INDEX

absolute reward value defined, 177-180 learning mechanisms for, 176-177 strengthening-weakening (S/W) learning principle and, 178-180 ACCg brain region, social learning and, 255-257 accumulation test, delay of gratification and, 380 actinopterygians hippocampal pallium in, 164-168 research on, 6 spatial memory in, 160-164 actions, in behavior systems framework, 210-214 adaptation. See also prepared learning bottom-up research approach to, 37-44 complex cognition and, 319-320 co-opted mechanisms for, 412-414 ecological hypotheses in, 40-41 forgetting and, 83 generalist sources for specialization in, 45-47 implicit and explicit learning and, 234-235 learning and memory and, 2-4 mnemonic value of animacy and, 414-415 model lineage in research on, 33-47 Pavlovian conditioning and, 133-139 predator-induced phenotypic change in prey and, 145-146 proximate mechanisms in, 411-412 social learning and, 266-268 source memory and, 433-434 top-down research approach to, 44-47 adaptive bias, reinforcement learning and, 273-275 adaptive degradation, phenotypic variation and, 45

adaptive information seeking, memory evolution and, 402 adaptive memory constraints on, 461 contamination and, 415-416 evolution and, 7-8 fitness-relevant tunings and, 406-419, 466-467 mnemonic value of animacy and, 414-415 adaptive specialization evolution and, 6-9 generalist ancestry and, 45-47 genetics and, 461-465 adaptive value cognitive mapping and, 109 conditioned stimulus and, 199-200 of learning ability, 98-99 multi-stimulus interactions in, 73-74 of sensitization, 40-41 Adkins-Regan, E., 130-131 Adler, K., 109-110 AESOP model behavior systems theory and, 217-218 conditioned inhibition and backward conditioning in, 218-221 AFD thermosensory neurons, thermosensory learning in C. elegans and, 24-25 aging, habituation and, 17 Águila, Tamara del, 159-170 alcohol consumption, allele creation and, 271-272 allelic differences genetic variation in learning ability and, 92-94 prepared learning research and, 84-85 allocentric strategies, teleost hippocampal pallium structure and spatial mapping in, 164–168

Cambridge University Press & Assessment 978-1-108-48799-3 — Evolution of Learning and Memory Mechanisms Edited by Mark A. Krause , Karen L. Hollis , Mauricio R. Papini Index More Information

474 *

Index

Amici, F., 366-367 amnesia, cognition and, 392-393 amniotes brain function and cognition in, 105 evolution, 106 medial pallium/hippocampus in, 115-116 amphibians brain structure and spatial cognition in, 105-119 evolution in, 106 field research on navigation and spatial memory in, 107-109 future research on brain structure and function in, 118-119 laboratory research on spatial cognition, 109-114 medial pallium/hippocampus and, 115-116 spatial cognition and medial pallium function in, 116-118 amygdala frustration and fear response and, 187-188, 463 homoplasy and, 463-464 reproductive fitness and, 129-130 animacy mnemonic value of, 414-415 survival processing paradigm and, 407 animals, learning and memory in behavior systems framework and, 210-214 cognitive control tasks and, 385-386 constraints on learning and, 454-455 cultural niche construction and evolution in, 271-272 episodic memory and, 302-313, 353 human-wildlife interactions and, 362-363 imitation and, 352 inheritance through social learning and, 266 language and rules in studies of, 352 memory capacity and, 342 memory evolution and, 339-354 reverse-reward contingency task and, 383-385 self-control and inhibition in framework of, 377-379 sequential stimuli and memory in, 346-347 shock stimuli and freezing behavior, 289-291 social learning and, 248-249 anomalies, in behavior systems framework, 215-216 Anselme, Patrick, 193-205

of, 143-145 antipredatory behaviors, cephalopod cognitive evolution and, 327-328 antlions (Neroptera/Myrmeleontidae), associative learning in, 56-57 anurans evolution of, 106 spatial cognition in, 105-119 apes causal learning in, 352 ecological pressures and cognitive evolution in, 320-322 future planning in, 326-328 social pressures and cognitive evolution in, 323-325 Aplysia ecological hypotheses for sensitization in, 38 - 44evolution of sensitization in, 35-36 generalist sources for specialization in, 45-47 homology and homoplasticity in, 464-465 neural hypotheses for learning in, 37-38 sensitization mechanisms in, 33-35 arbitrary localized stimuli, phenotypic variation in sexual behavior and, 134-138 Aristotle, 176-177 artificial selection genetic variation in learning ability and, 92-94 heritability and, 94-96 prepared learning research, 78-79 ASE gustatory neurons, gustatory learning in C. elegans and, 21-22 Ash1L gene, epigenetic modification of memory and, 440-443 ASH neurons, sensitization in C. elegans and, 19-20 asocial learning, defined, 247-248 associative learning. See also dissociative learning; nonassociative learning biological preparedness and, 72-75 in C. elegans, 21–26 general purpose long-term memory and, 340-341 insect nervous system and, 59-60 in insects, 52-59 intra- and inter-specific differences in learning and, 91-92 neural hypotheses for learning and, 37-38 research on, 454-455 robot stimuli and, 291-292

anthropogenic animal exploitation, overview

Index

* 475

self-control and inhibition in framework of, 377-379 in single-celled organisms and invertebrates, 52-64 social learning and, 255-257 spatial cognition in amphibians and, 110 specialization and, 350-351 stimulus generalization, predator-induced phenotypic change in prey and, 147-148 attentional processes, prepared learning and, 81 Australia, myna control case study in, 148-149 Australian magpies (Cracticus tibicen dorsalis), complex cognition in, 319-320 autoshaping task, suboptimal choice research, 201-202 aversion. See avoidance (learned) avoidance (learned) C. elegans aversive imprinting, 26-27 danger avoidance in insects and, 58-59 Dolabrifera sensitization to predators and, 41 - 44extinction and, 82-83 flavor aversion learning, 216, 456 gustatory learning in *C. elegans* and, 21–22 olfactory learning in C. elegans and, 22-24 awareness amnesia and, 393-394 implicit and explicit learning and, 234-236, 392-393 learning and, 96-97 metacognition and, 400-402 AWC olfactory neurons, olfactory learning in C. elegans and, 22-24 baboons, relational-matching-to-sample task studies in, 241-242 backward conditioning behavior systems framework, 218-221 contingency-based analysis, 220-221 bacteria associative learning in, 63 cAMP signaling and learning in, 63-64 Baddeley, Alan, 285 Baldwin effect, plasticity-first evolution and, 268-270 bandage effect, chemical defenses of Aplysia and, 40-41 Barclay, P., 431-432, 434 Bardet-Biedl syndrome genes, olfactory learning in C. elegans and, 22-24

Basile, B. M., 396-398 Batesian mimicry in insect food searching, 56-57 multi-stimulus interactions, 73-74 beacon guidance response, spatial cognition in amphibians and, 110-111, 116-118 bears (ursid) cognition evolution in, 363-369 human-wildlife interactions and, 362-363 integrated field and laboratory research on, 360-362 bees (Eucera berlandi), solitary bee, aversive learning in, 58-59 behavior. See also behavioral inhibition cognitive research on apes and reading of, 323-325 cost of learning and, 98-99 developmental bias in, 273-275 evolution and, 4-6 extinction and sequences of, 221-222 in free-ranging mynas, 150-153 habituation to nociceptive stimuli and, 20-21 insect learning and, 52-59 learning influence on, 125 salience of, 72-80 self-control and inhibition in framework of, 377-379 wildlife control and, 143-145 behavioral ecology hypotheses of, 41-44 in insects, 52-59 behavioral immune system, 415-416, 418-419 behavioral inhibition cognitive control tasks, 385-386 research on, 375-376 self-regulatory inhibition tasks, 382-385 without self-regulation, 382-386 behavioral innovations, developmental bias and, 274 behavior systems framework anomalies in, 215–216 arguments and disagreements within, 213-214 backward conditioning and, 218-221 conditioned inhibition and, 218-221 constraints on learning and, 455 data shortcomings in, 214 extinction and behavioral sequences, 221-222 flavor aversion learning and, 216 generalizability and, 216-222

guidelines and applications for, 210–223

Cambridge University Press & Assessment 978-1-108-48799-3 — Evolution of Learning and Memory Mechanisms Edited by Mark A. Krause , Karen L. Hollis , Mauricio R. Papini Index More Information

476 *

Index

behavior systems framework (cont.) incompatible goals in, 213 learning and, 210-214 limits of, 212-213 phenotypic variation in sexual behavior and, 134-138 uncertainties in, 214 Belay, A. T., 92-94 Bell, R., 426-432 belongingness, learning and, 454-455 Beran, Michael J., 367-368, 375-386 Bernhard, N., 19 Berriman, J. S., 40-41 bias in learning content-dependent biases, 254-255 context-dependent bias, 253-254 developmental bias, 273-275 innate bias, 78-79 sensory and perceptual bias, 81 social learning strategies and, 255 Bingman, Verner P., 105-119 biological functions, behavior systems framework and, 210-214 biological preparedness evolution of, 72-75 future research issues, 83-85 mechanisms for, 71-72, 80-83 selective associations, 80 birds. See also specific species cognitive complexity in, 317-318 cultural inheritance and mating preference in. 268 maternal effects and offspring viability, 132-133 plasticity-first evolution and learning in, 269-270 social learning and foraging in, 266 specialized memories in, 349 blackboxing strategy, social learning and, 255-257 black-capped chickadees (Parus atricapillus), 271-272 Blaisdell, Aaron P., 454-468 Blanchard, R. J., 293-294 Blattodea. See cockroaches blocking of multiple stimuli behavior systems theory and, 217-218 prepared learning and, 82 spatial cognition in amphibians and, 111-112 blowflies (Phormia regina), associative learning in, 56-57 blue gourami (Trichogaster trichopterus), Pavlovian conditioning, fertility, and reproductive investment in, 130-131

blue tits and great tits asocial learning and, 248-249 social learning in, 252–253 Boland, C. R. J., 107-109 Bolles, R. C., 463 Bonin, P., 416-418 "border cells," teleost hippocampal pallium and spatial mapping and, 167-168 bottom-up research methodology, neural sensitization and, 37-44 boundary geometry long-term potentiation and, 467-468 spatial cognition in amphibians and, 112–114, 116–118 survival processing and, 411-412 brain functionality in amphibians, 105-119 "cognition" in bears and, 359-360 commonality in mammals of, 181-182 information retention and, 438-440 insect plasticity and, 59-60 memory and demands on, 285-286 metabolic changes, learning-related, 167-168 social learning and, 266-268 Brandon, S. E., 221-222 Brattstrom, B. H., 109-110 breeding sites, amphibian navigation to, 107-109 Breland, K., 215-216, 454-455 Breland, M., 215-216, 454-455 Brenner, S., 15-16 bright-noisy-water experiment, aversion learning and, 216 Broglio, C., 167-168 Broschard, M. B., 232 Buchner, A., 428-430, 433-434 Buller, D. J., 411-412, 427-428 bumblebees (Bombus terrestris) color recognition in, 56 social learning in, 61–62 butterflies (Bicyclus anynana), mate selection learning in, 59 caching behavior corvid cognitive evolution and, 325-326 corvid evolution, ecological variability and, 321-323 specialized long-term memories and, 349 C. elegans associative learning in, 21-26 gustatory learning in, 21-22 habituation in, 16-19 learning and memory in, 15-27, 52-62

Index

* 477

nociceptive stimuli habituation in, 20-21 nonassociative learning in, 16-21 olfactory imprinting and transgenerational learning in, 26-27 olfactory learning in, 22-24 sensitization in, 19-20 structure and development of, 15-16 thermosensory learning in, 24-25 calcium/calmodulin-dependent protein kinase 1 (CAMK1), habituation studies and, 17 camouflage, cephalopod cognitive evolution and, 327-328 cAMP response element binding protein (CREB) evolution and learning and, 5 gating mechanism and epigenetic regulation of memory and, 443-445 gustatory learning in C. elegans and, 21-22 information retention and, 439 insect and vertebrate learning and, 63-64 long-term memory and, 17-18 olfactory learning in C. elegans and, 22-24 cane toads (Rhinella marina), navigation and spatial memory in, 107-109 captivity research, social learning of predators and, 149-150 capuchin monkeys (Sapajus apella), cultural niche construction in, 271-272 carry-over mechanisms, successive negative contrast studies, 182-184 caste-based learning, insect learning and, 60-61 categorization cognitive control and, 400 evolution of, 231-232 in humans, 231 caterpillar parasitoid (Microplitis croceipes), host location, 57-58 caudate nucleus, implicit-procedural learning and, 228 causal learning in apes, 352 cephalopods cognitive complexity in, 317-318 convergent cognitive evolution in, 326-329 ecological pressures on cognition in, 326-328 social pressures on cognition in, 328-329 "change in diet" hypothesis, 41–47 cheating detection algorithm, 425-428 expectancy violation and incongruity hypothesis and, 430-433 negative emotions linked to, 428-430

chemical defenses Aplysia sensitization and, 40-41 Dolabrifera, 41-44 Dolabrifera avoidance of predators and, 41-44 chemosensory adaptation habituation and, 19 sensitization in C. elegans and, 19-20 children content-dependent biases in, 254-255 cultural inheritance in, 266-268 explicit-declarative cognition in, 241-242 memory constraints in, 459-461 self-control research in, 380 social learning in, 252-253, 255-257, 323-325 survival processing paradigm and, 408-411 chimpanzees cultural niche construction in, 271-272 relational-matching-to-sample task studies in, 241–242 reverse-reward contingency task and, 383-385 self-control and tool use in, 381 Stroop-like test of cognitive control in, 385-386 choice commitment and, 377-379 self-control and, 377 smaller-sooner, larger-later choices, 379-380 chromatin conformation, gating mechanism and epigenetic regulation of memory and, 443-445 Church, Barbara, 227-243 Cimino, G., 41-44 circadian rhythms, insect learning and, 60 - 62circular arena research, spatial cognition in amphibians, 111-114 citrus greening disease, mate selection learning in psyllids and, 59 classical conditioning bear behavior and, 362-363 behavioral inhibition and, 382-386 blocking and overshadowing in, 82 neural hypotheses for learning and, 37-38 nonspatial memory in teleosts and, 168 - 170spatial cognition in amphibians and, 110-111 trace procedures in, 168-170, 303-310, 346-347, 351-353, 411-412, 445

Clayton, Nicola S., 317-330

478 *

Index

cockroaches Periplaneta americana, context-dependent discrimination learning in, 56 Rhyparobia maderae, operant conditioning research on, 60-62 cognition amnesia and, 392-393 bears (ursid) and evolution of, 363-369 complex cognition, evolution of, 317-330 content of memory and, 343-344 convergent cognitive evolution, 320-326 dissociative learning and, 227, 241-242 episodic memory and, 302-304, 311-312 evolution of, 85, 406-407 genetic variation in learning ability and, 92-94 insect learning and, 89-90 predator-induced phenotypic change in prey and, 146-148 quantification of insect learning ability and, 90-92 self-control and, 375-379 spatial cognition in amphibians, 105-119 cognitive attractors, content-dependent biases and, 254-255 cognitive control tasks, self-regulatory inhibition and, 385-386 cognitive heuristics, social learning and, 250-252 cognitive load expectancy violation and, 432 metacognition research and, 397 cognitive mapping in amphibians, 105, 109 evolution, learning and memory and, 6 telencephalic reversion in teleosts and, 164-168 in teleost fish, 160–164 cognitive monitoring, 392-402 coincidence detectors, constraints on, 463 collective behavior in apes, cognitive evolution and, 323-325 complex cognition and, 319-320 in corvids, cognitive evolution and, 325-326 social niche construction, 272-273 commitment, self-control and inhibition and, 377-379 common ancestry, phenotypic variation and, 463-464 comparative cognition, primate studies of, 311-312, 456-458 comparative psychology cognition in bears and, 359-360

cultural inheritance and, 266-268 dissociative learning and, 227-243 early research on learning and memory and, 5-6 field versus laboratory research in, 360-362 implicit-procedural learning and, 228 learning and memory and, 2-6 self-control and, 375-376 spatial cognition, laboratory research on, 109-114 compensatory responses, wildlife control and, 143-153 competition ape cognition and, 323-325 cephalopod cognition and, 328-329 complex cognition and, 323-326 corvid cognition and, 325-326 complex cognition, evolution of, 317-330 conditional probability, evolution of preparedness and, 74-75 conditioned ejaculatory preferences, Pavlovian conditioning and, 133-138 conditioned emotional response (CER) paradigm, backward conditioning and, 218-221 conditioned fertility effect, Pavlovian conditioning and, 130-131 conditioned inhibition, behavior systems framework, 218–221 conditioned stimulus (CS) autoshaping task experiment, 201-202 in behavior systems framework, 215-216 contexts as, 289-291 definition of, 288 fertility and reproductive investment, 130-131 misperceptions of, 287 reliability and, 73, 200-202 repetition and, 287-288 reproductive behavior and, 126-127 reproductive physiology and, 127-130 robot as stimuli, 291–292 suboptimal choice research, 193-194, 196, 198-200 temporal contiguity in, 456-457 conflict management, in apes, cognitive evolution and, 323-325 constraints on learning artificial selection and, 79 behavioral sequences and extinction, 221-222 comparative cognition and, 456-458 experimental evolution and, 79-80

Index

memory and, 339-340, 342-343, 454-468 overview of, 60-62 prepared learning, 71 sensory and perceptual bias, 81 suboptimal choice and, 193-194, 198-200 survival processing paradigm, 408-411 consummatory responses behavior systems theory and, 217-218 in mammalian successive negative contrast studies, 181-182 contamination, mnemonic value of, 415-416 content-dependent biases, social learning and, 254-255 context-dependent discrimination learning frequency-dependent strategies, 252-253 in honeybees, 56 host location and, 57-58 implicit-procedural learning and, 228 insect food source location and, 56 self-control and choice and, 377 synaptic plasticity and, 439-440 "who" strategies in social learning and, 253-254 contextual cues conditioned stimulus and, 289-291 memory of multiple items in context and, 304-307 phenotypic variation in sexual behavior and, 134-138 control. See self-control convergent cognitive evolution, 320-326 in cephalopods, 326-329 ecological pressures in, 320-323 social pressures in, 323-326 Cook, G. I., 431-432 Cook, R. G., 342 cooperation in apes, cognitive evolution and, 323-325 in bears, cognitive research on, 360-362 cephalopod cognition and, 328-329 complex cognition and, 323-326 in corvids, cognitive evolution and, 325-326 enhanced memory and, 425-428 expectancy violation and cheaters and, 431-432 in wild animals, 365-367 "copy if better" strategy, social learning and, 247-257 "copy the majority" strategy, social learning and, 252-253 cortical circuits, epigenetic regulation of long-term memory and, 446-447 cortico-striatal habit memory system, evolution of, 400-402

* 479

corvids cognitive complexity in, 317-318 ecological pressures and cognitive evolution in, 321-323 future planning in, 326-328 social pressures and cognitive evolution in, 325-326 Cosmides, L., 425-428 Costa, S. S., 167-168 cost-benefit analysis of learning, 96-99 costs of information, social learning and, 252-253 memory and, 98-99, 285-286, 339-340 negative memories and, 428-430 Coverdale, Michelle E., 406-419 crickets field crickets (Teleogryllus oceanicus), social learning in, 61-62 wood crickets (Nemobius sylvestris), social learning in, 61-62 Crossley, M. J., 231-232 cross talk, epigenetic regulation of long-term memory and, 446-447 cryptic habitat, 41-44 Crystal, Jonathon D., 302-313 cued-recall mechanism, successive negative contrast studies, 182-184 cue guidance bear cognition and, 367-368 Pavlovian conditioning and, 126-127 plasticity-first evolution and, 268-270 spatial cognition in amphibians and, 110 cultural inheritance content-dependent biases and, 254-255 evolutionary process and, 266-268 niche construction and, 271-272 social learning and, 247-248, 266 cultural intelligence hypothesis, social learning and, 266-268 cumulative culture, 247-257 cuttlefish (Sepia officinalis), cognitive evolution in, 326-328 cytoarchitectural organization future research on, 118-119 medial pallium in amphibians and, 115-116 cytochrome oxidase, teleost hippocampal pallium, and spatial mapping and, 167-168 cytoplasmic exchange, slime mold salt habituation and, 62-63 damselflies (Calpteryx splendens), mate

selection learning in, 59 Daneri, M. F., 110

480 *

Index

danger, insect avoidance learning, 58-59 deceptive pollinators, aversive learning in bees and, 58-59 decision-making dynamic cognitive monitoring of, 398-400 source memory and, 433-434 declarative memory, 159-160 decline test response for metacognitive monitoring in monkeys, 394-396 nonintrospective metacognition research, 396-398 defensive behavior, 290-292, 294-296 deferred-blocked reinforcement, 239-240 delayed match-to-sample experiments (DMTS), memory for single stimuli, 344-346 delay-related choice delay discounting, 375-376 delay of gratification, 380, 383-385 general-process learning and, 456-457 self-control and, 375-376 sequential stimuli and short-term memory research, 456-458 suboptimal choice research, 199-200 de novo behaviors, digital evolution and, 79 Derringer, C. J., 416-418 description paradigm enhanced memory and, 426-427 expectancy violation and, 431-432 Desjardins, C., 127-130 deterministic development, in C. elegans, 15-16 detour task, self-regulatory inhibition, 382-383 developmental bias, learning, and generation of, 273-275 developmental stages insect learning and, 60-61 self-control and, 375-376 Dexheimer, Andreia F., 71-85 diacetyls, olfactory learning in C. elegans, 22-24 Dictator game, source memory and, 433-434 Didelphid marsupials, 180-187 diet. See also foraging behavior cognition in bears and, 359-360, 364, 366-367 cultural niche construction and, 271-272 cultural transmission and, 269 ecological pressures on, 320-323, 326-328 evolution and, 45-47 fitness and, 97-98 predator avoidance and, 41-44

digital evolution, preparedness research and, 79 dimensional categorization, explicit and implicit learning systems, 231-232 Diptera. See flies and mosquitoes (Diptera), associative learning in Diquelou, Marie C., 143-153 directed forgetting, cognitive control and, 400 disgust as evolutionary process, 415-416 expectancy violation and, 431-432 displaced reinforcement, learning in monkeys and, 240-241 disruptive selection, genetic variation in learning ability and, 92-94 dissociative learning amnesia and, 392-393 cognition research and, 241-242 comparative perspective on, 227-243 implicit-procedural learning, 228 memory of multiple items in context and, 304-307 reinforcement paradigms, 236-240 research methodology, 229-231 systems of, 228-229 distress vocalizations, 149-153, 180-182 DNA methylation, epigenetic regulation of long-term memory and, 445-447 DNA methyltransferases, epigenetic modification of memory and, 440-443 DNMT inhibitors, epigenetic regulation of long-term memory and, 445-447 Dolabrifera bottom-up research on neural sensitization in, 37-44 ecological hypotheses for sensitization in, 41-44 evolution of neural sensitization in, 35-36 generalist sources for specialization in, 45-47 neural hypotheses for learning in, 37-38 phenotypic variation and adaptive degradation in, 45 reductionistic research on neural sensitization in, 36 domain-general and domain-specific capacities adaptation and, 8 emotion and memory and, 428-430 enhanced memory for cheaters and, 427-428 episodic memory and, 353 social learning and, 255-257 ultimate versus proximate accounts,

412-414

Cambridge University Press & Assessment 978-1-108-48799-3 — Evolution of Learning and Memory Mechanisms Edited by Mark A. Krause, Karen L. Hollis, Mauricio R. Papini Index More Information

Index

481

Domjan, Michael, 133-139, 288 DOP-1 (dopamine D1-like receptor), habituation and, 18-19 dopamine release habituation and, 18-19 implicit-procedural learning and, 236 Drosophila. See fruitflies (Drosophila melanogaster) Dunbar, R. I. M., 359-360, 425-428 Dunlap, Aimee S., 71-85 Durán, E., 161-167 Eastern red-spotted newts (Notophthalmus viridescens), navigation, and spatial memory in, 107-109 Ebbinghaus, H., 406-407, 411-412 ecological hypotheses arguments and disagreements over, 213-214 behavior systems framework and, 212-213 cost of learning and, 98-99 data shortcomings and, 214 ecological intelligence hypothesis, 319-320 incompatible goals and, 213 niche construction and, 271-272 sensitization in Dolabrifera and Aplysia and, 38-44 uncertainties in, 214 ecological pressures ape cognitive evolution, 320-322 cephalopod cognition and, 326-328 corvid cognitive evolution, 320-323 egocentric turn response spatial cognition in amphibians and, 110-111, 116-118 teleost hippocampal lesion studies and, 164-168 Ehrenberg, K., 431–432 elaborate-rich encoding survival processing and, 411-412 ultimate versus proximate accounts, 412-414 Eldridge, G. D., 217-218 electric shock, sensitization of Aplysia using, 38 - 44Elliott, M. H., 179-182 Emery, N. J., 321-323 emotional responses activation of, 182-184, 187-188 in mammalian successive negative contrast studies, 180-182 memory and, 428-430 nonrewards and, 187-188 emulation, social learning and, 248-249

energy budget rule, suboptimal choice research, 193-194 engram neurons epigenetic regulation of long-term memory and, 446-447 information retention and, 439 enhanced learning and memory cheating and, 425-428 costs of, 98-99 emotion and, 428-430 experimental evolution research on, 78-79 fitness and benefits of, 97-98 social learning and, 255-257 Enquist, Magnus, 339-354 environmental factors C. elegans associative learning and, 25-26 ecological intelligence hypothesis and, 319-320 habituation, 18-19 insect learning and, 61 niche construction, learning and, 270-273 plasticity-first evolution and, 268-270 self-control and, 375-376 suboptimal choice research, 193-205 epigenetics cellular memory and, 440 evolution, learning and memory and, 6 gating mechanism of memory and, 440, 443-445 long-term memory stabilization and, 445-447 memory circuits and, 438-448 memory formation and modification and, 440-443 nervous system evolution and, 63 regulation in, 438-448 episodic memory adaptive specialization and, 8-9 in animals, 302–313, 353 in apes, evolution of, 320-322 central hypothesis of, 303 cephalopod cognitive evolution and, 326-328 cognition and, 302-304, 311-312 replay of, 303, 307-310 semantic memory and, 302-303 verbal material and, 424-425 European newts, navigation, and spatial memory in, 107-109 EVE (robot), experiment with, 291-292 event-related potentials, survival processing and, 411-412 evolutionary processes adaptive specialization and, 6-9 in amphibians, 106

482 *

Index

evolutionary processes (cont.) animal memory and, 339-354 in apes, ecological pressures on, 320-322 bears (ursid) cognition and, 359-370 biological preparedness mechanisms, 71-72 cognitive complexity and, 317-330, 406-407 complex cognition, 317-330 content of memory and, 343-344 in corvids, ecological pressures and, 321-323 cultural inheritance and, 266-268 cultural niche construction and, 271-272 disgust as, 415-416 frequency-dependent strategies and, 252-253 general learning processes and, 4-6 insect learning and, 89-100 learning and, 4-6, 265-276 metacognition and, 398-400 mnemonic processes, 406 Pavlovian conditioning and, 133-139 plasticity-first evolution, 268-270 predator-induced phenotypic change in prey and, 145-146 of preparedness, 71 proximate mechanisms and, 427-428 source memory, social relevance and, 424-434 suboptimal choice research, 193-205 ultimate explanations versus proximate mechanisms in, 412-414 ultimate versus proximate explanations in, 412-414 exchange tasks, self-control and, 380-381 excitability. See also neural circuitry; synapses sensitization and, 33-36, 464-465 expectancy violation, source memory and, 430-433 expectations, source memory and, 426-427 experimental evolution technique future research using, 83-85 heritability studies, 94-96 limitations and challenges of, 79-80 prepared learning research, 78-79 explicit-declarative learning adaptation and fitness and, 234-235 adaptive specialization and, 8-9 category rules and, 232-234 cognition and, 241–242 dissociable learning and, 228-229 implicit-procedural learning and, 235 memory and, 392-393, 400-402

exploratory mechanisms, problem-solving and, 274 extinction behavioral sequences in behavior systems framework, 221-222 in mammalian successive negative contrast studies, 180-182 in nonmammalian vertebrates, successive negative contrast studies, 186-187 prepared learning and, 82-83 rewards and, 177-178 facial recognition, enhanced memory and, 426-427 Fagot, J., 241-242, 342 familiarity hypothesis episodic memory and, 303 memory of multiple items in context and, 304-307 replay of episodic memories and, 307-310 familiarity signals, memory system evolution and, 400-402 Fanselow, Michael, 285-299, 463 fast-flexible learning, benefits of, 96-97 fear conditioning context in, 289-291 epigenetic regulation of long-term memory and, 445-447 episodic memory and, 296–297 gating mechanism and epigenetic regulation of memory and, 445 successive negative contrast studies, 187-188 feedback systems gating mechanism and epigenetic regulation of memory and, 443-445 memory evolution and, 402 reinforcement learning and, 236 female birds, sexual learning in, 134-138 Fernandes, N. L., 416-418 fertility and fertilization maternal effects, 132-133 Pavlovian conditioning and, 125, 127–131, 138-139 phenotypic variation in sexual behavior and, 133-138 fight-or-flight response, survival processing and, 408 fire-bellied toad (Bombina orientalis), spatial cognition in, 109-110 fish cultural inheritance and social learning in, 266

cultural niche construction in, 271-272

Index

+ 483

fishing, behavior systems framework and, 210 fitness implicit and explicit learning and, 234-235 learned behavior for enhancement of, 274-275 learning ability and, 97-98 memory and relevant tunings in, 406-419 mnemonic value of survival processing and, 407-414 processing for, 408-411 proximate mechanisms for relevance in, 411-412 relevance of items for, 408-411 ultimate explanations vs. proximate mechanisms in, 412-414 Flack, J. C., 272-273 flag model of plasticity, 74-75 future research using, 83-85 flanker tests, cognitive control and, 385-386 flavor aversion learning, behavior systems framework, 216, 456 flies and mosquitoes (Diptera), associative learning in, 56-57 FLP-20 neuropeptide habituation and, 17-18 sensitization in C. elegans and, 19-20 food, as conditioned stimulus, 288 food density, suboptimal choice research and, 198-200 food source location bear cognition and, 363-369 context-dependent discrimination learning and, 56 insect learning and, 52-56 foraging behavior bear cognition and, 363-369 cephalopod cognitive evolution, 326-328 cognition in bears and, 359-360, 366 complex cognition and, 319-320 content-dependent biases and, 254-255 corvid evolution, ecological variability and, 321-323 in corvids, cognitive evolution and, 325-326 cultural niche construction and, 271-272 Dolabrifera avoidance of predators and, 41-44 evolution of preparedness and, 74-75 preference for suboptimality and, 198-200 social learning in animals and, 266 social learning in insects and, 61-62 suboptimal choice research, 194 foraging gene, genetic variation in learning ability and, 92-94

absolute and relative reward values and, 178-180 for metacognitive monitoring in monkeys, 394 foresight, in apes, evolution of, 320-322 forgetting directed forgetting, cognitive control and, 400 prepared learning and, 83 forward engineering, memory research and, 407 forward replay, episodic memory and, 311 Fotowat, H., 167-168 four-arm maze studies, map-like spatial memory in teleost fish and, 161 free choice tests absolute and relative reward values and, 178-180 suboptimal choice research, 193-194 free recall tests, mnemonic value of animacy and, 414-415 freezing behavior cat and rat conditioning studies, 292-295 robot stimuli and, 291-292 shock stimuli and, 289-291 frequency-dependent social learning, 252-253 frogs. See also individual species, e.g., poisonarrow frog cognitive mapping in, 109 fertility and reproductive investment in, 130-131 spatial cognition and reproduction in, 108 - 109fruitflies (Drosophila melanogaster) associative learning in, 56-57 circadian rhythms and conditioning in, 60-62 environmental factors in learning by, 61 evolution of preparedness in, 76-77 fitness and benefits of learning in, 97-98 genetic variation in learning ability and, 92-94 heritability studies, 94-96 limits of experimental evolution research in, 79-80 social learning in, 61-62 sperm count, 128–129 fruitfly parisitoids (Biosteresarisanus), 57-58 frustration context in, 289-291 epigenetic regulation of long-term

forced choice tests

memory and, 445-447

484 *

Index

frustration (cont.) episodic memory and, 296-297 gating mechanism and epigenetic regulation of memory and, 445 successive negative contrast studies, 187-188 functional incompatibilities, memory system evolution and, 400-402 future planning, cognitive evolution and, 326-328 G9a/GLP complex, epigenetic modification of memory and, 440-443 GABAergic transmission, frustration and fear in successive negative contrast studies, 187-188 game theory, social niche construction and, 272-273 Garcia, J., 216, 287-288 Garcia effect, selective associations, 80 gating mechanism in memory, epigenetic regulation of, 440, 443-445 generalist ancestors theory, adaptive specialization and, 45-47 generalizability in behavior systems theory, 216-222 Pavlovian conditioning and, 295-296 generalization explicit category rules and, 232-234 of learning, 79 rewards and, 177-180 social learning mechanisms and, 182-184 stimulus generalization, 147-148 general-process learning arguments over theories of, 213-214 behavior systems framework and, 212-213 data shortcomings and, 214 evidence for, 456-459 extinction and behavior sequences in, 221-222 incompatible goals and, 213 memory processes and, 459 Pavlovian conditioning and, 126-127 uncertainties in, 214 general purpose memory episodic memory as, 353 learning costs of, 351-353 long-term memory, 340-343 short-term memory, 344-347 genetic accommodation, plasticity-first evolution and, 268-270 genetic assimilation, plasticity-first evolution and, 268-270

genetics in C. elegans, 15–16 cultural niche construction and, 271-272 evolution and learning processes and, 4-6 habituation and, 17 insect learning, intra- and inter-specific differences in, 61 learning ability variation and, 92-94 memory and, 285-286 predator-prey regime and, 295 regulation in, 84-85, 116-118 social learning in bears and, 365-367 transcription in, 21–22, 439–443, 445 genome and genomics C. elegans sequencing, 15-16 editing, 52-64 epigenetic modification and, 440-443 natural selection and, 4-6 phenotypic plasticity, 145-146 predation and, 295 prepared learning research and, 84-85 geomagnetic mapping, amphibian navigation and spatial memory and, 107-109 geometric cues medial pallium function and, 116–118 spatial cognition in amphibians and, 112-114 Gheselin, M. T., 41-44 Ghirlanda, Stefano, 339-354 gill-withdrawal reflex, 16-19 glutamate signaling olfactory learning in C. elegans and, 22-24 short-term habituation and, 17-18 goldfish. See also teleost fish frustration and fear in successive negative contrast studies, 187-188 hippocampal pallium structure and spatial mapping in, 164-168 map-like spatial memory in, 160-164 nonspatial memory in, 168-170 spatial cognition in, 110 successive negative contrast studies of, 184-187 Gómez, Antonia, 159-170 gonadal physiology, Pavlovian conditioning and neural mechanisms in, 129-130 Graham, J. M., 127-130 grammar, memory and, 393-394 Grant, D., 108 grasshoppers (Schistocerca americana), food location, and reproductive fitness in, 56 gratification, delay of, 380, 383-385 Greene, S. L., 341 Griffin, Andrea S., 143-153

Index

485

Griffin, A. S., 274 group behavior. See collective behavior Guan, Ji-Song, 438-448 Guez, D., 274 Guillette, L. M., 60 Gunst, N., 271-272 gustatory learning, in C. elegans, 21-22 Gutiérrez, G., 134–138 habituation environmental factors, 18-19 evolution, learning and memory and, 6 interstimulus interval and, 17 nonassociative learning, 16-19, 81-82 in plants, 63 in single-celled organisms and invertebrates, 52-64 haloperidol, successive contrast studies, 186-187 Hampton, Robert R., 392-402 hemoglobin S allele (HbS), niche construction and, 271-272 heritability estimations of, 94 genetic variation in learning ability and, 92-94 learning and memory in, 9 in natural populations, 96 selection and, 94-96 heuristics, social learning and, 250-257 Hilliard, S., 221–222 Hinnenkamp, J. E., 198-200 hippocampus in amphibians, 115-116 comparative anatomy of, 159-160 epigenetic regulation of long-term memory and, 445-447 episodic memory and, 296-297 information retention and, 438-440 memory in teleosts and, 159-170 nonspatial memory in teleosts and, 168-170 relational memory in tetrapods and, 159-160 replay of episodic memories and, 310-311 sensory integration mechanisms and, 294-295 telencephalic eversion in teleosts and, 164-168 in tetrapods, 118-119, 159 in vertebrates, 164-168 histone acetyltransferases (HATs), epigenetic modification of memory and, 440-443

histone deacetylase (HDAC) epigenetic modification of memory and, 440-443 epigenetic regulation of long-term memory and, 445-447 gating mechanism and epigenetic regulation of memory and, 443-445 histone proteins, epigenetic modification of memory and, 440-443 Hobert, O., 26-27 Hobhouse, L. T., 382-383 Holland, P. C., 466-467 Hollis, Karen L., 1-10, 52-64 holometabolus insects, associative learning in. 63 homeobox gene sequence, evolution and learning and, 5 homology constraints on learning and, 464-465 learning and, 63-64 homoplasy constraints on learning and, 463-464 learning and, 63-64 honevbees associative learning in, 56 aversive learning in, 58-59 environmental factors in learning by, 61 host location, 57-58 Hoover, B. A., 38 horses (Equus caballus), Pavlovian conditioning and sperm count in, 127-130 host location, insect learning and, 57-58 hoverflies (Eristalis tenax), associative learning in, 56-57 Hox genes evolution and learning processes and, 4-6 frustration and fear in successive negative contrast studies, 187-188 human learning cultural inheritance and, 266-268 dimensional categorization and, 231 fitness-relevant tunings in adaptive memory and, 406-419 human-wildlife interactions and, 362-363 memory and, 393-394 niche construction and, 271-272 social learning, 252-253 human predation foraging and, 364 overview, 143-145 phenotypic change and, 150-153 Humphrey, N. K., 359-360 hunting, behavior systems framework and,

Cambridge University Press & Assessment 978-1-108-48799-3 — Evolution of Learning and Memory Mechanisms Edited by Mark A. Krause , Karen L. Hollis , Mauricio R. Papini Index More Information

486 *

Index

hymenopterans. See wasps; specific species, e.g., honeybees imitation animal behavior studies, 352 social learning and, 248-249 immediate cat deficit, cat and rat conditioning studies, 293-294 immediate shock deficit, conditioning studies and, 289-291 implicit memory amnesia and, 392-393 evolution of, 400-402 implicit-procedural learning, 228 adaptation and fitness and, 234-235 explicit-declarative learning and, 235 reinforcement in, 228, 236 impulsivity, self-control tests of, 375-376 incentive hope autoshaping task experiment, 201-202 uncertainty-induced behavioral sensitization, 203 incentive salience hypothesis, suboptimal choice research, 194, 196-198 incentive salience theory partial reinforcement and conditioned stimuli reliability, 200-202 in suboptimal choice research, 196-198 incongruity hypothesis, source memory and, 430-433 increased excitability (IE) Aplysia neuron sensitization, 33-35 neural hypotheses for learning and, 37-38 individual differences animal behavior and, 91-92 flexibility, social learning evolution and, 255 information integration (II) category rules and, 232-234 deferred-blocked reinforcement, 239-240 dimensional categorization and, 231-232 implicit and explicit learning systems, 229-231 memory evolution in animals and, 339-340 one-back reinforcement and, 237-239 information models cost of learning and, 98-99 memory research and, 406-407, 438-440 reliability in, 73 unexpected information, expectancy violation, and incongruity hypothesis and, 430-433 information seeking studies, evolution of metacognition in, 398-400

Ingle, D., 110 inhibitory control, reverse-reward contingency task and failure of, 383-385 innate bias experimental evolution research on, 78-79 robot stimuli experiments and, 292 innate recognition, 291-292 conditioned stimulus and, 293-298 Innis, N. K., 211–212 innovation cognitive research on apes and, 323-325 cultural inheritance and, 266-268 developmental bias and, 274-275 insect learning, 52-64 avoidance learning, 58–59 behavioral ecology of, 52-59 constraints on, 60-62 costs of, 98-99 developmental stages and, 60-61 environmental factors, 61 evolutionary processes in, 89-100 fitness and benefits of, 97-98 food location and, 52-56 host location, 57-58 intra- and inter-specific genetic differences in, 61 mate selection and, 59 nervous system properties and, 59-60 plasticity and variation in, 59-62 quantification of ability in, 90-92 sex differences in, 61 social learning, 61-62 table of insect classes, 52-53 instinctive drift, learning constraints and, 455 instrumental learning, memory and, 342-343 insulin signaling pathways salt avoidance in C. elegans and, 22 thermosensory learning in C. elegans and, 25 intelligence ecological and social hypotheses, 319-320, 359-360 evolution of, 247-248, 266-268, 317-318 intentionality cognitive research on apes and, 323-325 social learning and, 248-249 intermediate-term memory, habituation and, 17-18 interstimulus interval (ISI) C. elegans habituation to nociceptive stimuli and, 20-21 general-process learning and, 456–457 habituation and, 17

Cambridge University Press & Assessment 978-1-108-48799-3 — Evolution of Learning and Memory Mechanisms Edited by Mark A. Krause , Karen L. Hollis , Mauricio R. Papini Index More Information

Index

intertemporal choice definitions, 377 research, 375-376 tasks, 379-382 intertemporal tasks, self-control and, 379-380 intra- and inter-specific learning differences associative learning and, 91-92 similarities in short-term memory among species, 458-459 intracellular signaling, evolution of neural sensitization and, 36 introspective metacognition, tests for, 396 invasive species, impact of, 143-145 invertebrates, learning in, 52-64 cognitive complexity and, 317-318 cultural inheritance and social learning in, 266 involvement paradigm, enhanced memory and, 426-427 item-in-context memory, 304-310 Jackson, Brooke N., 227-243 Japanese quail (Coturnix japonica) extinction and behavior sequences in, 221-222 fertility and reproductive investment in, 130-131 phenotypic variation in sexual behavior and, 134-138 sperm competition and reproductive success in, 131-132 sperm count and Pavlovian conditioning in, 127–130 Jin, X., 26-27 Jolly, A., 359-360

Kaplan-Meier survival curves, behavior change in free-ranging mynas, 150-153 Kauffmann, A. L., 23 Kawecki, T. J., 76-79 Kendal, Rachel, 247-257 Killeen, P. R., 215-216 killer whale (Orcinus orca), 268-270 Kim, J. J., 291-292 kinship absence in cephalopods of, 328-329 memory and, 416–418 kissing bugs (Rhodinus prolixus), insect learning and, 60-62 Klauer, K. C., 431-432 Klein, S. B., 408-411, 416-418 Kodama, E., 25 Koelling, R. A., 216, 287-288

Köhler, W., 382–383 Konorski, J., 217–218 Kostic, B., 416-418 Kotrschal, A., 79 Krause, Mark A., 1-10, 133-139 Kriete, Alexis Lillian, 52-64 Kroneisen, Meike, 424-434 lactase persistence, 271-272 Laland, Kevin, 265-276 language in animal studies, 352 memory and cognition and, 8-9 latent inhibition, 105, 111-114, 440-443, 458-459 Law of Effect, 454-455, 466-467 leafcutter ants (Acromyrmex ambiguous), aversive learning in, 58-59 learned cues amphibian navigation and spatial memory and, 107-109 in honeybees, 56 host location, 57-58 insect food location and, 52-56 multi-stimulus interactions, 73-74 mynas social learning research and, 149-150 preparedness in fruitflies and, 76-77 learning. See also prepared learning; specific learning categories, e.g., associative learning adaptive evolution models, 33-47 behavior and, 125 behavior systems framework and, 210-214 constraints on, 454-468 cost-benefit analysis of, 96-99 developmental bias and, 273-275 evolution and processes in, 4-6, 265-276 generalist sources for adaptive specialization and, 45-47 neural mechanisms in, 465-466 niche construction and, 270-273 overview of research on, 1-2 plasticity-first evolution and, 268-270 processes and adaptive specialization in, 2-4 specialization and, 6-9 learning ability benefits of, 97-98 costs of, 98-99 genetic variation in, 92-94 heritability studies, 94-96

insect learning and, 89-90

quantification of, 90-92

487

Cambridge University Press & Assessment 978-1-108-48799-3 — Evolution of Learning and Memory Mechanisms Edited by Mark A. Krause , Karen L. Hollis , Mauricio R. Papini Index More Information

488 *

Index

Liefting, Maartje, 78, 89-100 light-gated ion channels, habituation and, 17 Lind, Johan, 339-354 local enhancement, asocial learning and, 248-249 locomotion C. elegans habituation to nociceptive stimuli and, 20-21 mynas social learning research and, 149-150 locusts (Locusta migratoria), food location and reproductive fitness in, 56 Logue, A. W., 456 long-term depression (LTD), synaptic plasticity and, 439-440 long-term memory (LTM) bear cognition and, 368-369 costs and benefits of, 285-286 epigenetic stabilization of, 445-447 general purpose LTM, 340-341 habituation and, 17-18 in mammalian successive negative contrast studies, 181 mechanism for immediate perceptual identification and, 297-298 molecular mechanisms for, 17-18 olfactory learning in C. elegans and, 22-24 specialized memories, 348-349 long-term potentiation (LTP) brain function and demands of, 285-286 memory mechanisms and, 467-468 neural hypotheses for learning and, 38 synaptic plasticity and, 439-440 López, J. C., 161-164 Lorenz, K., 33 Lucas, G. A., 210-222 Lukas, D., 90-91 Machiavellian intelligence, complex cognition and, 319-320 MacKillop, E. A., 130-131 MacLean, E. L., 382-383 mammals cognitive complexity in, 317-318 cultural inheritance and social learning in, 266 reward relativity in, 180-187 successive negative contrast reward studies in, 180-182 map-like spatial memory, 159, 164-168 marine reserves, ecological consequences for sensitization in, 38-44 Marr, D., 466-467 marshmallow test, delay of gratification and, 380

Maruyama, I. N., 23 maternal effects on offspring viability, 132-133 mate selection cephalopod cognition and, 328-329 cultural inheritance and, 266-268 mnemonic value of mating-related processing, 416-418 plasticity-first evolution and learning and, 270 Matthews, R. N., 131-132 Mayr, E., 4-6 Mazur, R., 366 McCain, G., 177-178 Mealey, L., 425-426 mechanism for immediate perceptual identification (MIPI), evolution of, 297-298 mechanosensory neurons environmental factors, 18-19 molecular mechanisms, 17-18 sensitization, 19-20, 33-35 transduction, habituation and, 17 medial pallium cognitive mapping in amphibians and, 109 nonspatial memory in teleosts and, 168-170 relational memory in tetrapods and, 159-160 spatial cognition in amphibians and, 116-118 structure and organization of, 115-116 in tetrapods, 118-119, 159 medial prefrontal cortex (mPFC), long-term memory and, 445-447 memory adaptive evolution models, 33-47 adaptive specialization and, 6-9 amnesia and, 392-393 animals and evolution of, 339-354 capacity of, 342 causal learning in apes, 352 cognitive control and, 400 consolidation, 84-85, 440-443 constraints on, 459-461 content of, 343-344 costs and benefits of, 98-99, 285-286, 339-340 duration of, 341 emotion and, 428-430 enhanced memory, 425-428 epigenetic modifications and, 440-443 fitness relevance and, 418-419 forward engineering research on, 407

Index

+ 489

gating mechanism and epigenetic regulation of, 440, 443-445 general purpose long-term memory, 340-343 information retention and structure of, 438-440 intra- and inter-specific differences in formation of, 91-92 introspective metacognition and, 396 mate-related processing, mnemonic value of, 416-418 metacognition and memory system evolution, 400-402 mnemonic value of animacy and, 414-415 of multiple items in context, 304-307 multiple memory systems, 296-297 overview of research on, 1-2 perceptual identification and evolution of, 285-299 processes and adaptive specialization in, 2 - 4processes of, 459 relational memory, 159-160, 168-170 source memory, social relevance and, 424-434 spatial memory, field research on amphibians and, 107-109 survival processing paradigm and, 407 systems, 295-297, 339-354, 400-402, 418-419 taxonomy of memory systems, 340, 392-393 teleost hippocampal pallium and, 159-170 update, 187-188 memory circuits, epigenetic regulation of, 438-448 memory trace model, sequential stimuli, 346-347 memory update, nonrewards and, 187-188 mental time travel, in apes, evolution of, 320-322 Mery, F., 76-79, 92-94 metacognition dissociative learning and, 241-242 evidence in monkeys of, 394-396 evolution of, 398-400 limits of laboratory research on, 402 memory systems evolution and, 400-402 monitoring and control components of, 392 in monkeys, control research on, 392-402 nonintrospective metacognition research, 396-398 metamemory, animal studies of, 8-9

Mieth, L., 432 milk consumption, allele creation and, 271-272 Miller, R. R., 416-418 Milner, Barbara, 392-393 Milton, K., 359-360 mirror-guided tracing, amnesia and, 392-393 mnemonic processes animacy and, 414-415 constraints on memory and, 459-461 contamination and value of, 415-416 evolutionary origins of, 406 mate-related processing and, 416-418 proximate mechanisms and, 411-412 survival processing paradigm, 407-414 tunings, 406-419, 466-467 Moatt, J. P., 128-129 model-based bases, social learning and, 253-254 model species, learning and memory research and, 5-6 modes, in behavior systems framework, 210-214 Mohri, A., 25 mollusks. See cephalopods; specific species, e.g., Aplysia monkeys. See also specific species, e.g., Rhesus macaques (Macaca mulatta) evidence of metacognitive monitoring in, 394-396 evolution of metacognition in, 398-400 memory system evolution in, 400-402 nonintrospective metacognition research in, 396–398 Moore, R. S., 26-27 morphofunctional studies, teleost hippocampal pallium structure, and spatial mapping, 167-168 Morrison, G. E., 22-24 mosquitoes, associative learning in, 56-57 motivation bear cognition and, 363-369 self-control and inhibition and, 377-379 as short-term memory, 350 source memory and, 429-430 multi-stimulus interactions adaptive learning and, 73-74 blocking and overshadowing, 82 Murty, V. P., 433-434 Muzio, Rubén N, 105-119 myeloid/lymphoid or mixed-lineage leukemia 2 (mll2/kmt2b) gene, epigenetic modification of memory and,

490 *

Index

myna(h)s (Acridotheres tristis) behavioral change in free-ranging mynas, 150-153 control case study of, 148-149 social learning and, 149-150 trapping and control of, 144-145 myoinhibitory peptide (MIP-1/NLP-38), salt avoidance in C. elegans and, 22 myth of the first time, in conditioning research, 292 Nairne, James S., 406-419, 424-425, 459-461 natural selection adaptation, learning and memory and, 2 - 4biological preparedness and, 71-72 cultural inheritance and, 271-272 enhanced memory and, 425-428 general-process learning and, 456 genetic variation in learning ability and, 92 - 94predator-induced phenotypic change in prey and, 145-146 preference for suboptimality and, 198-200 social learning and, 250-257 navigation field research on amphibians and, 107-109 laboratory research on amphibians and, 109-114 teleost map-like spatial memory and, 160-164 needle-in-a-haystack problems, cultural inheritance and, 268 negative contrast. See also successive negative contrast studies uncertainty-induced behavioral sensitization, 203 negative information expectancy violation and, 431-432 memory and, 428-430 nematodes. See C. elegans neocortex, information retention and, 438-440 neural circuitry in C. elegans, 24 gating mechanism and epigenetic regulation of memory and, 443-445 information retention and, 438-440 insect learning and, 59-60 learning mechanisms and, 465-466 Pavlovian conditioning and gonadal physiology, 129-130 neural mechanisms of sensitization, evolution of, 35-36

neurobiology comparative anatomy of tetrapod hippocampus, 159-160 evolution, learning and memory and, 6 social learning and, 255-257 survival processing and, 411-412 neuromodulatory transmitters, neural hypotheses for learning and memory and, 38 neuron sensitization, in Aplysia californica neurons, 33-35 neuron tagging, 446-447 neuropeptides C. elegans habituation to nociceptive stimuli and, 20-21 salt avoidance in C. elegans and, 22 Neuroptera. See antlions (Neuroptera/ Myrmeleontidae), associative learning in New, J., 459–461 New Caledonian crows (Corvus moneduloides), tool use in, 321-323, 325-326 niche construction collective behavior and social niche construction, 272-273 cultural inheritance and, 271-272 learning and, 270-273 Nishijima, S., 23 NMDA receptor gating mechanism and epigenetic regulation of memory and, 443-445 salt avoidance in C. elegans and, 22 NMR-1 glutamate receptor subunit (nmr-1), 18-19 nociceptive stimuli, C. elegans habituation to, 20-21 nonassociative learning biological preparedness and, 71-72 C. elegans, 16-21 habituation, 16-19, 81-82 nociceptive stimuli, habituation to, 20-21 sensitization and, 19-20, 81-82 noncognitive traits, experimental evolution research on, 79-80 nondeclarative memory, amnesia and, 392-393 nonhuman primates behavioral inhibition in, 375-379 cognition in, 302-304, 311-312 episodic memory and, 353 hippocampus in, 159-160 human predation and, 143-145 implicit-procedural learning in, 228 laboratory versus field studies, 360-362

Index

learning and memory in, 8-9 metacognition in, 396-398, 402 self-control tasks in, 379-382 self-regulatory inhibition tasks, 382-385 social learning in, 247-257 threat learning in, 146-148 nonmammalian vertebrates, successive negative contrast studies, 184-187 novel stimuli, memory of multiple items in context and, 304-307 Nrxns genes, epigenetic modification of memory and, 440-443 nucleolar organizer regions (NORs), teleost hippocampal pallium structure, and spatial mapping, 167-168 nucleosomes, epigenetic modification of memory and, 440-443 nuisance species, impact of, 143-145 numerosity, in honeybees, 56 nursing dyad, Pavlovian conditioning and, 126-127 Nuttley, W. M., 19 observational conditioning, social learning and, 248-249 Ocaña, Francisco M., 159-170 octopus (Octopus vulgaris), cognitive evolution in, 326-328 offspring viability, maternal effects on, 132-133 olfactory imprinting, C. elegans, 26-27 olfactory learning, in C. elegans, 22-24 Omega parameter, memory quantification and, 461 one-back reinforcement, 237-239 learning in monkeys and, 240-241 operant conditioning circadian rhythms and, 60-62 developmental bias and, 273-275 optimality, in suboptimal choice research, 196-200 orchid pollination systems, avoidance learning of sexual deception in, 58-59 Orthoptera. See crickets; grasshoppers; locusts Oudman, Thomas, 265-276 overshadowing of multiple stimuli prepared learning and, 82 spatial cognition in amphibians and, 111-112 oviposition preference heritability studies and, 94-96 preparedness in fruitflies and, 76-77 oxygen preference, C. elegans associative learning of, 25-26

PA14 pathogen, aversive imprinting and, 26-27 paced copulation, 133-138 paleoenvironment ape evolution, ecological variability and, 320-322 corvid evolution, ecological variability and, 321-323 Pandeirada, J. N. S., 416–418 Panoz-Brown, D., 307-310 Panulirus interruptus, sensitization in Aplysia by, 38-44 Papaj, Daniel, 99-100 Papini, Mauricio, 1-10, 176-189 Paramecium caudatum, associative learning in, 63 parasitoid wasps cost of learning in, 98-99 enhanced learning experiments on, 78 heritability studies and, 95-96 host location, 57-58 intra- and inter-specific differences in learning among, 61 mate selection learning in, 59 Parrish, Audrey, 375-386 parrots, cognitive complexity in, 317-318 partial reinforcement, in suboptimal choice research, 200-202 Pašukonis, A., 108-109 pathogenic bacteria, olfactory learning in C. elegans and, 23-24 Pavlov, Ivan, 287-291 Pavlovian conditioning adaptation and evolution and, 133-139 behavior systems framework and, 210-214 behavior systems theory and, 217-218 cat and rat studies and, 292-295 constraint, 461-465 fertility and reproductive investment, 130-131 future reproductive function research and, 138-139 generality and, 295–296 general-process learning and, 456-457 general purpose long-term memory and, 340-341 learning and memory and, 2-6 maternal effects on offspring viability, 132-133 mechanism for immediate perceptual identification and, 297-298 memory and, 342-343 misperceptions of, 287-291

nature of conditioned stimulus in, 288

492 *

Pavlovian conditioning (cont.) partial reinforcement and conditioned stimuli reliability, 200-202 phenotypic variation in sexual behavior, 133-138 place identification and, 289-291 repetition and, 287-288 reproductive behavior, 126-127 reproductive physiology, 127-130 sexual conditioning and sperm competition, 131-132 spatial cognition in amphibians and, 110-111 payoff biases, social learning and, 254-255 Pear, J. J., 217-218 Pearce, J. M., 232 perceptual bias, prepared learning, 81 perceptual identification episodic memory and, 296-297 evolution of memory and, 285-299 generality and, 295-296 mechanism for immediate perceptual identification, 297-298 multiple memory systems, 296-297 robots as subjects and stimuli, 291-292 perceptual learning, 292-294 perceptual-motor modules, in behavior systems framework, 210-214 Perdue, B. M., 367-368 Perry, C. J., 52 persistent conditional stimulus, defined, 290-291 personal relevance, source memory and, 429-430 perspective taking, cognitive research on apes and, 323-325 pest control, ecological impact of, 143-145 phenotypic variation adaptive degradation and, 45 constraints on learning and, 464-465 developmental bias and, 274-275 genetic variation in learning ability and, 92-94 intra- and inter-specific differences in cognition and, 91-92 learning and memory in, 9 plasticity-first evolution and, 268-270 predator-induced phenotypic change in prey and, 145-146 in sexual behavior, Pavlovian contributions to, 133-138 wildlife control and, 143-145 pheromone signaling, aversive imprinting in C. elegans and, 26-27

Index

Phillips, J. B., 107-109 Phyllaplysia avoidance of predators by, 41-44 evolution of neural sensitization in, 35-36 phenotypic variation and adaptive degradation in, 45 phylogenetics lesion, 35-38 social learning strategies and, 255 successive negative contrast and, 184-187 phylogeny, 15-19, 35-36, 168-170 pigeons (Colulmba livia) behavior systems research on, 217-218 dimensional categorization in, 232 frustration and fear in successive negative contrast studies, 187-188 memory capacity in, 342 memory duration in, 341 relational-matching-to-sample task studies in, 241-242 reversed successive negative contrast in, 184-187 sequential stimuli and memory in, 346-347 suboptimal choice research in, 194-200 uncertainty-induced behavioral sensitization research, 202-203 Pigment-Dispersing Factors (PDF-1 & 2), C. elegans habituation to nociceptive stimuli and, 20-21 PIWI proteins, transgenerational learning and, 26-27 place cells, spatial cognition and, 310-311 plants, habituation, and sensitization in, 63 plasticity epigenetic regulation of, 440 flag model of, 74-75 information retention and, 439-440 in insect learning, 59-64, 89-90 plasticity-first evolution and, 268-270 predator-induced phenotypic change in prey and, 145-146 PLM mechanosensory neurons, habituation and, 17–18 plus-maze studies, medial pallium function in amphibians and, 116-118 poison-arrow frog (Allobates femoralis), spatial cognition, and reproduction in, 108-109 poison frogs (Dendrobatidae) cognitive mapping in, 109 Pavlovian conditioning, fertility, and reproductive investment in, 130-131 spatial cognition and reproduction in, 108-109

Index

* 493

Polack, C. P., 416-418 polymodal nociceptor ASH neurons, 19-20 population-level flexibility, social learning evolution and, 255 positive contrast suboptimal choice research, 195-196 uncertainty-induced behavioral sensitization, SOC research, 202-203 positive information, expectancy violation and incongruity hypothesis and, 430-433 Posttraumatic Stress Disorder (PTSD), memory and, 285-286 PP1 memory suppressor gene, epigenetic regulation of long-term memory and, 446-447 predation subsystem, in rats, 210-214 predator-prey interactions. See also prey Aplysia sensitization and, 40 avoidance, 41–44, 58–59 cephalopod cognitive evolution and, 327-328 chemical defenses of Aplysia and, 40-41 cognition learning, predator-induced phenotypic change in prey and, 146-148 complex cognition and, 319-320 Dolabrifera sensitization and, 41-44 field and laboratory studies of, 362 learning requirements in, 295 memory evolution in animals and, 339-340 predator-induced phenotypic change in prey, 145-146 social learning of predators, 149-150 prediction learning, predator-induced phenotypic change in prey and, 146-148 preference learning mate selection and, 59 suboptimal choice and, 194-198 preparatory responses, behavior systems theory and, 217-218 prepared learning (preparedness) attentional processes and sampling, 81 biological preparedness and, 71-72, 80-83 blocking and overshadowing of interacting stimuli, 82 early research on, 72-75 empirical tests of evolution of, 76-77 evolution and adaptation and, 71 experimental evolution and artificial selection studies, 78-79 extinction in, 82-83

forgetting and, 83 future research issues, 83-85 mechanisms of, 71-85 reliability in, 74-75 selective associations, 80 sensory and perceptual bias, 81 prey cognition learning, predator-induced phenotypic change in prey and, 146-148 predator-induced phenotypic change in, 145-146 primates cognitive complexity in, 317-318 conflict management and cognitive evolution in, 323-325 predator-prey interactions and, 319-320 Prisoner's Dilemma, source memory and, 433-434 problem-solving, behavior and motor diversity and, 274 processes attentional processes, 81 evolution and general learning processes, 4 - 6learning and memory and, 2-4 survival processing effect, 7-8 proximate explanations survival processing and, 411-412 ultimate explanations vs., 412-414 psychology of learning. See also comparative psychology; receiver psychology adaptive learning and, 83 misperceptions of Pavlovian learning and, 287-291 preparedness and, 83-85 suboptimal choice research, 193-205 psyllid fly (Diaphorina citrii) mate selection learning in, 59 sex differences in learning among, 61 Qadri, M. A. J., 232 Rankin, Catharine H., 15-27 rat studies cat and rat conditioning studies, 292-295 cognition and episodic memory in, 311-312 conditioning and repetition in, 287-288 memory and metacognition in, 401

memory of multiple items in context in, 304–307

phenotypic variation in sexual behavior and, 133-138

494 *

Index

rat studies (cont.) robots as stimuli in, 291-292 search modes, predation subsystem, 210-214 shock stimuli and fear conditioning in, 289-291 suboptimal choice research, 196-198 receiver psychology, multi-stimulus interactions, 73-74 reciprocity, enhanced memory and, 425-428 recognition memory, 307-310, 426-427 reconciliation, in corvids, cognitive evolution and, 325-326 Red opposum (Lutreolina crassicaudata), 181-182 reductionistic research, neural sensitization evolution and, 36 Red-winged blackbirds (Agelaius phoeniceus), 274-275 reflex response ecological hypotheses, 38-44 habituation and, 16–19 neural hypotheses, 37-38 sensitization mechanisms, 33-36 reinforcement learning adaptive bias and, 273-275 deferred-blocked reinforcement, 239-240 displaced reinforcement, 240-241 implicit-procedural learning and, 228, 236 one-back reinforcement, 237-239 research on, 454-455 relational-matching-to-sample (RMTS) task, 241-242 relational memory nonspatial memory, teleost hippocampal pallium and, 168-170 tetrapod hippocampus/medial pallium and, 159-160 relative reward value learning mechanisms for, 176-177 strengthening-weakening (S/W) learning principle and, 178-180 relevance rating paradigm, mate-related processing, mnemonic value of, 416-418 reliability autoshaping task experiment, 201-202 of conditioned stimuli, suboptimal choice research and, 200-202 defense systems and absence of, 295-296 enhanced learning and, 78-79 evolution of preparedness and, 74-75 multi-stimulus interactions, 73-74 as predictive variable, 73 in suboptimal choice research, 194-198

Remy, J. J., 26-27 repetition, conditioning and, 287-288 replay of episodic memories, 303, 307-310 hippocampal replay and, 310-311 reproductive behavior. See also paced copulation cephalopod cognition and, 328-329 conditioning and, 288 cultural inheritance and evolution of, 266-268 Pavlovian conditioning and, 126-127 phenotypic variation in, Pavlovian conditioning and, 133-138 teleost hippocampal pallium structure and spatial mapping, 167-168 reproductive fitness insect food location linked to, 52-56 learned avoidance behavior and, 58-59 maternal effects on offspring viability, 132-133 mate selection and, 59 mnemonic value of mating-related processing, 416-418 Pavlovian conditioning and, 127-130 sperm competition and, 131–132 reproductive investment in corvids, cognitive evolution and, 325-326 Pavlovian conditioning and, 130-131 Rescorla, R. A., 287, 466-467 response-consequence contingency behavior systems framework and, 215-216 self-control and inhibition and, 377-379 response decrement, habituation and, 16-19 response facilitation, 248-249 response-reinforcement belongingness, learning and, 455 retention fitness relevance and, 418-419 survival processing paradigm and, 407-411 retrospective confidence judgment, nonintrospective metacognition research, 396-398 reversal learning, in honeybees, 56 reversed successive negative contrast, in nonmammalian vertebrates, 184-187 reverse replay, episodic memory and, 311 reverse-reward contingency task (RRCT), self-regulatory inhibition and, 383-385 rewards delay of gratification tests of self-control and, 380 discrepancy, 176-177

Index

extinction and, 177-178 frustration and fear in nonreward behavior, 187-188 mammalian successive negative contrast studies, 180-182 maximization, 193-194, 198-200 mechanisms in vertebrate studies of, 182-184 relativity in mammals of, 180-187 reverse-reward contingency task and, 383-385 suboptimal choice research, 193-198 successive negative contrast studies of, 180-187 vertebrate learning mechanisms and, 176-177 Rhesus macaques (Macaca mulatta) dimensional categorization in, 231-232 displaced reinforcement and learning in, 240-241 evidence of metacognitive monitoring in, 394-396 explicit category rules and, 232-234 plasticity-first evolution and learning in, 269-270 relational-matching-to-sample task studies in, 241–242 Stroop-like test of cognitive control in, 385-386 Rhinella arenarum. See terrestrial toads (Rhinella arenarum) rhythmic cloacal sphincter movements (RCSMs), Pavlovian conditioning and, 128-129, 131 Ripperberger, S. P., 360-362 Robinson, M. J. F., 201-202 robots, as subjects and stimuli, 291-292 rock-pool blenny (Parablennius parvicornis), sex-related spatial behavior in, 167-168 Rodríguez, Fernando, 159-170 Rodríguez-Expósito, B., 168-170 rotifers, learning in, 62 rover allele, genetic variation in learning ability and, 92-94 Rubi, T. L., 75 Rudy, J. W., 296-297 rule-based (RB) categorization in animal studies, 352 category rules and, 232-234 deferred-blocked reinforcement, 239 - 240dimensional categorization and, 231-232 explicit-declarative learning and, 228-229 implicit and explicit learning systems, 229-231 one-back reinforcement and, 237-239

Sahagian, D., 110 Saladin, M. E., 218-221 salamanders, 106-109, 115-116 Salas, Cosme, 159-170 salience attentional processes and, 81 biological preparedness and, 72-80 habituation and sensitization, 81-82 sensory and perceptual bias, 81 salivation, Pavlov conditioning and, 287, 296-297 salt avoidance, gustatory learning in C. elegans and, 21-22 salt habituation, in slime mold (Physarum polycephalum), 62-63 sampling, prepared learning and, 81 Samuel, L., 362 Sandry, J., 416-418 Schaper, M. L., 433-434 Schnell, Alexandra K., 317-330 schooling behavior, cephalopod cognition and, 328-329 Scofield, J. E., 416-418 scrub-jays (Aphelocoma californica) caching behavior in, 321-323 foraging techniques and social learning in, 325-326 sea anemones, learning in, 62 search modes, in behavior systems framework, 210-214 Seher, V., 366 Seitz, Benjamin M., 416-418, 454-468 selective associations, prepared learning and, 80 selective pressures evolution and, 4-9, 45-47 learning in bears and, 368-369 phenotypic variation and, 45 spatial cognition, 108-109 self-control defined, 377 explicit-declarative cognition and, 8-9 metacognitive monitoring in monkeys and, 392–402 overview of research on, 375-376 tasks, 379-382 self-regulatory inhibition tasks, 382-385 self-replicating beings, mutation and natural selection in, 79 Seligman, M. E., 71-72 semantic memory, episodic memory and, 302-303 sensitization in Aplysia neurons, mechanisms of, 33-35

495

496 *

Index

sensitization (cont.) evolution, learning and memory and, 6 neural hypotheses for learning and, 37-38 neural mechanism evolution of, 35-36 nonassociative learning, 19-20, 81-82 phenotypic variation and adaptive degradation of, 45 in plants, 63 in single-celled organisms and invertebrates, 63 site-specific, 33-35, 37-38, 41-45 uncertainty-induced behavioral sensitization, 202-203 sensory adaptation, 63, 81-82 sensory bias, prepared learning, 81 sensory cues, associative learning in C. elegans, 21-26 sensory integration mechanisms, in conditioning studies, 294-295 sequence memory, 346-347, 352-353 sequential stimuli episodic memory as, 353 memory for, 346-347 short-term memory and, 456-458 specialized memories of, 349 serotonin Aplysia neuron sensitization, 35-36 neural hypotheses for learning and, 37-38 sensitization and, 19-20 sex difference cognition in bears and, 367-368 memory and, 416-418 sex-specific learning, 25-26 sexually deceptive orchids, 58-59 sexual selection, 81, 133-139, 266-268 sharp-wave ripples, hippocampal replay and, 310-311 Shettleworth, S. J., 455 shock stimuli, fear conditioning and, 289-291 short-term memory general purpose STM, 344-347 list learning and, 456-458 molecular mechanisms of habituation and, 17-18 motivation and, 350 olfactory learning in C. elegans and, 22-24 in sloth bears, 366-367 specialization, 349-351 Signal for Good News (SiGN) hypothesis suboptimal choice research, 195-196 uncertainty-induced behavioral sensitization research, 202-203

signaling pathways, gating mechanism, and epigenetic regulation of memory and, 443-445 Silva, Francisco J., 210-223 Silva, Kathleen M., 210-223 Simpson, G. G., 4-6 single-celled organisms, learning in, 52-64 single stimuli memory for, 344-346 specialized long-term memories of, 349 Sinsch, U., 107-109 sitter allele, genetic variation in learning ability and, 92-94 slime mold (Dictyostelium discoideum), learning in, 63-64 slime mold (Physarum polycephalum), learning in, 62-63 sloth bears, cognition in, 366-367 Smith, J. D., 231-232, 237-242 Smith, J. David, 227-243 Smith, T., 397 social contract theory, enhanced memory and, 425-428 social facility, 248-249 social intelligence hypothesis cognition in bears and, 359-360 complex cognition and, 319-320 social learning. See also dissociable learning as adaptation, 85 in animals, inheritance through, 266 in apes, cognitive evolution and, 323-325 basic principles of, 247-248 cephalopod cognition and, 328-329 cognition in bears and, 359-360 collective behavior and social niche construction, 272-273 complex cognition and, 319-320, 323-326 in corvids, cognitive evolution and, 325-326 cultural niche construction and, 271-272 evolution of, 8, 255 expectancy violation and, 431-432 frequency-dependent strategies, 252–253 in insects, 61–62 mechanisms in, 255-257 negative information and, 428-430 plasticity-first evolution and, 268-270 predator-induced phenotypic change in prey and, 146-148 predators and dangerous places, 149-150 processes, 248-249 source memory and, 433-434 source memory and social relevance and, 424-434

Index

+ 497

strategies in, 250-257 tool use in apes and, 320-322 "what" strategies in, 254-255 "when" strategies in, 252-253 "who" strategies in, 253-254 in wild animals, 365-367 social niche construction, 272-273 Sol, D., 359-360 song learning cultural evolution and, 268 inheritance and, 266 maternal effects and offspring viability, 132-133 specialized memories and, 349 Sotelo, M. J., 112-114, 116-118 source memory decision-making and, 433-434 expectancy violation and incongruity hypothesis and, 430-433 negative information and, 428-430 social relevance and, 424-434 spatial cognition in amphibians, 105-119 in bears, 364, 366-367 field research on navigation and memory, 107-109 laboratory research on amphibians and, 109-114 medial pallium in amphibians and, 116-118 relational memory in tetrapods, 159-160 replay of episodic memories and, 310-311 telencephalic eversion in teleosts and, 164-168 in teleost fish, 160-164 spatial memory in bears, 363-369 navigation and, 107-109 in teleost fish, 160–170 in tetrapods, 159–160 spatial navigation egocentric turn response, 110-111 in frogs, 108–109 in goldfish, 167–170 specialization associative learning and, 350-351 imitation and, 352 learning costs of, 351-353 long-term memories, 348-349 short-term memories, 349-351 species differences genetics in insect learning and, 61 quantification of insect learning ability and, 90-91

species-typical cues, phenotypic variation in sexual behavior and, 134-138 sperm competition, Pavlovian conditioning and, 127-132 sperm volume, Pavlovian conditioning and, 127-130 spike broadening (SB) Aplysia neuron sensitization, 33-35 neural hypotheses for learning and, 37-38 SRA-11 G protein-coupled receptor, olfactory imprinting, and transgenerational learning in C. elegans and, 26-27 stabilizing mechanism in memory, epigenetic regulation of, 440, 445-447 Staddon, J. E. R., 211-212 starlings (Sturnus vulgaris), successive negative contrast studies, 186 state-based biases, social learning and, 252-253 statistical reliability, evolution of preparedness and, 74-75 stem tetrapods, evolution of, 106 Stephens, D. W., 74-75, 78-79 stickleback fish, social learning in, 252-253 stimulus enhancement, asocial learning and, 248-249 stimulus generalization, predator-induced phenotypic change in prey and, 147-148 stimulus-response (SR) learning category rules and, 232-234 content of memory and, 343-344 robots as subjects in, 291-292 stimulus sequences, animal memory for, 346-347, 351 storage capacity of memory, 342 strawberry poison frogs (Oophaga pumilio), spatial cognition and reproduction in, 108-109 strengthening-weakening (S/W) learning principle absolute and relative reward values and, 178-180 defined, 176-177 extinction and, 177-178 reward relativity in mammals and, 180-187 stress hormone, 180-182 Stroop test, cognitive control tasks, 385-386 suboptimal choice (SOC) motivations for, 194-198 partial reinforcement and conditioned stimuli reliability, 200-202

498 *

Index

suboptimal choice (SOC) (cont.) preference for suboptimality and, 198-200 psycho-evolutionary research on, 193-205 uncertainty-induced behavioral sensitization, 202-203 subsystems, in behavior systems framework, 210-214 successive negative contrast studies frustration and fear in, 187-188 in mammals, 180-182 mechanisms in, 182-184 in nonmammalian vertebrates, 184-187 reward relativity in vertebrates and, 180-187 uncertainty-induced behavioral sensitization, 203 Suga, S., 431-434 surprise source memory test, source memory and, 426-427 surprising nonreward, 176-177, 180-184, 187-188 survival processing paradigm animacy and mnemonics of, 414-415 contamination and mnemonics of, 415-416 development of, 7-8 mate-related processing, mnemonic value of, 416-418 memory research and, 407 mnemonic value of, 407-414 principles of, 408-411 proximate mechanisms and, 411-412 ultimate versus proximate explanations, 412-414 survival relevance concept, mnemonic value of survival processing and, 407-414 Suv39h1 gene, epigenetic modification of memory and, 440-443 Suzuki, A., 431-434 symbolic distance effect, nonintrospective metacognition research, 396-398 synapses epigenetic regulation of, 440 information retention and, 439-440 plasticity, 439-440 Tait, R. W., 218-221 Takagi, K. K., 41-44

Tarou, L. R., 364 task-related learning research cognitive control tasks, 385–386 self-control and, 379–382 self-regulatory inhibition tasks, 382–385 social learning and, 252–253 taste aversion learning, 216, 456 teaching, social learning and, 248-249 technical intelligence hypothesis, cognition in bears and, 359-360 telencephalon, teleost map-like spatial memory and structure of, 164-168 teleost fish hippocampal pallium and memory functions in, 159-170 map-like spatial memory in, 160-168 nonspatial relational memories in, 168-170 temporal discounting model, suboptimal choice research, 199-200 terrestrial toad (Rhinella arenarum), spatial cognition in, 109-114 terrestrial toads (Rhinella arenarum) navigation and spatial memory in, 107-109 reversed successive negative contrast in, 184-187 spatial cognition in, 109-114, 116-118 TET enzymes, 440-443, 445-447 tetrapods amphibians and evolution of, 106 future research on, 118-119 medial pallium/hippocampus structure and function, 115-116, 159 relational memory in, medial pallium/ hippocampus and, 159-160 Teyler, T. J., 296-297 thermosensory learning, in C. elegans, 24-25 Thompson, R. K. R., 241–242 Thorndike, E. L., 382-383, 454-455, 466-467 Thornton, A., 90-91 threat learning predator-induced phenotypic change in prey and, 146-148 survival processing and, 408 three-striped poison frogs (Ameerega trivittata), cognitive mapping in, 109 Timberlake, W., 210-222 Timbers, T. A., 17 Tinbergen, N., 1-2, 33 Tinsley, M. R., 218-221 T-maze research, spatial cognition in amphibians, 109-114 toads navigation and spatial memory in, 107-109 reversed successive negative contrast in, 184-187

spatial cognition in, 109–114, 116–118 Tomiyama, A. J., 459–461

Index

Tooby, J., 425-428 tool use ape evolution and, 320-322 in cephalopods, 327-328 corvid evolution and, 320-322, 325-326 cultural niche construction and, 271-272 self-control and, 381 top-down research methodology behavior systems framework and, 210-214 neural sensitization and, 44-47 touch receptor neurons, 17-19 Tower of Hanoi task, 385-386 Toyokawa, Wataru, 265–276 trace memory model, animal memory studies and, 352 transcranial magnetic stimulation (TMS), nonintrospective metacognition in nonhuman primates and, 396-398 transcriptomic techniques, prepared learning research and, 84-85 transgenerational learning, C. elegans, 26-27 transmission biases. See social learning, strategies in Trichogaster trichopterus. See blue gourami (Trichogaster trichopterus) Trinh, A. T., 167–168 trust game, enhanced memory and, 426-427 tufted capuchin monkeys (Cebus apella), memory and metacognition in, 401 Tulving, E., 302-303 túngara frog (Physalaemus pustulosus), cognitive mapping in, 109 turtles (Chrysemys picta), reversed successive negative contrast in, 184-187 turtles (Psedemys scripta), spatial cognition in, 110 two-action model, imitation research, 248-249 two-choice discrimination tasks, displaced reinforcement and, 240-241 tyramine, aversive imprinting in C. elegans and, 26-27 Uceda, S., 167-168 ultimate explanations, 412-414. See also proximate explanations uncertainty behavioral sensitization, suboptimal choice and, 202-203 partial reinforcement and conditioned stimuli reliability, 200-202 in suboptimal choice research, 194-198 unconditioned stimulus (US)

definition of, 288 reliability and, 73 repetition and, 287-288 reproductive behavior and, 126-127 reproductive physiology and, 127-130 temporal contiguity in, 456-457 unexpected information, expectancy violation, and incongruity hypothesis and, 430-433 unpredictability, replay of episodic memories and, 307-310 Urodele evolution, 106 ursid. See bears (ursid) Valdes, A., 45-47 vampire bats, field and laboratory studies of, 360-362 Van Der Kooy,D., 19, 22-24 Vargas, J. P., 167-168 variability, in suboptimal choice research, 199-200 variation in learning insect plasticity and, 59-62, 90-94 quantification of, 90-92 reliability as predictive variable, 73 Vasconcelos, M., 198-200, 416-418 Vaughan, W., 341 vertebrates. See also mammals brain evolution in, 181-182 complex cognition in, 319-320 hippocampal structure, teleost structure compared with, 164-168 nonmammalian vertebrates, successive negative contrast studies, 184-187 reward mechanisms in, 176-189 Vinepinsky, E., 167–168 visual cues short-term memory research and, 456-458 spatial cognition in amphibians and, 111-114 Volstorf, J., 431–432 Vonk, Jennifer, 359–370 heritability studies and, 95-96 intra- and inter-specific differences in learning and, 61, 91-92 sex differences in learning, 61 aversive learning in, 58-59

499

Wagner, A. R., 216-222, 466-467 WALL·E (robot), experiment with, 291-292 wasps (Nasonia sp.) wasps (Pollistes fuscatus) sex differences in learning, 61 wasps (Aphdus ervi), host location, 57-58

cat and rat conditioning studies, 292-295

500 *

Index

Watkins, A. J., 38–44	within-trial contrast, suboptimal choice
Watson, J. B., 287–291	research, 195–196
Weisman, R. G., 346–347	working for more tasks, self-control and,
whale species	379-380
cultural inheritance and social learning in,	working memory
266-268	cognitive control and, 400
mate-choice copying in, 270	evolution of, 400–402
plasticity-first evolution and learning in, 269	worms. See nematodes; specific species, e.g.,
wild animals	C. elegans
bear cognition research and, 364-365	Wright, A. A., 456–458
behavioral change in free-ranging mynas,	Wright, W. G., 33-47
150-153	
behavior systems framework in, 210	Yagashita, S., 236
compensatory responses in control of,	Yu, Alex J., 15–27
143-153	
heritability in, 96	Zakrzewski, A. C., 232–234
human-wildlife interactions and, 362-363	Zamisch, V., 364
myna control case study, 148–149	Zelikowsky, 463
Williams, G. C., 2–4	Zentall, T. R., 202–203
	5