Index

Acyclic directed graphs. See Bayesian networks Analogy, 50–53 Animals, 68, 191, 303–304, 307, 147-149, 152-153, 189-190, 204-205, 213, 367 Artifactual kinds, 331, 333, 350, 387 Associative view of causation. See Causal reasoning, regularity view of Bayesian networks, 171, 174-175, 177-183, 187, 189, 191, 203, 220, 305Bayes nets. See Bayesian networks Biology, 7, 34, 45-46, 47, 293, 294-295, 306, 385 Brain, 55, 128, 131, 132, 133-135, 138 Bugelski's law of constant learning, 22-24, 28, 36, 40 Causal Bayes nets. See Bayesian networks Causal code, 146, 154-157, 158 Causal maps, 300, 301-302, 303-304, 308, 315 Causal learning, 208, 214, 216 use of covariation in, 215 use of mechanism in, 216-217, 220 "Causal network instantiation." See Causal reasoning, synthesized approach to Causal power, 187, 190, 218-219, 227, 229-233, 241, 244, 246-248, 257-259, 268-269, 305 conjunctive, 227, 231-234, 236-238, 241-242, 245-248

generative, 230, 234, 237, 239-242, 245, 247 preventive, 230, 237, 239, 240-242, 245 Causal reasoning, 199, 273 and categorization, 191-192 mechanism view of, 200-202, 204, 206, 208, 218-221, 228, 261-269, 272 regularity view of, 202-208, 216-217, 219-221, 229, 266 synthesized approach to, 255-256, 269-273 Causal structure, 5, 6, 8, 109, 145-146, 149, 154, 158, 161, 337, 352, 384, 388-389 Causation, 9-10, 22-23, 29, 39-40, 47, 105-106, 108-109, 145, 152, 170, 200, 280, 285, 288, 292, 302, 306-307 definition of, 200 epistemic questions about, 200 Children, 92, 98, 109-111, 286-295, 307, 308, 318 causal understanding in, 110, 292, 304-305 as scientists, 66, 67, 92, 287, 289, 292, 294, 295 Cognitive development, 65, 80, 301, 305, 307, 308, 318 Cognitive labor, 102-106 Computer simulation, 38-45, 52-53, 55 data driven, 38-42 theory driven, 42-45 Concept learning, 365-368, 372, 385, 387 and concept formation, 366, 370-371, 377, 379-380, 382

with minimal knowledge, 376-379

Concept structure, 338, 344 and explanatory insight, 329-330, 338-339, 345-346, 352, 354-356 Conceptual combination, 327, 342, 350, 353 and feature inheritance, 333-334, 337, 353 noun-noun, 329, 331, 333 typicality of, 327-328, 332, 351 Conditional covariations, 205, 218-219, 221, 267, 270 Conditional independence, 182-183, 230-232 Connectionist models, 23-24, 63, 124, 132-133, 148-149, 153-154, 305 Consciousness, 98, 127-129, 138, 316-317 "Conspec" system, 148-149, 152-153 Constraints, 6, 8, 21, 42, 108, 149, 307 Context, 157-160, 161-163 Covariation view of causation. See Causal reasoning, regularity view of Directed graphs. See Bayesian networks Domains of knowledge, 7-8, 90-91, 98, 99, 103, 104, 107, 109, 110, 162, 286-287, 290, 291, 293, 295, 306, 311 D-separation. See Markov condition Elementary information processes (EIPs), 32-33 Elementary perceiver and memorizer (EPAM) theory, 23-26, 28-29, 40-41, 43 - 44Essentialism, 103, 294-295 Evolution, 135-136, 303, 314-316, 345, 352, 376 Experimentation, 45-46, 48, 308-309 Expertise, 103-104, 109-111 Explanation in concepts, 299, 361, 390 deductive nomological (DN) model of, 117-119, 127 definition of, 89, 179, 280 versus description, 22, 24-25, 30, 318 development of, 3-5, 61, 66, 286-295, 389 generalization of, 280-282, 288-291

intuitive, 3-4, 7, 279, 281 and knowledge, 89-90, 352 versus theories, 21, 99-103 types of, 64, 285-286, 292-295 Explanation-based reasoning. See Reasoning, knowledge-based Explanation in religion, 61 and agency, 77-82 apparent unnaturalness of, 64 versus explanation in theology, 71-72 naturalness of, 62, 65, 73-80, 82 and rituals, 75-76 Explanatory depth, 8, 79, 99-103, 107-109, 356, 364 and causal explanation, 105-106 Explanatory drive, 99-103, 107-109, 299-300, 311, 383 and affective response, 281, 312, 314 in children, 311-312 Explanatory hierarchies, 30-33, 35, 42-46, 55 Explanatory insight, 3, 4, 107 Explanatory laws, 26-28, 117-122, 140 as capacities, 122-126, 129-130, 132, 135 - 136as effects, 119-124, 130, 132, 134-136 Explanatory paradigms, belief-desire-intention, 127-129, 139 computational symbol processing, 129-133, 139 connectionist, 132-134, 139 evolutionary, 135-136 neuroscience, 133-135, 137, 139 Exploration, 308-310 Feature centrality, 346, 351 Frame problem, 192-193, 216 Framework theories, 386-387 Function. See Teleology Functional analysis, 125-126, 128-129, 135-137 Functionalism, 133, 160, 316-318 General problem solver (GPS) theory, 44-45, 49-50 Genetic determination, 151-152, 159

Germ theory, 40, 47, 204 Goals, 6, 127, 309–311

Imprinting, 147-149 learning systems in, 148-149, 152-153 neural systems in, 148 Infants, 98, 304, 306 walking in, 150, 153 Information processing, 32, 33, 35, 39, 55-56, 101, 161 Intention, 79, 89-90, 109, 127-129, 131, 137-138, 280, 285-286, 293, 345, 356, 389 Intermediate and medial hyperstriatum ventral (IHMV) system, 148-149, 153 Kepler's law, 21-24, 26, 35-36, 38-39, 42 Knowledge and concepts, 89, 92, 98, 101-105, 107, 110, 129, 153, 300, 362-363, 370, 372, 376 and feature learning, 373-383 and feature relatedness, 364, 369, 371, 375 - 381shallowness of, 364 Language, 4, 53, 63, 129, 157 Leibnitz's gap, 127-129, 132-135, 137, 138 Markov condition, 171, 174, 176–178, 184 Mathematics, 54, 56, 284, 286, 292 Memory, 44, 50, 51, 53, 97, 101 Mendelian genetics, 25-26, 33, 35 Methodology, 126-127, 130, 286, 316-321 Mind, 55, 78, 81, 128, 133, 300, 307 Natural kinds, 26, 110, 293, 330, 333, 350, 387 Neural networks. See Connectionist models Newtonian physics, 22, 24, 26-27, 42-43, 117, 120-121 Nonlinear dynamic systems, 95-96 Normative view of causation. See Causal reasoning, regularity view of "Overhypothesis," 389

Perception visual, 128, 302-303, 306, 313, 317 Phenomenology, 299-300, 309 affective measures of, 319-320 and children, 318-320 and the cognitive system, 313-321 and methodology, 316-321 and scientific discovery, 314-315 sexual, 313-314 and the visual system, 313-314, 317 Phenylketonuria (PKU), 158-160 Physical symbol system (PSS) hypothesis, 40-41, 55-56 Physics, 7, 22-24, 29, 34, 35-36, 45-46, 51, 306 Power PC theory. See Causal power Prediction, 8–9, 25, 28, 42, 52, 90–98, 119-120, 128, 124, 130, 284, 305, 307, 309 Probabilistic contrast model. See Causal power Problem solving, 30, 35, 53, 154-156, 312 Psychology, 32-33, 34, 40, 61, 65, 70, 90, 91, 94-95, 107, 121-122, 126, 128, 130, 134, 138, 189, 273, 306 Qualitative structure, 40, 41, 47-48 Quality of explanation, 7, 10, for children, 287, 289-292 for nonscientists, 281-283, 290 for scientists, 283-286, 290-291, 293 Reasoning, 209 abductive, 209-215, 269, 271 inductive, 10, 42, 94, 209-216, 220, 269, 307 knowledge-based, 205, 268 Recognition, 47-51 Representation, 50, 52-56, 77, 133, 300-301, 303, 305, 307, 309, 311, 314, 318, 380, 385 Rescorla-Wagner model, 188–189

Science, 76, 82, 88, 301, 309, 316
Scientific explanations, 5, 6, 21–24, 32, 61–62, 65–75, 82, 88, 91, 281, 289, 315

Scientific method, 33-34, 181, 281, 306, 309 and social structure, 36-38, 120-121, 315 Scientific specialization, 32, 34, 37-38 Scientists, 281, 283-285, 289, 290, 293 as children, 301 Spatial cognition, 303, 307 Special relativity, 54-55 Structural equations, 28-29 Symmetry, 147 causal, 147, 158 explanatory, 157-158, 159, 162 Teleology, 90, 109, 280, 285, 286, 292-293 Theories, 69-70, 92, 98-102, 118, 124, 282, 289, 290-292, 294, 299, 301, 306, 308, 329, 347, 355, 361-362 descriptive versus explanatory, 21-27, 34-35, 38-41, 46 scientific, 301-302 unified, 27-28 Theory-based reasoning. See Reasoning, knowledge-based Theory drive, 307-309, 312-313 Theory formation system, 300-301, 306-307, 313-316, 318, 320 "Theory theory," 300, 301, 305, 361 "Typical combination feature (TCF)," 331-332, 339, 347 "Typical noun feature (TNF)," 331-335, 340, 345, 348 Understanding, 89, 92, 97-98, 107, 280-281, 288 Unification problem, 137, 139-140