, 144
eye_api_status, 144
eye_api_superseded, 145
eye_benchmark_design, 145
eye_decision_manifest, 146
eye_format_profiles
(eyeprocess-format-validation), 158
eye_mapping (eyeprocess-adapters), 155
eye_pipeline_dot, 147
eye_pipeline_graph, 147
eye_pipeline_manifest, 148
eye_pipeline_mermaid, 148
eye_pipeline_step, 149
eye_plot_spec, 149
eye_prov_graph, 151
eye_reproducibility_fingerprint, 151

eye_schema (eyeprocess-schema), 163
eye_session_manifest, 152
eye_storage_spec, 153
eye_stream_fidelity_audit, 154
eye_targets_manifest, 154
eyeprocess (eyeprocess-package), 23
eyeprocess-adapters, 155
eyeprocess-class, 155
eyeprocess-coordinates-time, 156
eyeprocess-experimental, 157
eyeprocess-export-report, 157
eyeprocess-features, 158
eyeprocess-format-validation, 158
eyeprocess-import-gazepoint, 159
eyeprocess-import-generic, 160
eyeprocess-import-vendors, 160
eyeprocess-models, 161
eyeprocess-package, 23
eyeprocess-plots, 161
eyeprocess-preprocessing, 162
eyeprocess-quality, 163
eyeprocess-schema, 163
eyeprocess-simulation, 164
eyeprocess-trials-aoi, 164
eyeprocess_api_version, 165
eyeprocess_benchmark_study, 165
eyeprocess_cdm_attribute_profiles, 166
eyeprocess_cdm_classification_uncertainty, 166
eyeprocess_cdm_dina_ideal_response, 167
eyeprocess_cdm_dina_probability, 167
eyeprocess_cdm_qmatrix_audit, 168
eyeprocess_deprecation, 168
eyeprocess_irt_2pl_probability, 169
eyeprocess_irt_3pl_probability, 170
eyeprocess_irt_4pl_probability, 170
eyeprocess_irt_adaptive_trace, 171
eyeprocess_irt_anchor_audit, 172
eyeprocess_irt_anchor_purification, 172
eyeprocess_irt_apply_link, 173
eyeprocess_irt_bank_coverage, 174
eyeprocess_irt_category_function_audit, 174
eyeprocess_irt_classification_precision, 175
eyeprocess_irt_conditional_sem, 176
eyeprocess_irt_content_balance_audit, 176
eyeprocess_irt_device_drift, 177
eyeprocess_irt_dif_effect_curve, 177
eyeprocess_irt_dtf_curve, 178
eyeprocess_irt_eap_score, 179
eyeprocess_irt_engine_evidence_table, 179
eyeprocess_irt_engine_registry, 180
eyeprocess_irt_engine_status, 180
eyeprocess_irt_expected_score, 181
eyeprocess_irt_exposure_summary, 181
eyeprocess_irt_extreme_score_audit, 182
eyeprocess_irt_fit_dashboard, 182
eyeprocess_irt_functioning_effect_summary, 183
eyeprocess_irt_gpcm_probability, 184
eyeprocess_irt_grm_probability, 184
eyeprocess_irt_haebara_link, 185
eyeprocess_irt_identification_audit, 185
eyeprocess_irt_infit_outfit, 186
eyeprocess_irt_information_area, 187
eyeprocess_irt_information_gain, 187
eyeprocess_irt_information_targeting, 188
eyeprocess_irt_invariance_evidence, 188
eyeprocess_irt_item_bank, 189
eyeprocess_irt_item_fit_residuals, 190
eyeprocess_irt_item_information, 190
eyeprocess_irt_item_selection, 191
eyeprocess_irt_latent_regression_design, 192
eyeprocess_irt_link_stability, 192
eyeprocess_irt_local_dependence_pairs, 193
eyeprocess_irt_map_score, 194
eyeprocess_irt_marginal_reliability, 194
eyeprocess_irt_mean_mean_link, 195
eyeprocess_irt_mean_sigma_link, 196
eyeprocess_irt_measurement_precision_profile, 196
eyeprocess_irt_missing_by_design_audit, 197
eyeprocess_irt_misspecification_metrics,

198
eyeprocess_irt_misspecification_suite, 198
eyeprocess_irt_mle_score, 199
eyeprocess_irt_model_card, 199
eyeprocess_irt_model_card_audit, 200
eyeprocess_irt_model_spec, 201
eyeprocess_irt_monotonicity_audit, 202
eyeprocess_irt_nominal_probability, 202
eyeprocess_irt_parameter_plausibility_audit, 203
eyeprocess_irt_person_fit_lz, 203
eyeprocess_irt_person_fit_residuals, 204
eyeprocess_irt_plausible_values, 205
eyeprocess_irt_ppc_discrepancy, 205
eyeprocess_irt_precision_evidence_table, 206
eyeprocess_irt_prior_sensitivity_grid, 206
eyeprocess_irt_prior_sensitivity_summary, 207
eyeprocess_irt_prior_spec, 208
eyeprocess_irt_process_alignment, 209
eyeprocess_irt_process_aware_selection_penalty, 209
eyeprocess_irt_process_dif_concordance, 210
eyeprocess_irt_q3, 211
eyeprocess_irt_recovery_design, 211
eyeprocess_irt_recovery_failures, 212
eyeprocess_irt_recovery_summary, 213
eyeprocess_irt_sbc_ranks, 213
eyeprocess_irt_sbc_summary, 214
eyeprocess_irt_score_table, 214
eyeprocess_irt_score_uncertainty, 215
eyeprocess_irt_session_drift, 216
eyeprocess_irt_sparse_design_audit, 216
eyeprocess_irt_stocking_lord_link, 217
eyeprocess_irt_stopping_rule, 218
eyeprocess_irt_targeting_gap, 219
eyeprocess_irt_test_characteristic_curve, 219
eyeprocess_irt_test_information, 220
eyeprocess_irt_testlet_audit, 220
eyeprocess_irt_testlet_spec, 221
eyeprocess_irt_threshold_order_audit, 221
eyeprocess_joint_process_irt_spec, 222
eyeprocess_mirt_directional_information, 223
eyeprocess_mirt_information_matrix, 223
eyeprocess_mirt_loading_audit, 224
eyeprocess_mirt_loading_spec, 225
eyeprocess_multichannel_measurement_map, 225
eyeprocess_negative_control_evidence_plan, 226
eyeprocess_negative_control_evidence_table, 227
eyeprocess_process_irt_data_bundle, 227
eyeprocess_process_item_profile, 228
eyeprocess_process_missingness_pattern, 229
eyeprocess_process_person_profile, 229
eyeprocess_recovery_evidence_table, 230
eyeprocess_reliability_evidence_plan, 230
eyeprocess_reliability_evidence_table, 231
eyeprocess_response_time_profile, 231
eyeprocess_sbc_evidence_table, 232
eyeprocess_speed_accuracy_profile, 232
eyeprocess_stress_evidence_plan, 233
eyeprocess_stress_evidence_table, 234
eyeprocess_validation_atlas_gaps, 234
eyeprocess_validation_claim_matrix, 235
eyeprocess_validation_evidence_atlas, 235
eyeprocess_validation_evidence_grade, 236
eyeprocess_validation_evidence_index, 237
eyeprocess_validation_evidence_manifest, 237
eyeprocess_validation_plan, 238
eyeprocess_validation_readiness, 239
eyeprocess_validation_release_gate, 240
eyeprocess_validation_seed, 240

facet_effects, 241
feature_dictionary (eyeprocess-features), 158
feature_spec (eyeprocess-features), 158
features_wide (eyeprocess-features), 158
field_fidelity_report, 241
file_hash_manifest, 242
filter_eye_signal, 243
filter_gaze (eyeprocess-preprocessing), 162
filter_pupil (eyeprocess-preprocessing), 162
filter_pupil_signal, 243
find_process_measures, 244
fingerprint_eye_dataset (eyeprocess-format-validation), 158
fingerprint_validation_case, 244
fit_accuracy_rt (eyeprocess-models), 161
fit_aoi_compositional_model (derive_aoi_composition), 109
fit_aoi_growth_curve, 245
fit_brms_adapter, 246
fit_censored_normal_process_irt, 246
fit_changepoint_multimodal_irt, 247
fit_changepoint_rt_irt, 248
fit_cognitive_diagnosis_process, 248
fit_continuous_time_irt, 249
fit_crossclassified_process_irt, 250
fit_crossclassified_process_irt_mhrm, 251
fit_device_linking, 251
fit_dif (eyeprocess-models), 161
fit_diffirt_adapter, 253
fit_diffirt_engine_adapter, 253
fit_dynamic_aoi_model (eyeprocess-models), 161
fit_dynamic_gpirt, 254
fit_dynamic_irtree, 254
fit_dynamic_irtree_stan, 255
fit_event_time_irt, 255
fit_explanatory_irt (eyeprocess-models), 161
fit_external_engine, 256
fit_eyeprocess_erm, 257
fit_eyeprocess_gdina, 258
fit_eyeprocess_lnirt, 258
fit_eyeprocess_mirt, 259
fit_eyeprocess_tam, 259
fit_eyetrackingr_adapter, 260
fit_fixation_point_process, 261
fit_flow_mirt, 262
fit_functional_pupil_stan, 263
fit_gaze_anchored_3pl_audit, 263
fit_gaze_diffusion_irt, 264
fit_gaze_diffusion_stan, 265
fit_gaze_informed_irt (eyeprocess-experimental), 157
fit_gaze_informed_missingness_irt, 265
fit_gaze_weighted_choice (eyeprocess-experimental), 157
fit_gdina_adapter, 266
fit_gpirt, 267
fit_irt (eyeprocess-models), 161
fit_irt_model, 268
fit_item_parameter_seed_model, 268
fit_joint_functional_pupil_irt, 269
fit_joint_gaze_rt_irt, 270
fit_joint_graded_rt_process_irt, 271
fit_joint_process_model (eyeprocess-models), 161
fit_joint_signal_missingness (fit_process_observation_model), 296
fit_kde_latent_distribution_irt, 272
fit_latent_class_process_irt, 272
fit_latent_space_irt, 273
fit_lnirt_adapter, 274
fit_manyfacet_process_irt, 275
fit_marked_gaze_process (fit_fixation_point_process), 261
fit_mirt_adapter, 276
fit_mixture_irt_process_classes, 276
fit_multiblock_process_map, 277
fit_multimodal_irt (eyeprocess-experimental), 157
fit_multimodal_m2, 278
fit_multimodal_m3, 279
fit_multimodal_m4, 280
fit_multimodal_trait_irt, 282
fit_multinomial_transition, 283
fit_multiple_response_process_irt, 284
fit_nominal_gaze_irt, 285
fit_nonignorable_missing_irt, 286
fit_offline_recalibration

(detect_calibration_drift), 111
fit_omission_survival_irt, 286
fit_openmx_adapter, 287
fit_openmx_process_model, 288
fit_persistence_gaze_diffusion_irt, 289
fit_phase_amplitude_irt (register_pupil_curves), 516
fit_process_dif, 289
fit_process_gstudy, 291
fit_process_hmm_irt, 292
fit_process_irt (eyeprocess-experimental), 157
fit_process_missingness_model, 293
fit_process_norms, 294
fit_process_observation_model, 296
fit_process_profile_mixture, 297
fit_process_rasch_tree, 298
fit_pupil_confound_model, 298
fit_pupil_event_deconvolution, 299
fit_pupil_informed_irt (eyeprocess-experimental), 157
fit_pupillometryr_adapter, 300
fit_response_process_embedding_irt, 301
fit_revisit_process_cdm, 302
fit_seqhmm_adapter, 303
fit_shared_process_factor (eyeprocess-models), 161
fit_speed_accuracy_engagement_irt, 303
fit_strategy_mixture (eyeprocess-experimental), 157
fit_strategy_mixture_em, 304
fit_strategy_mixture_stan, 304
fit_tam_adapter, 305
fit_theory_strategy_irt, 306
fit_traminer_adapter, 306
fit_validation_replicate, 307
fit_variational_irt, 308
fit_visual_context_irt, 308
fixation_boundary_uncertainty, 309
flag_gaze_outliers (eyeprocess-preprocessing), 162
format_compatibility_matrix (eyeprocess-format-validation), 158
format_validation_spec (eyeprocess-format-validation), 158
freeze_eyeprocess_irt_reference, 310
freeze_eyeprocess_validation_atlas, 310
freeze_eyeprocess_validation_evidence, 311
freeze_software_paper_evidence, 312
freeze_validation_reference, 312
functional_pupil_basis, 313
functional_pupil_diagnostics, 314
functional_pupil_features (eyeprocess-experimental), 157
functional_pupil_irt_spec, 314

gaze_anchored_3pl_alignment, 316
gaze_data_quality_profile, 317
gaze_diffusion_spec, 318
gaze_entropy (eyeprocess-features), 158
gaze_precision_rms_s2s, 319
gaze_recurrence, 319
gaze_uncertainty_ellipse, 321
gaze_velocity (eyeprocess-preprocessing), 162
gazepoint_analysis_tables, 321
gazepoint_irt_tables, 322
gazepoint_workflow_spec, 322
generalizability_process_study, 324
get_eye_table (eyeprocess-class), 155
get_irt_model, 324
gp_align_media_ids (eyeprocess-import-gazepoint), 159
gp_audit_file_pairs (eyeprocess-import-gazepoint), 159
gp_check_biometrics_sync (eyeprocess-import-gazepoint), 159
gp_check_fixation_ids (eyeprocess-import-gazepoint), 159
gp_check_media_timing (eyeprocess-import-gazepoint), 159
gp_check_pupil_channels (eyeprocess-import-gazepoint), 159
gp_check_sampling_rate (eyeprocess-import-gazepoint),

159
gp_check_validity_fields
(eyeprocess-import-gazepoint), 159
gp_identify_export_type
(eyeprocess-import-gazepoint), 159
gp_list_export_fields
(eyeprocess-import-gazepoint), 159
gp_match_biometrics
(eyeprocess-import-gazepoint), 159
gp_match_recordings
(eyeprocess-import-gazepoint), 159
gp_pair_exports
(eyeprocess-import-gazepoint), 159
gp_parse_markers
(eyeprocess-import-gazepoint), 159
gp_parse_media_events
(eyeprocess-import-gazepoint), 159
gp_parse_user_events
(eyeprocess-import-gazepoint), 159
gp_profile_export
(eyeprocess-import-gazepoint), 159
gp_reconstruct_stimuli
(eyeprocess-import-gazepoint), 159
gp_reconstruct_trials
(eyeprocess-import-gazepoint), 159
gp_validate_export
(eyeprocess-import-gazepoint), 159
grade_model_evidence, 325
grouped_cv, 325
grouped_folds, 326

import_benchmark_study, 327
import_canonical
(eyeprocess-export-report), 157
import_eye_bids, 327
incremental_process_validity, 328
infer_eye_mapping
(eyeprocess-adapters), 155
init_validation_corpus
(eyeprocess-format-validation), 158
init_vendor_corpus, 328
inject_aoi_label_noise, 329
inject_calibration_offset, 329
inject_device_shift, 330
inject_eye_missingness, 331
inject_pupil_dropout, 331
inject_sampling_jitter, 332
inject_trial_imbalance, 332
inspect_eye_source
(eyeprocess-format-validation), 158
interpolate_pupil
(eyeprocess-preprocessing), 162
interpretive_warnings
(eyeprocess-quality), 163
irt_compositional_channel, 333
irt_continuous_channel, 333
irt_count_channel, 334
irt_functional_channel, 335
irt_model_spec, 335
irt_nominal_channel, 336
irt_response_channel, 337
irt_rt_channel, 338
irt_sequence_channel, 338
irt_survival_channel, 339
irt_validation_spec, 340
is_eye_dataset (eyeprocess-class), 155
is_eyelink_export
(eyeprocess-import-vendors), 160
is_gazepoint_export
(eyeprocess-import-gazepoint), 159
is_pupil_labs_export
(eyeprocess-import-vendors), 160
is_smi_export
(eyeprocess-import-vendors), 160
is_tobii_export
(eyeprocess-import-vendors), 160
item_objective_spec, 341

item_parameters (eyeprocess-models), 161
item_pareto_front
(item_objective_spec), 341

label_process_episodes
(detect_process_changepoints), 115
latent_distribution_stress_test, 343
latent_trait_trajectory, 343
leave_device_out_validation, 344
leave_item_out_validation, 344
leave_session_out_validation, 345
leave_site_out_validation, 345
list_irt_models, 346
lock_decision_manifest, 346

map_latent_classes_to_process_profiles, 347
measurement_error_budget, 348
migrate_eye_storage_schema, 348
model_data (eyeprocess-models), 161
model_fit_statistics
(eyeprocess-models), 161
model_missing_process
(eyeprocess-experimental), 157
model_promotion_spec, 349
model_validation_spec, 350
model_validation_summary, 351
monitor_dif_drift (fit_process_dif), 289
multiblock_contributions, 351
multiblock_person_coordinates, 352
multiblock_variable_coordinates, 352
multimodal_backend_status, 353
multimodal_irt_spec, 353
multimodal_m2_ablation, 354
multimodal_m2_negative_controls, 354
multimodal_m2_ppc, 355
multimodal_m2_process_information, 355
multimodal_m2_recovery, 356
multimodal_m2_spec, 357
multimodal_m3_ablation, 357
multimodal_m3_functional_bridge, 358
multimodal_m3_negative_controls, 359
multimodal_m3_ppc, 359
multimodal_m3_process_information, 360
multimodal_m3_recovery, 360
multimodal_m3_spec, 361
multimodal_m4_ablation, 362
multimodal_m4_negative_controls, 363
multimodal_m4_ppc, 363
multimodal_m4_process_information, 364
multimodal_m4_recovery, 365
multimodal_m4_sensitivity, 366
multimodal_m4_spec, 366
multimodal_m4_state_diagnostics, 367
multimodal_ppc, 368

negative_control_concordance, 368
negative_control_process_test, 369
new_aoi (eyeprocess-trials-aoi), 164
new_coordinate_space
(eyeprocess-schema), 163
new_eye_dataset (eyeprocess-class), 155
normalize_timebase
(eyeprocess-coordinates-time), 156

object_hash, 370
object_schema, 370
open_eye_storage, 371
open_partitioned_eye_storage, 371
optimize_item_bank
(item_objective_spec), 341
option_process_information, 372
outcome_blind_feature_audit, 372
outcome_blind_snapshot, 373

package_reproducibility_manifest, 373
paper_reproducibility_manifest, 374
parameter_recovery
(eyeprocess-simulation), 164
partition_eye_storage, 374
person_scores (eyeprocess-models), 161
pipeline_failures, 375
pipeline_result, 375
pipeline_step_status, 376
placebo_window_audit, 376
plot.eye_adapter_regression_audit, 377
plot.eye_aoi_composition
(derive_aoi_composition), 109
plot.eye_aoi_composition_comparison
(derive_aoi_composition), 109
plot.eye_aoi_composition_model
(derive_aoi_composition), 109
plot.eye_aoi_growth_curve, 377
plot.eye_aoi_separation_audit
(assign_aois_probabilistic), 34
plot.eye_aoi_trajectory, 378

plot.eye_aoi_uncertainty (assign_aois_probabilistic), 34
plot.eye_bank_decision_stability (item_objective_spec), 341
plot.eye_bayesian_process_dashboard, 378
plot.eye_bids_roundtrip, 379
plot.eye_biometric_imputation_sensitivity, 379
plot.eye_biometric_preflight, 380
plot.eye_calibration_drift (detect_calibration_drift), 111
plot.eye_candidate_item_bank_audit, 380
plot.eye_compatibility_evidence_matrix, 381
plot.eye_corpus_validation (eyeprocess-format-validation), 158
plot.eye_cross_recurrence (gaze_recurrence), 319
plot.eye_crossmodal_recurrence_model (fit_process_missingness_model), 293
plot.eye_dataset (eyeprocess-plots), 161
plot.eye_decision_process_proxy, 381
plot.eye_decision_trace (build_evidence_graph), 76
plot.eye_device_equivalence (fit_device_linking), 251
plot.eye_device_linking (fit_device_linking), 251
plot.eye_dif_drift (fit_process_dif), 289
plot.eye_dynamic_irtree, 382
plot.eye_dynamic_ppc, 382
plot.eye_episode_comparison (detect_process_changepoints), 115
plot.eye_event_roundtrip_audit, 383
plot.eye_event_time_irt, 383
plot.eye_evidence_graph (build_evidence_graph), 76
plot.eye_fairness_transportability (fit_process_dif), 289
plot.eye_fixation_point_process (fit_fixation_point_process), 261
plot.eye_format_validation (eyeprocess-format-validation), 158
plot.eye_functional_pupil_diagnostics, 384
plot.eye_functional_pupil_irt, 384
plot.eye_functional_pupil_sensitivity, 385
plot.eye_gated_process_model, 385
plot.eye_gaze_anchored_3pl_audit, 386
plot.eye_gaze_informed_missingness_irt, 386
plot.eye_gaze_point_process_diagnostics (fit_fixation_point_process), 261
plot.eye_gpirt, 387
plot.eye_incremental_information_audit, 387
plot.eye_irt_changepoints, 388
plot.eye_irt_equating, 388
plot.eye_irt_ppc, 389
plot.eye_irt_recovery_summary, 389
plot.eye_irt_sbc, 390
plot.eye_item_bank_optimization (item_objective_spec), 341
plot.eye_item_parameter_seed, 391
plot.eye_item_pareto (item_objective_spec), 341
plot.eye_item_reduction_sensitivity, 391
plot.eye_joint_gaze_rt_irt, 392
plot.eye_joint_graded_rt_process_irt, 392
plot.eye_latent_distribution_comparison, 393
plot.eye_latent_process_alignment, 393
plot.eye_latent_space_irt, 394
plot.eye_manyfacet_process_irt, 394
plot.eye_mixture_irt_process, 395
plot.eye_mnar_sensitivity (fit_process_observation_model), 296
plot.eye_mnar_tipping_point (fit_process_observation_model), 296
plot.eye_model_promotion_audit, 395
plot.eye_multiblock_process_map, 396
plot.eye_nominal_gaze_irt, 396

plot.eye_nonparametric_rasch_audit, 397
plot.eye_norm_transportability (fit_process_norms), 294
plot.eye_omission_survival_irt, 397
plot.eye_parameter_recovery (eyeprocess-simulation), 164
plot.eye_phase_amplitude_irt (register_pupil_curves), 516
plot.eye_preaction_process_features, 398
plot.eye_presentation_accessibility, 398
plot.eye_presentation_fairness_comparison, 399
plot.eye_probabilistic_aoi (assign_aois_probabilistic), 34
plot.eye_process_anomaly_audit, 399
plot.eye_process_cat_simulation, 400
plot.eye_process_changepoints (detect_process_changepoints), 115
plot.eye_process_channel_ablation, 400
plot.eye_process_dependent_discrimination, 401
plot.eye_process_dif (fit_process_dif), 289
plot.eye_process_drift_audit, 401
plot.eye_process_dstudy (fit_process_gstudy), 291
plot.eye_process_episodes (detect_process_changepoints), 115
plot.eye_process_external_validity, 402
plot.eye_process_facet_effects, 403
plot.eye_process_feature_blocks, 403
plot.eye_process_g_study, 404
plot.eye_process_gstudy (fit_process_gstudy), 291
plot.eye_process_hmm_irt, 404
plot.eye_process_local_dependence_audit, 405
plot.eye_process_negative_control, 405
plot.eye_process_norms (fit_process_norms), 294
plot.eye_process_observation_model (fit_process_observation_model), 296
plot.eye_process_person_fit, 406
plot.eye_process_profile_mixture, 406
plot.eye_process_rasch_tree, 407
plot.eye_process_reliability_audit (fit_process_gstudy), 291
plot.eye_process_uncertainty (process_uncertainty_spec), 490
plot.eye_process_uncertainty_propagation (process_uncertainty_spec), 490
plot.eye_process_window_sensitivity, 407
plot.eye_process_windows, 408
plot.eye_provenance_comparison (build_evidence_graph), 76
plot.eye_pupil_confound_model, 408
plot.eye_pupil_deconvolution, 409
plot.eye_pupil_fatigue_drift, 410
plot.eye_pupil_frequency_features, 410
plot.eye_pupil_frequency_stability, 411
plot.eye_pupil_phase_amplitude (register_pupil_curves), 516
plot.eye_pupil_registration (register_pupil_curves), 516
plot.eye_recalibration_audit (detect_calibration_drift), 111
plot.eye_recurrence (gaze_recurrence), 319
plot.eye_roundtrip_loss_audit, 411
plot.eye_sbc_audit, 412
plot.eye_scanpath_bootstrap (representative_scanpath), 521
plot.eye_scanpath_comparison (representative_scanpath), 521
plot.eye_scanpath_representative (representative_scanpath), 521
plot.eye_semantic_roundtrip, 412
plot.eye_signal_filter_audit, 413
plot.eye_storage_benchmark, 413
plot.eye_strategy_aoi_sensitivity, 414
plot.eye_streaming_score, 414
plot.eye_transition_diagnostics, 415
plot.eye_uncertainty_budget_comparison (process_uncertainty_spec), 490
plot.eye_validation_bundle, 415
plot.eye_vendor_compatibility_matrix, 416

plot.eye_vendor_semantic_validation, 416
plot.eye_visual_context_irt, 417
plot.eye_windowed_recurrence (gaze_recurrence), 319
plot_aoi_balance_biplot (derive_aoi_composition), 109
plot_aoi_boundary_risk (assign_aois_probabilistic), 34
plot_aoi_composition_trajectory (derive_aoi_composition), 109
plot_aoi_dwell (eyeprocess-plots), 161
plot_aoi_metric_uncertainty (assign_aois_probabilistic), 34
plot_aoi_probability_map (assign_aois_probabilistic), 34
plot_aoi_ternary (derive_aoi_composition), 109
plot_aoi_transition_matrix, 417
plot_aoi_transition_rank, 418
plot_aoi_variation_matrix (derive_aoi_composition), 109
plot_bank_information_coverage (item_objective_spec), 341
plot_biometrics (eyeprocess-plots), 161
plot_calibration_error_ellipses (detect_calibration_drift), 111
plot_calibration_vector_field (detect_calibration_drift), 111
plot_changepoint_ribbons (detect_process_changepoints), 115
plot_clock_alignment (eyeprocess-plots), 161
plot_complete_case_sensitivity (fit_process_observation_model), 296
plot_compositional_group_difference (derive_aoi_composition), 109
plot_coordinate_spaces (eyeprocess-plots), 161
plot_covariate_effect_surface (fit_fixation_point_process), 261
plot_cross_vendor_metric_matrix (fit_device_linking), 251
plot_crossmodal_recurrence (gaze_recurrence), 319
plot_decision_stability (item_objective_spec), 341
plot_dependability_surface (fit_process_gstudy), 291
plot_device_agreement (fit_device_linking), 251
plot_device_bias_by_magnitude (fit_device_linking), 251
plot_device_equivalence_intervals (fit_device_linking), 251
plot_device_transfer_curve (fit_device_linking), 251
plot_diagnostics (eye_plot_spec), 149
plot_diagonal_recurrence_profile (gaze_recurrence), 319
plot_dif_drift_heatmap (fit_process_dif), 289
plot_distractor_information, 419
plot_drift_over_time (detect_calibration_drift), 111
plot_episode_duration_distribution (detect_process_changepoints), 115
plot_episode_transition_graph (detect_process_changepoints), 115
plot_episode_waterfall (detect_process_changepoints), 115
plot_evidence (eye_plot_spec), 149
plot_evidence_graph (build_evidence_graph), 76
plot_eye_overview (eyeprocess-plots), 161
plot_eye_trace (eyeprocess-plots), 161
plot_fairness_transport_matrix (fit_process_dif), 289
plot_feature_correlation (eyeprocess-plots), 161
plot_feature_distribution (eyeprocess-plots), 161
plot_fixation_intensity (fit_fixation_point_process), 261
plot_fixations (eyeprocess-plots), 161
plot_fuzzy_transition_matrix (assign_aois_probabilistic), 34
plot_gaze_heatmap (eyeprocess-plots),

161
plot_gazepoint_workflow, 419
plot_group_icc_process_overlay (fit_process_dif), 289
plot_group_scanpath_transport (representative_scanpath), 521
plot_interval_coverage, 420
plot_irf_uncertainty, 420
plot_item_decision_path (build_evidence_graph), 76
plot_item_difficulty (eyeprocess-plots), 161
plot_item_group_process_curves (fit_process_dif), 289
plot_item_normative_deviation (fit_process_norms), 294
plot_item_pareto (item_objective_spec), 341
plot_item_phase_delay (register_pupil_curves), 516
plot_item_sampling_reliability (fit_process_gstudy), 291
plot_metric_dependency_graph (build_evidence_graph), 76
plot_missingness (eyeprocess-plots), 161
plot_missingness_by_aoi (fit_process_observation_model), 296
plot_missingness_by_time (fit_process_observation_model), 296
plot_mnar_tipping_point (fit_process_observation_model), 296
plot_model_decision_impact (build_evidence_graph), 76
plot_model_diagnostics (eyeprocess-plots), 161
plot_normative_fan (fit_process_norms), 294
plot_objective_tradeoffs (item_objective_spec), 341
plot_observation_probability (fit_process_observation_model), 296
plot_observed_expected_fixations (fit_fixation_point_process), 261
plot_parameter_recovery, 421
plot_person_item_space, 422
plot_person_normative_profile (fit_process_norms), 294
plot_phase_amplitude_scores (register_pupil_curves), 516
plot_probabilistic_scanpath (assign_aois_probabilistic), 34
plot_process_centiles (fit_process_norms), 294
plot_process_changepoint, 422
plot_process_channel_ablation_delta, 423
plot_process_dif_forest (fit_process_dif), 289
plot_process_episodes (detect_process_changepoints), 115
plot_process_feature_stability, 424
plot_process_window_sensitivity, 424
plot_pupil_activity_sensitivity, 425
plot_pupil_activity_windows, 426
plot_pupil_band_power, 426
plot_pupil_components, 427
plot_pupil_preprocessing_audit, 427
plot_pupil_registration (register_pupil_curves), 516
plot_pupil_spectrum, 428
plot_pupil_timeseries (eyeprocess-plots), 161
plot_recalibration_before_after (detect_calibration_drift), 111
plot_recurrence_matrix (gaze_recurrence), 319
plot_recurrence_network (gaze_recurrence), 319
plot_registered_pupil_effects (register_pupil_curves), 516
plot_reliability_by_metric (fit_process_gstudy), 291
plot_representative_scanpath (representative_scanpath), 521
plot_sampling_rate (eyeprocess-plots), 161
plot_sbc_rank, 429
plot_scanpath (eyeprocess-plots), 161
plot_scanpath_atlas (representative_scanpath), 521

plot_scanpath_dispersion (representative_scanpath), 521
plot_scanpath_similarity_matrix (representative_scanpath), 521
plot_screen_coverage (detect_calibration_drift), 111
plot_selected_bank_profile (item_objective_spec), 341
plot_sensitivity (eye_plot_spec), 149
plot_session_stability (fit_process_gstudy), 291
plot_signal_quality (eyeprocess-plots), 161
plot_spatial_residuals (fit_fixation_point_process), 261
plot_temporal_excitation_kernel (fit_fixation_point_process), 261
plot_transition_matrix (eyeprocess-plots), 161
plot_trial_timeline (eyeprocess-plots), 161
plot_uncertainty_by_item (process_uncertainty_spec), 490
plot_uncertainty_by_stage (process_uncertainty_spec), 490
plot_uncertainty_tornado (process_uncertainty_spec), 490
plot_uncertainty_waterfall (process_uncertainty_spec), 490
plot_validation_failures, 429
plot_validation_runtime, 430
plot_variance_components (fit_process_gstudy), 291
plot_warping_functions (register_pupil_curves), 516
plot_windowed_recurrence (gaze_recurrence), 319
posterior_predictive_discrepancies, 430
posterior_sbc_contract, 431
power_process_simulation (eyeprocess-simulation), 164
preaction_process_features, 431
predict.eye_censored_normal_process_irt, 432
predict.eye_multinomial_transition, 433
predict.eyeprocess_model (eyeprocess-models), 161
predict_aoi_trajectory, 433
predict_fixation_intensity (fit_fixation_point_process), 261
predict_item_parameter_priors, 434
predict_process_centiles (fit_process_norms), 294
predict_theta_at_time, 434
preflight_decisions, 435
preflight_exclusion_manifest, 435
preflight_failures, 436
preflight_passed, 436
prepare_dynamic_irtree_data, 437
prepare_functional_pupil_data, 437
prepare_gaze_diffusion_data, 438
prepare_multimodal_irt_data, 439
prepare_strategy_mixture_data, 440
prepare_structured_unstructured_process_features, 440
preprocess_eye (eyeprocess-preprocessing), 162
preprocess_spec (eyeprocess-preprocessing), 162
preprocessing_multiverse, 441
print.eye_aoi (eyeprocess-trials-aoi), 164
print.eye_benchmark_reproduction, 442
print.eye_benchmark_study, 442
print.eye_benchmark_validation, 443
print.eye_clock_transform (eyeprocess-coordinates-time), 156
print.eye_corpus_validation (eyeprocess-format-validation), 158
print.eye_dataset (eyeprocess-class), 155
print.eye_diffusion_diagnostics, 443
print.eye_diffusion_identification_study, 444
print.eye_dynamic_aoi (eyeprocess-models), 161
print.eye_dynamic_irtree, 444
print.eye_dynamic_ppc, 445
print.eye_dynamic_recovery, 445

print.eye_engine_adapter_result, 446
print.eye_feature_spec
(eyeprocess-features), 158
print.eye_format_detection
(eyeprocess-adapters), 155
print.eye_format_validation
(eyeprocess-format-validation), 158
print.eye_format_validation_spec
(eyeprocess-format-validation), 158
print.eye_functional_pupil_data, 446
print.eye_functional_pupil_diagnostics, 447
print.eye_functional_pupil_irt, 447
print.eye_functional_pupil_sensitivity, 448
print.eye_functional_scalar_comparison, 448
print.eye_gated_process_model, 449
print.eye_gaze_diffusion_data, 449
print.eye_gaze_diffusion_irt, 450
print.eye_gaze_diffusion_spec, 450
print.eye_irt_evidence_grade, 451
print.eye_irt_model_spec, 451
print.eye_irt_validation_spec, 452
print.eye_mapping
(eyeprocess-adapters), 155
print.eye_mi_result (eye_plot_spec), 149
print.eye_missing_sensitivity
(eyeprocess-experimental), 157
print.eye_model_contract_validation, 452
print.eye_model_promotion_audit, 453
print.eye_multinomial_transition, 453
print.eye_partition_spec, 454
print.eye_partitioned_storage, 454
print.eye_plot_spec (eye_plot_spec), 149
print.eye_preprocess_spec
(eyeprocess-preprocessing), 162
print.eye_process_drift_spec, 455
print.eye_process_negative_control, 455
print.eye_process_preflight_spec, 456
print.eye_process_uncertainty_spec
(process_uncertainty_spec), 490
print.eye_process_window_spec, 456
print.eye_readiness
(eyeprocess-quality), 163
print.eye_redaction_result, 457
print.eye_roundtrip_loss_audit, 457
print.eye_roundtrip_validation
(eyeprocess-format-validation), 158
print.eye_sensitivity
(eyeprocess-quality), 163
print.eye_strategy_data, 458
print.eye_strategy_manipulation_validation, 458
print.eye_strategy_mixture
(eyeprocess-experimental), 157
print.eye_theory_strategy_irt, 459
print.eye_theory_strategy_spec, 459
print.eye_transition_design, 460
print.eye_transition_diagnostics, 460
print.eye_two_stage_rt
(eyeprocess-models), 161
print.eye_validation
(eyeprocess-class), 155
print.eye_validation_bundle, 461
print.eye_validation_case_fingerprint, 461
print.eye_validation_collection, 462
print.eye_validation_completion_audit, 462
print.eye_validation_job_plan, 463
print.eye_validation_run, 463
print.eye_vendor_case, 464
print.eye_vendor_compatibility_matrix, 464
print.eye_vendor_schema_contract, 465
print.eye_vendor_semantic_comparison, 465
print.eye_visual_context_registry, 466
print.eyeprocess_model
(eyeprocess-models), 161
print.process_irt_spec
(eyeprocess-experimental), 157
print.summary.eye_dataset
(eyeprocess-class), 155
print.summary.eyeprocess_model
(eyeprocess-models), 161
probabilistic_aoi_assignment, 466
process_anomaly_distance, 467
process_bland_altman, 468
process_channel_ablation, 468

process_criterion_associations, 469
process_dependent_discrimination_audit, 470
process_dif_nuisance_surrogate, 471
process_drift_alerts, 471
process_drift_spec, 472
process_feature_blocks, 473
process_feature_family_registry, 473
process_feature_stability, 474
process_feature_time_provenance, 474
process_icc, 475
process_information, 476
process_irt_diagnostics (eyeprocess-experimental), 157
process_irt_spec (eyeprocess-experimental), 157
process_item_information, 476
process_measure_card, 477
process_measure_coverage, 478
process_measure_guardrails, 478
process_measure_lineage, 479
process_measure_registry, 479
process_measure_units, 480
process_negative_control_permute, 480
process_negative_control_shift, 481
process_ngram_features, 482
process_null_benchmark, 482
process_pattern_mixture (fit_process_observation_model), 296
process_person_fit, 483
process_preflight_spec, 483
process_profile_probabilities, 485
process_profile_summary, 485
process_reliability_profile, 486
process_residual_map, 486
process_sensitivity_grid, 487
process_sequence_embedding, 487
process_state_occupancy, 488
process_state_transition_summary, 488
process_temporal_stability, 489
process_uncertainty_spec, 490
process_validation_design, 491
process_variance_components (fit_process_gstudy), 291
process_window_spec, 492
promote_irt_model, 493
promote_vendor_support, 494
propagate_aoi_uncertainty (assign_aois_probabilistic), 34
propagate_calibration_uncertainty, 494
propagate_process_uncertainty (process_uncertainty_spec), 490
provenance_edge_table, 495
provenance_lineage_table, 496
provenance_manifest (eyeprocess-class), 155
prune_validation_checkpoints, 496
public_validation_corpus, 497
pupil_activity_index, 497
pupil_band_power, 498
pupil_baseline_sensitivity, 499
pupil_confound_effects, 499
pupil_deconvolve (eyeprocess-preprocessing), 162
pupil_event_effects, 500
pupil_event_regressor, 500
pupil_frequency_features, 501
pupil_labs_format (eyeprocess-import-vendors), 160
pupil_latency_sensitivity, 502
pupil_preprocessing_grid, 503
pupil_preprocessing_sensitivity, 503
pupil_response_kernel, 504
pupil_unit_fidelity_audit, 505
pupil_velocity_activity, 506

quantify_process_leakage, 506
query_eye_storage, 507

raven_reproduction_spec, 507
read_api_lifecycle_registry, 508
read_benchmark_table, 509
read_decision_manifest, 509
read_eye_dataset (eyeprocess-export-report), 157
read_eye_export (eyeprocess-adapters), 155
read_eye_folder (eyeprocess-adapters), 155
read_eye_generic (eyeprocess-import-generic), 160
read_eyelink_asc (eyeprocess-import-vendors), 160

read_eyelink_edf
(eyeprocess-import-vendors), 160
read_eyelink_report
(eyeprocess-import-vendors), 160
read_eyeprocess_validation_evidence, 510
read_gazepoint
(eyeprocess-import-gazepoint), 159
read_gazepoint_aoi_statistics
(eyeprocess-import-gazepoint), 159
read_gazepoint_biometrics
(eyeprocess-import-gazepoint), 159
read_gazepoint_combined
(eyeprocess-import-gazepoint), 159
read_gazepoint_events
(eyeprocess-import-gazepoint), 159
read_gazepoint_fixations
(eyeprocess-import-gazepoint), 159
read_gazepoint_folder
(eyeprocess-import-gazepoint), 159
read_gazepoint_gaze
(eyeprocess-import-gazepoint), 159
read_gazepoint_summary
(eyeprocess-import-gazepoint), 159
read_pupil_core
(eyeprocess-import-vendors), 160
read_pupil_neon
(eyeprocess-import-vendors), 160
read_pupillabs
(eyeprocess-import-vendors), 160
read_reproducibility_fingerprint, 510
read_smi (eyeprocess-import-vendors), 160
read_smi_aoi_export
(eyeprocess-import-vendors), 160
read_smi_event_export
(eyeprocess-import-vendors), 160
read_smi_raw_export
(eyeprocess-import-vendors), 160
read_tobii (eyeprocess-import-vendors), 160
read_validation_job_manifest, 511
read_validation_manifest
(eyeprocess-format-validation), 158
read_validation_scenario_manifest, 511
read_vendor_registry, 512
recalibrate_after_changepoint, 512
recommended_validation_replications, 513
recurrence_features (gaze_recurrence), 319
redact_validation_case, 514
register_aois (eyeprocess-trials-aoi), 164
register_coordinate_space
(eyeprocess-coordinates-time), 156
register_eye_adapter
(eyeprocess-adapters), 155
register_eye_api_status, 514
register_irt_model, 515
register_process_measure, 516
register_pupil_curves, 516
register_validation_case, 518
register_vendor_semantics, 519
remap_recording_ids
(eyeprocess-adapters), 155
report_eye_dataset
(eyeprocess-export-report), 157
report_processirt
(eyeprocess-export-report), 157
reporting_guideline_audit, 520
representative_scanpath, 521
response_matrix (eyeprocess-models), 161
response_time_matrix
(eyeprocess-models), 161
resume_eye_pipeline, 522
resume_validation_jobs, 523

rolling_apply
(eyeprocess-preprocessing), 162
roundtrip_eye_bids, 523
roundtrip_eye_dataset
(eyeprocess-format-validation), 158
run_benchmark_reproduction, 524
run_eye_benchmark, 525
run_eye_pipeline, 525
run_eyeprocess_equateirt, 526
run_eyeprocess_irt_ability_sbc, 527
run_eyeprocess_irt_recovery, 528
run_eyeprocess_mirtcat, 528
run_eyeprocess_stress_evidence, 529
run_eyeprocess_validation_program, 529
run_gazepoint_workflow, 531
run_model_validation, 532
run_posterior_sbc, 533
run_process_negative_controls, 533
run_process_sensitivity, 534
run_process_validation, 535
run_raven_reproduction, 536
run_sbc, 536
run_validation_jobs, 537

sbc_ecdf_deviation, 538
sbc_rank_diagnostics, 539
sbc_summary, 539
scanpath_dispersion
(representative_scanpath), 521
scanpath_sequence
(eyeprocess-features), 158
schema_coverage
(eyeprocess-format-validation), 158
schema_coverage_summary
(eyeprocess-format-validation), 158
schema_table (eyeprocess-schema), 163
score_partial_response_pattern, 540
score_process_deviation
(fit_process_norms), 294
score_response_stream, 540
segment_process_episodes
(detect_process_changepoints), 115
select_next_item_process, 541
semantic_fidelity_spec, 542
semantic_loss_map, 543
semantic_roundtrip_audit, 543
sensitivity_branch_fingerprint, 544
sensitivity_decision_leverage, 545
sensitivity_fragility_index, 545
sensitivity_missing_process
(eyeprocess-experimental), 157
sensitivity_mnar_process
(fit_process_observation_model), 296
sensitivity_multiverse_manifest, 546
sensitivity_process
(eyeprocess-quality), 163
sensitivity_rank_stability, 546
sensitivity_sign_stability, 547
sensitivity_significance_stability, 547
sensitivity_threshold_stability, 548
sequence_interoperability, 548
session_facet_effects, 549
set_eye_table (eyeprocess-class), 155
simulate_advanced_process_data, 550
simulate_dynamic_irtree_data, 551
simulate_eye_dataset
(eyeprocess-simulation), 164
simulate_eyeprocess_catr, 552
simulate_eyeprocess_irt_binary, 552
simulate_from_model, 553
simulate_gaze_diffusion_data, 554
simulate_irt_model, 555
simulate_multimodal_irt, 555
simulate_multimodal_m2, 556
simulate_multimodal_m3, 557
simulate_multimodal_m4, 559
simulate_presentation_variants, 560
simulate_process_cat, 560
simulate_process_irt
(eyeprocess-simulation), 164
simulate_process_validation_data, 561
simulate_strategy_mixture_data, 562
simulation_based_calibration, 562
simulation_rank_statistic, 563
software_paper_claim_matrix, 564
software_paper_coverage, 565
software_paper_evidence_bundle, 565
software_paper_gap_analysis, 566
software_paper_readiness, 567
software_paper_validation_table, 568
source_preservation_audit

(eyeprocess-format-validation), 158
specification_coverage, 568
specification_curve_data, 569
split_half_process_reliability, 569
split_validation_plan, 570
standardize_eye_table (eyeprocess-schema), 163
storage_transaction_manifest, 571
store_quality (eyeprocess-quality), 163
strategy_aoi_sensitivity, 571
strategy_classification_uncertainty, 572
strategy_label_switching_diagnostics, 572
strategy_posterior_probabilities, 573
streaming_score_history, 573
stress_test_latent_distribution, 574
stress_test_local_dependence, 574
stress_test_missingness, 575
stress_test_misspecification, 576
stress_test_preprocessing, 576
stress_test_process_pipeline, 577
stress_test_speededness, 578
stress_test_summary, 578
stress_tolerance_frontier, 579
structural_transition_mask, 579
summarise_aoi_membership (assign_aois_probabilistic), 34
summarise_eye_benchmark, 580
summarise_eyeprocess_stress_evidence, 581
summarise_process_negative_controls, 581
summarise_process_sensitivity, 582
summarise_process_validation, 582
summarise_validation_acceptance, 583
summarize_fixations (eyeprocess-features), 158
summarize_parameter_recovery, 583
summarize_process_windows, 584
summary.eye_dataset (eyeprocess-class), 155
summary.eye_format_validation (eyeprocess-format-validation), 158
summary.eye_parameter_recovery (eyeprocess-simulation), 164
summary.eye_validation_bundle, 584
summary.eye_validation_job_plan, 585
summary.eyeprocess_model (eyeprocess-models), 161
supported_eye_formats (eyeprocess-adapters), 155
synchronize_eye_biometrics (eyeprocess-coordinates-time), 156
synthetic_corruption_plan, 585

theory_strategy_spec, 586
timestamp_fidelity_audit, 588
trace_item_decision (build_evidence_graph), 76
transform_aoi_composition (derive_aoi_composition), 109
transition_entropy (eyeprocess-features), 158
transition_matrix (eyeprocess-features), 158
transition_residual_diagnostics, 589
trial_table (eyeprocess-features), 158

uncertainty_budget (process_uncertainty_spec), 490
unregister_eye_adapter (eyeprocess-adapters), 155
update_person_score, 589
upgrade_eye_dataset, 590
upgrade_eyeprocess_model, 591

validate_against_reference, 591
validate_benchmark_study, 592
validate_bids_eye_semantics, 592
validate_decision_manifest, 593
validate_engine_adapter, 593
validate_eye_corpus (eyeprocess-format-validation), 158
validate_eye_dataset (eyeprocess-class), 155
validate_eye_mapping (eyeprocess-adapters), 155
validate_eye_pipeline, 594
validate_eye_prov_graph, 594
validate_eye_source (eyeprocess-format-validation), 158

validate_eye_storage_metadata, 595
validate_eye_table (eyeprocess-schema), 163
validate_eyelink_export (eyeprocess-format-validation), 158
validate_eyeprocess_external_irt_fit, 595
validate_eyeprocess_irt_item_bank, 596
validate_eyeprocess_irt_model_spec, 596
validate_eyeprocess_joint_process_irt_spec, 597
validate_eyeprocess_validation_plan, 597
validate_feature_availability, 598
validate_gazepoint_workflow, 598
validate_generic_export (eyeprocess-format-validation), 158
validate_hed_event_semantics, 599
validate_irt_model, 599
validate_latent_space_process_similarity, 600
validate_model_object, 600
validate_multimodal_irt, 601
validate_multimodal_m2, 601
validate_multimodal_m3, 602
validate_multimodal_m4, 602
validate_process_measure_registry, 603
validate_process_validation_design, 604
validate_process_windows, 604
validate_pupillabs_export (eyeprocess-format-validation), 158
validate_smi_export (eyeprocess-format-validation), 158
validate_strategy_manipulation, 605
validate_tobii_export (eyeprocess-format-validation), 158
validate_vendor_semantics, 605
validate_vendor_timestamp_semantics, 606
validation_acceptance_matrix, 607
validation_acceptance_rule, 607
validation_bundle_manifest, 608
validation_calibration_summary, 609
validation_condition_id, 609
validation_condition_ranking, 610
validation_coverage_table, 610
validation_evidence_levels, 611
validation_evidence_matrix, 611
validation_failure_profile, 612
validation_failure_summary, 612
validation_failure_taxonomy, 613
validation_job_plan, 613
validation_ladder, 614
validation_manifest (eyeprocess-format-validation), 158
validation_mcse, 614
validation_mcse_profile, 615
validation_recovery_summary, 615
validation_recovery_table, 616
validation_replication_budget, 616
validation_report, 617
validation_robustness_score, 617
validation_runtime_summary, 618
validation_sbc_summary, 618
validation_scenario_manifest, 619
validation_seed, 620
validation_summary_mcse, 620
validation_thresholds, 621
vendor_schema_contract, 622
vendor_validation_spec, 623
verify_decision_manifest_lock, 624
verify_eyeprocess_validation_atlas, 624
verify_eyeprocess_validation_evidence, 625
verify_outcome_blind_snapshot, 625
verify_reproducibility_fingerprint, 626
verify_reproducibility_manifest, 626
visual_context_registry, 627

windowed_recurrence (gaze_recurrence), 319
write_advanced_model_evidence_report, 627
write_api_lifecycle_registry, 628
write_benchmark_data_dictionary, 629
write_decision_manifest, 629

write_eye_dataset
(eyeprocess-export-report), 157
write_eye_pipeline_report, 630
write_eye_storage, 630
write_eye_targets_template, 631
write_eyeprocess_validation_evidence, 632
write_eyeprocess_validation_report, 632
write_format_validation_report
(eyeprocess-format-validation), 158
write_gazepoint_workflow_report, 633
write_model_promotion_report, 633
write_partitioned_eye_storage, 634
write_prov_dot, 634
write_provenance
(eyeprocess-export-report), 157
write_reporting_guideline_report, 635
write_reproducibility_fingerprint, 635
write_software_paper_evidence, 636
write_software_paper_reproduction, 636
write_software_paper_scaffold, 637
write_validation_job_manifest, 637
write_validation_manifest
(eyeprocess-format-validation), 158
write_validation_release_report, 638
write_validation_report, 638
write_validation_scenario_manifest, 639
write_vendor_case_report, 639
write_vendor_registry, 640
write_vendor_validation_report, 640