

SUBJECT INDEX

JOURNAL OF THE EXPERIMENTAL ANALYSIS OF BEHAVIOR
January 1994–November 2009

NOTE: This index covers Volumes 61 through 92 of the journal. For each entry, the volume number is given in italics; the number following refers to the first page in which the entry appears.

- absolute rates, measuring resistance to change at the within-session level, 86, 109
- abstraction, levels of, 78, 315
- accumulation, determinants of reinforcer, 76, 321
- accuracy, a theory of attending, remembering, and reinforcement in delayed matching to sample, 88, 285
- acquired equivalence, tests of response membership in, 86, 81; and within-class sample responding, 89, 241; and the origins of emergent differential sample behavior, 90, 61; acquired equivalence changes representations, 91, 127
- acquisition, choice and multiple reinforcer dimensions, 89, 49; *d*-amphetamine and sensitivity to delay, 89, 71; with terminal links following an ascending and descending series, 91, 1; within-session transitions in choice, 91, 319; response acquisition by humans with delayed reinforcement, 91, 377
- acquisition, see also *repeated acquisition, response acquisition*
- activity anorexia, reinforcement value and substitutability of sucrose and wheel running, 86, 131
- acts, behavioral economics without anomalies, 64, 397
- adaptation, effects of reinforcer-ratio variation, 75, 207; evolution of learning and behavior (book review), 78, 225; Herbert Spencer's contributions to behavior analysis (book review), 86, 123
- addiction, and self-control (book review), 78, 117
- additive summation, reversing composite-stimulus control, 92, 367
- adenosine, and modulation of respiration in rhesus monkeys, 62, 57
- adjunctive behavior, punishment of schedule-induced drinking, 64, 47; induced attack during fixed-ratio and matched-time schedules of food presentation, 89, 31
- adjusting-amount, discounting of delayed rewards, 81, 39
- adult humans, see *humans*
- adult humans, see also *older adults, young adults, middle-aged adults*
- adventitious reinforcement, and experimental control procedures, 70, 321; emergent differential sample behavior, 78, 409; and the origins of emergent differential sample behavior, 90, 61
- advice, consequences of for rule control and choice, 70, 1
- age, pilocarpine seizures and auditory discrimination, 84, 357
- age effect, in Asian elephant learning, 83, 15
- age differences, in response time distributions, 88, 319
- aggression, visual reinforcement in the female *Betta splendens*, 90, 53; aggression as positive reinforcement, 91, 185
- alcohol, effect of on impulsive behavior, 71, 121; relative reinforcing effects in rhesus monkeys, 77, 49
- alfentanil, normalized demand for, 64, 373
- alternation learning, temporal tracking and, 83, 243
- alternative reinforcement, and resistance to change in multiple and concurrent schedules, 63, 1; and behavioral momentum, 65, 389
- alternatives, number and discriminability of, 61, 45
- altruism, Richard Dawkins' *The God Delusion* (book review), 88, 435; delay, probability, and social discounting in a public goods game, 91, 61
- amount, of reinforcement, 79, 233
- amount of reinforcement, morphine tolerance and, 83, 281
- amphetamine, human drug discrimination, 61, 169; effects of reinforcement history in pigeons, 61, 375; effects on behavior maintained by timeout from avoidance, 63, 19; effects on response acquisition, 66, 349; self-administration by baboons, 68, 47; effects on temporal discrimination, 78, 195; effects on variable and repetitive key-peck sequences, 86, 285; and sensitivity to delay, 89, 71
- analogical relations, producing and recognizing analogical relations, 91, 105
- analogues, legacies of E. L. Thorndike, 70, 325
- analogy, functional-analytic model of, 78, 375; relational frame theory and, 84, 435
- Animal Intelligence, 72, 425; 72, 429; 72, 433
- analysis, units of and psychological essentialism (book review), 78, 597
- animal training, behavior analysis and horses (book review), 72, 139
- animated motion, pigeons' discrimination of Michotte's launching effect, 86, 223
- anticipation, and operant feeding in goldfish, 62, 1
- anticipatory contrast, varieties of contrast, 68, 133; within trials, and preference for CRs that follow more rather than less aversive events, 88, 131
- antipunishment, ethanol's antipunishment effects, 92, 161
- antisymmetry, associative symmetry, and a theory of pigeons' equivalence-class formation, 90, 257
- anxiety, avoidance of CO₂-enriched air, 70, 79; equivalence based accounts of, 81, 257
- anxiolytics, diazepam and buspirone discrimination, 63, 277
- apes, language comprehension (review), 65, 477

SUBJECT INDEX

- apomorphine, effect on sensitivity to reinforcement, 84, 371
- apparatus, coevolution of research and technology, 89, 129
- applied behavior analysis, and Behavior Theory and Philosophy (book review), 83, 315
- applied psychology, book review, 71, 115
- arbitrarily applicable relations, transformation of self-discrimination response functions, 64, 163
- arbitrary matching, electrophysiological analysis of equivalence, 92, 245
- area under the curve, as a measure of discounting, 76, 235
- arithmetic and exponential schedules, and concurrent choice, 65, 445
- arousal, responding under conditions of varying motivation, 64, 405; satiation, capacity, and within-session responding, 72, 407; criticisms of the satiety hypothesis, 74, 347; in concurrent schedules, 80, 261
- artificial selection, a brief opportunity to run does not function as a reinforcer for mice selected for high daily wheel-running rates, 88, 199
- Asian elephants, visual discrimination in, 15, 15
- associationism, and E. L. Thorndike, 72, 425; 72, 429; 72, 433; behavior analysis and reevaluation, 74, 331
- associations, episodic memory and the hippocampus, 84, 619
- associative learning, involvement of cerebellar cortex in, 84, 631
- associative symmetry, antisymmetry and a theory of pigeons' equivalence-class formation, 90, 257
- atomism, molecular to molar in behavior analysis, 78, 95
- atoms of behavior, and in vitro reinforcement, 61, 155
- attending, conditional discriminations and, 84, 281; a theory of attending, remembering, and reinforcement in delayed matching to sample, 88, 285
- attention, stimulus control in landmark use, 63, 187; picture recognition in pigeons, 65, 465; lapses of, 80, 273; to the sample, 83, 119; neural recording with behavioral regularity in rats, 92, 113
- attention deficit hyperactivity disorder, and spontaneously hypertensive rats, 65, 129
- auditing, effects of competitive reward distribution, 74, 115
- audition, and career of J.M. Harrison, 90, 131
- auditory anatomy, and career of J.M. Harrison, 90, 131
- auditory discrimination, pilocarpine seizures and, 84, 357
- automaintenance, and autoshaping: a neural-network approach, 88, 115; stimulus–food pairings produce stimulus-directed touch-screen responding in monkeys, 92, 41
- automated stimulus presentation, to rats in a two-choice discrimination task, 90, 113
- automated technology, differential vocalization in budgerigars, 63, 111
- autonomic nervous system, stability of in the awake rat, 61, 273
- autoshaping, the pigeon's gape response, 62, 201; blocking, unblocking, and overexpectation in, 65, 575; within-session changes in responding during, 66, 51; negative automaintenance omission training is effective, 86, 1; and automaintenance: a neural-network approach, 88, 115; stimulus–food pairings produce stimulus-directed touch-screen responding in monkeys, 92, 41
- averaging techniques, choice between FR and geometrically escalating schedules, 68, 357; effects and fixed-ratio response patterns, 71, 145; pigeons' choices of schedules, 73, 93
- aversive conditioning, transfer of aversive respondents, 92, 85
- aversive control, response-contingent shock, 61, 135; and horse training (book review), 72, 139; *JEAB* at 0, 50, and 100, 89, 111
- aversive sounds, quantifying aversiveness, 65, 37
- aviary-based testing, starlings' discrimination of size asymmetries in paired stimuli, 87, 39
- avoidance, of timeout from food presentation, 61, 479; cocaine and timeout from, 63, 19; pigeons' pecks and gapes, 65, 21; of CO₂-enriched air by humans, 70, 79; and extinction of responding, 71, 1; effects of sleep deprivation on, 73, 333; feedback stimuli are safety signals, 75, 311; transformation of response functions in accordance with same and opposite relational frames, 88, 249
- avoidance conditioning, and hypertension in dogs, 61, 255
- avoidance efficiency, avoidance of timeout from response-independent food, 89, 169
- baboons, effects of cocaine on reaction time and sensory threshold, 61, 231; effects of sodium and stress, 61, 263; and "demand" for food, 62, 293; food and amphetamine self-administration, 68, 47; food and cocaine self-administration, 72, 215
- background reinforcement, effect on the foreground response–reinforcer relation, 61, 65; and the response-strength equation, 61, 97
- Barker, R.G., ecological psychology in context, 92, 275
- bar press, rats drinking in a patchy environment, 62, 169; within-session changes in the VI response function, 64, 95; patch choice by foraging rats, 69, 5; reinforcer magnitude and DRL schedules, 78, 17; currency of procurement cost, 78, 31
- barrier, overmatching and the barrier choice paradigm, 75, 93
- barycentric analyses, barycentric extension of generalized matching, 92, 139
- base rates, unified theory of decision criterion learning, 78, 567

SUBJECT INDEX

- base-rate error, choice as a function of reinforcement ratios, 66, 11; behavior analysis and decision making, 69, 355
- base-rate fallacy, in probabilistic contingency learning, 90, 23
- base-rate neglect, and sample accuracy in human matching to sample, 71, 155
- base-rates, skewed, in probabilistic contingency learning, 90, 23
- basic-applied continuum, for the development of behavioral technologies, 61, 529
- behavior, mathematical models of, 85, 275
- behavior, see also *impulsive behavior*, *low-rate behavior*, *observing behavior*, *precurrent behavior*, *reinforced behavior*, *superstitious behavior*, *verbal behavior*
- behavior allocation, on concurrent VI extinction schedules, 69, 49
- behavior analysis, and social psychology, 62, 315; and learning, 62, 435; research methods (review), 64, 247; and decision making, 69, 355; and B. F. Skinner (book review), 71, 115; future of, 89, 125; conceptual revision of, 91, 287; ecological psychology in context, 92, 275
- behavior analysis history, *JEAB* at 50, 89, 95; *JEAB* at 0, 50, and 100, 89, 111; coevolution of research and technology, 89, 129
- behavior categories, implications for (book review) 79, 137
- behavior dynamics, a computational theory of selection by consequences applied to concurrent schedules, 90, 387
- behavior systems, learning and behavior (book review), 78, 225
- behavior theory, reinforcer magnitude and the matching law, 61, 505
- behavior-physiology relations, 61, 307
- behavioral community health, in Honduras, 61, 295
- behavioral competition theory, shortcomings of, 61, 107
- behavioral contrast, and competition theory, 61, 107; and extraneous reinforcer reallocation, 63, 203; varieties of contrast, 68, 133; habituation may contribute to, 69, 199; and preference for CRs that follow more rather than less aversive events, 88, 131
- behavioral dynamics, linear modeling of, 77, 3; and transfer functions, 81, 289
- behavioral ecology, pigeons' preference for VI water reinforcement, 64, 299
- behavioral economics, of cigarette smoking, 61, 191; a unit-price analysis of "demand" for food in baboons, 62, 293; editorial, 64, 257; discounting of delayed rewards by individuals, 64, 263; effects of altering VR requirements in concurrent reinforcement, 64, 331; normalized demand for drugs and other reinforcers, 64, 373; and behavioral momentum, 64, 385; without anomalies, 64, 397; food and water intake versus costs in a closed economy, 65, 527; open vs. closed economies, 67, 67; food and amphetamine self-administration by baboons, 68, 47; ratio size and cocaine concentration effects, 70, 185; food and cocaine self-administration by baboons, 72, 215; similar consumption and responding across single and multiple sources of drug, 72, 299; unit price and choice, 73, 45; stock optimizing in choice, 76, 245; tests of unit price, 83, 99; demand curve analysis, 85, 73; reinforcement value and substitutability of sucrose and wheel running, 86, 131; assessing unit-price related remifentanyl choice in rhesus monkeys, 86, 181; assessments of relative reinforcer efficacy II: economic complements, 88, 355; pigeons approach Nash equilibrium, 91, 169; token reinforcement review and analysis, 91, 257; comparing demand equations, 92, 305
- behavioral evolution, *Taking Pragmatism Seriously* (review), 92, 131
- behavioral genetics, effect on acquisition of lever pressing, 84, 339
- behavioral history, effects on responding under progressive-ratio schedules, 61, 375; social history and the behavioral repertoire, 62, 315; instructions as discriminative stimuli, 72, 205; systematic effects in humans, 79, 37; stimulus generalization of, 80, 173; an experimental analysis of, 80, 217; effects on forced and free choice, 81, 27; and response acquisition, 81, 51; reinforcement history effects, 86, 31; resurgence of response sequences during extinction in rats shows a primacy effect, 86, 307; concurrent resurgence and, 90, 313
- behavioral mechanisms, *d*-amphetamine and sensitivity to delay, 89, 71
- behavioral momentum, and responding under progressive-ratio schedules, 61, 375; behavioral contrast and undermatching, 61, 407; basic research needed, 61, 529; different accessibility of reinforcement schedules and choice, 62, 269; resistance to reinforcement change in multiple and concurrent schedules, 63, 1; and behavioral economics, 64, 385; effects of Pavlovian contingencies on, 65, 389; response-independent food delivery and resistance to change, 65, 549; intermittent and continuous reinforcement, 67, 91; temporal separation of reinforcement rate, 69, 29; ratio size and cocaine concentration effects, 70, 185; Pavlovian contingencies and resistance to change in a multiple schedule, 72, 81; preference and resistance to change, 74, 165; computer-presented discriminations, 75, 15; and response-independent milk delivery, 76, 179; engagement bouts and resistance to extinction, 77, 211; preference and resistance to change, 77, 233; rate of conditioned reinforcement and, 84, 1; attending and, 84, 281; reinforcer rate and amount, 85, 23; conditioned reinforcement and resistance to change, 89, 263; uncorrelated stimuli and resistance to change, 92, 199

SUBJECT INDEX

- behavioral pharmacology, and human drug discrimination, 61, 181; effects of marijuana in humans, 62, 73; diazepam and buspirone discrimination, 63, 277; contributions of P.B. Dews, 86, 359; and Joseph V. Brady, 90, 405
- behavioral physiology, and Joseph V. Brady, 90, 405
- behavioral repetition, resistance to change of, 76, 195
- behavioral research, strategies and tactics (review), 64, 247
- behavioral stress, and salt loading in baboons, 61, 263
- behavioral theory of timing, 61, 19; biasing the pacemaker, 64, 225
- behavioral tolerance, to rate-increasing effects of cocaine, 62, 45; cocaine and food deprivation, 65, 145
- behavioral units, control of choice by its consequences, 68, 329; second-order schedules of token reinforcement, 76, 159; development of and demarcating stimuli, 76, 303; resurgence of, 87, 5
- behavioral variability, in SHR and WKY rats, 65, 129; increasing in pigeons, 68, 1; resistance to change of, 76, 195; development of functional response units, 76, 303; effects of *d*-amphetamine and ethanol on key-peck sequences, 86, 285
- behaviorism, and William N. Schoenfeld, 67, 1; and the teaching of learning, 72, 269; philosophical (book review), 72, 273; and mentalism (book review), 76, 115; self-control and impulsivity (book review), 78, 117; theoretical (book review), 82, 73; and Behavior Theory and Philosophy (book review), 83, 315; *Taking Pragmatism Seriously* (review), 92, 131
- behaviorism, see also *molar behaviorism*
- Behaviorism and the Sciences of Behavior, International Congress on, remembering Peter Harzem, 91, 287
- behavior-neuroscience relation, autoshaping and automaintenance, a neural-network approach, 88, 115
- belief, philosophical behaviorism (book review), 72, 273
- benefit-cost, the price of water in a patchy environment, 62, 169; unified theory of decision criterion learning, 78, 567
- bias, in self-evaluation, 62, 235; in responding of possums, 79, 289; response requirement and second-order schedules, 84, 19; barycentric extension of generalized matching, 92, 139
- bidirectional motor, automated method for presenting stimuli to rats in a two-choice discrimination task, 90, 113
- bidirectional transfer, origins of emergent differential sample behavior, 90, 61
- biography, Roger T. Kelleher, 86, 371
- biological constraints on learning, and selective association in pigeons, 71, 13; and horse training (book review), 72, 139
- biological effect, on key pecking and treadle pressing in pigeons, 80, 43
- biological evolution, *Taking Pragmatism Seriously* (review), 92, 131
- biological motion, categorization by pigeons, 70, 281
- bipolar control, in fixed interfood intervals, 79, 1
- bisection procedure, numerosity discrimination in preschool children, 88, 339; and context effects in a temporal discrimination task, 90, 33
- blackout, effects on choice in a variable environment, 77, 65
- blocking, and unblocking and overexpectation in autoshaping, 65, 575; a selective association in pigeons, 71, 13
- blood pressure, behavior analysis and hypertension, 61, 255; sodium and stress in baboons, 61, 263; in the awake rat during rest, 61, 273; blood pressure and heart rate during schedule-controlled responding, 92, 379
- body weight, in SHR and WKY rats, 65, 129; and response acquisition, 67, 131; choice between constant and variable alternatives, 73, 79; stability under free-feeding conditions, 86, 393; seasonal variation and delayed matching-to-sample performance in pigeons, 88, 395
- book reviews, history of in JEAB, 65, 663
- bouts, response rate as engagement, 75, 247; 77, 211; of lever pressing by rats, 80, 159; rate and reinforcement, 81, 65; of responding on VI schedules, 81, 155
- Brady, Joseph V., festschrift for, 61, 131; pioneer in behavioral pharmacology (tribute), 90, 405
- brain, relations between neuroscience and human behavioral science, 61, 307
- brain-behavior, prediction of choice behavior, 84, 537
- brain regions, stimulus equivalence and, 84, 453
- brain slice, in vitro reinforcement, 61, 155
- brainstem, role in associative learning, 84, 631
- brain stimulation, effects of ethanol and cocaine, 61, 223
- break-point criterion, effects on PR performance, 70, 123
- brief stimulus, presentations on multiform schedules, 61, 417; schedule-correlated stimulus presentation, 89, 299
- budgerigars, differential vocalization in, 63, 111; and derived stimulus control, 70, 321
- buspirone, and diazepam discrimination, 63, 277
- button press, and human drug discrimination, 61, 181; effects of marijuana in humans, 62, 73; and humans' choice to compete, 62, 133; exchange delays and impulsive choice in humans, 62, 225; bias in self-evaluation, 62, 235; different accessibility of reinforcement schedules and choice, 62, 269; self-control, impulsiveness, and food preferences, 64, 33; consequences of advice on rule control and choice, 70, 1; covarying functions in

SUBJECT INDEX

- stimulus class formation and transfer of function, 78, 509; conditional relations with compound abstract stimuli using a go–no-go procedure, 87, 89; contextual control by function and form of transfer of functions, 88, 87; emergent relations in go/no-go procedures, 92, 233
- C57BL/6J mice, response effort, 92, 257
- caffeine, human drug discrimination, 61, 181; modulation of respiration in rhesus monkeys, 62, 57
- carbon dioxide–enriched air, avoidance by humans, 70, 79
- card choices, and human social behavior, 76, 21
- carryover, choice in a variable environment, 77, 65
- categorical discrimination, rapid acquisition in concurrent chains, 85, 181
- categorization, operant processes as components of, 70, 267; of natural movements by pigeons, 70, 281; concept learning and behavior analysis (special issue), 78, 237; spontaneous, 78, 291; hierarchical, 78, 433; and naming in children, 81, 267; typicality effects, 82, 253; in children, 83, 47; and naming by preschool children, 89, 383
- category match to sample, naming and categorization in children, 81, 267; naming and categorization in children, 83, 47
- cats, meal patterns of, 67, 303
- caudate, discriminative stimuli and, 84, 505
- causation, philosophical behaviorism, 72, 273; pigeons' discrimination of Michotte's launching effect, 86, 223
- CD-1 mice, effects of differing response-force requirements on food-maintained responding, 88, 381
- cellular operant conditioning, and in vitro reinforcement of hippocampal bursting, 61, 155
- central nervous system, discrimination of depressants and stimulants, 72, 187
- cerebellum, role in associative learning, 84, 631
- CFW mice, aggression as positive reinforcement, 91, 185
- chain schedules, value transmission in discrimination learning, 72, 177; stimulus control of cocaine self-administration, 79, 111; and IRT-stimulus contingencies: implications for the concept of conditioned reinforcement, 88, 215
- chained schedules, see *chain schedules*
- chained FI schedules, and reinforcing effects of houselight illumination, 90, 187
- changeover, and precurrent contingencies, 61, 427; behavior and preference, 65, 513; within-session changes in responding, 66, 75
- changeover behavior, in concurrent schedules, 80, 261
- changeover delay, foraging in a radial maze, 61, 331; concurrent-schedule performance in domestic hens, 63, 71; aversiveness of noise, 65, 37; functions of, 69, 141; preference after training with, 71, 45; choice and reinforcement delay, 74, 311; stay and switch reinforcement, 79, 207
- changeover probability, effects on discrete-trial choice, 71, 375
- changeover response, in concurrent schedule, 82, 143
- changeover time, time and rate measures in, 81, 135
- children, reversal of baseline relations and stimulus equivalence in, 63, 239; self-control, impulsiveness, and food preferences, 64, 33; naming and symbolic behavior, 65, 185; equivalence class establishment, expansion, and modification, 71, 195; acquisition of arbitrary conditional discriminations, 73, 177; naming and categorization, 78, 527; conditional discrimination performance, 79, 395; naming and categorization in, 81, 267; naming and categorization in, 83, 47; numerosity discrimination in preschool, 88, 339; emergence of conditioned reinforcement from observation, 89, 15;
- children, see also *infants*; see also *young children*; see also *preschool children*
- chimpanzees, visual search by, 63, 175; establishing functional classes in, 72, 57; symmetry in conditional discriminations, 73, 5; exclusion and match to sample, 78, 497; and folk physics (book review), 79, 267
- chlordiazepoxide, discrimination under concurrent FI FI schedules, 74, 55; effect on extinction, 84, 327
- choice, and human cigarette smoking, 61, 191; in the time-left procedure, 61, 349; in concurrent ratio-interval schedules, 61, 453; delay reduction and optimal foraging, 61, 465; effect of variable delays on self-control, 62, 33; humans' choice to compete, 62, 133; effects of travel requirements on leaving patches, 62, 185; exchange delays and impulsivity in humans, 62, 225; effects of different accessibility of reinforcement schedules, 62, 269; between reliable and unreliable reinforcement, 62, 353; control of human choice in situations of diminishing returns, 62, 367; cued and uncued terminal links in concurrent-chains schedules, 62, 385; ratio versus difference comparators, 62, 409; and conditioned reinforcement with delayed and uncertain primary reinforcers, 63, 139; independence of reinforcement delay and magnitude in concurrent chains, 63, 255; preferences for fixed and variable food sources, 63, 313; self-control, impulsiveness, and food preferences, 64, 33; self-control achieved by response persistence, 64, 117; quantitative analysis of extreme choice, 64, 147; discounting of delayed rewards by individuals, 64, 263; maximizing reinforcement rate in pigeons, 64, 277; pigeons' preference for VI water reinforcement, 64, 299; effects of FI duration and PI step size on human choice, 65, 5; procrastination by pigeons, 65, 159; latency in a signal-detection task, 65,

SUBJECT INDEX

- 561; commitment using punishment, 65, 593; contextual, and prechoice effects, 65, 619; as a function of reinforcement ratios, 66, 11; token reinforcement and self-control, 66, 29; with certain and uncertain reinforcers, 66, 63; control of in concurrent chains, 66, 97; and differential reinforcement in monkeys, 66, 143; stimulus effects on behavior allocation, 66, 149; relative sensitivity to reinforcer amount and delay, 66, 219; effects of sample duration in DMTS, 66, 231; on VR and FR schedules, 66, 283; response type and sensitivity to reinforcer variation, 66, 297; operant simulation of foraging in patches, 66, 327; preference and resistance to change, 67, 43; residence time in concurrent foraging, 67, 161; determination of discount functions, 67, 353; transfer tests of stimulus value, 68, 93; nonstable concurrent choice, 68, 219; contiguity and conditioned reinforcement in probabilistic choice, 68, 317; control of choice by its consequences, 68, 329; free vs. forced, preference for, 68, 349; between FR and geometrically escalating schedules, 68, 357; humans' in a self-control choice situation, 69, 87; trade-offs between risk and delay, 69, 123; reporting contingencies of reinforcement, 69, 161; procrastination by pigeons, 69, 185; effects of unsignaled delayed reinforcement, 69, 247; behavior analysis and decision making, 69, 355; with delayed and probabilistic reinforcers, 70, 253; context effects on, 70, 301; after training with differential changeover delays, 71, 45; effect of alcohol on impulsive behavior, 71, 121; base rates and sample accuracy in human matching to sample, 71, 155; contingency discrimination and foraging theory, 71, 355; stimuli paired with food, 72, 21; transitivity under different response requirements, 72, 235; travel time and concurrent-schedule choice, 73, 65; between constant and variable alternatives, 73, 79; pigeons' choice of schedules, 73, 93; in a variable environment, 74, 1; preference and resistance to change, 74, 79; preference and resistance to change, 74, 165; changing over and reinforcement delays, 74, 311; overmatching and the barrier choice paradigm, 75, 93; effects of reinforcement delay, 75, 165; reinforcer-ratio variation and adaptation, 75, 207; changing behavior within session, 75, 235; risk-sensitive choice in humans, 76, 1; group choice and the ideal free distribution, 76, 21; effects of primary reinforcement on, 76, 75; stock optimizing with a token deposit, 76, 245; in a variable environment, 77, 65; comparison of money rewards in delay discounting, 77, 129; on concurrent schedules, 77, 257; self-control and impulsivity, 78, 117; and group foraging, 78, 179; on dynamical concurrent schedules, 79, 1; with strict and random alternation, 79, 65; in transition, 79, 87; in self-control procedures, 79, 207; preference reversals in rats, 79, 233; effects of reinforcer magnitude on, 79, 351; rational thought and rational behavior (book review), 79, 409; between different reinforcer magnitudes, 80, 95; in a variable environment, 80, 187; in a token-reinforcement context, 81, 5; effects of experience on, 81, 27; discounting of delayed rewards, 81, 39; in a variable environment, 81, 85; time and rate measures in, 81, 135; in concurrent chains, 81, 215; in a prisoner's dilemma, 82, 161; and the sunk cost effect, 83, 1; between fixed-interval and random interval schedules, 83, 129; variation and repetition, 83, 147; effects of reinforcer probability, delay, and response requirements on, 83, 263; effects of methylphenidate and morphine on, 83, 297; effects of reinforcer sequences, 84, 37; brain imaging and, 84, 537; response-by-response models of, 84, 555; linear-nonlinear-poisson models of, 84, 581; influence of prior on current choice, 85, 3; in concurrent chains, 85, 181; contingency discriminability and peak shift in concurrent schedules, 86, 11; fix and sample with rats in the dynamics of, 86, 43; reinforcement value and substitutability of sucrose and wheel running, implications for activity anorexia, 86, 131; of unpriced remifentanyl in rhesus monkeys, 86, 181; do conditional reinforcers count?, 86, 269; four-alternative and maternal nutrition, 87, 51; and residence time in conc. VI performance, 87, 121; stochastic matching and the voluntary nature of, 88, 1; in a successive-encounters procedure and hyperbolic decay of reinforcement, 88, 73; and loss aversion in capuchin monkeys, 89, 145; asymmetry of reinforcement and punishment, 89, 157; control by relative reinforcer rates and magnitudes, 90, 169; sensitivity of conditional-discrimination performance to within-session variation of reinforcer frequency, 90, 301; in Lewis and Fischer 344 rats, 90, 333; with terminal links following an ascending and descending series, 91, 1; pigeons approach Nash equilibrium, 91, 169; extended control of local preference, 91, 293; within-sessions transitions in choice, 91, 319; fairness in resource allocation, 91, 337; ethanol's antipunishment effects, 92, 161; procedural variations in concurrent chains, 92, 345
- choose-short effect, towards a pacemaker-free theory of interval timing, 71, 215; and trace models of timing, 72, 473
- chunking, development of functional response units, 76, 303
- cigarette smoking, behavioral economics of, 61, 191; behavioral economic demand curves, 85, 73
- circadian rhythms, simple and conditional visual discrimination, 70, 103
- class, molecular to molar in behavior analysis, 78, 95
- class bifurcation, nodal structure and the partitioning of equivalence classes, 89, 359

SUBJECT INDEX

- class expansion, CARIN theory of conceptual combination, 78, 551
- class merger, of equivalence and perceptual classes, 68, 67
- class size, the simultaneous protocol and equivalence class formation, 67, 367
- class-specific reinforcement, sea lions and equivalence, 78, 449
- classical conditioning, and stimulus equivalence classes, 62, 331; within-session changes in responding, 66, 51; Pavlov and Skinner, 72, 455; cerebellar cortex and, 84, 631; transformation of the discriminative and eliciting functions of generalized relational stimuli, 88, 179
- clock, towards a pacemaker-free theory of interval timing, 71, 215; timing without internal, 71, 288
- clock stimuli, observing responses and serial stimuli, 92, 215
- closed economy, pigeons' preference for VI water reinforcement, 64, 299; effects of deprivation and session duration, 65, 111; substitution and caloric regulation in, 65, 401; food and water intake versus costs in, 65, 527; reversed schedule effects in, 71, 171; effects of economy, deprivation, and session duration on leaving patches, 72, 373; labor supply and consumption of food in, 83, 99
- clustered encounter, and optimal foraging, 61, 465
- cocaine, effects of mesolimbic dopamine depletion on responding maintained by, 61, 213; effects on brain stimulation reward, 61, 223; effects on reaction time and sensory threshold, 61, 231; tolerance to after repeated administration, 62, 45; and modulation of respiration in rhesus monkeys, 62, 57; effects on behavior maintained by timeout from avoidance, 63, 19; effects on food-reinforced pecking, 64, 61; normalized demand for, 64, 373; effects on food-reinforced FR performance, 65, 145; and reinforcement delay, 65, 375; discrimination by pigeons without explicit training, 66, 193; concentration effects on oral self-administration, 70, 185; food and cocaine self-administration by baboons, 72, 215; effects on FI responding, 75, 77; tolerance to under behavior-correlated reinforcement magnitude, 76, 217; and time of supplemental feeding, 77, 199; stimulus control of self-administration, 79, 111; roles of dose and FR schedule, 81, 169; tolerance to effects of, 82, 293; matching law as a measure of drug choice, 89, 209; repeated acquisition and cocaine self-administration, 89, 225; tolerance under a response-initiated FI schedule, 90, 207; cocaine tolerance and conjunctive schedules, 92, 413
- cocaine seeking, involvement of nucleus accumbens and prefrontal cortex in, 84, 653
- cocaine self-administration, unsignaled delayed reinforcement and, 84, 269
- cochlear implant, relational learning in children with deafness, 89, 407
- codeine, unit price and progressive-ratio schedules, 64, 361
- coevolution, of research and technology, 89, 129
- cognition, logical functions of joint control, 69, 327; and Asian elephants, 83, 15
- cognitive dissonance, within-trial contrast: pigeons prefer CRs that follow more rather than less aversive events, 88, 131
- cognitive neuroscience, philosophical foundations of (book review), 84, 683; *In Search of Memory: The Emergence of a New Science of Mind* by Eric R. Kandel (book review), 90, 235
- cognitivism, philosophical behaviorism (book review), 72, 273
- college students, and formation of partially and fully elaborated generalized equivalence classes, 90, 135; equivalence in a stimulus pairing 2-response format, 92, 57
- college students, see also *humans*
- combinatorial entailment, derived relational responding as generalized operant behavior, 74, 207; producing and recognizing analogical relations, 91, 105
- commitment, self-control achieved by response persistence, 64, 117; using punishment, 65, 593
- comparison-stimulus dimensions, reinforcer control in delayed matching-to-sample, 89, 311
- competition, humans' choice to compete, 62, 133; and group choice, 69, 227; effects of reward and feedback, 69, 263; effects of competitive reward distribution, 74, 115; pigeons approach Nash equilibrium, 91, 169
- complement, tests of behavioral-economic assessments of relative reinforcer efficacy, 88, 355
- complex stimulus control, reversal of baseline relations and stimulus equivalence in adults, 63, 225
- component alternation, contrast and undermatching, 61, 407
- component duration, contrast and reinforcer reallocation, 63, 203
- component value, contrast and reinforcer reallocation, 63, 203
- composite-stimulus control, reversing composite-stimulus control, 92, 367
- composite-stimulus recombination test, reversing composite-stimulus control, 92, 367
- compound samples, control in conditional discriminations, 90, 81
- compound stimuli, with conditional relations using a go-no-go procedure, 87, 89; emergent relations in go/no-go procedures, 92, 233
- computational modeling, of selection by consequences, 81, 297, a computational theory of selection by consequences applied to concurrent schedules, 90, 387
- computer, and equivalence class formation, 67, 367; equivalence, naming, and conflicting baseline control, 75, 55

SUBJECT INDEX

- computer images, training visual discriminations in rats, 65, 173
- computer keyboard, and probabilistic contingency learning, 90, 23
- computer keyboard responding, linked perceptual classes in humans, 84, 243; formation of partially and fully elaborated generalized equivalence classes, 90, 135
- computer keyboard responding, see also *keyboard responding*
- computer mouse click, default-response option and untrained stimulus relations, 70, 87; human category formation, 70, 267; human sensitivity to concurrent schedules, 71, 303; acquisition of arbitrary conditional discriminations by children, 73, 177; behavioral momentum in individuals with mental retardation, 75, 15; equivalence class formation, 76, 265; punishment in human choice, 80, 1; function transfer in humans, 81, 239; transformation of consequential functions, 82, 177
- computer simulation, and the S-R issue, 67, 193; the In Situ testbed, 75, 135
- computer task, instructional effects on matching-to-sample performance, 89, 333
- concept, pigeons' discrimination of paintings, 63, 165, 69, 223; discrimination and biological motion, 70, 281; formation by crows, 73, 163; learning and behavior analysis (special issue), 78, 237; natural, in a gorilla, 78, 315; psychological essentialism (book review), 78, 597
- concept discrimination, transfer to intermediate forms following, 82, 125
- concept learning, typicality effects, 82, 253
- conceptual analysis, teaching the psychology of learning, 70, 215; and neuroscience (book review), 84, 683
- conceptual combination, CARIN theory of, 78, 551
- concomitant schedule, response-independent events in the behavior stream, 68, 375; acquisition of lever pressing, 84, 339
- Concorde fallacy, in nonhuman animals, 83, 1
- concrete-abstract, molecular to molar in behavior analysis, 78, 95
- concurrent chains, a contextual model, 61, 113; choice by rats, 61, 349; delay reduction and optimal foraging, 61, 465; choice between reliable and unreliable reinforcement, 62, 353; with cued and uncued terminal links, 62, 385; independence of reinforcement delay and magnitude in, 63, 255; pigeons' preference for VI water reinforcement, 64, 299; commitment using punishment, 65, 593; response-dependent pre-choice effects, 65, 619; control of choice in, 66, 97; relative sensitivity to reinforcer amount and delay, 66, 219; preference and resistance to change, 67, 43; and conditioned reinforcement dynamics, 67, 145; transfer tests of stimulus value, 68, 93; humans' choice and self-control, 69, 87; effects of unsignaled delayed reinforcement, 69, 247; context effects on choice, 70, 301; and accounts of self-control choice, 71, 27; preferences for and against stimuli paired with food, 72, 21; pigeons' choice of schedules, 73, 93; preference and resistance to change, 74, 79; preference and resistance to change, 74, 165; effects of primary reinforcement on initial-link responding, 76, 75; evidence against a constant-difference effect, 77, 147; preference and resistance to change, 77, 233; acquisition of preference in, 80, 235; preference between forced and free choice, 81, 27; temporal context in, 81, 215; independence of entry rate and immediacy in, 82, 235; variation, repetition, and choice, 83, 147; sensitivity to reinforcer magnitude in, 83, 169; model for, 85, 181; choice between single and multiple reinforcers in, 86, 211; choice and multiple reinforcer dimensions, 89, 49; with terminal links following an ascending and descending series, 91, 1; procedural variations in concurrent chains, 92, 345
- concurrent choice, reinforcer rate and temporal distribution, 65, 445
- concurrent fixed-interval schedules, drug discrimination by pigeons, 68, 193; 74, 55
- concurrent fixed-ratio schedules, drug discrimination by pigeons, 72, 187; ethanol and rhesus monkeys, 77, 49; drug discrimination by pigeons, 77, 91
- concurrent operants, and discriminated timeout avoidance in pigeons, 88, 51; schedule-correlated stimulus presentation, 89, 299
- concurrent ratio-interval schedules, human choice in, 61, 453
- concurrent schedules, and discriminability of alternatives, 61, 45; foraging in a radial maze, 61, 331; effects of variable delays on self-control, 62, 33; and resistance to reinforcement change, 63, 1; performance in domestic hens, 63, 71; hens' preferences for topographically different responses, 63, 151; contrast and extraneous reinforcer reallocation, 63, 203; behavioral economics without anomalies, 64, 397; residence time and choice in foraging, 65, 423; drug discrimination on, 65, 495; changeover behavior and preference, 65, 513; stimulus effects on behavior allocation, 66, 149; and resistance to change, 66, 169; preference between VR and FR, 66, 283; operant simulation of foraging in patches, 66, 327; within-session changes in responding, 66, 369; nonstable concurrent choice, 68, 219; pigeons' preference for free choice, 68, 349; choice between FR and geometrically escalating schedules, 68, 357; response-independent events in the behavior stream, 68, 375; functions of the changeover delay, 69, 141; reporting contingencies of reinforcement, 69, 161; effects of response form, force, and number, 70, 45;

SUBJECT INDEX

- preference and differential changeover delays, 71, 45; local model of performance on, 71, 57; and optimality, 71, 75; human sensitivity to, 71, 303; travel time and choice, 73, 65; choice in a variable environment, 74, 1; choice, changing over, and reinforcement delays, 74, 311; sensitivity to relative reinforcer rate, 75, 25; reinforcer-ratio variation and adaptation, 75, 207; risk-sensitive choice in humans, 76, 1; choice in a variable environment, 77, 65; short- and long-term effects of reinforcers, 77, 257; dynamical, 79, 1; with strict and random alternation, 79, 65; changeover delays and signaled reinforcer ratios, 79, 87; and changeover delay, 79, 219; contingency discriminability, matching, and bias, 79, 289; reinforcer magnitude effects, 79, 351; punishment in human choice, 80, 1; choice in a variable environment, 80, 187; arousal, changeover responses, and preference in, 80, 261; matching with, 82, 143; second order schedules and, 84, 19; local preference and, 84, 37; formal and modern theories of matching, 84, 129; earning reinforcers and, 84, 167; do conditional reinforcers count?, 86, 269; residence time in conc. VI performance, 87, 121; stochastic matching and voluntary choice, 88, 1; of positive and negative reinforcement, 90, 1; relative reinforcer rates and magnitudes and control of choice, 90, 169; concurrent resurgence and behavioral history, 90, 313; a computational theory of selection by consequences applied to, 90, 387; and the stay/switch model, 91, 21; and informative stimuli in a constant environment, 91, 41; within-session transitions in choice, 91, 319; barycentric extension of generalized matching, 92, 139; ethanol's antipunishment effects, 92, 161; comparing demand equations, 92, 305
- concurrent variable-interval schedules, quantitative analysis of extreme choice, 64, 147; maximizing reinforcement rate in pigeons, 64, 277; aversiveness of noise in hens, 65, 37; within-session changes in responding, 66, 75; performance on concurrent VI extinction schedules, 69, 49; effects on discrete-trial choice, 71, 375; drug discrimination in rats, 73, 103; generalized matching law and choice, 75, 299; interpretation of Herrnstein's r_e in, 84, 185
- concurrent variable-interval variable-ratio schedules, and optimality, 71, 75; asymmetry of reinforcement and punishment, 89, 157
- concurrent variable-ratio schedules, matching with drug reinforcement, 70, 23; drug discrimination under, 77, 91
- conditional discrimination, transfer of relational stimulus control, 61, 487; context specificity in acquisition, 62, 157; reversal of baseline relations and stimulus equivalence in adults, 63, 225; reversal of baseline relations and stimulus equivalence in children, 63, 239; key-peck probability and topography, 67, 109; and incongruous stimulus pairing, 68, 143; control of choice by its consequences, 68, 329; reporting contingencies of reinforcement, 69, 161; default-response option and untrained stimulus relations, 70, 87; with wheel-running reinforcement in rats, 70, 103; psychophysics of remembering, 71, 91; equivalence classes in preschool children, 71, 195; integration of stimuli, reinforcers, and behavior, 71, 439; effects of number of sample stimuli and choices on discriminability, 72, 33; a discrimination analysis of training-structure effects on stimulus equivalence outcomes, 72, 117; theory of memory for event duration, 72, 467; of language-trained chimpanzees, symmetry in, 73, 5; acquisition of arbitrary by children, 73, 177; individuals with minimal verbal repertoires, 74, 101; equivalence relations and the reinforcement contingency, 74, 127; differential outcome effect in the horse, 74, 245; equivalence classification by sea lions, 76, 131; exclusion and match to sample in chimpanzees, 78, 497; generalized contextual control of, 79, 383; transfer for specific contextual functions, 79, 395; in mentally retarded individuals, 80, 131; signal-detection analyses of, 82, 57; emergent stimulus relations, 83, 185; behavioral momentum theory and, 84, 281; medial prefrontal lesions and, 84, 485; emergence of symmetry using different responses as proprioceptive samples in pigeons, 86, 65; testing response-stimulus equivalence relations using differential responses as a sample, 86, 239; intertrial sources of stimulus control and delayed matching-to-sample performance in humans, 86, 253; conditional relations with compound abstract stimuli using a go-no-go procedure, 87, 89; effects of differential training procedures on linked perceptual class formation, 87, 97; common control by compound samples in, 90, 81; formation of partially and fully elaborated generalized equivalence classes, 90, 135; sensitivity of performance to within-session variation of reinforcer frequency, 90, 301; emergent relations in go/no-go procedures, 92, 233
- conditional matching to sample, formation of transitivity, 62, 399
- conditional probability of reinforcer location, local preference and, 84, 37
- conditional reinforcement, do conditional reinforcers count?, 86, 269; and informative stimuli in a constant environment, 91, 41
- conditional-stimulus duration, and cocaine administration, 81, 169
- conditioned emotional response, and Joseph V. Brady, 90, 405
- conditioned reinforcement, and concurrent-chains choice, 61, 113; and choice, 61, 349; and brief-stimulus presentations, 61, 417; context specificity of, 62, 157; exchange delays and impulsivity in

SUBJECT INDEX

- humans, 62, 225; choice between reliable and unreliable reinforcement, 62, 353; cued and uncued terminal links in concurrent-chains schedules, 62, 385; and choice with delayed and uncertain primary reinforcers, 63, 139; cocaine and reinforcement delay, 65, 375; choice in an adjusting-delay procedure, 66, 63; dynamics in chained schedules, 67, 145; contiguity and probabilistic choice, 68, 317; choice with delayed and probabilistic reinforcers, 70, 253; context effects on choice, 70, 301; preferences for and against stimuli paired with food, 72, 21; value transmission in discrimination learning, 72, 177; sample-duration effects on delayed matching, 72, 279; and delayed discriminative stimulus functions of stimuli, 73, 125; effects of primary reinforcement on initial-link responding, 76, 75; generality of selective observing, 77, 171; and observing behavior, 78, 161; resistance to change of observing, 80, 273; time and rate measures in choice, 81, 135; effects on observing rate and resistance to change, 84, 1; disruption of responding maintained by, alterations in response-conditioned-reinforcer relations, 86, 197; and Roger T. Kelleher, 86, 371; and IRT-stimulus contingencies in chained schedules, 88, 215; emergence of from observation, 89, 15; and resistance to change, 89, 263; schedule-correlated stimulus presentation, 89, 299; token reinforcement review and analysis, 91, 257; uncorrelated stimuli and resistance to change, 92, 199; observing responses and serial stimuli, 92, 215; procedural variations in concurrent chains, 92, 345
- conditioned reinforcement value, rapid acquisition in concurrent chains, 85, 181
- conditioning, acquired equivalence changes representations, 91, 127
- conditioning, see also *classical conditioning*, *operant conditioning*, *Pavlovian conditioning*, *respondent conditioning*
- confusion, theory of memory for event duration, 72, 467
- conjoint schedules, response-independent events in the behavior stream, 68, 375
- conjunction fallacy, behavior analysis and decision making, 69, 355
- conjunctive schedule, cocaine tolerance and conjunctive schedules, 92, 413
- connectionism, and E. L. Thorndike, 72, 441; 72, 451; mechanisms underlying behavior, 84, 313
- consciousness, naming and symbolic behavior, 65, 185
- consequential functions, transformation of, 82, 177; transformation of, in accordance with the relational frames of more-than and less-than, 86, 317
- constant-ratio rule, and discriminability of alternatives, 61, 45
- constrained optimization, assessing preference for reinforcers, 64, 313
- consummatory response, human performance on yoked schedules, 74, 265
- consumption, determined by unit price, 83, 99
- consumption cost, food and water intake versus costs in a closed economy, 65, 527
- consumption rate, of water in a patchy environment, 62, 169; determined by unit price, 83, 99
- contact detector, touch or lick detector circuit, 91, 253
- context, discrimination of relative frequency of events, 72, 151
- context effect, in a temporal discrimination task, and tests of the scalar expectancy theory, 90, 33
- contextual choice model, in concurrent chains, 66, 97; in concurrent chains, 81, 215; independence of entry rate and immediacy, 82, 235; for concurrent-chains performance, 83, 169; choice between single and multiple reinforcers in concurrent-chains schedules, 86, 211
- contextual control, of transformation of functions, 78, 63; transfer to conditional discriminations, 79, 395; equivalence relations, contextual control, and naming, 86, 337; by function and form of transfer of functions, 88, 87
- contiguity, and the S-R issue, 67, 193; theory of, 79, 193
- contingencies, Pavlovian versus operant, 72, 81; coevolution of research and technology, 89, 129; *In Search of Memory: The Emergence of a New Science of Mind* by Eric R. Kandel (book review), 90, 235
- contingencies of reinforcement, and the S-R issue, 67, 193; incongruous, 68, 143; effects on competitive responding, 69, 263; in MTS procedures, 79, 323
- contingency discriminability, stimulus effects on behavior allocation, 66, 149; on concurrent VI extinction schedules, 69, 49; choice in a variable environment, 74, 1; in responding of possums, 79, 289; and peak shift in concurrent schedules, 86, 11; maternal nutrition and four-alternative choice, 87, 51
- contingency-discriminability model, quantitative analysis of extreme choice, 64, 147; choice and foraging theory, 71, 355; synthesizing concurrent interval performances, 74, 189
- contingency tracking, during unsignaled delayed reinforcement, 88, 229
- contingent reinforcement, economic and biological influences on responding, 80, 43
- contingent tolerance, with pre-session cocaine administration, 81, 169
- continuous reinforcement, determinants of key-peck speeds, 64, 215; and behavioral momentum, 67, 91
- contrast, see *behavioral contrast*
- conviction, tolerance in a rigorous science, 71, 284

SUBJECT INDEX

- cooperation, prisoner's dilemma and the pigeon, 64, 1; delay, probability, and social discounting in a public goods game, 91, 61
- correction procedure, for biases in matching-to-sample, 90, 103
- correlated schedule, tolerance to cocaine under, 76, 217
- cost, normalized demand for drugs and other reinforcers, 64, 373
- cost, see also *benefit-cost*, *response cost*
- countercontrol, basic research needed, 61, 529
- cows, concurrent-schedule performance, 65, 57
- crop capacity, and within-session responding, 72, 407
- cross-class probes, and linked perceptual classes, 78, 271; to assess linked perceptual classes, 84, 243; effects of differential training procedures on linked perceptual class formation, 87, 97
- cross-species analysis, token reinforcement review and analysis, 91, 257
- crows, use of number by, 73, 163
- cue, starlings' discrimination of size asymmetries in paired stimuli, 87, 39
- cultural evolution, Richard Dawkins' *The God Delusion* (book review), 88, 435
- cumulative dosing, in human triazolam discriminators, 71, 417
- cumulative recorder, manufactured in Japan, 90, 125
- cumulative records, and fixed-interval performance, 61, 11
- currency, the price of water in a patchy environment, 62, 169; procurement time and meal frequency and duration, 63, 295
- cyclic-interval schedules, dynamics of waiting in pigeons, 65, 603; temporal tracking and, 83, 243
- cyclicity, changing behavior within session, 75, 235
- dairy cows, see *cows*
- d*-amphetamine, see *amphetamine*
- Darwin, Charles, and E. L. Thorndike, 72, 425; *Taking Pragmatism Seriously* (review), 92, 131
- Darwinism, and religion as a natural phenomenon (book review), 87, 143
- Dawkins, Richard, *The God Delusion* (book review), 88, 435
- deaf children, relational learning in children with cochlear implants, 89, 407
- decision criteria, ratio versus difference comparators in choice, 62, 409; unified theory of, 78, 567
- decision making, and behavior analysis, 69, 355; rational approach (book review), 79, 409; brain regions involved in, 84, 537; in a dynamic foraging environment, 84, 581; future of behavior analysis, 89, 125
- decision theory, same-different learning by pigeons, 78, 345
- default-response option, and untrained stimulus relations, 70, 87
- definition of verbal behavior, B. F. Skinner (book review), 81, 189
- delay, and procrastination by pigeons, 65, 159; 69, 185; trade-offs between risk and, 69, 123; choice with delayed and probabilistic reinforcers, 70, 253; feedback stimuli are safety signals, 75, 311; area under the curve as a measure of discounting, 76, 235; discounting of delayed rewards, 81, 39
- delay, see also *fixed delay*, *multiple delay*, *progressive delay*, *variable delay*
- delay discounting, effect of alcohol on impulsive behavior, 71, 121; unit price and choice, 73, 45; comparison of money rewards, 77, 129; effects of methylphenidate and morphine on, 83, 297; in Lewis and Fischer 344 rats, 90, 333; delay, probability, and social discounting in a public goods game, 91, 61; discounting gains and losses, 92, 1
- delay gradients, within session, 82, 21
- delay interval distribution, and the forgetting function, 80, 295
- delay of reinforcement, and response acquisition, 61, 35; and self-control, 61, 83; effects of variable delays on self-control, 62, 33; context specificity in discrimination acquisition, 62, 157; and impulsive choice in humans, 62, 225; choice between reliable and unreliable reinforcement, 62, 353; conditioned reinforcement and choice with delayed and uncertain primary reinforcers, 63, 139; and magnitude in concurrent chains, 63, 255; procurement time and meal frequency and duration, 63, 295; pigeons' preference for VI water reinforcement, 64, 299; token reinforcement, choice, and self-control, 66, 29; choice in an adjusting-delay procedure, 66, 63; preference between VR and FR schedules, 66, 283; response type and sensitivity to reinforcer variation, 66, 297; effects of *d*-amphetamine on response acquisition, 66, 349; body weight and response acquisition, 67, 131; determination of discount functions, 67, 353; response acquisition with, 69, 17; effects on acquisition of lever pressing, 69, 59; mechanisms underlying the effects of un signaled, 69, 103; functions of the changeover delay, 69, 141; effects of un signaled, 69, 247; and the role of the response-reinforcer relation, 71, 187; value transmission in discrimination learning, 72, 177; preference and resistance to change, 74, 165; choice and changing over, 74, 311; effects of signaled vs. un signaled, 75, 165; *d*-amphetamine and sensitivity to delay, 89, 71; and loss aversion in capuchin monkeys, 89, 145; response acquisition by humans with delayed reinforcement, 91, 377; procedural variations in concurrent chains, 92, 345
- delay-reduction hypothesis, and concurrent-chains choice, 61, 113; and choice, 61, 349; and optimal foraging, 61, 465; and different accessibility of

SUBJECT INDEX

- reinforcement schedules and choice, 62, 269; choice between reliable and unreliable reinforcement, 62, 353; response-dependent prechoice effects, 65, 619; choice as a function of reinforcement ratios, 66, 11; and choice in concurrent chains, 66, 97; and sample duration in DMTS, 66, 231; contiguity and conditioned reinforcement in probabilistic choice, 68, 317; context effects on choice, 70, 301; sample-duration effects on delayed matching, 72, 279; evidence against a constant-difference effect, 77, 147; choice between single and multiple reinforcers in concurrent-chains schedules, 86, 211; choice in a successive-encounters procedure and hyperbolic decay of reinforcement, 88, 73; within-trial contrast: pigeons prefer CRs that follow more rather than less aversive events, 88, 131
- delay-reduction theory, see *delay-reduction hypothesis*.
- delayed and immediate emergence, linked perceptual class formation and transfer of function, 91, 225
- delayed discriminations, memory processes in, 67, 323
- delayed matching to sample, and the differential-outcomes effect, 61, 389; effects of relative reinforcer frequency and of signaled versus unsignaled reinforcer magnitudes, 63, 33; and directed forgetting in pigeons, 63, 127; effects of sample duration and response requirements, 64, 19; presence-versus-absence discrimination in pigeons, 65, 81; choice as a function of reinforcement ratios, 66, 11; effects of sample duration in, 66, 231; and reinforcer efficacy, 69, 77; psychophysics of remembering, 71, 91; sample-duration effects on, 72, 279; theory of memory for event duration, 72, 467; choose-short effect and trace models of timing, 72, 473; and conditioned reinforcing functions of stimuli, 73, 125; generalization following training at different delays, 75, 1; reinforcer delays and remembering, 80, 77; arithmetic and logarithmic distributions, 80, 295; signal-detection analyses, 82, 57; memory testing, 83, 67; effects of signaled reinforcer probability and magnitude, 83, 119; resistance to change, 84, 65; neural correlates of, 84, 521; and intertrial sources of stimulus control in humans, 86, 253; a theory of attending, remembering, and reinforcement in, 88, 285; seasonal variation in pigeon body weight and performance on, 88, 395; reinforcer control in DMTS, 89, 311
- delayed reinforcement, response acquisition with, 81, 51; and choice, 83, 263; effects on cocaine self-administration, 84, 269; response induction during acquisition and maintenance of lever pressing with, 88, 29
- delayed rewards, temporal discounting of, 64, 263
- delayed stimulus control, component transition as the relational basis for successive discrimination, 64, 185
- delayed-symbolic-matching to sample, timing, remembering and discrimination, 87, 25
- Δ^9 tetrahydrocannabinol, effects of, 61, 203
- demand, and human cigarette smoking, 61, 191; unit-price analysis of "demand" for food in baboons, 62, 293; substitution and caloric regulation, 65, 401; food and amphetamine self-administration by baboons, 68, 47
- demand curve, assessing preference for reinforcers, 64, 313; normalized demand for drugs and other reinforcers, 64, 373; behavioral economics and within-session changes in responding, 72, 355; replacing relative reinforcing efficacy, 85, 73
- demand elasticity, behavioral economics and behavioral momentum, 64, 385
- demand functions, responding under conditions of varying motivation, 64, 405; effects of response type and price, 71, 329; comparing demand equations, 92, 305
- depletion, locomotion vs. lever-press travel in foraging simulation, 68, 177
- depressants, effects on discrimination, 84, 77
- deprivation, responding under conditions of varying motivation, 64, 405; effects on closed-economy multiple-schedule performance, 65, 111; effects on SHR and WKY rats, 65, 129; effects on food-reinforced FR performance, 65, 145; and concurrent VI VI schedules, 67, 109; effects of level on response rate, 81, 155
- derived equivalence relations, semantic relations and, 84, 417; as a model of analogical reasoning, 84, 435; neuroimaging and, 84, 453
- derived relations, transformation of the discriminative and eliciting functions of generalized relational stimuli, 88, 179; derived transfer of functions and the implicit association test, 88, 263
- derived stimulus relations, resurgence of, 66, 267; producing and recognizing analogical relations, 91, 105; transfer of aversive respondents, 92, 85
- derived transfer, of self-discrimination response functions, 62, 251
- detection, varying sample- and choice-stimulus disparity, 69, 311; integration of stimuli, reinforcers, and behavior, 71, 439; effects of response disparity, 75, 183; infrared detector to verify delivery of food pellets, 90, 249
- devaluation, behavior analysis and revaluation, 74, 331
- Dews, P.B., contributions to the behavioral determinants of drug action, 86, 359
- dexfenfluramine, anorectic drugs and food access, 82, 275
- dextromethorphan, effects of drugs and drug combinations, 92, 387
- dextrorphan, effects of drugs and drug combinations, 92, 387
- dextropropoxyphene, unit price and progressive-ratio schedules, 64, 361

SUBJECT INDEX

- diazepam, and buspirone discrimination, 63, 277; effects of drugs and drug combinations, 92, 387
- Dictator Game, fairness in resource allocation, 91, 337
- digging, olfactory discrimination procedure for mice, 73, 305; episodic memory in rats, 84, 619
- different responses, matching with, 63, 151
- differential discrimination, self-reports of emergent relations, 65, 355
- differential outcome, equivalence classification by sea lions, 76, 131; 78, 449
- differential reinforcement, of vocalization in budgerigars, 63, 111; biasing the pacemaker in the behavioral theory of timing, 64, 225; and choice in monkeys, 66, 143; of high- and low-rate schedules, 67, 311; and social influence in pigeons, 79, 175;
- differential reinforcement of low rates of responding, within-session changes, 62, 109; long-term effects of responding history, 75, 43; effects of reinforcer magnitude, 78, 17; and differential sample responding, 79, 21; aggression as positive reinforcement, 91, 185
- differential-reinforcement-of-low-rate schedules, stimulus generalization of behavioral history, 80, 173; analysis of reinforcement history effects, 86, 31; criterion changes, 92, 181
- differential response, as proprioceptive samples in pigeons and emergence of symmetry, 86, 65; testing response-stimulus equivalence relations using, 86, 239
- differential sample responding, development of in pigeons, 78, 409; tests of response membership in acquired equivalence classes, 86, 81; on the origins of, 90, 61
- differential-outcomes effect, investigation of within sessions, 61, 389; in delayed matching performance, 63, 33; in the horse, 74, 245; with concurrent schedules of positive and negative reinforcement, 90, 1
- differentiation, basic research needed, 61, 529
- diffusion generalization model, and dynamics of time discrimination, 66, 117
- digital camera, response-initiated imaging of operant behavior, 77, 283
- dimensional contrast, within-session analysis of visual discrimination, 72, 385
- diminishing returns, choice and, 83, 1
- direct effects, similar consumption and responding across single and multiple sources of drug, 72, 299
- direct remembering, and reinforcer efficacy, 69, 77
- directed forgetting, in pigeons, 63, 127
- directedness, autoshaping and automaintenance: a neural-network approach, 88, 115
- direction, categorizing a moving target, 78, 249
- discounting, area under the curve as a measure of, 76, 235; of delayed rewards, 81, 39
- discounting function, and delayed rewards, 64, 263
- discrete trials, effects of ITI duration, 71, 375
- discrete water probes, and polydipsia in rats, 62, 307
- discriminability, and human symbolic matching-to-sample performance, 63, 53; and human signal-detection performance, 66, 243; extension of equivalence classes, 68, 67; reporting contingencies of reinforcement, 69, 161; psychophysics of remembering, 71, 91; integration of stimuli, reinforcers, and behavior, 71, 439; stimulus presentation ratios in signal-detection procedures, 72, 1; reinforcer control and human signal detection, 73, 275; perceptual classes and humans, 76, 95; and sensitivity to reinforcer magnitude, 85, 41
- discriminated operant, integration of stimuli, reinforcers, and behavior, 71, 439; and MTS performance, 79, 323
- discriminated timeout-avoidance, in pigeons and the roles of added stimuli, 88, 51
- discrimination, and brief-stimulus presentations, 61, 417; basic research needed, 61, 529; and bias in self-evaluation, 62, 235; effects of response disparity, 75, 183; pictorial categories in pigeons, 78, 333; of directional movements in pigeons, 80, 29; matching: acquisition and generalization, 82, 143; pigeons' discrimination of Michotte's launching effect, 86, 223; timing and remembering, 87, 25; contingency tracking during un-signalized delayed reinforcement, 88, 229
- discrimination, see also *conditional discrimination*, *drug discrimination*, *olfactory discrimination*, *temporal discrimination*
- discrimination based on trial format, nodal partitioning of equivalence classes, 89, 359
- discrimination learning, and the S-R issue, 67, 193; a discrimination analysis of training-structure effects on stimulus equivalence outcomes, 72, 117; value transmission in, 72, 177; high-probability stimulus control topographies, 77, 189; equivalence classes in pigeons, 78, 397; speech perception in rats, 80, 205; starlings' discrimination of size asymmetries in paired stimuli, 87, 39
- discrimination reversal, olfactory discrimination procedure for mice, 73, 305
- discrimination training, determinants of key-peck speeds, 64, 215; stimulus control and generalization of punishment, 73, 261
- discriminative control, with wheel-running reinforcement in rats, 70, 103
- discriminative law of effect, science and, 83, 85
- discriminative stimulus, instructions as, 72, 205; control of, 79, 175; the sunk cost effect, 83, 1; brain activation associated with, 84, 505; schedule-correlated stimulus presentation, 89, 299
- dishabituation, and within-session changes in wheel running, 76, 289
- disk press, effects of differing response-force requirements on food-maintained responding in CD-1 mice, 88, 381; response effort, 92, 257
- dispositions, philosophical behaviorism (book review), 72, 273

SUBJECT INDEX

- distance, determinants of reinforcer accumulation, 76, 321
- diversity, tolerance in a rigorous science, 71, 284
- dizocilpine, effects of drugs and drug combinations, 92, 387
- dogs, behavior analysis and hypertension, 61, 255; domestic dog behavior review, 89, 247
- domain, specificity and generality (book review), 78, 225
- domestic hens, comparing demand equations, 92, 305
- Donahoe, J. W., and Palmer, D. C. Learning and complex behavior (review), 63, 347; 67, 193
- door pushes, hens' matching with different responses, 63, 151; effects of response form, force, and number, 70, 45; effects of response type and price on demand, 71, 329; transitivity of choices under different response requirements, 72, 235
- dopamine, and in vitro reinforcement of hippocampal bursting, 61, 155; effects of mesolimbic depletion, 61, 213
- dopamine D₁-like and D₂-like receptors, sensitivity to reinforcement and, 84, 371
- dose choice, of marijuana, 61, 203
- dose-response curve, graded versus quantal, 65, 495; drug discrimination under concurrent schedules, 77, 91
- drinking, in a patchy environment, 62, 169; polydipsia in rats, 62, 307
- drive, responding under conditions of varying motivation, 64, 405
- drug dependence, human cigarette smoking, 61, 191; development of, 84, 667
- drug combinations, effects on discrimination, 84, 77
- drug-combination tests, effects of drugs and drug combinations, 92, 387
- drug combination training, effects of drugs and drug combinations, 92, 387
- drug discrimination, human d-amphetamine, 61, 169; human caffeine, 61, 181; human diazepam and buspirone, 63, 277; under concurrent schedule, 65, 495; by pigeons without explicit training, 66, 193; under concurrent FI schedules, 68, 193; 74, 55; comparing single and cumulative dosing procedures, 71, 417; under a concurrent FR FR schedule, 72, 187; in rats under concurrent VI VI schedule, 73, 103; stimulus control during extinction, 74, 283; under concurrent VR VR schedules, 77, 91; navigation in the Morris swim task, 78, 215
- drug effects, subjective, 61, 203; on risky choice, 75, 275
- drug levels, cocaine self-administration, 79, 111
- drug self-administration, of marijuana, 61, 203; of cocaine, 61, 213; unit-price analysis of opioid consumption, 64, 361; normalized demand for drugs and other reinforcers, 64, 373; matching on VR schedules, 70, 23; similar consumption and responding across single and multiple sources of drug, 72, 299; unit price and choice, 73, 45; effects of compounding drug-related stimuli, 73, 211; ethanol and rhesus monkeys, 77, 49; of cocaine, 79, 111; role of nucleus accumbens and prefrontal cortex in, 84, 653; assessing unit-price related remifentanyl choice in rhesus monkeys, 86, 181
- drugs, of abuse, and behavior of rats, 68, 117; discrimination by pigeons, 68, 193; effects of compounding drug-related stimuli, 73, 211
- dualism, in cognitive neuroscience (book review), 84, 683
- duration, comparison signal detection, 62, 15; of wheel running, 79, 243; use of cues in labeling of sounds, 80, 205
- duration predictability, sample-duration effects on delayed matching, 72, 279
- dynamics, of time discrimination, 66, 117; temporal control in rats, 70, 35; theories of timing, 71, 293; in concurrent schedules, 79, 1; of choice, 81, 85; effects of past choices and past reinforcers on current behavior, 84, 555; extended control of local preference, 91, 293
- earning reinforcers, generalized matching law and, 84, 167
- ecological psychology, ecological psychology in context, 92, 275
- ecologies, responding under conditions of varying motivation, 64, 405
- economics, without anomalies, 64, 397; responding under conditions of varying motivation, 64, 405
- economic effect, on key pecking and treadle pressing in pigeons, 80, 43
- economic games, fairness in resource allocation, 91, 337
- education, a behavioral program in Honduras, 61, 295
- effort, effects of response-force requirements on FR responding, 63, 331; determinants of reinforcer accumulation, 76, 321; currency of procurement cost, 78, 31; effects of different response-force requirements on food-maintained responding in CD-1 mice, 88, 381; extensive training and the work-ethic effect, 91, 143; response effort, 92, 257
- elasticity, of demand for cigarettes, 61, 191; normalized demand for drugs and other reinforcers, 64, 373
- electric shock, see *shock*
- electrode, neural recording with behavioral regularity in rats, 92, 113
- electrodermal responses, transformation of respondently conditioned stimulus function, 67, 275
- electrophysiological response, in the rabbit retina, 61, 247
- electrophysiology, performance on delay go-no-go tasks and, 84, 521
- emergent behavior, in pigeons, 78, 409

SUBJECT INDEX

- emergent relations, common control by compound samples in conditional discriminations, 90, 81
- emergent sample behavior, on the origins of, 90, 61
- emergent stimulus relations, in many-to-one matching to sample, 83, 185
- emission, and E. L. Thorndike, 72, 429
- energy budgets, choice between constant and variable alternatives, 73, 79; risk-sensitive choice in humans, 76, 1; risky choice under temporal constraints, 80, 59
- environmental enrichment, behavioral variability in SHR and WKY rats, 65, 129
- environmental variability, and choice, 74, 1
- epilepsy, effects on auditory discrimination, 84, 357
- episodic memory, in nonhuman animals, 84, 619
- epistemology, teaching the psychology of learning, 70, 215; and behavior analysis, 74, 255; and universal Darwinism (book review), 76, 351; *Realism without Truth* (review), 91, 391
- equations, mathematical models and the experimental analysis of behavior, 85, 275
- equivalence, electrophysiological analysis of, 92, 245
- equivalence, see also *productive equivalence*, *stimulus equivalence*
- equivalence class, maintained nodal-distance effects in, 64, 129; self-reports of emergent relations, 65, 355; extension from primary generalization gradients, 68, 67; class-consistent differential reinforcement and stimulus class formation in pigeons, 72, 97; and relational frame theory (book review), 81, 189; nodal structure and the partitioning of, 89, 359; equivalence in a stimulus pairing 2-response format, 92, 57
- equivalence protocols, experimental control of nodality, 85, 107
- equivalence relations, in preschool children, 71, 195; functional-analytic model of analogy, 78, 375; acquired, 78, 409; emergence of symmetry in a conditional discrimination task using different responses as proprioceptive samples in pigeons, 86, 65; testing response-stimulus equivalence relations using differential responses as a sample, 86, 239; associative symmetry, antisymmetry and a theory of pigeons' equivalence-class formation, 90, 257
- escalation, pigeons' choice of schedules, 73, 93; of heroin self-administration, 73, 211; and the reinforcement contingency, 74, 127; derived relational responding as generalized operant behavior, 74, 207; of commitment in decision making 83, 1
- essentialism, psychological (book review), 78, 597
- estrogen, sexual reinforcement in the female rat, 68, 399
- ethanol, effects on brain stimulation reward, 61, 223; effects of altering VR requirements in concurrent reinforcement, 64, 331; formation and the simultaneous protocol, 67, 367; discrimination under concurrent FI FI schedules, 74, 55; effects on variable and repetitive key-peck sequences, 86, 285; ethanol's antipunishment effects, 92, 161; effects of drugs and drug combinations, 92, 387
- ethanol, see also *alcohol*
- ethics, and behavior analysis, 74, 255; and Behavior Theory and Philosophy (book review), 83, 315
- European starlings, preferences for fixed and variable food sources, 63, 313; simulation of foraging, 67, 181; are capable of discriminating subtle size asymmetries in paired stimuli, 87, 39
- event-related potentials, testing equivalence relations using, 84, 417
- everyday life, examples in the teaching of learning, 72, 269
- evolution, and universal Darwinism (book review), 76, 351; of learning and behavior (book review), 78, 225; relation between behavior principles and development (book review), 79, 137; and religion as a natural phenomenon (book review), 87, 143; and career of J.M. Harrison, 90, 131
- evolution, see also *behavioral evolution*; *biological evolution*; *social evolution*
- evolutionary biology, and optimal foraging, 61, 465
- excitatory stimulus effects, roles of, 79, 243
- exclusion, sea lions and equivalence, 78, 449; control by in match to sample, 78, 497
- expansion path, assessing preference for reinforcers, 64, 313
- experience, effects on choice, 81, 27
- experimental analysis, and reasoning, 64, 111
- experimental analysis of behavior, and Behavior Theory and Philosophy (book review), 83, 315; and Joseph V. Brady, 90, 405
- experimental evolution, a brief opportunity to run does not function as a reinforcer for mice selected for high daily wheel-running rates, 88, 199
- exponential discounting, and delay-amount trade-offs, 91, 197
- exponential forgetting, training at different delays, 75, 1
- extinction, of operant behavior in rats, 62, 149; transfer through equivalence classes, 62, 331; and behavioral momentum, 67, 91; 69, 29; concurrent VI extinction schedules, 69, 49; of responding maintained by timeout from avoidance, 71, 1; drug discrimination and stimulus control during, 74, 283; effects on choice in a variable environment, 77, 65; engagement bouts and resistance to, 77, 211; response-initiated imaging of operant behavior, 77, 283; recency, repeatability, and reinforcer retrenchment, 80, 217; effect of chlordiazepoxide on, 84, 327; and resurgence of integrated behavioral units, 87, 5; and visual reinforcement in *Betta splendens*, 90, 53; resurgence of infant caregiving responses, 92, 327

SUBJECT INDEX

- extraneous reinforcers, contrast and reallocation of, 63, 203; closed-economy multiple-schedule performance, 65, 111; interpretations of, 84, 185
- eye movement, matching in monkeys, 84, 555
- eyelid conditioning, role of cerebellar cortex in, 84, 631
- factor analysis, components of response strength, 75, 111
- familiarity, an experimental analysis of memory processing, 88, 405
- fast mapping, sea lions and equivalence, 78, 449
- fear, transfer through stimulus equivalence classes, 62, 331; transfer of aversive respondents, 92, 85
- feedback, performance and competitive responding, 69, 263; 74, 115; and avoidance of electric shock, 75, 311
- feedback functions, human performance on negative slope schedules, 73, 241; relating response to reinforcement on VI schedules, 79, 157; and the relation of response rate to reinforcer rate, 85, 57
- feeding schedules, and temporal discrimination in goldfish, 62, 1
- female *Betta splendens*, visual reinforcement in, 90, 53
- figure-ground, emergent relations in go/no-go procedures, 92, 233
- Fischer 344 rats, impulsive choice in, 90, 333
- five-term control; and the contextual control of conditional discriminations, 79, 383
- fix and sample, patterns of visits, 81, ; second-order schedules and, 84, 19; with rats in the dynamics of choice, 86, 43
- fixed consecutive number schedule, behavior of rats, 68, 117; differentiation of response numerosities in the pigeon, 88, 153
- fixed delay, and reinforcer efficacy, 69, 77; evidence against a constant-difference effect, 77, 147
- fixed-interval schedules, temporal control in, 61, 1; molecular and molar analyses, 61, 11; response-contingent shock, 61, 135; foraging in a radial maze, 61, 331; and operant feeding in goldfish, 62, 1; and tolerance to effects of cocaine, 62, 45; modulation of respiration in rhesus monkeys, 62, 57; within-session changes in responding, 62, 109; and polydipsia in rats, 62, 307; and effects of VR histories in rats, 63, 97; cocaine and food deprivation, 64, 61; effects of duration on human choice, 65, 5; reinforcement amount and induced attack, 65, 93; temporal control by PI schedules, 66, 311; procrastination by pigeons, 69, 185; food-deprivation level and morphine, 69, 295; effects on responding reinforced by the opportunity to run, 70, 69; reversed schedule effects in open and closed economies, 71, 171; timing without a timer, 71, 257; instructions as discriminative stimuli, 72, 205; reinforcer duration-PRP relation, 73, 225; effects of morphine on, 74, 229; long-term effect of responding history, 75, 43; effects of cocaine, 75, 77; tolerance to cocaine under behavior-correlated schedule, 76, 217; disruption of temporally organized behavior by morphine, 77, 157; same-different learning by pigeons, 78, 365; effects of differences in IRIs, 79, 49; sucrose concentration and wheel-running, 79, 243; effect of signaled reinforcement on, 79, 367; stimulus generalization of behavioral history, 80, 173; effects of cocaine on performance under, 82, 293; choices between random interval and, 83, 129; effects of reinforcement history on, 83, 221; effects on temporal tracking and alternation learning, 83, 243; requirements and choice, 83, 263; effect of chlordiazepoxide on extinction following, 84, 327; behavior-analytic contributions to research on animal timing, 85, 125; analysis of reinforcement history effects, 86, 31; behavioral determinants of drug action, 86, 359; cocaine tolerance under, 90, 207; probability and RI preference, 91, 89; ; aggression as positive reinforcement, 91, 185; blood pressure and heart rate during schedule-controlled responding, 92, 379; cocaine tolerance and conjunctive schedules, 92, 413
- fixed-ratio schedules, and behavioral economics, 61, 191; and modulation of respiration in rhesus monkeys, 62, 57; and social reinforcement in rats, 62, 149; unit-price analysis of "demand" for food in baboons, 62, 293; sample and comparison requirements, 62, 399; effects of response-force requirements on, 63, 331; cocaine and food deprivation, 64, 61; normalized demand for drugs and other reinforcers, 64, 373; cocaine and food deprivation, 65, 145; performance of hens in open vs. closed economies, 67, 67; sexual reinforcement in the female rat, 68, 399; food-deprivation level and morphine, 69, 295; ratio size and cocaine concentration effects, 70, 185; and averaging effects, 71, 145; reversed schedule effects in open and closed economies, 71, 171; effects of response type and price on demand, 71, 329; behavioral economics and within-session changes in responding, 72, 355; effects of later requirements on earlier performances, 73, 291; long-term effect of responding history, 75, 43; and risky choice, 75, 275; second-order schedules of token reinforcement, 76, 159; time of supplemental feeding and effects of cocaine, 77, 199; and preraio pausing, 77, 273; same-different discrimination by pigeons, 78, 365; and differential sample responding, 79, 21; unit price and choice, 81, 5; labor supply and consumption of food, 83, 99; requirements and choice, 83, 263; morphine tolerance as a function of, 83, 281; effect of chlordiazepoxide on extinction following, 84, 327; second-order schedules of token reinforcement, 85, 95; and induced attack, 89, 31; cocaine tolerance under, 90, 207; reinforcer

SUBJECT INDEX

- accumulation in a token-reinforcement context with pigeons, 90, 283; ; aggression as positive reinforcement, 91, 185; comparing demand equations, 92, 305
- fixed-time schedules, and control of human choice, 62, 367; punishment of schedule-induced drinking, 64, 47; spatial distribution of behavior, 73, 195
- flicker rate, within-session analysis of visual discrimination, 72, 385
- fluctuating asymmetry, starlings' discrimination of size asymmetries in paired stimuli, 87, 39
- folk physics, for chimpanzees (book review), 79, 267
- folk psychology, and chimpanzees (book review), 79, 267
- following-component effect, and behavioral contrast, 69, 199
- food, stock optimizing in choice, 76, 245; and preratio pausing, 77, 273
- food amount, avoidance of timeout from response-independent food, 89, 169; extended control of local preference, 91, 293
- food density, and within-session changes in the VI response function, 64, 95
- food deprivation, and the response-strength equation, 61, 97; effects on punished schedule-induced drinking in rats, 64, 47; and cocaine's effects on food-reinforced pecking, 64, 61; and the effects of morphine, 69, 295; effects on leaving patches, 72, 373; stability of pigeon body weight under free-feeding conditions, 86, 393; seasonal variation in pigeon body weight and delayed matching-to-sample performance, 88, 395
- food discrimination, starlings' discrimination of size asymmetries in paired stimuli, 87, 39
- food hopper duration, and VI performance in an open economy, 72, 341
- food intake, unit-price analysis of "demand" for food in baboons, 62, 293; food and water intake versus costs in a closed economy, 65, 527; under variable procurement cost, 67, 303; self-administration by baboons, 68, 47; patch choice by foraging rats, 69, 5; and cocaine self-administration by baboons, 72, 215; effects of anorectic drugs on, 82, 275
- food-maintained behavior, anorectic drugs and food access, 82, 275
- food preferences, effect on self-control and impulsiveness in children and adults, 64, 33; in cows on concurrent schedules, 65, 57; in possums on concurrent schedules, 79, 289
- food quality, avoidance of timeout from response-independent food, 89, 169
- food rate, extended control of local preference, 91, 293
- food reinforcers, within-session responding for water during multiple VI schedules, 64, 75
- food-shock conflict, and stress in baboons, 61, 263
- foraging, by rats in a radial maze, 61, 331; and the delay-reduction hypothesis, 61, 465; drinking in a patchy environment, 62, 169; procurement time and meal frequency and duration, 63, 295; preferences for fixed and variable food sources, 63, 313; residence time and choice, 65, 423; operant simulation of, 66, 327; residence time, 67, 161; optimal, by starlings for earthworms, 67, 181; meal patterns of cats, 67, 303; locomotion vs. lever-press travel, 68, 177; and group choice, 69, 227; optimality and concurrent schedules, 71, 75; choice and contingency discrimination, 71, 355; and risky choice in rats, 75, 275; currency of procurement cost, 78, 31; sensitivity to changes in food distribution, 78, 179; theory of, 83, 129
- foraging, see also *optimal foraging theory*
- force, effects of different response-force requirements on food-maintained responding in CD-1 mice, 88, 381; response effort, 92, 257
- forgetting functions, psychophysics of remembering, 71, 91; effect of delayed reinforcement on, 80, 77; effects of arithmetic and logarithmic distributions of delays, 80, 295; resistance to change of, 84, 65
- four-choice drug discrimination, effects of drug combinations, 84, 77
- four-key drug discrimination, effects of drugs and drug combinations, 92, 387
- frame-by-frame analysis, response-initiated imaging of operant behavior, 77, 283
- free feeding, procurement time and meal frequency and duration, 63, 295; patch choice by rats, 69, 5; and stability of body weight, 86, 393; seasonal variation in pigeon body weight and delayed matching-to-sample performance, 88, 395
- free-operant avoidance, avoidance of timeout from response-independent food, 89, 169
- free operant, and precurrent contingencies, 61, 427
- free will, and stochastic matching, 88, 1
- frequency discrimination, by pigeons, 67, 11
- frequency domain, and behavioral dynamics, 66, 391
- frequency reduction, of shock is inherently reinforcing, 75, 311
- frustration, determinants of key-peck speeds, 64, 215
- fully-elaborated generalized equivalence class, see *generalized equivalence classes*
- function transfer, in human operant experiments, 81, 239
- function-transfer networks, linked perceptual class formation and transfer of function, 91, 225
- functional class, maintained nodal-distance effects in equivalence classes, 64, 129; establishing in a chimpanzee, 72, 57; class-consistent differential reinforcement and stimulus class formation in pigeons, 72, 97; equivalence classification in sea lions, 76, 131; equivalence class formation, 81, 257
- functional equivalence, differential vocalization in budgerigars, 63, 111; relative sensitivity to rein-

SUBJECT INDEX

- forcer amount and delay, 66, 219; human vocal behavior, 74, 363; stability of with baseline reversals, 77, 29; equivalence classes in pigeons, 78, 397
- functional magnetic resonance imaging, transitive inference and, 84, 453; decision-making and, 84, 537
- functional response unit, resurgence of integrated, 87, 5
- functional stimuli, within-class sample responding and acquired equivalence, 89, 341
- GABA_A modulators, effects on acquisition of response sequences in squirrel monkeys, 82, 37
- Gallistel, C. R. The organization of learning (review), 62, 435
- gambling, future of behavior analysis, 89, 125
- gape, effects of food-pellet size in pigeons, 65, 21
- generalization, discrimination of relative frequency, 67, 11; of emergent relations, 68, 67; logical functions of joint control, 69, 327; effects of VI value and training amount, 70, 139; equivalence relations between visual stimuli, 71, 395; of DMTS following training at different delays, 75, 1; perceptual classes in humans, 76, 95; equivalence classes in pigeons, 78, 397; to chimeras and morphs, 82, 125; and acquisition of matching, 82, 143; transformation of consequential functions in accordance with the relational frames of more-than and less-than, 86, 317; equivalence relations, contextual control, and naming, 86, 337; timing, remembering and discrimination, 87, 25; linked perceptual class formation and transfer of function, 91, 225
- generalized contextual control, of conditional discriminations, 79, 383
- generalized equivalence classes, and linked perceptual classes, 78, 271; formation of partially and fully elaborated, 90, 135; linked perceptual class formation and transfer of function, 91, 225
- generalized imitation, of gestures in infants, 87, 63; and hand-to-body gestures in children, 89, 183; effects of skills training and multiple exemplar matching training, 91, 355
- generalized matching, quantitative analysis of extreme choice, 64, 147; and concurrent choice, 65, 445; stimulus effects on behavior allocation, 66, 149; nonstable concurrent choice, 68, 219; on concurrent VI extinction schedules, 69, 49; choice in a variable environment, 74, 1; reinforcer-ratio variation and adaptation, 75, 207; short- and long-term effects of reinforcers, 77, 257; strict and random alternation, 79, 65; changeover delays and signaled reinforcer ratios, 79, 87; reinforcer magnitude effects, 79, 351; reinforcer magnitude and local preference, 80, 95; effects of unequal reinforcer distributions, 80, 187; rapid acquisition in concurrent chains, 85, 181; maternal nutrition and four-alternative choice, 87, 51; relative reinforcer rates and magnitudes and control of concurrent choice, 90, 169; barycentric extension of generalized matching, 92, 139
- generalized matching law, and concurrent-chains choice, 61, 113; effects of variable delays on self-control, 62, 33; and aversiveness of noise in hens, 65, 37; relative sensitivity to reinforcer amount and delay, 66, 219; response type and sensitivity to reinforcer variation, 66, 297; and concurrent performance, 69, 275; and VR schedules of drug reinforcement, 70, 23; choice, contingency discrimination, and foraging theory, 71, 355; synthesizing concurrent interval performances, 74, 189; alternative to, 79, 219; earning reinforcers and, 84, 167; differential-impact and differential-outcomes hypotheses, 90, 1; and the stay/switch model, 91, 21; ethanol's antipunishment effects, 92, 161
- generalized operant class, derived relational responding as, 74, 207
- generalized transitivity repertoire, equivalence in a stimulus pairing 2-response format, 92, 57
- genes, roles and categorizations in behavior-environment relations (book review), 79, 137
- genetics, reinforcers and mice selected for high daily wheel-running rates, 88, 199
- geographical distribution of editors, *JEAB* at 50, 89, 95
- gestures, domestic dog behavior review, 89, 247
- Gibson, J.J., ecological psychology in context, 92, 275
- Gigerenzer, G., and Selten, R. Bounded rationality: The adaptive toolbox (review), 79, 409
- Gilovich, T. How we know what isn't so: The fallibility of human reason in everyday life (review), 64, 111
- global features, concept discrimination by pigeons, 82, 125
- God theory, Richard Dawkins' *The God Delusion* (book review), 88, 435
- go-no-go procedure, conditional relations with compound abstract stimuli using a, 87, 89; emergent relations in, 92, 233
- go-no-go reinforcement schedule, associative symmetry and, 84, 147
- go-no-go successive discrimination, precursor to the relational evaluation procedure, 76, 339
- go-no-go task, neural correlates of, 84, 521
- goldfish, temporal discrimination and operant feeding, 62, 1
- gorilla, natural concepts in, 78, 315
- Gottlieb, G. Synthesizing nature-nurture: Prenatal roots of instinctive behavior (review), 79, 137
- group choice, competition, travel, and the ideal free distribution, 69, 227; and the ideal free distribution, 78, 1; sensitivity of foraging to changes in food distribution, 78, 179
- group selection, *Taking Pragmatism Seriously* (review), 92, 131

SUBJECT INDEX

- habituation, and behavioral contrast, 69, 199; towards a pacemaker-free theory of interval timing, 71, 215; theories of timing, 71, 293; criticisms of the satiety hypothesis, 74, 347; and within-session changes in wheel running, 76, 289; tuned-trace theory of interval-timing dynamics, 77, 105
- haloperidol, repeated acquisition and cocaine self-administration, 89, 225
- Harrison, J.M., a research career well-lived (tribute), 90, 131
- Harvard Pigeon Lab, tribute to, 77, 301
- Harzem, Peter, remembering 91, 287
- Hayes, S. C. et al. Relational frame theory: A post-Skinnerian account of human language and cognition (review), 81, 189
- head movement, the conditioned pecking response, 61, 517
- heart rate, blood pressure and heart rate during schedule-controlled responding, 92, 379
- hens, changeover delay and concurrent-schedule performance in, 63, 71; matching with different responses, 63, 151; delayed matching-to-sample performance, 64, 19; aversiveness of noise, 65, 37; performance on FR schedules, 67, 67; reinforcer efficacy in a DMTS task, 69, 77; effects of response form, force, and number, 70, 45; effects of response type and price on demand, 71, 329; transitivity of choices under different response requirements, 72, 235; second-order schedules, 84, 19
- hens, see also *domestic hens*
- heroin, unit price and progressive-ratio schedules, 64, 361
- Herrnstein's equation, within-session changes in responding, 64, 237; closed-economy multiple-schedule performance, 65, 111; parameters vary with schedule order, 73, 319
- Herrnstein's hyperbola, and background reinforcement, 61, 65; changes in as a function of water deprivation, 72, 251; species differences (review), 84, 99; classic and modern theories of matching, 84, 111; interpretation of r_c 185; relation of response rate to reinforcer rate, 85, 57
- heuristics, psychology of decision making (book review), 79, 409
- higher-order class, do infants show generalized imitation of gestures? 87, 63
- hints, time to completion of web-based physics problems with tutoring, 88, 103
- hippocampus, in vitro reinforcement, 61, 155; pilocarpine seizures and auditory discrimination, 84, 357; role in episodic memory, 84, 619; acquired equivalence changes representations, 91, 127
- historicity, tolerance in a rigorous science, 71, 284
- history, of cumulative recorders manufactured in Japan, 90, 125
- history, see also *behavior analysis history*
- history effects, temporal control by PI schedules, 66, 311; instructions as discriminative stimuli, 72, 205; changing behavior within session, 75, 235
- history of psychology, ecological psychology in context, 92, 275
- Holt, E.B., ecological psychology in context, 92, 275
- homologues, legacies of E. L. Thorndike, 70, 325
- Honduras, designing a behavioral program in, 61, 295
- horses, behavior analysis and animal training (book review), 72, 139; differential outcome effect in, 74, 245
- housing, a behavioral program in Honduras, 61, 295
- houselight illumination as primary reinforcer, during chained schedules of food presentation, 90, 187
- human behavior, *JEAB* at 0, 50, and 100, 89, 111
- human-nonhuman differences, VR histories and FI performances, 63, 97; legacies of E. L. Thorndike, 70, 325
- human operant research, instructional effects on matching-to-sample performance, 89, 333
- humans, drug discrimination, 61, 169; 61, 181; behavioral economics of cigarette smoking, 61, 191; effects of marijuana, 61, 203; overcoming learned nonuse by shaping, 61, 281; a behavioral program in Honduras, 61, 295; relations between neuroscience and human behavioral science, 61, 307; and precurrent contingencies, 61, 427; choice in concurrent ratio-interval schedules, 61, 453; transfer of relational stimulus control, 61, 487; effects of marijuana, 62, 73; choice to compete, 62, 133; exchange delays and impulsive choice, 62, 225; bias in self-evaluation, 62, 235; transfer of self-discrimination response functions, 62, 251; effects of different accessibility of reinforcement schedules on choice, 62, 269; transfer of respondent eliciting and extinction through equivalence classes, 62, 331; control of choice in situations of diminishing returns, 62, 367; symbolic matching-to-sample performance, 63, 53; reversal of baseline relations and stimulus equivalence in adults, 63, 225; diazepam and buspirone discrimination, 63, 277; self-control, impulsiveness, and food preferences, 64, 33; maintained nodal-distance effects in equivalence classes, 64, 129; transformation of self-discrimination response functions, 64, 163; discounting of delayed rewards, 64, 263; choice and time-based diminishing returns, 65, 5; self-reports of emergent relations, 65, 355; speed analyses of stimulus equivalence, 65, 643; signal-detection performance, 66, 243; resurgence of derived stimulus relations, 66, 267; transformation of respondently conditioned stimulus function, 67, 275; the simultaneous protocol and equivalence class formation, 67, 367; extension of equivalence classes, 68, 67; incongruous stimulus pairing and conditional discrimination training,

SUBJECT INDEX

68, 143; schedule interactions involving punishment, 68, 161; restricted stimulus control in mental retardation, 68, 303; choice and self-control, 69, 87; choice between risk and delay, 69, 123; effects of reward and feedback on competitive responding, 69, 263; logical functions of joint control, 69, 327; consequences of advice on rule control and choice, 70, 1; avoidance of CO₂-enriched air, 70, 79; default-response option and untrained stimulus relations, 70, 87; mental rotation and temporal contingencies, 70, 203; operant processes and category formation, 70, 267; effect of alcohol on impulsive behavior, 71, 121; base rates and sample accuracy in human matching to sample, 71, 155; sensitivity to concurrent schedules, 71, 303; equivalence relations between visual stimuli, 71, 395; triazolam discriminators, 71, 417; instructions as discriminative stimuli, 72, 205; similar consumption and responding across single and multiple sources of drug, 72, 299; unit price and choice, 73, 45; performance on negative slope schedules, 73, 241; stimulus control and generalization of punishment, 73, 261; reinforcer control and signal-detection performance, 73, 275; equivalence classes and minimal verbal repertoires, 74, 101; effects of competitive reward distribution on auditing and competitive responding, 74, 115; derived relational responding as generalized operant behavior, 74, 207; performance on yoked schedules, interaction of procedural factors, 74, 265; speech-recognition technology, 74, 363; behavioral momentum in, 75, 15; equivalence, naming, and conflicting baseline control, 75, 55; effects of response edisparity on stimulus and reinforcer control, 75, 183; risk-sensitive choice, 76, 1; ideal free distribution and social behavior, 76, 21; perceptual classes in, 76, 95; equivalence class formation, 76, 265; contextual cues that control equivalence responding, 76, 339; stability of functional equivalence and stimulus equivalence, 77, 29; comparison of money rewards in delay discounting, 77, 129; high-probability stimulus control topographies, 77, 189; group choice and the ideal free distribution, 78, 1; formation of linked perceptual classes, 78, 271; generalized categorization repertoire, 78, 291; functional-analytic model of analogy, 78, 375; covarying functions in stimulus class formation and transfer of function, 78, 509; effects of differences in IRIs, 79, 49; alternative reinforcement effects on behavior, 79, 193; generalized contextual control, 79, 383; punishment and choice, 80, 1; risky choice under temporal constraints, 80, 59; equivalence relations and language, 80, 131; stimulus generalization of behavioral history, 80, 173; speech perception, 80, 205; function transfer in, 81, 239; formation

of equivalence relations, 81, 257; formation of equivalence relations, 81, 257; reinforcement in a prisoner's dilemma, 82, 161; transformation of consequential functions, 82, 177; typicality effects, 82, 253; marijuana effects on forgetting functions, 83, 67; matching in, 84, 129; testing during spaceflight, 84, 227; test schedules and linked perceptual classes, 84, 243; derived equivalence relations, 84, 417; relational frame theory, 84, 435; brain activation correlated with discriminative stimuli, 84, 505; brain imaging and choice, 84, 537; replacing relative reinforcing efficacy with behavioral economic demand curves, 85, 73; experimental control of nodality, 85, 107; testing response-stimulus equivalence relations using differential responses as a sample, 86, 239; intertrial sources of stimulus control and delayed matching-to-sample performance in, 86, 253; transformation of consequential functions in accordance with the relational frames of more-than and less-than, 86, 317; equivalence relations, contextual control, and naming, 86, 337; conditional relations with compound abstract stimuli using a go-no-go procedure, 87, 89; effects of differential training procedures on linked perceptual class formation, 87, 97; stochastic matching and the voluntary nature of choice, 88, 1; contextual control by function and form of transfer of functions, 88, 87; time to completion of web-based physics problems with tutoring, 88, 103; transformation of the discriminative and eliciting functions of generalized relational stimuli, 88, 179; transformation of avoidance response functions in accordance with same and opposite relational frames, 88, 249; a derived transfer of functions and the implicit association test, 88, 263; aging and intraindividual variability in performance: analyses of response time distributions, 88, 319; an experimental analysis of memory processing, 88, 405; and loss aversion in capuchin monkeys, 89, 145; asymmetry of reinforcement and punishment, 89, 157; instructional effects on matching-to-sample performance, 89, 333; nodal partitioning of equivalence classes, 89, 359; concurrent schedules of positive and negative reinforcement, 90, 1; and probabilistic contingency learning, 90, 23; common control by compound samples in conditional discriminations, 90, 81; individual differences and intelligence, 90, 219; delay, probability, and social discounting in a public goods game, 91, 61; producing and recognizing analogical relations, 91, 105; acquired equivalence changes representations, 91, 127; linked perceptual class formation and transfer of function, 91, 225; fairness in resource allocation, 91, 337; response acquisition by humans with delayed reinforcement, 91, 377; discounting gains and losses, 92, 1; punishment

SUBJECT INDEX

- and human signal detection, 92, 17; transfer of aversive respondents, 92, 85; ethanol's antipunishment effects, 92, 161; emergent relations in go/no-go procedures, 92, 233; resurgence of infant caregiving responses, 92, 327
- humans, see also *children; infants; normally-capable adults*
- hydromorphone, human drug discrimination, 61, 169
- hyperbolic decay model, and self-control, 62, 33; contiguity and conditioned reinforcement in probabilistic choice, 67, 317; comparison of money rewards, 77, 129; and choice in a successive-encounters procedure, 88, 73
- hyperbolic discounting, tolerance for delay, 79, 37; choice in dynamic environments and, 84, 581; and delay-amount tradeoffs, 91, 197
- hyperbolic value added model, in concurrent chains, 81, 214; independence of entry rate and immediacy, 82, 235; in concurrent chains, 83, 169; choice between single and multiple reinforcers in concurrent-chains schedules, 86, 211
- hyperboloid, discounting gains and losses, 92, 1
- hypercapnia, behavior analysis and hypertension, 61, 255
- hypertension, and behavior analysis, 61, 255; sodium and stress in baboons, 61, 263
- hysteresis, with terminal links following an ascending and descending series, 91, 1
- ideal free distribution, and group choice, 69, 227, 76, 21; and human group choice, 78, 1; and group foraging sensitivity, 78, 179
- identity matching, performance in rats, 68, 27
- imitation, social learning in pigeons, 79, 175; and hand-to-body gestures in children, 89, 183; effects of skills training and multiple exemplar matching training, 91, 355
- immediate and delayed emergence, and effects of differential training procedures on linked perceptual class formation, 87, 97
- impaired movement, overcoming learned nonuse by shaping, 61, 281
- implicit association test, and a derived transfer of functions, 88, 263
- imprinting, environmental influence and behavioral plasticity of (book review), 79, 137
- impulse, and E. L. Thorndike, 72, 429
- impulsive behavior, and exchange delays in humans, 62, 225; effects of food preferences in children and adults on, 64, 33; determination of discount functions, 67, 353; effect of alcohol, 71, 121; and self-control (book review), 78, 117
- impulsive choice, nicotine effects, 91, 213
- impulsivity, in Lewis and Fischer 344 rats, 90, 333
- In Situ testbed, and computational models of learning, 75, 135
- in vitro reinforcement, of hippocampal bursting, 61, 155
- incentive, responding under conditions of varying motivation, 64, 405; contrast, 68, 133; effects of compounding drug-related stimuli, 73, 211
- incentive contrast, analysis of reinforcement history effects, 86, 31; and preference for CRs that follow more rather than less aversive events, 88, 131
- incentive theory, and self-control, 62, 33; in concurrent chains, 83, 169
- income, choice between risk and delay, 69, 123
- indirect stimulus control, resurgence of derived stimulus relations, 66, 267
- individual, molecular to molar in behavior analysis, 78, 95
- individual differences, and intelligence, 90, 219
- infants, generalized imitation of gestures, 87, 63; effects of skills training and multiple exemplar matching training, 91, 355
- infrared, infrared detector to verify delivery of food pellets, 90, 249
- inhibition, an experimental analysis of memory processing, 88, 405
- inhibitory aftereffects, roles of, 79, 243
- initial discriminability, and the differential-outcomes effect, 61, 389
- instructional control, versus schedule control of human choice, 62, 367; human performance on yoked schedules, 74, 265; instructional effects on matching-to-sample performance, 89, 333
- instructional failure, theory of memory for event duration, 72, 467
- instructions, effects on humans' choice to compete, 62, 133; transfer of self-discrimination response functions, 62, 251; as discriminative stimuli, 72, 205; acquisition of arbitrary conditional discriminations by children, 73, 177
- integration, of basic and applied research, 61, 529
- intelligence, legacies of E. L. Thorndike, 70, 325; individual differences and behavior analysis, 90, 219
- intentional act, philosophical behaviorism (book review), 72, 273
- intentional stance, and religion as a natural phenomenon (book review), 87, 143
- interchangeover time, in strict and random alternation conditions, 79, 65
- interdependent schedules, a model for residence time in conc. VI performance, 87, 121
- interference, an experimental analysis of memory processing, 88, 405
- interfood interval, dynamics of time discrimination, 66, 117; temporal control in rats, 70, 35
- internal states, in *The new behaviorism* (book review), 82, 73
- interpositus nucleus, role in associative learning, 84, 631
- interpretation, autoshaping and automaintenance: a neural-network approach, 88, 115
- interreinforcement interval, and the behavioral theory of timing, 61, 19; distribution of and

SUBJECT INDEX

- behavioral dynamics, 66, 391; effects of differences in, 79, 49
- interresponse time, autoshaping the pigeon's gape response, 62, 201; sensitivity during concurrent VI schedules, 72, 317; reinforcer magnitude and DRL schedules, 78, 17; principal components of response strength, 78, 127; differential reinforcement of, 79, 157; time and rate measures in choice, 81, 135; effects of morphine on, 82, 197; in chained schedules: implications for the concept of conditioned reinforcement, 88, 215; in variable-ratio and variable-interval schedules, 90, 345; schedule discrimination based on reinforced IRT, 91, 157; differential reinforcement of low rate schedule criterion changes, 92, 181
- interresponse time, *see also* IRT
- intersensory perception, and linked perceptual classes, 78, 271
- intertemporal conflict, and tolerance for delay 79, 37
- intertrial interval, context effects on choice, 70, 301; and risky choice, 75, 275
- intertrial reinforcers, and self-control, 61, 83
- interval, theories of timing, 71, 293; tuned-trace theory of interval-timing dynamics, 77, 105
- interval schedules, behavioral economics and behavioral momentum, 64, 385; time and rate measures in choice, 81, 135
- intruded stimulus paradigm, and polydipsia in rats, 62, 307
- IRT distributions, applications and extensions of Shull, Gaynor and Grimes, 90, 363
- isovalue function, assessing preference for reinforcers, 64, 313
- Japanese manufacture, of cumulative recorders, 90, 125
- jaw movement, the conditioned pecking response, 61, 517
- JEAB*, and the Skinnerian interpretation, 89, 137
- Johnston, J. M., and Pennypacker, H. S. *Strategies and tactics of behavioral research* (2nd ed.) (review), 64, 247
- joint control, logical functions of, 69, 327
- joystick response, self-reports of emergent relations, 65, 355; human performance on yoked schedules, 74, 265; match to sample in chimpanzees, 78, 497; alternative reinforcement effects on behavior, 79, 193
- judgment, future of behavior analysis, 89, 125
- justification of effort, within-trial contrast: pigeons prefer CRs that follow more rather than less aversive events, 88, 131
- Kelleher, Roger T., behavior analyst (tribute), 86, 371
- Keller, Fred S. 66, 1; 66, 7
- key area, pigeons' preference for free choice, 68, 349
- keyboarding, nodal partitioning of equivalence classes, 89, 359; equivalence in a stimulus pairing 2-response format, 92, 57
- keyboard pressing, *see keyboard responding*
- keyboard responding, effects of differential training procedures on linked perceptual class formation, 87, 97; transformation of the discriminative and eliciting functions of generalized relational stimuli, 88, 179; linked perceptual class formation and transfer of function, 91, 225
- key number, pigeons' preference for free choice, 68, 349
- key peck, temporal control in fixed-interval schedules, 61, 1; and the behavioral theory of timing, 61, 19; and the discriminability of alternatives in concurrent-schedule performance, 61, 45; intertrial reinforcers and self-control, 61, 83; and the behavioral competition theory of contrast, 61, 107; and concurrent-chains choice, 61, 113; effects of reinforcement history, 61, 375; and the differential-outcomes effect, 61, 389; contrast and undermatching, 61, 407; delay reduction and optimal foraging, 61, 465; analysis of pecking response parameters, 61, 517; and duration comparison, 62, 15; effects of variable delays on self-control, 62, 33; leaving patches, 62, 89; within-session changes in responding, 62, 109; context specificity and discrimination acquisition, 62, 157; travel requirements and leaving patches, 62, 185; autoshaping the pigeon's gape response, 62, 201; choice between reliable and unreliable reinforcement, 62, 353; cued and uncued terminal links in concurrent-chains schedules, 62, 385; transitivity in conditional matching to sample, 62, 399; ratio versus difference comparators in choice, 62, 409; resistance to reinforcement change in multiple and concurrent schedules, 63, 1; delayed matching and reinforcement, 63, 33; changeover delay and concurrent-schedule performance in domestic hens, 63, 71; directed forgetting in pigeons, 63, 127; conditioned reinforcement and choice with delayed and uncertain primary reinforcers, 63, 139; hens' matching with different responses, 63, 151; pigeons' discrimination of paintings, 63, 165; contrast and extraneous reinforcer reallocation, 63, 203; reinforcement delay and magnitude in concurrent chains, 63, 255; preferences for fixed and variable food sources, 63, 313; prisoner's dilemma and the pigeon, 64, 1; delayed matching-to-sample performance of hens, 64, 19; cocaine and food deprivation, 64, 61; self-control achieved by response persistence, 64, 117; quantitative analysis of extreme choice, 64, 147; component transition as the relational basis for successive discrimination, 64, 185; determinants of speed, 64, 215; biasing the pacemaker in the behavioral theory of timing, 64, 225; within-session changes in responding,

SUBJECT INDEX

64, 237; maximizing reinforcement rate in pigeons, 64, 277; pigeons' preference for VI water reinforcement, 64, 299; behavioral economics and behavioral momentum, 64, 385; effects of food-pellet size on, 65, 21; aversiveness of noise in hens, 65, 37; presence-versus-absence discrimination in pigeons, 65, 81; reinforcement amount and induced attack, 65, 93; closed-economy multiple-schedule performance, 65, 111; cocaine and food deprivation, 65, 145; procrastination by pigeons, 65, 159; residence time and choice in foraging, 65, 423; and concurrent choice, 65, 445; drug discrimination by pigeons, 65, 495; changeover behavior and preference, 65, 513; blocking, unblocking, and overexpectation in autoshaping, 65, 575; commitment using punishment, 65, 593; dynamics of waiting in pigeons, 65, 603; response-dependent prechoice effects, 65, 619; choice as a function of reinforcement ratios, 66, 11; token reinforcement, choice, and self-control, 66, 29; within-session changes in responding, 66, 51; choice in an adjusting-delay procedure, 66, 63; within-session changes in responding in conc VI, 66, 75; choice in concurrent chains, 66, 97; dynamics of time discrimination, 66, 117; within-session response rates, 66, 135; stimulus effects on behavior allocation, 66, 149; drug discrimination by pigeons without explicit training, 66, 193; within-session patterns on conjoint VI VT schedules, 66, 205; effects of sample duration in DMTS, 66, 231; preference between VR and FR schedules, 66, 283; response type and sensitivity to reinforcer variation, 66, 297; within-session changes in responding, 66, 369; behavioral dynamics, 66, 391; discrimination of relative frequency, 67, 11; preference and resistance to change, 67, 43; open vs. closed economies, 67, 67; and behavioral momentum, 67, 91; residence time in concurrent foraging, 67, 161; histories of differential reinforcement, 67, 311; memory processes in delayed discriminations, 67, 323; increasing the variability of response sequences, 68, 1; transfer tests of stimulus value, 68, 93; schedule interactions involving punishment, 68, 161; drug discrimination under concurrent FI schedules, 68, 193; nonstable concurrent choice, 68, 219; contiguity and conditioned reinforcement in probabilistic choice, 68, 317; control of choice by its consequences, 68, 329; pigeons' preference for free choice, 68, 349; choice between FR and geometrically escalating schedules, 68, 357; response-independent events in the behavior stream, 68, 375; concurrent VI extinction schedules, 69, 49; reinforcer efficacy in a DMTS task, 69, 77; unsignaled delayed reinforcement and VI schedules, 69, 103; functions of the changeover delay, 69, 141; reporting contingencies of reinforcement, 69, 161; procrastination by pigeons, 69, 185; effects of unsignaled delayed reinforcement, 69, 247; food-deprivation level and morphine, 69, 295; varying sample- and choice-stimulus disparity, 69, 311; effects of response form, force, and number, 70, 45; step size and break-point criterion and PR performance, 70, 123; VI value, training amount, and stimulus generalization, 70, 139; response persistence on ratio and interval schedules, 70, 165; control by sample location, 70, 235; choice with delayed and probabilistic reinforcers, 70, 253; categorization of natural movements, 70, 281; context effects on choice, 70, 301; accounts of self-control choice, 71, 27; preference and differential changeover delays, 71, 45; reversed schedule effects in open and closed economies, 71, 171; response-reinforcer relation and delay-of-reinforcement effects, 71, 187; effects of response type and price on demand, 71, 329; choice, contingency discrimination, and foraging theory, 71, 355; effects of ITI duration on discrete-trial-choice, 71, 375; stimulus presentation ratios and outcomes in signal-detection procedures, 72, 1; preferences for and against stimuli paired with food, 72, 21; effects of number of sample stimuli and choices on discriminability, 72, 33; Pavlovian contingencies and resistance to change in a multiple schedule, 72, 81; class-consistent differential reinforcement and stimulus class formation in pigeons, 72, 97; discrimination of relative frequency of events, 72, 151; drug discrimination under a concurrent FR FR schedule, 72, 187; transitivity of choices under different response requirements, 72, 235; sample-duration effects on delayed matching, 72, 279; reward density and VI performance in an open economy, 72, 341; behavioral economics and within-session changes in responding, 72, 355; effects of economy, deprivation, and session duration on leaving patches, 72, 373; within-session analysis of visual discrimination, 72, 385; satiation, capacity, and within-session responding, 72, 407; theory of memory for event duration, 72, 467; travel time and concurrent-schedule choice, 73, 65; pigeons' choice of schedules, 73, 93; conditioned reinforcing and delayed discriminative stimulus functions of stimuli, 73, 125; transfer of matching to novel sample locations, 73, 141; choice in a variable environment, 74, 1; psychometric function and timing, 74, 25; drug discrimination under concurrent FI FI schedules, 74, 55; preference and resistance to change, 74, 79, 165; timeout postponement without increased reinforcement frequency, 74, 147; effects of morphine on FI patterns and temporal discrimination, 74, 229; choice, changing over, and reinforcement delays, 74, 311; sensitivity to relative reinforcer rate in concurrent schedules, 75, 25; computational

SUBJECT INDEX

models of learning, 75, 135; reinforcement delays and choice, 75, 165; reinforcer-ratio variation and adaptation, 75, 207; changing behavior within session, 75, 235; VR vs. VI schedules, 76, 43; second-order schedules of token reinforcement, 76, 159; resistance to change of variation and repetition, 76, 195; tolerance to cocaine under behavior-correlated schedule, 76, 217; linear modeling of behavioral dynamics, 77, 3; choice in a variable environment, 77, 65; drug discrimination under concurrent VR schedules, 77, 91; evidence against a constant-difference effect, 77, 147; disruption of temporally organized behavior by morphine, 77, 157; preference and resistance to change, 77, 233; effects of reinforcers on concurrent schedules, 77, 257; dynamical concurrent schedules, 79, 1; differential sample responding without different exteroceptive stimuli, 79, 21; strict and random alternation, 79, 65; changeover delays and signaled reinforcer ratios, 79, 87; choices in self-control procedures, 79, 207; resistance of discrimination and response rate, 79, 307; and MTS performance, 79, 323; reinforcer magnitude effects, 79, 351; directional movement discrimination, 80, 29; economic and biological influences on responding, 80, 43; reinforcer magnitude and local preference, 80, 95; effects of unequal reinforcer distributions, 80, 187; an analysis of resurgence, 80, 217; acquisition of preference in concurrent chains, 80, 235; arousal, changeover responses, and preference, 80, 261; unit price and choice, 81, 5; preference between forced and free choice, 81, 27; discounting of delayed rewards, 81, 39; choice in a variable environment, 81, 85; time and rate measures in choice, 81, 135; repeated post- or pre-session cocaine administration, 81, 169; temporal context in concurrent chains, 81, 215; within-session delay-of-reinforcement gradients, 82, 21; generalization to chimeras and morphs, 82, 125; matching acquisition and generalization, 82, 143; morphine and temporal discrimination, 82, 197; effects of cocaine on performance, 82, 293; independence of entry rate and immediacy, 82, 235; tests of unit price, 83, 99; choices between fixed- and random-interval schedules, 83, 129; variation, repetition, and choice, 83, 147; sensitivity to magnitude, 83, 169; unsignaled delay of reinforcement and matching, 83, 201; temporal tracking, 83, 243; effects of reinforcer probability, delay, and response requirement on choice, 83, 263; morphine tolerance as a function of ratio schedule, 83, 281; effects of conditioned reinforcement rate on observing rate and resistance to change, 84, 1; second-order schedules, 84, 19; effects of reinforcer sequences on local preference, 84, 37; resistance to change of forgetting functions and

response rates, 84, 65; drug discrimination, 84, 77; associative symmetry, 84, 147; effect of morphine on temporal discrimination, 84, 401; influence of prior choices on current choice, 85, 3; discriminability and sensitivity to reinforcer magnitude, 85, 41; rapid acquisition in concurrent chains, 85, 181; second-order schedules of token reinforcement, 85, 95; negative automaintenance omission training, 86, 1; analysis of reinforcement history effects, 86, 31; contingency discriminability and peak shift in concurrent schedules, 86, 11; tests of response membership in acquired equivalence classes, 86, 81; effects of delayed reinforcement on variability and repetition of response sequences, 86, 159; disruption of responding maintained by conditioned reinforcement, 86, 197; choice between single and multiple reinforcers in concurrent-chains schedules, 86, 211; pigeons' discrimination of Michotte's launching effect, 86, 223; effects of *d*-amphetamine and ethanol on, 86, 285; timing, remembering, and discrimination, 87, 25; discriminated timeout avoidance and the roles of added stimuli, 88, 51; choice in a successive-encounters procedure and hyperbolic decay of reinforcement, 88, 73; differentiation of response numerosities in the pigeon, 88, 153; IRT-stimulus contingencies in chained schedules: implications for the concept of conditioned reinforcement, 88, 215; seasonal variation in pigeon body weight and delayed matching-to-sample performance, 88, 395; induced attack during fixed-ratio and matched-time schedules, 89, 31; choice and multiple reinforcer dimensions, 89, 49; *d*-amphetamine and sensitivity to delay, 89, 71; conditioned reinforcement and resistance to change, 89, 263; schedule-correlated stimulus presentation, 89, 299; context effects in a temporal discrimination task, 90, 33; relative reinforcer rates and magnitudes and control of concurrent choice, 90, 169; cocaine tolerance under FI schedules, 90, 207; associative symmetry, antisymmetry and a theory of pigeons' equivalence-class formation, 90, 257; sensitivity of conditional-discrimination performance to within-session variation of reinforcer frequency, 90, 301; concurrent resurgence and behavioral history, 90, 313; interresponse time structures in variable-ratio and variable-interval schedules, 90, 345; reinforcer accumulation in a token-reinforcement context with pigeons, 90, 283; and informative stimuli in a constant environment, 91, 41; probability and RI preference, 91, 89; extensive training and the work-ethic effect, 91, 143; pigeons approach Nash equilibrium, 91, 169; and delay-amount tradeoffs, 91, 197; uncorrelated stimuli and resistance to change, 92, 199; comparing demand equations, 92, 305; procedural variations in concurrent chains, 92, 345;

SUBJECT INDEX

- cocaine tolerance and conjunctive schedules, 92, 413
- key poke, generality of selective observing, 77, 171; engagement bouts and resistance to extinction, 77, 211; reinforcer magnitude and DRL schedules, 78, 17; d-amphetamine and temporal discrimination, 78, 195; same-different discrimination, 78, 365; emergent differential sample behavior, 78, 409; tests of symmetry in pigeons, 78, 467; bout rate and reinforcement, 81, 65; bouts of responding on VI schedules, 81, 155; resistance to extinction following variable-interval reinforcement, 85, 23
- key press, and precurrent contingencies, 61, 427; and transfer of relational stimulus control, 61, 487; and control of human choice, 62, 367; within-session changes in responding for water, 64, 75; maintained nodal-distance effects in equivalence classes, 64, 129; human choice and time-based diminishing returns, 65, 5; cocaine and reinforcement delay, 65, 375; speed analyses of stimulus equivalence, 65, 643; resurgence of derived stimulus relations, 66, 267; extension of equivalence classes, 68, 67; incongruous stimulus pairing and conditional discrimination training, 68, 143; simple and conditional visual discrimination, 70, 103; base rates and sample accuracy in human matching to sample, 71, 155; symmetry in conditional discriminations of chimpanzees, 73, 5; reinforcer control and human signal detection, 73, 275; risk-sensitive choice in humans, 76, 1; perceptual classes in humans, 76, 95; high-probability stimulus control topographies, 77, 189; formation of linked perceptual classes, 78, 271; function transfer in humans, 81, 239; repeated acquisition and GABA_A modulators 82, 37; repeated acquisition and cocaine self-administration, 89, 225
- knob pull, competitive responding in humans, 69, 263; 74, 115
- knowing, transfer of self-discrimination response functions, 62, 251
- labor supply, behavioral economics and behavioral momentum, 64, 385
- laboratory analogue, avoidance of CO₂-enriched air, 70, 79
- landmarks, and stimulus control in the use of, 63, 187
- language, naming and symbolic behavior, 65, 185; 68, 235; and animal training (book review), 72, 139; conditional discriminations of language-trained chimpanzees, 73, 5; producing and recognizing analogical relations, 91, 105
- language limitations, equivalence relations in individuals with, 80, 131
- latency, of key pecks and gapes in pigeons, 65, 21; components of response strength, 75, 111; 78, 127
- law of effect, legacies of E. L. Thorndike, 70, 325; 72, 425; 72, 429; 72, 441; 72, 447; a model for residence time in conc VI performance, 87, 121
- law of effect, see also *symmetrical law of effect*
- law of exercise, and E. L. Thorndike, 72, 441; 85, 3
- laws, mechanistic explanation of behavior, 84, 313
- learned helplessness, and animal training (book review), 72, 139
- learning, language acquisition, 62, 323; and behavior analysis, 62, 435; and complex behavior (review), 63, 347; theory, and William N. Schoenfeld, 67, 1; teaching the psychology of, 70, 215; everyday examples in the teaching of, 72, 269; theories and E. L. Thorndike, 72, 425; 72, 429; 72, 433; to time, models of, 74, 25; computational models of, 75, 135; evolution of (book review), 78, 225; effects of GABA_A modulators on, 82, 37; enhancement of by signaled reinforcement, 83, 31; and career of J.M. Harrison, 90, 131; individual differences and intelligence, 90, 219; acquired equivalence changes representations, 91, 127
- learning, see also *matched-dependent learning, relational learning*
- learning-to-time (LeT) model, learning to time, 92, 423
- learning without awareness, and E. L. Thorndike, 72, 441
- less than, transformation of self-discrimination response functions with arbitrarily applicable relations, 64, 163
- levels of organization, mechanistic explanation of behavior and, 84, 313
- lever press, molecular and molar analyses of fixed-interval performance, 61, 11; and background reinforcement, 61, 65; different reinforcers and the response-strength equation, 61, 97; and response-contingent shock, 61, 135; responding maintained by cocaine and food, 61, 213; effects of ethanol and cocaine on brain stimulation reward, 61, 223; effects of cocaine on baboons, 61, 231; choice in concurrent chains, 61, 349; and brief-stimulus presentations, 61, 417; and response-rate differences, 61, 441; effects of chlordiazepoxide and cocaine, 61, 479; reinforcer magnitude and the matching law, 61, 505; and operant feeding in goldfish, 62, 1; tolerance to effects of cocaine, 62, 45; modulation of respiration in rhesus monkeys, 62, 57; and social reinforcement in rats, 62, 149; and polydipsia in rats, 62, 307; effects of cocaine on behavior maintained by timeout from avoidance, 63, 19; VR histories and FI performances in rats, 63, 97; effects of response-force requirements on FR responding, 63, 331; within-session changes in responding for water, 64, 75; within-session changes in responding, 64, 237; concurrent ethanol-sucrose and sucrose reinforcement, 64, 331; unit price and progressive-ratio schedules,

SUBJECT INDEX

64, 361; behavioral economics and behavioral momentum, 64, 385; Pavlovian contingencies and behavioral momentum, 65, 389; substitution and caloric regulation, 65, 401; food and water intake versus costs in a closed economy, 65, 527; within-session changes in responding in conc VI, 66, 75; within-session patterns on conjoint VI VT schedules, 66, 205; relative sensitivity to reinforcer amount and delay, 66, 219; temporal control by PI schedules, 66, 311; effects of d-amphetamine on response acquisition, 66, 349; within-session changes in responding, 66, 369; delayed reinforcement, 67, 131; conditioned reinforcement dynamics, 67, 145; effects of reinforcer duration, 67, 337; rats and drugs of abuse, 68, 117; schedule interactions involving punishment, 68, 161; locomotion vs. lever-press travel, 68, 177; response acquisition with delayed reinforcement, 69, 17; behavioral momentum and temporal separation, 69, 29; acquisition of, and reinforcement rate and delay, 69, 59; and concurrent performance, 69, 275; temporal control in rats, 70, 35; responding reinforced by the opportunity to run, 70, 69; response persistence on ratio and interval schedules, 70, 165; extinction of responding and timeout from avoidance, 71, 1; local model of concurrent performance, 71, 57; optimality and concurrent schedules, 71, 75; averaging effects and fixed-ratio response patterns, 71, 145; molar and molecular control in VI and VR schedules, 71, 319; value transmission in discrimination learning, 72, 177; falsification of matching theory, 72, 251, 73, 23; behavioral economics and within-session changes in responding, 72, 355; choice between constant and variable alternatives, 73, 79; reinforcer duration-PRP relation, 73, 225; stimulus control and generalization of punishment, 73, 261; effects of later requirements on earlier performances on PR schedules, 73, 291; parameters of Herrnstein's equation vary with schedule order, 73, 319; effects of sleep deprivation on free-operant avoidance, 73, 333; synthesizing concurrent interval performances, 74, 189; differential outcome effect in the horse, 74, 245; stimulus control during extinction, 74, 283; drugs and response-duration differentiation, 74, 295; long-term effects of responding history, 75, 43; effects of cocaine on FI responding, 75, 77; overmatching and the barrier choice paradigm, 75, 93; behavioral and pharmacological variables and risky choice, 75, 275; matching law and choice on concurrent VI schedules, 75, 299; response-independent milk delivery and persistence, 76, 179; determinants of reinforcer accumulation, 76, 321; observing behavior and reinforcement, 78, 161; tolerance for delay with bundled rewards, 79, 37; rats' performance on VI+ schedules, 79, 157; stay and switch reinforce-

ment, 79, 207; preference reversals in rats, 79, 233; sucrose concentration and wheel-running duration, 79, 243; responding on concurrent schedules of reinforcement, 79, 289; bouts of responding from VI reinforcement, 80, 159; sleep deprivation and positive reinforcement, 80, 253; discounting of delayed rewards, 81, 39; behavioral history and response acquisition, 81, 51; anorectic drugs and food access, 82, 275; signaled-reinforcement effect on operant responding, 83, 31; emergent stimulus relations, 83, 185; reinforcement history and fixed-interval performance, 83, 221; effects of reinforcer probability, delay, and response requirement on choice, 83, 263; effects of methylphenidate and morphine on delay discounting, 83, 297; matching in humans, 84, 129; earning reinforcers and the matching law, 84, 167; Herrnstein's r_e , 84, 185; unsignaled delayed reinforcement, 84, 269; effects of chlordiazepoxide on extinction, 84, 327; procedural and genetic influences on response acquisition, 84, 339; pilocarpine seizures and auditory discrimination, 84, 357; dopamine and sensitivity to reward, 84, 371; medial prefrontal lesions and conditional discrimination, 84, 485; relation of response rate to reinforcer rate, 85, 57; fix and sample with rats in the dynamics of choice, 86, 43; measuring resistance to change at the within-session level, 86, 109; reinforcement value and substitutability of sucrose and wheel running, 86, 131; assessing unit-price related remifentanil choice in rhesus monkeys, 86, 181; resurgence of response sequences during extinction in rats shows a primacy effect, 86, 307; resurgence of integrated behavioral units, 87, 5; acquisition and maintenance with delayed reinforcement, 88, 29; wheel-running reinforcement and mice selected for high daily wheel-running rates, 88, 199; contingency tracking during unsignaled delayed reinforcement, 88, 229; tests of behavioral-economic assessments of relative reinforcer efficacy: economic complements, 88, 355; primacy of molecular processes in determining response rates under variable-ratio and variable-interval schedules, 89, 5; avoidance of timeout from response-independent food, 89, 169; matching law as a measure of drug choice, 89, 209; steady-state assessment of impulsive choice in Lewis and Fischer 344 rats, 90, 333; and the stay/switch model, 91, 21; reinforcer volume and progressive-ratio schedules, 91, 75; schedule discrimination based on reinforced IRT, 91, 157; and delay-amount tradeoffs, 91, 197; nicotine effects, 91, 213; within-session transitions in choice, 91, 319; observing responses and serial stimuli, 92, 215
lever pull, and human drug discrimination, 61, 169; sodium and stress in baboons, 61, 263; and

SUBJECT INDEX

- “demand” for food in baboons, 62, 293; food and cocaine self-administration by baboons, 72, 215
- Lewis rats, impulsive choice in, 90, 333
- lick, punishment of schedule-induced drinking, 64, 47
- lickometer, touch or lick detector circuit, 91, 253
- Lindsley plunger pull, avoidance of CO₂-enriched air, 70, 79; replacing relative reinforcing efficacy with behavioral economic demand curves, 85, 73
- linear system theory, relation of response rate to reinforcer rate, 85, 57
- linear systems analysis, and behavioral dynamics, 66, 391; 77, 3; and falsification of matching theory, 72, 251, 73, 23; and behavioral dynamics, 81, 289
- linear-nonlinear-poisson models, choice in dynamic environments and, 84, 581
- linear waiting, dynamics of waiting in pigeons, 65, 603
- linked perceptual classes, formation of, 78, 271; effect of test schedules on, 84, 243; effects of differential training procedures on formation of, 87, 97; formation of partially and fully elaborated generalized equivalence classes, 90, 135; linked perceptual class formation and transfer of function, 91, 225
- listener behavior, naming and symbolic behavior, 65, 185; naming in children, 81, 267
- local analyses, of reinforcer magnitude, 80, 95; concurrent schedules and, 84, 37; and informative stimuli in a constant environment, 91, 41
- local contrast, and habituation to the reinforcer, 69, 199
- local models, of concurrent performance, 71, 57; 74, 189; extension of the, 79, 207
- location, of behavior under varying frequencies of water delivery, 73, 195
- location-reinforcer contingencies, and resistance to change, 66, 169
- locomotion, vs. lever-press travel in foraging simulation, 68, 177; overmatching and barrier choice, 75, 93
- logarithmic time, time to completion of web-based physics problems with tutoring, 88, 103
- log survivor functions, tolerance and tandem FI FR schedules, 82, 293
- log survivor plot, of interresponse times, 80, 159; of IRTs, 81, 65; and bouts of responding, 81, 155
- lorazepam, stimulus control during extinction, 74, 283
- loss aversion, in capuchin monkeys, 89, 145
- low-rate behavior, basic research needed, 61, 529
- magazine training, effects on response acquisition, 81, 51
- magnitude effect, in discounting of delayed rewards, 81, 39
- magnitude-of-reinforcer, comparing demand equations, 92, 305
- manual gestures, infants’ generalized imitation of gestures, 87, 63; imitation of hand-to-body gestures in children, 89, 183; effects of skills training and multiple exemplar matching training, 91, 355
- many-to-one matching, within-class sample responding and acquired equivalence, 89, 341
- many-to-one transfer effect, in rats, 83, 185
- marijuana, effects of, 61, 203; effects of in humans, 62, 73; effects on human forgetting functions, 83, 67
- marking, and brief-stimulus presentations, 61, 417
- Markov chains, IRT sensitivity during concurrent VI schedules, 72, 317
- Markov decision processes, partially observable, 75, 135
- matched-dependent learning, social influence in pigeons, 79, 175
- matched-time schedules, and induced attack, 89, 31
- matching, and discriminability of alternatives, 61, 45; foraging in a radial maze, 61, 331; human choice in concurrent ratio-interval schedules, 61, 453; and duration comparison, 62, 15; change-over delay and concurrent-schedule performance in domestic hens, 63, 71; concurrent-schedule performance in cows, 65, 57; residence time and choice in foraging, 65, 423; functions of the changeover delay, 69, 141; human sensitivity to concurrent schedules, 71, 303; integration of stimuli, reinforcers, and behavior, 71, 439; human performance on negative slope schedules, 73, 241; of response rates to reinforcer rates, 79, 1; in concurrent-schedule responding of possums, 79, 289; acquisition and generalization, 82, 143; dopamine and, 84, 371; response-by-response models and, 84, 555; linear-nonlinear-poisson models and, 84, 581; residence time in conc. VI performance, 87, 121; ethanol’s antipunishment effects, 92, 161
- matching games, imitation of hand-to-body gestures in children, 89, 183
- matching law, and background reinforcement, 61, 65; and reinforcer magnitude, 61, 505; hens’ preferences for topographically different responses, 63, 151; reinforcement delay and magnitude in concurrent chains, 63, 255; within-session changes in responding, 64, 237; maximizing reinforcement rate in pigeons, 64, 277; drug discrimination by pigeons, 65, 495; changeover behavior and preference, 65, 513; within-session changes in responding, 66, 369; drug discrimination under concurrent FI schedules, 68, 193; and group choice by foragers, 69, 227; and accounts of self-control choice, 71, 27; drug discrimination under a concurrent FR FR schedule, 72, 187; unit price and choice, 73, 45; sensitivity to relative reinforcer rate in concurrent schedules, 75, 25; and choice on concurrent VI schedules, 75, 299; and human social behav-

SUBJECT INDEX

- ior, 76, 21; group choice and the ideal free distribution, 78, 1, 179; and effects of alternative reinforcement on human behavior, 79, 193; classic and modern theories, 84, 111; asymmetry of reinforcement and punishment, 89, 157; as a measure of drug choice in rhesus monkeys, 89, 209; extended control of local preference, 91, 293
- matching law, see also *generalized matching law*
- matching theory, basic research needed, 61, 529; falsification of, 72, 251; 73, 23; classic and modern theories, 84, 111; formal and modern theories, 84, 129; Herrnstein's r_c , 84, 185; a computational theory of selection by consequences applied to concurrent schedules, 90, 387
- matching to sample, transfer of relational stimulus control, 61, 487; bias in self-evaluation, 62, 235; zero-delay, 62, 399; visual search by chimpanzees, 63, 175; naming and symbolic behavior, 65, 185; self-reports of emergent relations, 65, 355; speed analyses of stimulus equivalence, 65, 643; naming and verbal behavior, 68, 235; reinforcer frequency and restricted stimulus control, 68, 303; varying sample- and choice-stimulus disparity, 69, 311; behavior analysis and decision making, 69, 355; simple and conditional visual discrimination, 70, 103; control by sample location, 70, 235; base rates versus sample accuracy in humans, 71, 155; equivalence classes in pre-school children, 71, 195; equivalence relations between visual stimuli, 71, 395; transfer to novel sample locations, 73, 141; use of number by crows, 73, 163; acquisition of arbitrary conditional discriminations by children, 73, 177; equivalence relations and the reinforcement contingency, 74, 127; derived relational responding as generalized operant behavior, 74, 207; speed contingencies, number of presentation, and nodality effect, 76, 265; contextual cues that control equivalence responding, 76, 339; stability of functional equivalence and stimulus equivalence, 77, 29; generalized categorization repertoire, 78, 291; tests of symmetry in pigeons, 78, 467; control by exclusion, 78, 497; category MTS in young children, 78, 527; resistance of discrimination and response rate, 79, 307; models of performance, 79, 323; generalized contextual control, 79, 383; function transfer in humans, 81, 239; emergent stimulus relations in, 83, 185; conditional discriminations and, 84, 281; transitive inference and neuroimaging, 84, 453; symmetry in a conditional discrimination task using different responses as proprioceptive samples in pigeons, 86, 65; experimental control of nodality, 85, 107; testing response-stimulus equivalence relations using differential responses as a sample, 86, 239; equivalence relations, contextual control, and naming, 86, 337; conditional relations with compound abstract stimuli using a go-no-go procedure, 87, 89; a derived transfer of functions and the implicit association test, 88, 263; instructional effects on matching-to-sample performance, 89, 333; and base-rate neglect, 90, 23; a procedure to correct biases in, 90, 103; producing and recognizing analogical relations, 91, 105
- matching to sample, see also *conditional matching to sample*, *delayed matching to sample*
- maternal nutrition, and four-alternative choice, 87, 51
- mathematical model, discrimination of relative frequency, 72, 151; selection by consequences, 81, 297; and the experimental analysis of behavior, 85, 275; for residence time in conc. VI performance, 87, 121; learning to time, 92, 423
- Mathematical Principles of Reinforcement (MPR), reinforcer volume and progressive-ratio schedules, 91, 75
- maximizing, human choice in concurrent ratio-interval schedules, 61, 453; reinforcement rate in pigeons, 64, 277; behavioral economics without anomalies, 64, 397; and choice in monkeys, 66, 143; momentary, and IRT sensitivity during concurrent VI schedules, 72, 317; human performance on negative slope schedules, 73, 241; stock optimizing in choice, 76, 245; brain imaging and choice behavior, 84, 537
- maximizing, see also *momentary maximizing*
- maze, foraging in a radial maze, 61, 331
- meals, size and frequency by cats, 67, 303; patterns of foraging rats, 69, 5; currency of procurement cost, 78, 31
- mechanics, responding under conditions of varying motivation, 64, 405
- mechanistic explanation, of behavior, 84, 313
- mediation, naming and verbal behavior, 68, 235
- melioration theory, changeover behavior and preference, 65, 513; synthesizing concurrent interval performances, 74, 189; group choice and the ideal free distribution, 78, 1
- memory, and duration comparison, 62, 15; delayed matching and reinforcement, 63, 33; directed forgetting in pigeons, 63, 127; presence-versus-absence discrimination in pigeons, 65, 81; working, and delayed discriminations, 67, 323; modeling theories of, 71, 281; and timing, 71, 288; marking and effects of primary reinforcement, 76, 75; tuned-trace theory of interval-timing dynamics, 77, 105; marijuana effects on, 83, 67; effects of chlordiazepoxide on extinction, 84, 327; an experimental analysis of memory processing, 88, 405; acquired equivalence changes representations, 91, 127
- mental retardation, and behavioral momentum, 75, 15; equivalence relations in individuals with, 80, 131; intertrial sources of stimulus control and delayed matching-to-sample performance in humans, 86, 253;

SUBJECT INDEX

- mental rotation, and temporal contingencies, 70, 203
- mentalism, and behaviorism (book review), 76, 115
- mereological fallacy, and neuroscience (book review), 84, 683; *In Search of Memory: The Emergence of a New Science of Mind* by Eric R. Kandel (book review), 90, 235
- methadone, discrimination by pigeons without explicit training, 66, 193
- methamphetamine, human drug discrimination, 61, 169; discrimination under concurrent FI FI schedules, 74, 55; and response-force requirements, 74, 295
- methodology, teaching the psychology of learning, 70, 215; legacies of E. L. Thorndike, 70, 325
- methohexital, normalized demand for, 64, 373; matching law as a measure of drug choice, 89, 209
- methylphenidate, effects on delay discounting, 83, 297
- mice, olfactory discrimination procedure for, 73, 305; effects of chlordiazepoxide on extinction, 84, 327; procedural and genetic influences on response acquisition, 84, 339; selected for high daily wheel-running rates and wheel-running reinforcement, 88, 199
- Michotte's launching effect, pigeons' discrimination of, 86, 223
- middle-aged adults, age trends in stimulus overselectivity, 88, 369
- milk, response-independent delivery of, 76, 179
- mind, mentalism and behaviorism (book review), 76, 115
- minimum-needs, tests of behavioral-economic assessments of relative reinforcer efficacy, 88, 355
- mirror image, as visual reinforcer in response acquisition, 61, 35
- mirror-image reinforcement, in *Betta splendens*, 90, 53
- mistaken identity, match-to-sample performance in rats, 68, 27
- mixed schedules, and variable patterns of responding, 79, 49
- mixed-strategy equilibrium, pigeons approach Nash equilibrium, 91, 169
- model of war duration, joys of research, 89, 119
- models, responding under conditions of varying motivation, 64, 405; modeling modeling, 71, 275; of timing, 71, 281; of behavioral dynamics, 77, 3; of the principal components of response strength, 78, 127; functional-analytic model of analogy, 78, 375; of conceptual combination, 78, 551; dynamic response-by-response, 84, 555; of timing, 85, 125; pigeons approach Nash equilibrium, 91, 169
- Moerk, E. L. First language: Taught and learned (review), 62, 323
- molar accounts see *molar view*
- molar analyses, of fixed-interval performance, 61, 11; effects of ITI duration on discrete-trial choice, 71, 375; feedback stimuli are safety signals, 75, 311
- molar behaviorism, *Taking Pragmatism Seriously* (review), 92, 131
- molar feedback function, and response-rate differences, 61, 441; in VI and VR schedules, 71, 319
- molar versus molecular analyses, averaging effects and fixed-ratio response patterns, 71, 145; paradigm shift in behavior analysis, 78, 95; *JEAB* at 0, 50, and 100, 89, 111
- molar view, of behavior, 81, 85; fix and sample with rats in the dynamics of choice, 86, 43; in determining response rates under variable schedules, 89, 5;
- molecular accounts, in determining response rates under variable schedules, 89, 5;
- molecular analyses, of fixed-interval performance, 61, 11; effects of ITI duration on discrete-trial choice, 71, 375
- molecular feedback, in VI and VR schedules, 71, 319
- molecular versus molar, see *molar versus molecular analyses*
- momentary maximizing, and the stay/switch model, 91, 21
- monetary gain, asymmetry of reinforcement and punishment, 89, 157
- monetary loss, asymmetry of reinforcement and punishment, 89, 157
- money, behavioral economics of cigarette smoking, 61, 191; as reinforcer for humans, 62, 225; as a reinforcer for humans, 79, 193; differential-impact and differential-outcomes hypotheses, 90, 1; fairness in resource allocation, 91, 337
- monkeys, overcoming learned nonuse by shaping, 61, 281; substitution and caloric regulation, 65, 401; choice and differential reinforcement, 66, 143; response-by-response models of matching, 84, 555; an experimental analysis of memory processing, 88, 405; loss aversion in capuchin monkeys, 89, 145; stimulus-food pairings produce stimulus-directed touch-screen responding in monkeys, 92, 41
- monkeys, see also *rhesus monkeys*, *squirrel monkeys*
- Monte Carlo, algorithm for Weiner transfer functions, 81, 289; analytic form for the IRT analysis of Shull, Gaynor, and Grimes, 90, 363
- more than, transformation of self-discrimination response functions with arbitrarily applicable relations, 64, 163
- more than two choices, barycentric extension of generalized matching, 92, 139
- morphine, and food-deprivation level, 69, 295; effects on FI patterns and temporal discrimination, 74, 229; disruption of temporally organized behavior, 77, 157; navigation and drug discrimination, 78, 215; and temporal discrimination, 82, 197; tolerance as a function of ratio schedule, 83, 281; effects on delay discounting, 83, 297; effects on temporal discrimination, 84, 401; effects of drugs and drug combinations, 92, 387

SUBJECT INDEX

- Morris swim task, navigation as a baseline for drug discrimination, 78, 215
- Morse, William H., architect of the golden years (tribute), 86, 385
- motion, discrimination of, 80, 29
- motion, see also *biological motion*
- motion perception, in pigeons, 80, 29
- motivation, responding under conditions of varying, 64, 405; and the S-R issue, 67, 239; a brief opportunity to run does not function as a reinforcer for mice selected for high daily wheel-running rates, 88, 199
- motor skills training, infants' generalized imitation of gestures, 87, 63
- mouse click, experimental control of nodality, 85, 107; transformation of consequential functions in accordance with the relational frames of more-than and less-than, 86, 317; relational learning in children with deafness, 89, 407; concurrent schedules of positive and negative reinforcement, 90, 1; punishment and human signal detection, 92, 17; electrophysiological analysis of equivalence, 92, 245
- mouth-contact responses, ethanol and rhesus monkeys, 77, 49
- moving targets, categorization by speed and direction, 78, 249
- moving-sample tests, control by sample location, 70, 235
- multiform schedules, and brief-stimulus presentations, 61, 417
- multiple baseline across behaviors, infants' generalized imitation of gestures, 87, 63
- multiple-concurrent schedules, contingency discriminability and peak shift in, 86, 11
- multiple delays, and the forgetting function, 80, 295
- multiple exemplars, effects of skills training and multiple exemplar matching training, 91, 355
- multiple reinforcers, choice between single and, in concurrent-chains schedules, 86, 211
- multiple schedules, responding maintained by cocaine and food, 61, 213; contrast and undermatching, 61, 407; and resistance to reinforcement change, 63, 1; contrast and extraneous reinforcer reallocation, 63, 203; effects of response-force requirements on FR responding, 63, 331; within-session changes in responding for water during, 64, 75; component transition as the relational basis for successive discrimination, 64, 185; closed-economy multiple-schedule performance, 65, 111; concurrent and behavioral momentum, 65, 389; response-independent food delivery and resistance to change, 65, 549; and resistance to change, 66, 169; preference and resistance to change, 67, 43; effects of schedule history on response rate, 67, 311; rats and drugs of abuse, 68, 117; behavioral momentum and temporal separation, 69, 29; habituation and behavioral contrast, 69, 199; effects of unsignaled delayed reinforcement, 69, 247; Pavlovian contingencies and resistance to change, 72, 81; effects of later requirements on earlier performances, 73, 291; preference and resistance to change, 74, 79; and behavioral momentum, 75, 15; stimulus control of cocaine self-administration, 79, 111; and resistance to change, 79, 307; effect of signaled reinforcement on FI responding, 79, 367; economic and biological influences on responding, 80, 43; matching: acquisition and generalization, 82, 143; effects of delayed reinforcement on variability and repetition of response sequences, 86, 159; repeated acquisition and cocaine self-administration, 89, 225; cocaine tolerance and conjunctive schedules, 92, 413
- multiple time scales, and theories of timing, 71, 293; choose-short effect and trace models of timing, 72, 473
- multivariate signal-detection theory, in perceptual categorization, 78, 567
- mutual entailment, derived relational responding as generalized operant behavior, 74, 207; tuned-trace theory of interval-timing dynamics, 77, 105; producing and recognizing analogical relations, 91, 105
- mutual selection and class definition, test schedules and, 84, 243
- N-400, electrophysiological analysis of equivalence, 92, 245
- nalbuphine, normalized demand for, 64, 373
- naming, and other symbolic behavior, 65, 185; 68, 235; equivalence relations between visual stimuli, 71, 395; human vocal behavior, 74, 363; equivalence and conflicting baseline control, 75, 55; and categorization in young children, 78, 527; and categorization in children, 81, 267; equivalence relations, contextual control, and naming, 86, 337; and categorization in children, 83, 47; imitation of hand-to-body gestures in children, 89, 183; in stimulus categorization by preschool children, 89, 383
- NASA, repeated performance testing during spaceflight, 84, 227
- natural categories, perceptual classes in humans, 76, 95
- natural selection, Richard Dawkins' *The God Delusion* (book review), 88, 435
- nature-nurture, relation to developmental and evolutionary principles (book review) 79, 137
- negative automaintenance, omission training is effective, 86, 1; stimulus-food pairings produce stimulus-directed touch-screen responding in monkeys, 92, 41
- negative recency, and negative primacy effects, 67, 11
- negative reinforcement, effects of chlordiazepoxide and cocaine, 61, 479; effects of cocaine on behavior maintained by timeout from avoidance,

SUBJECT INDEX

- 63, 19; extinction of responding and timeout from avoidance, 71, 1; effects of sleep deprivation on free-operant avoidance, 73, 333; timeout postponement without increased reinforcement frequency, 74, 147; differential-impact and differential-outcomes hypotheses, 90, 1; resurgence of infant caregiving responses, 92, 327
- negative slope schedules, human performance on, 73, 241
- neorealism, ecological psychology in context, 92, 275
- neural networks, approach to autoshaping and automaintenance, 88, 115
- neural network models, 67, 193; and theories of timing, 71, 257; behavior analysis and reevaluation, 74, 331; the In Situ testbed, 75, 135
- neuroeconomics, dynamic foraging and, 84, 581
- neuroimaging, discriminative stimuli and, 84, 505
- neuropathology, and Soman-induced brain injury, 61, 319
- neuropsychopharmacology, and Joseph V. Brady, 90, 405
- neuroscience, relations with human behavioral science, 61, 307; and theories of timing, 71, 257; drug addiction and, 84, 667; and Joseph V. Brady, 90, 405
- neuroscience methods, relationship between learning and the brain, 84, 631
- nicotine, nicotine effects on delay discounting and amount sensitivity, 91, 213
- nodal distance, nodal structure and the partitioning of, 89, 359
- nodal distance effects, in equivalence classes, 64, 129; the simultaneous protocol and equivalence class formation, 67, 367; equivalence relations between visual stimuli, 71, 395
- nodal number, relation to response accuracy and speed, 85, 107
- nodal relations, speed analyses of stimulus equivalence, 65, 643
- nodal structure, and the partitioning of equivalence classes, 89, 359
- nodality, effect in equivalence class formation, 76, 265; experimental control of effect, 85, 107
- nonlocalized effects, of short interfood intervals, 70, 35
- nonstationary Markov chain model, and behavioral variability, 68, 1
- normalization, comparing demand equations, 92, 305
- normalized demand, for drugs and other reinforcers, 64, 373
- normally-capable adults, electrophysiological analysis of equivalence, 92, 245
- nose key, match-to-sample performance in rats, 68, 27
- nose poke, foraging by rats in a radial maze, 61, 331; determination of discount functions, 67, 353; sexual reinforcement in the female rat, 68, 399; effects of compounding drug-related stimuli, 73, 211; response rate as engagement bouts, 75, 247; maternal nutrition and four-alternative choice, 87, 51; aggression as positive reinforcement, 91, 185
- nose press, concurrent-schedule performance in cows, 65, 57
- noun compounds, CARIN theory of conceptual combination, 78, 551
- novel behavior, language comprehension in apes and children (review), 65, 477; *JEAB* at 0, 50, and 100, 89, 111
- novel-response procedure, in human drug discrimination, 71, 417
- nucleus accumbens, depletion of dopamine in, 61, 213; drug relapse and, 84, 653
- numerical competence, use of number by crows, 73, 163
- numerosity differentiation, in pigeons, 88, 153
- numerosity discrimination, in preschool children, 88, 339
- object displacement, reversal of baseline relations and stimulus equivalence in adults, 63, 225; reversal of baseline relations and stimulus equivalence in children, 63, 239; acquisition of arbitrary conditional discriminations by children, 73, 177
- object permanence, domestic dog behavior review, 89, 247
- observational conditioning, emergence of conditioned reinforcement from observation, 89, 15; observational learning see *observational conditioning*
- observing, resistance to change of, 80, 273; rate of conditioned reinforcement and, 84, 1; conditional discrimination and, 84, 281; brain activation correlated with discriminative stimuli, 84, 505; disruption of responding maintained by conditioned reinforcement, 86, 197; conditioned reinforcement and resistance to change, 89, 263; schedule-correlated stimulus presentation, 89, 299
- observing behavior, unsignaled delayed reinforcement and VI schedules, 69, 103; behavior analysis and decision making, 69, 355; human sensitivity to concurrent schedules, 71, 303; generality of selective, 77, 171; effects of rate and magnitude of reinforcement, 78, 161
- observing responses, and serial stimuli, 92, 215
- odd-item search, visual search by chimpanzees, 63, 175
- oddtity from sample, use of number by crows, 73, 163
- odor discrimination, episodic memory in nonhuman animals, 84, 619
- older adults, aging and intraindividual variability in performance: analyses of response time distributions, 88, 319; age trends in stimulus overselectivity, 88, 369
- olfactory discrimination, procedure for mice, 73, 305; automated method for presenting stimuli to rats in a two-choice discrimination task, 90, 113;

SUBJECT INDEX

- neural recording with behavioral regularity in rats, 92, 113
- omission training, and negative automaintenance, 86, 1
- omitted reinforcers, resistance to extinction, 85, 23
- one factor theory, of punishment, 80, 1
- one-lever procedure, acquisition of lever pressing and, 84, 339
- online publishing, *JEAB* at 50, 89, 95
- open economies, vs. closed, 67, 67; reversed schedule effects in, 71, 171; reward density and VI performance in, 72, 341
- operant, philosophical behaviorism (book review), 72, 273; effects of delayed reinforcement on variability and repetition of response sequences, 86, 159; effects of differing response-force requirements on food-maintained responding in CD-1 mice, 88, 381; response effort, 92, 257
- operant acquisition, influence of procedural and genetic variables on, 84, 339
- operant behavior, foraging by starlings, 67, 181; locomotion vs. lever-press travel, 68, 177; Pavlov and Skinner, 72, 455; spaceflight and, 84, 227; and William H. Morse, 86, 385; blood pressure and heart rate during schedule-controlled responding, 92, 379
- operant conditioning, within-session changes in responding, 66, 51; response acquisition with immediate and delayed reinforcement, 81, 51
- operant-respondent distinction, autoshaping and automaintenance, a neural-network approach, 88, 115
- operant response, social reinforcement in rats, 62, 149; resistance to change of variation and repetition, 76, 195
- operations, characterization of, 84, 313
- operants, behavioral economics without anomalies, 64, 397
- opioid, unit price and progressive-ratio schedules, 64, 361
- opposite, transformation of avoidance response functions in accordance with same and opposite relational frames, 88, 249
- opposition, transformation of respondently conditioned stimulus function, 67, 275
- optimal foraging theory, response-dependent pre-choice effects, 65, 619; and concurrent schedules, 71, 75; risk-sensitive choice in humans, 76, 1; risky choice under temporal constraints 80, 59; earning reinforcers and, 84, 167; choice in a successive-encounters procedure and hyperbolic decay of reinforcement, 88, 73; and the stay/switch model, 91, 21
- optimization, human choice and time-based diminishing returns, 65, 5; unified theory of decision criterion learning, 78, 567; and the relation of response rate to reinforcer rate, 85, 57
- oral route, of drug self-administration, 77, 49
- order, joys of research, 89, 119
- organophosphate, Soman-induced brain injury, 61, 319
- outcomes, stimulus presentation ratios in signal-detection procedures, 72, 1; differential outcomes and stimulus class formation in pigeons, 72, 97
- overall reinforcement rate, maximizing in pigeons, 64, 277
- overall response output, normalized demand for drugs and other reinforcers, 64, 373
- overexpectation, and blocking and unblocking in autoshaping, 65, 575
- overmatching, closed-economy multiple-schedule performance, 65, 111; travel time and concurrent-schedule choice, 73, 65; preference and resistance to change, 74, 79; and the barrier choice paradigm, 75, 93
- overtraining, extensive training and the work-ethic effect, 91, 143
- pacemaker, behavioral theory of timing and biasing the, 64, 225; towards a pacemaker-free theory of interval timing, 71, 215; evaluation of theories of timing, 71, 253; modeling modeling, 71, 275
- spacing, sexual reinforcement in the female rat, 68, 399
- Palmer, D. C. Learning and complex behavior (Donahoe, J. W., and) (review), 63, 347
- panel press, human performance on negative slope schedules, 73, 241
- parakeets, see *budgerigars*
- parameter invariance, and symbolic matching to sample, 69, 311
- parsimony, tolerance in a rigorous science, 71, 284
- partially elaborated generalized equivalence class see generalized equivalence classes
- partial reinforcement, determinants of key-peck speeds, 64, 215
- partial-reinforcement extinction effect, and behavioral momentum, 67, 91
- patch probability, leaving patches, 62, 89; foraging by starlings, 67, 181
- patch residence time, a laboratory analogue, 62, 89; effects of travel requirements, 62, 185; effects of economy, deprivation, and session duration on leaving patches, 72, 373
- patch selection, operant simulation of, 66, 327; by foraging rats, 69, 5
- patch-leaving decisions, operant simulation of, 66, 327
- pattern, self-control achieved by response persistence, 64, 117; behavioral economics without anomalies, 64, 397
- pattern discrimination, pigeons' discrimination of paintings, 63, 165
- pattern sensitivity, in the rabbit retina, 61, 247
- Pavlov, I. P., and B. F. Skinner, 72, 455; 72, 463
- Pavlovian conditioning, and tolerance to effects of cocaine, 81, 169; in human operant experiments, 81, 239

SUBJECT INDEX

- Pavlovian Society of North America, 72, 455
- peak procedure, and temporal control, 61, 1; disruption of temporally organized behavior by morphine, 77, 157
- peak shift, and contingency discriminability in concurrent schedules, 86, 11
- peck, stimulus control in the use of landmarks by pigeons, 63, 187
- pecking, do conditional reinforcers count?, 86, 269; within-class sample responding and acquired equivalence, 89, 341; and the origins of emergent differential sample behavior, 90, 61
- pecking, see also *key peck*
- pellet, infrared detector to verify delivery of food pellets, 90, 249
- pellet size, effects on key pecks and gapes in pigeons, 65, 21
- Pennypacker, H. S. Strategies and tactics of behavioral research (2nd ed.) (Johnston, J. M. and) (review), 64, 247
- pentazocine, unit price and progressive-ratio schedules, 64, 361
- pentobarbital, discrimination on concurrent schedule, 65, 495; matching on VR schedules, 70, 23; rats' discrimination on concurrent VI VI schedule, 73, 103; pigeons' discrimination on concurrent FI FI schedules, 74, 55; pigeons' discrimination on concurrent VR VR schedules, 77, 91; effects of drugs and drug combinations, 92, 387
- per-visit analysis, optimality and concurrent schedules, 71, 75
- percentage reinforcement, choice between reliable and unreliable reinforcement, 62, 353; and informative stimuli in a constant environment, 91, 41
- perceptual classes, merger with equivalence classes, 68, 67; established with primary generalization tests and transfer of function, 76, 95; generalized categorization repertoire, 78, 291
- perceptual cues, visual search by chimpanzees, 63, 175
- performance measures, obtained during space-flight, 84, 227
- persistence, components of response strength, 75, 111; enhanced by response-independent milk delivery, 76, 179; negative automaintenance omission training is effective, 86, 1
- perspectival realism, *Realism without Truth* (review), 91, 391
- phencyclidine, normalized demand for, 64, 373; discrimination under concurrent FI FI schedules, 74, 55; and response-force requirements, 74, 295; effects of drugs and drug combinations, 92, 387
- phentermine, anorectic drugs and food access, 82, 275
- phenylketonuria, olfactory discrimination procedure for mice, 73, 305
- philosophy, and science (book review), 71, 483; and behavior analysis (book review), 74, 255; and Behavior Theory and Philosophy (book review), 83, 315
- phonemes, speech perception in rats, 80, 205
- physics, time to completion of web-based physics problems with tutoring, 88, 103
- picture perception, in pigeons, 65, 465; categories in pigeons, 78, 333
- pigeon IRT banding, analytic form for the IRT analysis of Shull, Gaynor and Grimes, 90, 363
- pigeons, temporal control in fixed-interval schedules, 61, 1; and the behavioral theory of timing, 61, 19; and the discriminability of alternatives in concurrent-schedule performance, 61, 45; inter-trial reinforcers and self-control, 61, 83; and the behavioral competition theory of contrast, 61, 107; and concurrent-chains choice, 61, 113; effects of reinforcement history, 61, 375; and the differential-outcomes effect, 61, 389; contrast and undermatching, 61, 407; delay reduction and optimal foraging, 61, 465; the conditioned pecking response, 61, 517; and duration comparison, 62, 15; effects of variable delays on self-control, 62, 33; leaving patches, 62, 89; within-session changes in responding, 62, 109; and discrimination acquisition, 62, 157; travel requirements and leaving patches, 62, 185; auto-shaping the gape response, 62, 201; choice between reliable and unreliable reinforcement, 62, 353; cued and uncued terminal links in concurrent-chains schedules, 62, 385; transitivity in conditional matching to sample, 62, 399; ratio versus difference comparators in choice, 62, 409; resistance to reinforcement change in multiple and concurrent schedules, 63, 1; delayed matching and reinforcement, 63, 33; directed forgetting, 63, 127; conditioned reinforcement and choice with delayed and uncertain primary reinforcers, 63, 139; discrimination of paintings, 63, 165, 69, 223; stimulus control in landmark use, 63, 187; contrast and extraneous reinforcer reallocation, 63, 203; reinforcement delay and magnitude in concurrent chains, 63, 255; and prisoner's dilemma, 64, 1; cocaine and food deprivation, 64, 61; self-control achieved by response persistence, 64, 117; quantitative analysis of extreme choice, 64, 147; component transition as the relational basis for successive discrimination, 64, 185; determinants of key-peck speeds, 64, 215; biasing the pacemaker in the behavioral theory of timing, 64, 225; within-session changes in responding, 64, 237; maximizing reinforcement rate in, 64, 277; preference for VI water reinforcement, 64, 299; behavioral economics and behavioral momentum, 64, 385; effects of pellet size on key pecks and gapes, 65, 21; presence-versus-absence discrimination, 65, 81; reinforcement amount and induced attack, 65, 93; closed-economy multiple-schedule performance, 65, 111; cocaine and

SUBJECT INDEX

food deprivation, 65, 145; procrastination by, 65, 159; cocaine and reinforcement delay, 65, 375; residence time and choice in foraging, 65, 423; concurrent choice, 65, 445; picture recognition in, 65, 465; drug discrimination on concurrent schedule, 65, 495; changeover behavior and preference, 65, 513; response-independent food delivery and resistance to change, 65, 549; responding in a signal-detection task, 65, 561; blocking, unblocking, and overexpectation in autoshaping, 65, 575; commitment using punishment, 65, 593; dynamics of waiting in, 65, 603; response-dependent prechoice effects, 65, 619; choice as a function of reinforcement ratios, 66, 11; token reinforcement, choice, and self-control, 66, 29; within-session changes in responding, 66, 51; choice in an adjusting-delay procedure, 66, 63; within-session changes in responding in conc VI, 66, 75; choice in concurrent chains, 66, 97; dynamics of time discrimination, 66, 117; within-session response rates, 66, 135; stimulus effects on behavior allocation, 66, 149; and resistance to change, 66, 169; drug discrimination without explicit training, 66, 193; within-session patterns on conjoint VI VT schedules, 66, 205; effects of sample duration in DMTS, 66, 231; preference between VR and FR schedules, 66, 283; response type and sensitivity to reinforcer variation, 66, 297; operant simulation of foraging in patches, 66, 327; within-session changes in responding, 66, 369; behavioral dynamics, 66, 391; discrimination of relative frequency, 67, 11; preference and resistance to change, 67, 43; and behavioral momentum, 67, 91; and concurrent VI VI schedules, 67, 109; residence time in concurrent foraging, 67, 161; effects of schedule history on response rate, 67, 311; memory processes in delayed discriminations, 67, 323; increasing the variability of response sequences, 68, 1; transfer tests of stimulus value, 68, 93; schedule interactions involving punishment, 68, 161; drug discrimination under concurrent FI schedules, 68, 193; nonstable concurrent choice, 68, 219; contiguity and conditioned reinforcement in probabilistic choice, 68, 317; control of choice by its consequences, 68, 329; preference for free choice, 68, 349; choice between FR and geometrically escalating schedules, 68, 357; response-independent events in the behavior stream, 68, 375; concurrent VI extinction schedules, 69, 49; unsignaled delayed reinforcement and VI schedules, 69, 103; functions of the changeover delay, 69, 141; reporting contingencies of reinforcement, 69, 161; procrastination with FI response requirements, 69, 185; group choice by foragers, 69, 227; effects of unsignaled delayed reinforcement, integration of stimuli, reinforcers, and behavior, 71, 439; 69, 247; food-deprivation level

and morphine, 69, 295; varying sample- and choice-stimulus disparity, 69, 311; step size and break-point criterion on PR performance, 70, 123; VI value, training amount, and stimulus generalization, 70, 139; response persistence on ratio and interval schedules, 70, 165; control by sample location, 70, 235; choice with delayed and probabilistic reinforcers, 70, 253; categorization of natural movements, 70, 281; context effects on choice, 70, 301; blocking a selective association in, 71, 13; accounts of self-control choice, 71, 27; preference and differential changeover delays, 71, 45; psychophysics of remembering, 71, 91; reversed schedule effects in open and closed economies, 71, 171; response-reinforcer relation and delay-of-reinforcement effects, 71, 187; theories of timing, 71, 293; choice, contingency discrimination, and foraging theory, 71, 355; effects of ITI duration on discrete-trial choice, 71, 375; stimulus presentation ratios and outcomes in signal-detection procedures, 72, 1; preferences for and against stimuli paired with food, 72, 21; effects of number of sample stimuli and choices on discriminability, 72, 33; Pavlovian contingencies and resistance to change in a multiple schedule, 72, 81; class-consistent differential reinforcement and stimulus class formation, 72, 97; discrimination of relative frequency of events, 72, 151; drug discrimination under a concurrent FR FR schedule, 72, 187; sample-duration effects on delayed matching, 72, 279; IRT sensitivity during concurrent VI schedules, 72, 317; reward density and VI performance in an open economy, 72, 341; behavioral economics and within-session changes in responding, 72, 355; effects of economy, deprivation, and session duration on leaving patches, 72, 373; within-session analysis of visual discrimination, 72, 385; satiation, capacity, and within-session responding, 72, 407; theory of memory for event duration, 72, 467; choose-short effect and trace models of timing, 72, 473; travel time and concurrent-schedule choice, 73, 65; choice of schedules, 73, 93; conditioned reinforcement functions of stimuli, 73, 125; transfer of matching to novel sample locations, 73, 141; choice in a variable environment, 74, 1; psychometric function and timing, 74, 25; drug discrimination under concurrent FI FI schedules, 74, 55; preference and resistance to change, 74, 79, 165; timeout postponement without increased reinforcement frequency, 74, 147; effects of morphine on FI patterns and temporal discrimination, 74, 229; choice, changing over, and reinforcement delays, 74, 311; generalization of DMTS, 75, 1; sensitivity to relative reinforcer rate in concurrent schedules, 75, 25; components of response strength, 75, 111; reinforcement delays and choice, 75, 165;

SUBJECT INDEX

reinforcer-ratio variation and adaptation, 75, 207; changing behavior within session, 75, 235; VR vs. VI schedules, 76, 43; effects of primary reinforcement on initial-link responding, 76, 75; second-order schedules of token reinforcement, 76, 159; resistance to change of variation and repetition, 76, 195; tolerance to cocaine under behavior-correlated schedule, 76, 217; linear modeling of behavioral dynamics, 77, 3; choice in a variable environment, 77, 65; drug discrimination under concurrent VR VR schedules, 77, 91; tuned-trace theory of interval-timing dynamics, 77, 105; evidence against a constant-difference effect, 77, 147; disruption of temporally organized behavior by morphine, 77, 157; preference and resistance to change, 77, 233; effects of reinforcers on concurrent schedules, 77, 257; reinforcer magnitude and DRL schedules, 78, 17; principal components of response strength, 78, 127; group foraging sensitivity, 78, 179; d-amphetamine and temporal discrimination, 78, 195; failure of stimulus generalization, 78, 333; structure of same-different learning, 78; brief presentations and same-different discrimination, 78, 365; formation of equivalence classes, 78, 397; emergent differential sample behavior, 78, 409; tests of symmetry in, 78, 467; dynamical concurrent schedules, 79, 1; differential sample responding without different exteroceptive stimuli; strict and random alternation, 79, 65; changeover delays and signaled reinforcer ratios, 79, 87; socially-influenced learning in, 79, 175; choices in self-control procedures, 79, 207; resistance of discrimination and response rate, 79, 307; and MTS performance, 79, 323; reinforcer magnitude effects, 79, 351; directional movement discrimination in, 80, 29; economic and biological influences on responding, 80, 43; reinforcer delays and remembering, 80, 77; reinforcer magnitude and local preference, 80, 95; effects of unequal reinforcer distributions, 80, 187; an analysis of resurgence, 80, 217; acquisition of preference in concurrent chains, 80, 235; arousal, changeover responses, and preference, 80, 261; resistance to change of observing, 80, 273; effects of arithmetic and logarithmic distributions of delays, 80, 295; unit price and choice, 81, 5; preference between forced and free choice, 81, 27; discounting of delayed rewards, 81, 39; choice in a variable environment, 81, 85; time and rate measures in choice, 81, 135; repeated post- or pre-session cocaine administration, 81, 169; temporal context in concurrent chains, 81, 215; Wiener filter estimation of transfer functions, 81, 289; within-session delay-of-reinforcement gradients, 82, 21; generalization to chimeras and morphs, 82, 125; matching: acquisition and generalization, 82, 143; morphine and temporal discrimination,

82, 197; effects of cocaine on performance, 82, 293; independence of entry rate and immediacy, 82, 235; the sunk cost effect in, 83, 1; tests of unit price, 83, 99; effects of signaling reinforcer probability and magnitude, 83, 119; choices between fixed- and random-interval schedules, 83, 129; variation, repetition, and choice, 83, 147; sensitivity to magnitude, 83, 169; unsignaled delay of reinforcement and matching, 83, 201; temporal tracking, 83, 243; effects of reinforcer probability, delay, and response requirement on choice, 83, 263; morphine tolerance as a function of ratio schedule, 83, 281; effects of conditioned reinforcement rate on observing rate and resistance to change, 84, 1; effects of reinforcer sequences on local preference, 84, 37; resistance to change of forgetting functions and response rates, 84, 65; drug discrimination, 84, 77; Herrnstein's hyperbola (review), 84, 99; associative symmetry, 84, 147; effect of morphine on temporal discrimination, 84, 401; neural correlates of delay go-no-go tasks 84, 521; influence of prior choices on current choice, 85, 3; discriminability and sensitivity to reinforcer magnitude, 85, 41; second-order schedules of token reinforcement, 85, 95; rapid acquisition in concurrent chains, 85, 181; negative automaintenance omission training, 86, 1; contingency discriminability and peak shift, 86, 11; analysis of reinforcement history effects, 86, 31; symmetry in a conditional discrimination task using different responses as proprioceptive samples, 86, 65; tests of response membership in acquired equivalence classes, 86, 81; effects of delayed reinforcement on variability and repetition of response sequences, 86, 159; disruption of responding maintained by conditioned reinforcement, 86, 197; choice between single and multiple reinforcers in concurrent-chains schedules, 86, 211; discrimination of Michotte's launching effect, 86, 223; do conditional reinforcers count?, 86, 269; effects of d-amphetamine and ethanol on variable and repetitive key-peck sequences, 86, 285; behavioral determinants of drug action, 86, 359; stability of body weight under free-feeding conditions, 86, 393; timing, remembering, and discrimination in, 87, 25; residence time in conc. VI performance, 87, 121; discriminated timeout avoidance and the roles of added stimuli, 88, 51; choice in a successive-encounters procedure and hyperbolic decay of reinforcement, 88, 73; differentiation of response numerosities in, 88, 153; IRT-stimulus contingencies in chained schedules and the concept of conditioned reinforcement, 88, 215; seasonal variation in body weight and delayed matching-to-sample performance, 88, 395; an experimental analysis of memory processing, 88, 405; response-dependent and -independent in-

SUBJECT INDEX

- duced attack, 90, 31; choice and multiple reinforcer dimensions, 89, 49; *d*-amphetamine and sensitivity to delay, 89, 71; conditioned reinforcement and resistance to change, 89, 263; schedule-correlated stimulus presentation, 89, 299; reinforcer control in delayed matching-to-sample, 89, 311; within-class sample responding and acquired equivalence, 89, 341; context effects in a temporal discrimination task, 90, 33; and the origins of emergent differential sample behavior, 90, 61; procedure to correct biases in matching-to-sample, 90, 103; relative reinforcer rates and magnitudes and control of concurrent choice, 90, 169; reinforcing effects of houselight illumination, 90, 187; cocaine tolerance under response-initiated FI schedules, 90, 207; associative symmetry, antisymmetry and a theory of pigeons' equivalence-class formation, 90, 257; sensitivity of conditional-discrimination performance to within-session variation of reinforcer frequency, 90, 301; concurrent resurgence and behavioral history, 90, 313; interresponse time structures in variable-ratio and variable-interval schedules, 90, 345; reinforcer accumulation in a token-reinforcement context, 90, 283; with terminal links following an ascending and descending series, 91, 1; and informative stimuli in a constant environment, 91, 41; probability and RI preference, 91, 89; extensive training and the work-ethic effect, 91, 143; pigeons approach Nash equilibrium, 91, 169; and delay-amount tradeoffs, 91, 197; uncorrelated stimuli and resistance to change, 92, 199; procedural variations in concurrent chains, 92, 345; effects of drugs and drug combinations, 92, 387; cocaine tolerance and conjunctive schedules, 92, 413
- plethysmograph, modulation of respiration in rhesus monkeys, 62, 57
- plunger pull, similar consumption and responding across single and multiple sources of drug, 72, 299; unit price and choice, 73, 45; stimulus control and generalization of punishment, 73, 261
- (+)-PHNO, and in vitro reinforcement of hippocampal bursting, 61, 155
- point loss, punishment and human signal detection, 92, 17
- point of subjective equality, numerosity discrimination in preschool children, 88, 339
- points, exchangeable for money, 76, 1; response acquisition by humans with delayed reinforcement, 91, 377
- pole-push response, contingency tracking during unsignaled delayed reinforcement, 88, 229
- polydipsia, and drinking opportunities in a fixed-interval schedule, 62, 307
- position, of behavior under varying frequencies of water delivery, 73, 195
- position bias, a procedure to correct biases in matching-to-sample, 90, 103
- positive reinforcement, and sleep deprivation, 80, 253; differential-impact and differential-outcomes hypotheses, 90, 1; ; aggression as positive reinforcement, 91, 185
- positive reinforcers, and response-contingent shock, 61, 135; and animal training (book review), 72, 139
- possums, responding on concurrent schedules of reinforcement, 79, 289
- postreinforcement pause, effects of marijuana in humans, 62, 73; within-session changes, 62, 109; temporal control by PI schedules, 66, 311; temporal control in rats, 70, 35; averaging effects and fixed-ratio response patterns, 71, 145; relation to reinforcer duration, 73, 225; effects of later requirements on earlier performances, 73, 291; effects of an alternative reinforcer, 77, 273
- Povinelli, D. J. Folk physics for apes: The chimpanzee's theory of how the world works (review), 79, 267
- power spectrum, and visceral behavior in the rat, 61, 273
- pragmatism, and science (book review), 71, 483; *Taking Pragmatism Seriously* (review), 92, 131
- preavoidance, and hypertension in dogs, 61, 255
- precurrent behavior, and precurrent contingencies, 61, 427
- precurrent contingencies, and reinforcement probability, 61, 427
- preference, assessment of for reinforcers, 64, 313; pigeons' preference for free choice, 68, 349; VR vs. VI schedules, 76, 43; acquisition of in concurrent chains, 80, 235; in concurrent schedules, 80, 261; between forced and free choice, 81, 27; concurrent interval schedules and, 84, 167; *d*-amphetamine and sensitivity to delay, 89, 71; probability and RI preference, 91, 89
- preference pulses, and reinforcer magnitude, 80, 95; do conditional reinforcers count?, 86, 269; extended control of local preference, 91, 293
- preference reversals, with food and water reinforcers in rats, 79, 233
- prefrontal cortex, control of competing responses and, 84, 485; performance on delay go-no-go tasks and, 84, 521; drug relapse and, 84, 653; neural recording with behavioral regularity in rats, 92, 113
- preratio pause, effects of an alternative reinforcer, 77, 273
- preschool children, and naming, 89, 383
- presence-versus-absence discrimination, in pigeons, 65, 81
- prey probability, a laboratory analogue, 62, 89; and foraging by starlings, 67, 181
- primacy effect, resurgence of response sequences during extinction in rats shows a, 86, 307

SUBJECT INDEX

- primary reinforcement, effects on initial-link responding, 76, 75
- principles, responding under conditions of varying motivation, 64, 405
- prisoner's dilemma, and the pigeon, 64, 1; contingencies of reinforcement in, 82, 161
- private event, mental rotation and temporal contingencies, 70, 203; and behavior analysis (book review), 74, 255; human language and behavior (book review), 81, 189
- proactive interference, memory processes in delayed discriminations, 67, 323; differential outcome effect in the horse, 74, 245; intertrial sources of stimulus control and delayed matching-to-sample performance in humans, 86, 253;
- probabilistic contingency learning, and base-rate neglect as a function of base rates, 90, 23
- probabilistic epigenesis, relation between development, evolution, and behavior principles (book review), 79, 137
- probabilistic reinforcement, and choice, 68, 317, 70, 253; barycentric extension of generalized matching, 92, 139
- probability, area under the curve as a measure of discounting, 76, 235; principal components of response strength, 78, 127; probability and RI preference, 91, 89
- probability discounting, effect of alcohol on impulsive behavior, 71, 121; delay, probability, and social discounting in a public goods game, 91, 61; discounting gains and losses, 92, 1
- probability of reinforcement, and humans' choice to compete, 62, 133; conditioned reinforcement and choice with delayed and uncertain primary reinforcers, 63, 139; changeover behavior and preference, 65, 513; choice in an adjusting-delay procedure, 66, 63; choice between risk and delay, 69, 123; scheduled, and concurrent performance, 69, 275; local model of concurrent performance, 71, 57; psychophysics of remembering, 71, 91; preferences for and against stimuli paired with food, 72, 21; resistance of discrimination and response rate, 79, 307; and choice, 83, 263
- probability schedules, and precurrent contingencies, 61, 427
- problem solving, and E. L. Thorndike, 72, 433; time to completion of web-based physics problems with tutoring, 88, 103
- processing speed, individual differences and intelligence, 90, 219
- procrastination, by pigeons, 65, 159, 69, 185
- procurement cost, and meal patterns of cats, 67, 303
- productive equivalence, producing and recognizing analogical relations, 91, 105
- profitability, drinking in a patchy environment, 62, 169; patch choice by foraging rats, 69, 5
- programming, coevolution of research and technology, 89, 129
- progressive delays, of reinforcement, 82, 21
- progressive-interval schedules, effects of marijuana in humans, 62, 73; effects of step size on human choice, 65, 5; temporal control by PI schedules, 66, 311
- progressive-ratio schedules, effects of reinforcement history, 61, 375; unit-price analysis of opioid consumption in monkeys, 64, 361; effects of step size and break-point criterion, 70, 123; response persistence on, 70, 165; effects of later requirements on earlier performances, 73, 291; effects of anorectic drugs on food intake under, 82, 275; reinforcer volume and progressive-ratio schedules, 91, 75; aggression as positive reinforcement, 91, 185
- progressive-time schedules, and control of human choice, 62, 367
- prospect theory, and loss aversion in capuchin monkeys, 89, 145
- prospective coding, memory processes in delayed discriminations, 67, 323; choose-short effect and trace models of timing, 72, 473
- prototype theory, and psychological essentialism, 78, 597
- prototypes, typicality effects, 82, 253
- pseudocontingency, and base-rate neglect, 90, 23
- psychobiology, and EAB (book review) 79, 137
- psychology, history of and B. F. Skinner (book review), 71, 115; teaching of learning, 72, 269
- psychometric function, and the behavioral theory of timing, 61, 19; shifts in, and models of timing, 74, 25; numerosity discrimination in preschool children, 88, 339
- psychopharmacology, of contrast, 68, 133
- psychophysical judgments, stochastic matching and the voluntary nature of choice, 88, 1
- public goods game, delay, probability, and social discounting in a public goods game, 91, 61
- punishment, and human drug discrimination, 61, 181; effects of response-force requirements on FR responding, 63, 331; food-deprivation effects on, 64, 47; commitment using punishment, 65, 593; schedule interactions involving, 68, 161; travel time and concurrent-schedule choice, 73, 65; stimulus control and generalization of, 73, 261; in human choice, 80, 1; asymmetry of reinforcement and punishment, 89, 157; punishment and human signal detection, 92, 17; ethanol's antipunishment effects, 92, 161
- punishment of interresponse times, with shock, 61, 135
- quantification, joys of research, 89, 119
- quantitative analysis, of behavioral dynamics, 77, 3
- quantitative law of effect, selection by consequences, 81, 297; classic and modern theories of matching, 84, 111
- quantitative models, of MTS performance, 79, 323; differentiation of response numerosities in the pigeon, 88, 153

SUBJECT INDEX

- quarter life, and fixed-interval performance, 61, 11
- quinpirole, and in vitro reinforcement of hippocampal bursting, 61, 155; effect on sensitivity to reinforcement, 84, 371
- rabbits, spectral and pattern response in the retina, 61, 247
- radical behaviorism, and B. F. Skinner (book review), 71, 115; science and society (book review), 71, 483; philosophy of (book review), 74, 255; *Realism without Truth* (review), 91, 391
- random alternation, in concurrent VI schedules, 79, 65
- random-interval schedules, foraging in a radial maze, 61, 331; effects of chlordiazepoxide and cocaine, 61, 479; reversed schedule effects in open and closed economies, 71, 171; timeout postponement without increased reinforcement frequency, 74, 147; synthesizing concurrent interval performances, 74, 189; selection by consequences, 81, 297; choices between fixed interval and, 83, 129; probability and RI preference, 91, 89; schedule discrimination based on reinforced IRT, 91, 157
- random ratio, labor supply and consumption of food, 83, 99; schedule discrimination based on reinforced IRT, 91, 157
- rate, principal components of response strength, 78, 127
- rate dependency, effects of cocaine on FI responding, 75, 77; d-amphetamine and temporal discrimination, 78, 195
- rate maximization, delay reduction and optimal foraging, 61, 465; preferences for fixed and variable food sources, 63, 313; response-dependent prechoice effects, 65, 619
- rate of forgetting, and the differential-outcomes effect, 61, 389
- rating procedure, and human category formation, 70, 267
- rating scales, and human drug discrimination, 61, 169
- ratio schedules, behavioral economics and behavioral momentum, 64, 385; procrastination by pigeons, 65, 159; preference between VR and FR schedules, 66, 283; food and amphetamine self-administration by baboons, 68, 47; food and cocaine self-administration by baboons, 72, 215; wheel running reinforcement and mice selected for high daily wheel running rates, 88, 199
- rational choice, maximizing reinforcement rate in pigeons, 64, 277
- rationality, behavioral economics without anomalies, 64, 397; heuristics as aids to (book review), 79, 409
- ratios, versus difference comparators in choice, 62, 409
- rats, molecular and molar analyses of fixed-interval performance, 61, 11; background reinforcement and response-reinforcer relation, 61, 65; different reinforcers and the response-strength equation, 61, 97; effects of mesolimbic dopamine depletion, 61, 213; effects of ethanol and cocaine on brain stimulation reward, 61, 223; visceral behavior of, 61, 273; foraging in a radial maze, 61, 331; choice in concurrent chains, 61, 349; and brief-stimulus presentations, 61, 417; and response-rate differences, 61, 441; effects of chlordiazepoxide and cocaine, 61, 479; reinforcer magnitude and the matching law, 61, 505; social reinforcement of operant behavior, 62, 149; drinking in a patchy environment, 62, 169; and polydipsia, 62, 307; effects of cocaine on behavior maintained by timeout from avoidance, 63, 19; VR histories and FI performances, 63, 97; procurement time and meal frequency and duration, 63, 295; effects of response-force requirements on FR responding, 63, 331; punishment of schedule-induced drinking, 64, 47; within-session changes in responding for water, 64, 75; within-session changes in the VI response function, 64, 95; within-session changes in responding, 64, 237; concurrent ethanol-sucrose and sucrose reinforcement, 64, 331; behavioral economics and behavioral momentum, 64, 385; behavioral variability in SHR and WKY, 65, 129; training visual discriminations, 65, 173; Pavlovian contingencies and behavioral momentum, 65, 389; substitution and caloric regulation, 65, 401; food and water intake versus costs in a closed economy, 65, 527; within-session changes in responding in conc VI, 66, 75; within-session patterns on conjoint VI VT schedules, 66, 205; relative sensitivity to reinforcer amount and delay, 66, 219; temporal control by PI schedules, 66, 311; effects of d-amphetamine on response acquisition, 66, 349; within-session changes in responding, 66, 369; body weight and response acquisition, 67, 131; conditioned reinforcement dynamics, 67, 145; effects of reinforcer duration, 67, 337; determination of discount functions, 67, 353; match-to-sample performance, 68, 27; and drugs of abuse, 68, 117; locomotion vs. lever-press travel, 68, 177; sexual reinforcement in the female rat, 68, 399; patch choice and foraging, 69, 5; response acquisition with delayed reinforcement, 69, 17; behavioral momentum and temporal separation, 69, 29; effects of reinforcement rate and delay, 69, 59; concurrent performance, 69, 275; temporal control in, 70, 35; responding reinforced by the opportunity to run, 70, 69; simple and conditional visual discrimination, 70, 103; response persistence on ratio and interval schedules, 70, 165; extinction of responding and timeout from avoidance, 71, 1; local model of concurrent performance, 71, 57; optimality and concurrent schedules, 71, 75; averaging effects and fixed-ratio response pat-

SUBJECT INDEX

terms, 71, 145; theories of timing, 71, 293; molar and molecular control in VI and VR schedules, 71, 319; value transmission in discrimination learning, 72, 177; falsification of matching theory, 72, 251; 73, 23; behavioral economics and within-session changes in responding, 72, 355; choose-short effect and trace models of timing, 72, 473; choice between constant and variable alternatives, 73, 79; drug discrimination on concurrent VI VI schedule, 73, 103; spatial distribution of behavior, 73, 195; effects of compounding drug-related stimuli, 73, 211; reinforcer duration-PRP relation, 73, 225; earlier performances on PR schedules, 73, 291; parameters of Herrnstein's equation vary with schedule order, 73, 319; effects of sleep deprivation on free-operant avoidance, 73, 333; synthesizing concurrent interval performances, 74, 189; drug discrimination and extinction, 74, 283; drugs and response-duration differentiation, 74, 295; long-term effect of responding history, 75, 43; effects of cocaine on FI responding, 75, 77; overmatching and barrier choice, 75, 93; response rate as engagement bouts, 75, 247; behavioral and pharmacological variables and risky choice, 75, 275; matching law and choice on concurrent VI schedules, 75, 299; response-independent milk delivery and persistence, 76, 179; habituation and within-session changes in wheel running, 76, 289; functional response units and demarcating stimuli, 76, 303; determinants of reinforcer accumulation, 76, 321; tuned-trace theory of interval-timing dynamics, 77, 105; generality of selective observing, 77, 171; time of supplemental feeding and effects of cocaine, 77, 199; engagement bouts and resistance to extinction, 77, 211; preratio pausing, 77, 273; response-initiated imaging of operant behavior, 77, 283; reinforcer magnitude and DRL schedules, 78, 17; currency of procurement cost, 78, 31; principal components of response strength, 78, 127; observing behavior, 78, 161; navigation in the Morris swim task, 78, 215; tolerance for delay with bundled rewards, 79, 37; self-administration of cocaine, 79, 111; performance on VI+ schedules, 79, 157; stay and switch reinforcement, 79, 207; preference reversals in, 79, 233; sucrose concentration and wheel-running duration, 79, 243; signaled reinforcement, 79, 367; bouts of lever pressing, 80, 159; speech perception, 80, 205; sleep deprivation and positive reinforcement, 80, 253; discounting of delayed rewards, 81, 39; behavioral history and response acquisition, 81, 51; bout rate and reinforcement, 81, 65; bouts of responding on VI schedules, 81, 155; anorectic drugs and food access, 82, 275; signaled-reinforcement effect on operant responding, 83, 31; emergent stimulus relations, 83, 185; reinforcement history and fixed-interval

performance, 83, 221; effects of reinforcer probability, delay, and response requirement on choice, 83, 263; effects of methylphenidate and morphine on delay of discounting, 83, 297; Herrnstein's hyperbola (review), 84, 99; earning reinforcers and the matching law, 84, 167; Herrnstein's re, 84, 185; pilocarpine seizures and auditory discrimination, 84, 357; dopamine and sensitivity to reward, 84, 371; medial prefrontal lesions and conditional discrimination, 84, 485; episodic memory, 84, 619; neuronal substrates of drug relapse, 84, 653; resistance to extinction following variable-interval reinforcement, 85, 23; relation of response rate to reinforcer rate, 85, 57; fix and sample in the dynamics of choice, 86, 43; measuring resistance to change at the within-session level, 86, 109; reinforcement value and substitutability of sucrose and wheel running, 86, 131; resurgence of response sequences during extinction shows a primacy effect, 86, 307; resurgence of integrated behavioral units, 87, 5; maternal nutrition and four-alternative choice, 87, 51; response induction during acquisition and maintenance of lever pressing with delayed reinforcement, 88, 29; contingency tracking during unsignaled delayed reinforcement, 88, 229; tests of behavioral-economic assessments of relative reinforcer efficacy II: economic complements, 88, 355; primacy of molecular processes in determining response rates under variable-ratio and variable-interval schedules, 89, 5; avoidance of timeout from response-independent food, 89, 169; automated method for presenting stimuli in a two-choice discrimination task, 90, 113; steady-state assessment of impulsive choice in Lewis and Fischer 344 rats, 90, 333; reinforcer volume and progressive-ratio schedules, 91, 75; schedule discrimination based on reinforced IRT, 91, 157; and delay-amount tradeoffs, 91, 197; nicotine effects on delay discounting and amount sensitivity, 91, 213; extended control of local preference, 91, 293; within-session transitions in choice, 91, 319; barycentric extension of generalized matching, 92, 139; differential reinforcement of low rate schedule criterion changes, 92, 181; observing responses and serial stimuli, 92, 215; reversing composite-stimulus control, 92, 367
reaction time, effects of cocaine, 61, 231; maintained nodal-distance effects in equivalence classes, 64, 129; mental rotation and temporal contingencies, 70, 203
real-time signal processing, differential vocalization in budgerigars, 63, 111
reallocation hypothesis, contrast and extraneous reinforcer reallocation, 63, 203
reasoning, fallibility of human (review), 64, 111
recall, towards a pacemaker-free theory of interval timing, 71, 215

SUBJECT INDEX

- recency and primacy effects, discrimination in pigeons, 72, 151; resurgence of response sequences during extinction in rats shows a primacy effect, 86, 307
- recollection, episodic memory and the hippocampus, 84, 619
- rectangular form, within-session analysis of visual discrimination, 72, 385
- reductionism, mentalism and behaviorism (book review), 76, 115; and neuroscience (book review), 84, 683; *In Search of Memory: The Emergence of a New Science of Mind* by Eric R. Kandel (book review), 90, 235
- Reese, Ellen P., in memoriam, 69, 1
- reflexivity, match-to-sample performance in rats, 68, 27
- regression, resurgence of derived stimulus relations, 66, 267
- regulation, and substitution in a closed economy, 65, 401
- rehabilitation medicine, overcoming learned non-use by shaping, 61, 281
- reinforced behavior, and the matching law, 61, 505
- reinforced interresponse time, response-rate differences, 61, 441
- reinforcement, effects of marijuana, 61, 203; cocaine and food, 61, 213; schedules, and William N. Schoenfeld, 67, 1; simulation of foraging by starlings, 67, 181; and the S-R issue, 67, 193; sexual reinforcement in the female rat, 68, 399; integration of stimuli, reinforcers, and behavior, 71, 439; effects of competitive reward distribution on auditing and competitive responding, 74, 115; computational models of learning, 75, 135; short- and long-term effects of, 77, 257; responding for sucrose and wheel-running duration, 79, 243; in a prisoner's dilemma, 82, 161; effect on behavior, 85, 275; do conditional reinforcers count?, 86, 269
- reinforcement, see also *adventitious reinforcement*, *alternative reinforcement*, *conditioned reinforcement*, *continuous reinforcement*, *delayed reinforcement*, *negative reinforcement*, *partial reinforcement*, *primary reinforcement*, *probability of reinforcement*, *sensitivity to reinforcement*, *social reinforcement*, *token reinforcement*
- reinforcement context, and concurrent-chains choice, 61, 113; transfer tests of stimulus value, 68, 93; terminal-link duration, 81, 215
- reinforcement delay, see *delay of reinforcement*
- reinforcement density, responding following sleep deprivation, 80, 253
- reinforcement mechanisms, and Skinner's atoms of behavior, 61, 155
- reinforcement probability, effects of in delayed matching to sample, 83, 119; forgetting functions and response rates, 84, 65
- reinforcement rate, effects on resistance to change of observing, 80, 273; effects on matching and resistance to change, 83, 201; effects on observing rate and resistance to change, 84, 1; analysis of reinforcement history effects, 86, 31
- reinforcement schedules, see *schedules of reinforcement*
- reinforcement value, and substitutability of sucrose and wheel running, implications for activity anorexia, 86, 131
- reinforcer accumulation, in a token-reinforcement context with pigeons, 90, 283
- reinforcer amount, and self-control, 61, 83; and induced attack in pigeons, 65, 93; token reinforcement, choice, and self-control, 66, 29; choice between constant and variable alternatives, 73, 79; and resistance to extinction, 85, 23; and delay-amount tradeoffs, 91, 197; nicotine effects on delay discounting and amount sensitivity, 91, 213
- reinforcer control, effects of response disparity, 75, 183; in delayed matching-to-sample, 89, 311
- reinforcer delay, effect on the form of the forgetting function, 80, 77; a theory of attending, remembering, and reinforcement in delayed matching to sample, 88, 285; in terminal links following an ascending and descending series, 91, 1; and delay-amount tradeoffs, 91, 197; nicotine effects on delay discounting and amount sensitivity, 91, 213
- reinforcer density, humans' choice and self-control, 69, 87
- reinforcer devaluation, and E. L. Thorndike, 72, 447
- reinforcer distribution, effects on human signal-detection performance, 66, 243; and humans' competitive responding, 69, 263
- reinforcer duration, effects on running, 67, 337; effects on responding reinforced by the opportunity to run, 70, 69; effect on revolution-PRP relation, 73, 225; in concurrent schedules, 80, 261
- reinforcer efficacy, effects of step size and breakpoint criterion, 70, 123; response rate and (review), 84, 99; replacing with behavioral economic demand curves, 85, 73
- reinforcer evaluation function, using demand curves, work-rate functions, and expansion paths, 64, 313
- reinforcer immediacy, terminal link entry rate in concurrent chains, 82, 235; choice and multiple reinforcer dimensions, 89, 49
- reinforcer loss, tolerance to cocaine under behavior-correlated schedule, 76, 217
- reinforcer magnitude, and the matching law, 61, 505; effects of marijuana in humans, 62, 73; and humans' choice to compete, 62, 133; and delayed matching-to-sample performance, 63, 33; and delay in concurrent chains, 63, 255; determination of discount functions, 67, 353; matching on VR schedules of drug reinforcement, 70, 23; falsification of matching theory, 72, 251; 73, 23; effects on initial-link responding, 76, 75; relative reinforcing effects of ethanol, 77, 49; comparison of money rewards, 77, 129; independence of, 77, 233; and DRL schedules, 78, 17; and observing behavior, 78, 161; effects on

SUBJECT INDEX

- choice, 79, 351; sensitivity to in concurrent chains, 83, 169; formal and modern theories of matching and, 84, 129; discriminability and sensitivity to, 85, 41; choice and multiple reinforcer dimensions, 89, 49; and rates and control of concurrent choice, 90, 169; reinforcer volume and progressive-ratio schedules, 91, 75
- reinforcer probability, a theory of attending, remembering, and reinforcement in delayed matching to sample, 88, 285; choice and multiple reinforcer dimensions, 89, 49
- reinforcer quality, and key-peck probability and topography, 67, 109; residence time in concurrent foraging, 67, 161; comparing demand equations, 92, 305
- reinforcer rate, and restricted stimulus control, 68, 303; control of choice by its consequences, 68, 329; scheduled, and concurrent performance, 69, 275; VI value, training amount, and stimulus generalization, 70, 139; and VI performance in an open economy, 72, 341; independence of, 77, 233; and observing behavior, 78, 161; sensitivity to in concurrent schedules, 82, 235; and resistance to extinction, 85, 23; and magnitude and control of concurrent choice, 90, 169
- reinforcer ratio, effects on human symbolic matching-to-sample performance, 63, 53; effects on acquisition of lever pressing, 69, 59; reinforcer control and human signal detection, 73, 275; effects of variation on adaptation, 75, 207; effects of unequal reinforcer distributions, 80, 187
- reinforcer sequences, effects of unequal reinforcer distributions, 80, 187; effects on local preference, 84, 37
- reinforcers, see also *positive reinforcers*, *relative reinforcer frequency*, *visual reinforcers*
- reinstatement, neural circuitry of drug relapse, 84, 653
- relational frame theory, naming and verbal behavior, 68, 235; derived relational responding as generalized operant behavior, 74, 207; functional-analytic model of analogy, 78, 375; human language and cognition (book review), 81, 189; transformation of consequential functions, 82, 177; response to Palmer's review of (book review commentary), 82, 213; response to Hayes and Barnes-Holmes (book review commentary), 82, 225; transformation of avoidance response functions in accordance with same and opposite relational frames, 88, 249; producing and recognizing analogical relations, 91, 105
- relational frames of more-than and less-than, transformation of consequential functions in accordance with, 86, 317
- relation frames, human language and cognition (book review), 81, 189
- relational learning, and duration comparison, 62, 15; visual search by chimpanzees, 63, 175; and equivalence relations, 80, 131
- relational-control kernel, maintained nodal-distance effects in equivalence classes, 64, 129
- relational responding, transformation of discriminative and eliciting functions of generalized relational stimuli, 88, 179
- relational stimuli, transformation of discriminative and eliciting functions of, 88, 179
- relating relations, relational frame theory and, 84, 435
- relative frequency discrimination, by pigeons, 72, 151
- relative rates, measuring resistance to change at the within-session level, 86, 109
- relative rate of reinforcement, and the behavioral competition theory of contrast, 61, 107; teaching a pigeon to maximize, 64, 277; varieties of contrast, 68, 133; response rate as engagement bouts, 75, 247
- relative reinforcer effects, on oral cocaine self-administration, 70, 185
- relative reinforcer efficacy, tests of behavioral-economic assessments of, and economic complements, 88, 355
- relative reinforcer frequency, and delayed matching-to-sample performance, 63, 33
- relative reinforcing efficacy, replacing with behavioral economic demand curves, 85, 73
- relative time, unsignaled delay of reinforcement and, 83, 201
- relativity, of time, 71, 281
- reliability, infrared detector to verify delivery of food pellets, 90, 249
- religion, a review of "Breaking the Spell: Religion as a Natural Phenomenon" by Daniel C. Dennett, 87, 143
- religious behavior, and William N. Schoenfeld, 67, 1
- remembering, psychophysics of, 71, 91; generalization of DMTS, 75, 1; timing and discrimination, 87, 25; a theory of attending, remembering, and reinforcement in delayed matching to sample, 88, 285
- remifentanil, unit-price related choice in rhesus monkeys, 86, 181; matching law as a measure of drug choice, 89, 209
- repeated acquisition, and GABA_A modulators, 82, 37; and cocaine self-administration, 89, 225
- repetition, and variability of response sequences, effects of delayed reinforcement, 86, 159; effects of *d*-amphetamine and ethanol on key-peck sequences, 86, 285
- replication, publication of failed, 83, 85
- Rescorla-Wagner model, in autoshaping with pigeons, 65, 575
- research, coevolution of research and technology, 89, 129
- residence time, and choice in foraging, 65, 423; in concurrent foraging, 67, 161
- resistance to change, reinforcement in multiple and concurrent schedules, 63, 1; behavioral economics and behavioral momentum, 64, 385; re-

SUBJECT INDEX

- response-independent food delivery and, 65, 549; and stimulus-reinforcer and location-reinforcer contingencies, 66, 169; relation to preference, 67, 43; behavioral momentum and temporal separation, 69, 29; effects of unsignaled delayed reinforcement, 69, 247; Pavlovian contingencies in a multiple schedule, 72, 81; and E. L. Thorndike, 72, 447; and preference with constant-duration schedule components, 74, 79; and preference with constant- and variable-duration schedule components, 74, 165; VR vs. VI schedules, 76, 43; response-independent milk delivery and persistence, 76, 179; of operant variation and repetition, 76, 195; engagement bouts and resistance to extinction, 77, 211; with constant- and variable-duration terminal links, 77, 233; molecular to molar in behavior analysis, 78, 95; response rate and, 79, 307; of observing, 80, 273; response rate and, 83, 15; unsignaled delay of reinforcement and, 83, 201; rate of conditioned reinforcement and, 84, 1; forgetting functions and response rates, 84, 65; measuring, at the within-session level, 86, 109; effects of delayed reinforcement on variability and repetition of response sequences, 86, 159; and conditioned reinforcement, 89, 263; uncorrelated stimuli and resistance to change, 92, 199
- resistance to extinction, Pavlovian contingencies and behavioral momentum, 65, 389; following variable-interval reinforcement, 85, 23
- resource allocation, fairness in resource allocation, 91, 337
- respiration, and hypertension in dogs, 61, 255; in the awake rat during rest, 61, 273; modulation of in rhesus monkeys, 62, 57
- respondent conditioning, autoshaping the pigeon's gape response, 62, 201; and the S-R issue, 67, 193; transformation of stimulus function, 67, 275; Pavlov and Skinner, 72, 455; covarying functions in stimulus class formation and transfer of function, 78, 509
- respondent feedback, behavior analysis and reevaluation, 74, 331
- respondent-operant interactions, and stimulus class formation in pigeons, 72, 97
- response accuracy, in equivalence class formation, 76, 265; relation to nodal number, 85, 107
- response acquisition, by Siamese fighting fish with delayed reinforcement, 61, 35; effects of d-amphetamine on, 66, 349; with delayed reinforcement, 67, 131; 69, 17; acquisition, nonstable concurrent choice, 68, 219; effects of reinforcement rate and delay, 69, 59; functional response units and demarcating stimuli, 76, 303; and behavioral history, 81, 51; unsignaled delayed reinforcement and, 84, 269; lever pressing with delayed reinforcement, 88, 29; stimulus-food pairings produce stimulus-directed touch-screen responding in monkeys, 92, 41
- response bias, delayed matching and reinforcement, 63, 33; and human symbolic matching-to-sample performance, 63, 53; in a signal-detection task, 65, 561; in human signal-detection performance, 66, 243; in signal-detection procedures, 72, 1; reinforcer control and human signal detection, 73, 275; sensitivity to relative reinforcer rate in concurrent schedules, 75, 25; effects of response disparity on stimulus and reinforcer control, 75, 183; reinforcer control in delayed matching-to-sample, 89, 311
- response conflict, medial prefrontal lesions and, 84, 485
- response cost, schedule interactions involving punishment, 68, 161
- response duration, of conditioned pecking, 61, 517
- response elements, and Skinner's atoms of behavior, 61, 155
- response feedback, autoshaping and automaintenance: a neural-network approach, 88, 115
- response force, effects on FR responding, 63, 331; effects on concurrent-schedule performance, 70, 45; requirements, and effect of drugs, 74, 295
- response form, effects on concurrent-schedule performance, 70, 45
- response-independent mirror presentation, and *Betta splendens*, 90, 53
- response-independent schedules, schedule-correlated stimulus presentation, 89, 299
- response induction, during acquisition and maintenance of lever pressing with delayed reinforcement, 88, 29
- response interval, contextual cues that control equivalence responding, 76, 339
- response latencies, decay process and timing of conditioned responses, 71, 264
- response learning, effects of a reinforcement signal, 79, 367
- response location, of conditioned pecking, 61, 517; during acquisition and maintenance of lever pressing with delayed reinforcement, 88, 29
- response mediation, memory processes in delayed discriminations, 67, 323
- response patterns, temporal control by PI schedules, 66, 311; response-independent events in the behavior stream, 68, 375; effects of morphine on FI patterns and temporal discrimination, 74, 229
- response membership, tests of, in acquired equivalence classes, 86, 81
- response persistence, on ratio and interval schedules, 70, 165
- response probability, components of response strength, 75, 111
- response rate, effects of marijuana in humans, 62, 73; within-session changes, 62, 109; different accessibility of reinforcement schedules and choice, 62, 269; effects of pellet size on pecks and gapes, 65, 21; behavioral variability in SHR and WKY rats, 65, 129; within-session, 66, 135;

SUBJECT INDEX

- and reinforcer quality, 67, 109; components of response strength, 75, 111; as engagement bouts, 75, 247; VR vs. VI schedules, 76, 43; and resistance of discrimination, 79, 307; sensitivity to changes in reinforcement rate, 80, 159
- response rate–reinforcement rate correlation, 61, 441
- response recovery, and the resurgence effect, 80, 217; concurrent resurgence and behavioral history, 90, 313
- response-reinforcer relations, disruption of responding maintained by conditioned reinforcement, 86, 197
- response requirement, and effects of sample duration on delayed matching-to-sample performance 64, 19; determinants of reinforcer accumulation, 76, 321; second-order schedules and, 84, 19
- response sequence, increasing the variability of, 68, 1; development of functional response units, 76, 303; effects of *d*-amphetamine and ethanol on variable and repetitive key-peck sequences, 86, 285; resurgence of, during extinction in rats shows a primacy effect, 86, 307; and resurgence of integrated behavioral units, 87, 5; response acquisition by humans with delayed reinforcement, 91, 377
- response speed, determinants of, 64, 215; speed analyses of stimulus equivalence, 65, 643; effect in equivalence class formation, 76, 265; experimental control of nodality under, 85, 107
- response stereotypy, development of functional response units, 76, 303
- response-stimulus relations, testing, using differential responses as sample, 86, 239
- response strength, preference and resistance to change, 67, 43; principal components of, 75, 111; resistance to change of variation and repetition, 76, 195; time of supplemental feeding and effects of cocaine, 77, 199; effects of signaled reinforcement on, 83, 31; variable-interval reinforcement and (review), 84, 99; uncorrelated stimuli and resistance to change, 92, 199
- response topography, of conditioned pecking, 61, 517; autoshaping the pigeon's gape response, 62, 201; effects on demand, 71, 329; response-initiated imaging of operant behavior, 77, 283
- response transfer, nodal structure and the partitioning of equivalence classes, 89, 359; linked perceptual class formation and transfer of function, 91, 225
- response units, VR histories and FI performances in rats, 63, 97
- response variability, response-initiated imaging of operant behavior, 77, 283
- response-dependent reinforcement, economic and biological influences on responding, 80, 43
- response-contingent shock, responding maintained by, 61, 135
- response-dependent reinforcement, economic and biological influences on responding, 80, 43
- response-generated stimuli, and shock avoidance, 75, 311
- response-independent reinforcement, point delivery, 79, 193; economic and biological influences on responding, 80, 43
- response-initiated delay schedules, dynamics of waiting in pigeons, 65, 603
- response-initiated image taking, with digital camera, 77, 283
- response-outcome associations, and E. L. Thorndike, 72, 451
- response-reinforcer discriminability, varying sample and choice-stimulus disparity, 69, 311; effects of number of sample stimuli and choices on, 72, 33
- response-reinforcer relation, and delay-of-reinforcement effects, 71, 187
- response-strength equation, effects of different reinforcers, 61, 97; and the matching law, 61, 505; effects of signaled reinforcement on, 83, 31
- response time, aging and intraindividual variability in performance, 88, 319
- response-timeout interval, effects of chlordiazepoxide and cocaine, 61, 479
- responses per reinforcer, within-session changes, 62, 109
- restricted control, by compound samples in conditional discriminations, 90, 81
- restriction, to overcome learned nonuse, 61, 281
- resurgence, of derived stimulus relations, 66, 267; analysis of, 80, 217; resurgence of response sequences during extinction in rats shows a primacy effect, 86, 307; of behavioral units, 87, 5; concurrent resurgence and behavioral history, 90, 313; resurgence of infant caregiving responses, 92, 327
- retention interval, choice as a function of reinforcement ratios, 66, 11; reinforcer delays and remembering, 80, 77
- reevaluation, behavior analysis and, 74, 331
- revealed preference, assessing preference for reinforcers, 64, 313
- reversal design, transformation of consequential functions, 82, 177; transformation of consequential functions in accordance with the relational frames of more-than and less-than, 86, 317
- reversal learning, and context specificity, 62, 157; reversing composite-stimulus control, 92, 367
- reversal procedure, equivalence classification by sea lions, 76, 131
- reversed contingency, and loss aversion in capuchin monkeys, 89, 145
- reward, real vs. hypothetical money in delay discounting, 77, 129
- reward bundling, tolerance for delay with, 79, 37
- reward density, and VI performance in an open economy, 72, 341
- reward distribution, effects on auditing and competitive responding, 74, 115

SUBJECT INDEX

- reward versus punishment, and E. L. Thorndike, 72, 441
- rhesus monkeys, modulation of respiration in, 62, 57; unit-price analysis of opioid consumption by, 64, 361; normalized demand for drugs and other reinforcers, 64, 373; matching on VR schedules of drug reinforcement, 70, 23; ratio size and cocaine concentration effects, 70, 185; stock optimizing in choice, 76, 245; relative reinforcing effects of ethanol, 77, 49; un signaled delayed reinforcement, 84, 269; assessing unit-price related remifentanil choice in, 86, 181; matching law as a measure of drug choice, 89, 209; repeated acquisition and cocaine self-administration, 89, 225
- ring swimming, visual reinforcement in the female *Betta splendens*, 90, 53
- rise time, use of cues in labeling of sounds, 80, 205
- risk, nicotine effects on delay discounting and amount sensitivity, 91, 213
- risk preference, for VI water reinforcement in pigeons, 64, 299
- risk sensitivity, preferences for fixed and variable food sources, 63, 313; choice between constant and variable alternatives, 73, 79
- risk taking, behavioral and pharmacological variables, 75, 275; delay, probability, and social discounting in a public goods game, 91, 61; discounting gains and losses, 92, 1
- risky choice, tests of an energy-budget model, 80, 59
- rod push, self-control, impulsiveness, and food preferences, 64, 33
- RT distribution, aging and intraindividual variability in performance, 88, 319
- rule governance, naming and symbolic behavior, 65, 185; consequences of advice on rule control and choice, 70, 1
- rule-governed behavior, instructional effects on matching-to-sample performance, 89, 333
- rules, and heuristics (book review), 79, 409
- run length, and concurrent performance, 69, 275
- running rate, effect of later requirements on earlier performances, 73, 291
- S-R bond, and E. L. Thorndike, 72, 447
- S-R psychology, 67, 193
- safety signal, for shock avoidance, 75, 311
- saliency, Pavlovian contingencies and behavioral momentum, 65, 389; directional movement discrimination pigeons, 80, 29
- same, transformation of self-discrimination response functions with arbitrarily applicable relations, 64, 163; same-different learning by pigeons, 78, 345; brief presentations and same-different discrimination, 78, 365; transformation of avoidance response functions in accordance with same and opposite relational frames, 88, 249
- sample accuracy, base rates and human matching to sample, 71, 155
- sample duration, and response requirements' effects on delayed matching-to-sample performance 64, 19; effects of trial-specific and average in DMTS, 66, 231; effects on delayed matching, 72, 279; and same-different discrimination, 78, 365
- sample location, performance in rats, 68, 27; control by in pigeons' matching to sample, 70, 235; transfer of matching to novel sample locations, 73, 141
- sample naming, acquisition of arbitrary conditional discriminations by children, 73, 177
- sample-reinforcer interval, and reinforcer efficacy, 69, 77
- sample responding, within-class sample responding and acquired equivalence, 89, 341
- sample-stimulus probability, effects on human symbolic matching-to-sample performance, 63, 53
- satiation, and within-session changes in the VI response function, 64, 95; responding under conditions of varying motivation, 64, 405; similar consumption and responding across single and multiple sources of drug, 72, 299; capacity and within-session responding, 72, 407; criticisms of the satiety hypothesis, 74, 347; and bouts of responding, 81, 155
- Savage-Rumbaugh, E. S., et al. Language comprehension in ape and child (review), 65, 477
- scalar expectancy, and choice, 61, 349; preferences for fixed and variable food sources, 63, 313; residence time in concurrent foraging, 67, 161; evaluation of theories of timing, 71, 253; and multiple time scales, 71, 272; and theories of timing, 71, 293
- Scalar Expectancy Theory (SET), learning to time, 92, 423
- scalar property, differentiation of response numerosities in the pigeon, 88, 153; numerosity discrimination in preschool children, 88, 339
- scalar timing theory, evaluation of, 71, 253; tuned-trace theory of interval-timing dynamics, 77, 105
- scalar variability, decay process and timing of conditioned responses, 71, 264
- scallop, molecular and molar analyses of fixed-interval performance, 61, 11
- schedule control, effects of marijuana in humans, 62, 73; versus instructional control of human choice, 62, 367; and drug discrimination in rats, 73, 103
- schedule history, effects on FI contingencies in rats, 63, 97; effects on response rate, 67, 311; long-term effects of, 75, 43; performance on fixed-interval schedules and, 83, 221
- schedule transitions, and effects of reinforcement history, 61, 375
- schedule theory, and William H. Morse, 86, 385
- schedule variability, preference between VR and FR schedules, 66, 283

SUBJECT INDEX

- schedule-dependent, responding following sleep deprivation, 80, 253
- schedule-induced attack, effects of reinforcer amount, 65, 93; during fixed-ratio and matched-time schedules of food presentation 89, 31
- schedule-induced drinking, food-deprivation effects on, 64, 47
- schedules of reinforcement, behavioral determinants of drug action, 86, 359; and Roger T. Kelleher, 86, 371; and William H. Morse, 86, 385; *JEAB* at 0, 50, and 100, 89, 111; and Joseph V. Brady, 90, 405
- Schoenfeld, William N. 67, 1
- Science and Human Behavior, golden anniversary of, 80, 311
- science, philosophy and society (book review), 71, 483; and religion as a natural phenomenon (book review), 87, 143; *Realism without Truth* (review), 91, 391
- scientific behavior, *In Search of Memory: The Emergence of a New Science of Mind* by Eric R. Kandel (book review), 90, 235
- scientific method, *In Search of Memory: The Emergence of a New Science of Mind* by Eric R. Kandel (book review), 90, 23
- screen touch, visual search by chimpanzees, 63, 175; training visual discriminations in rats, 65, 173; humans' choice and self-control, 69, 87; establishing functional classes in a chimpanzee, 72, 57; instructions as discriminative stimuli, 72, 205; equivalence classes in individuals with minimal verbal repertoires, 74, 101; behavioral momentum in mental retardation, 75, 15; effects of response disparity on stimulus and reinforcer control, 75, 183; natural concepts in a gorilla, 78, 315; fixed interval responding in humans, 79, 49; stimulus generalization of behavioral history, 80, 173; response acquisition by humans with delayed reinforcement, 91, 377
- sea lion, equivalence classification by California, 76, 131; expanding classes by exclusion, 78, 449
- search, stimulus control in landmark use, 63, 187
- seasonal effects, on pigeon body weight and delayed matching-to-sample performance, 88, 395
- secobarbital, human drug discrimination, 71, 417
- second-order schedules, hens' preferences for topographically different responses, 63, 151; effects of response form, force, and number, 70, 45; transitivity of choices under different response requirements, 72, 235; of token reinforcement, 76, 159; of token reinforcement, 81, 5; concurrent chains and, 84, 19; of token reinforcement, 85, 95; and Roger T. Kelleher, 86, 371
- seizures, effects on auditory discrimination, 84, 357
- selection by consequences, a computational model of, 81, 297; a computational theory applied to concurrent schedules, 90, 387
- selection-based responding, formation of a generalized categorization repertoire, 78, 291
- selectionism, and E. L. Thorndike, 72, 425; 72, 451; and Herbert Spencer, 86, 123
- selective associations, blocking in pigeons, 71, 13
- selective observing, generality of, 77, 171
- self-administration, concurrent ethanol-sucrose and sucrose reinforcement, 64, 331; of food and amphetamine by baboons, 68, 47; of food and cocaine by baboons, 72, 215; matching law as a measure of drug choice, 89, 209; repeated acquisition and cocaine self-administration, 89, 225
- self-control, effects of intertrial reinforcers on, 61, 83; effects of variable delays on, 62, 33; exchange delays and impulsive choice in humans, 62, 225; independence of reinforcement delay and magnitude in concurrent chains, 63, 255; prisoner's dilemma and the pigeon, 64, 1; effects of food preferences in children and adults on, 64, 33; achieved by response persistence, 64, 117; behavioral economics without anomalies, 64, 397; response type and sensitivity to reinforcer variation, 66, 297; determination of discount functions, 67, 353; and humans' choice, 69, 87; accounts of choice, 71, 27; effect of alcohol, 71, 121; and impulsivity, 78, 117; tolerance for delay, 79, 37; and token reinforcement, 79, 207; reinforcement in a prisoner's dilemma, 82, 161; effects of methylphenidate and morphine on delay discounting, 83, 297; delay, probability, and social discounting in a public goods game, 91, 61; and delay-amount tradeoffs, 91, 197
- self-discrimination response function, transfer through equivalence relations, 62, 251; transformation with arbitrarily applicable relations, 64, 163; commitment using punishment, 65, 593; token reinforcement and choice, 66, 29
- self-reports, bias in self-evaluation, 62, 235; diazepam and buspirone discrimination, 63, 277; avoidance of CO₂-enriched air, 70, 79; space-flight and, 84, 227
- semantic priming, testing equivalence relations using, 84, 417
- sensitivity, effects of relative reinforcer frequency and of signaled versus unsignaled reinforcer magnitudes, 63, 33; human performance on yoked schedules, 74, 265; and discriminability to reinforcer magnitude, 85, 41; a theory of attending, remembering, and reinforcement in delayed matching to sample, 88, 285; conditional-discrimination performance to within-session variation of reinforcer frequency, 90, 301
- sensitivity to reinforcement, quantitative analysis of extreme choice, 64, 147; component transition as the relational basis for successive discrimination, 64, 185; and concurrent choice, 65, 445; to amount and delay, 66, 219; to amount, delay, and density, 69, 87; human sensitivity to concurrent schedules, 71, 303; to relative reinforcer rate in concurrent schedules, 75, 25
- sensitivity to reward, dopamine and, 84, 371

SUBJECT INDEX

- sensitization, and behavioral contrast, 69, 199; criticisms of the satiety hypothesis, 74, 347
- sequence learning, and resurgence of integrated behavioral units, 87, 5
- sequential analysis, dynamics of waiting in pigeons, 65, 603
- sequential responding, establishing functional classes in a chimpanzee, 72, 57
- serial compound stimuli, and resistance to change, 66, 169
- serial learning, neuroimaging and, 84, 453
- serial position function, an experimental analysis of memory processing, 88, 405
- session duration, effects on closed-economy multiple-schedule performance, 65, 111; open vs. closed economies, 67, 67; effects on leaving patches, 72, 373
- session time, and within-session changes in the VI response function, 64, 95
- sexual arousal, transformation of respondently conditioned stimulus function, 67, 275
- sexual motivation, sexual reinforcement in the female rat, 68, 399
- shaping, to overcome learned nonuse, 61, 281; human performance on yoked schedules, 74, 265; and William H. Morse, 86, 385
- Sharing Game, fairness in resource allocation, 91, 337
- shock, schedule interactions involving punishment, 68, 161; avoidance and safety signals, 75, 311
- shock postponement, 61, 135
- shock-maintained responding, 61, 135; and tolerance to rate-increasing effects of cocaine, 62, 45
- Shull machine, interresponse time structures in variable-ratio and variable-interval schedules, 90, 345
- Siamese fighting fish, response acquisition with delayed reinforcers, 61, 35
- sigmoidal functions, time to completion of web-based physics problems with tutoring, 88, 103
- signal detection, and bias in self-evaluation, 62, 235; and human symbolic matching-to-sample performance, 63, 53; presence-versus-absence discrimination in pigeons, 65, 81; types of responding under, 65, 561; effects of signal presentation probabilities and reinforcer distributions, 66, 243; stimulus presentation ratios and outcomes, 72, 1; reinforcer control and human performance, 73, 275; and MTS procedures, 79, 323; behavioral models of, 82, 57; conditional discrimination and, 84, 281; discriminability and sensitivity to reinforcer magnitude, 85, 41; punishment and human signal detection, 92, 17
- signal presentation probability, effects on human signal-detection performance, 66, 243; reinforcer control and human performance, 73, 275
- signal probability effects, in self-evaluation, 62, 235
- signaled delays, punishment of schedule-induced drinking, 64, 47; cocaine and reinforcement delay, 65, 375; effects on choice, 75, 165
- signaled outcomes, choice between reliable and unreliable reinforcement, 62, 353
- signaled magnitude effect, effects of in delayed matching to sample, 83, 119
- signaled reinforcement, effect on response-reinforcer relation, 61, 65; effect on FI responding, 79, 367; effect on operant responding, 83, 15
- signaled reinforcer-frequency ratios, sensitivity of conditional-discrimination performance to within-session variation of reinforcer frequency, 90, 301
- simple discrimination, a discrimination analysis of training-structure effects on stimulus equivalence outcomes, 72, 117; equivalence relations and the reinforcement contingency, 74, 127; equivalence classification by sea lions, 76, 131
- simple discrimination task, age trends in stimulus overselectivity, 88, 369
- simple schedules, within-session changes in the VI response function, 64, 95; behavioral momentum and temporal separation, 69, 29
- simulation, behavior analysis and revaluation, 74, 331; of performance, 82, 57
- simultaneous visual discrimination, in Asian elephants, 83, 15
- single-factor theory, of avoidance, 75, 311
- single-unit electrophysiology, testing neuronal substrates of drug relapse using, 84, 653; neural recording with behavioral regularity in rats, 92, 113
- 6-hydroxydopamine, effects of, 61, 213
- size symmetry, starlings' discrimination of size in paired stimuli, 87, 39
- skew, aging and intraindividual variability in performance: analyses of response time distributions, 88, 319
- skewed base rates, see base-rates, skewed
- SKF 38393, effect on sensitivity to reinforcement, 84, 371
- SKF 82958, and in vitro reinforcement of hippocampal bursting, 61, 155
- skin conductance, transfer of respondent eliciting and extinction through equivalence classes, 62, 331; covarying functions in stimulus class formation and transfer of function, 78, 509; transformation of the discriminative and eliciting functions of generalized relational stimuli, 88, 179; transfer of aversive respondents, 92, 85
- Skinner, B. F., Recent issues in the analysis of behavior (book review), 71, 115; and I. P. Pavlov, 72, 455; 72, 463; Psychology in the year 2000, 81, 207 (introduction 205); and The new behaviorism (book review), 82, 73; centennial (special section), 82, 311; and Behavior Theory and Philosophy (book review), 83, 315; behavior-analytic contributions to research on animal timing, 85, 125; *JEAB* at 50, 89, 95; *JEAB* and the Skinnerian interpretation, 89, 137; ecological psychology in context, 92, 275

SUBJECT INDEX

- Skinner box, coevolution of research and technology, 89, 129
- sleep deprivation, effects of on free-operant avoidance, 73, 333; and positive reinforcement, 80, 253
- social behavior, group choice in humans, 76, 21
- social cognition, domestic dog behavior review, 89, 247
- social context, and humans' choice to compete, 62, 133
- social discounting, delay, probability, and social discounting in a public goods game, 91, 61
- social evolution, *Taking Pragmatism Seriously* (review), 92, 131
- social influence, role of differential reinforcement in pigeons, 79, 175
- social learning, Richard Dawkins' *The God Delusion* (book review), 88, 435
- social psychology, and behavior analysis, 62, 315
- social reinforcement, of operant behavior in rats, 62, 149
- sodium chloride, and hypertension in dogs, 61, 255; and stress in baboons, 61, 263
- Soman, overview of Soman-induced brain injury, 61, 319
- somatosensory deafferentation, and rehabilitation medicine, 61, 281
- sound localization, and career of J. M. Harrison, 90, 131
- spaceflight, repeated performance testing during, 84, 227
- spatial aggregation, foraging by starlings, 67, 181
- spatial distribution, of behavior under varying frequencies of water delivery, 73, 195
- spatial frequency, concept discrimination by pigeons, 82, 125
- spatial learning, stimulus control in landmark use, 63, 187; navigation and drug discrimination, 78, 215
- spatial location, transitivity in conditional matching to sample, 62, 399
- species comparisons, and selective associations, 71, 13
- spectral sensitivity, in the rabbit retina, 61, 247
- speech for self, naming and symbolic behavior, 65, 185
- speech perception, in rats, 80, 205
- speech-recognition technology, applications to analysis of human vocal behavior, 74, 363; stability of functional equivalence and stimulus equivalence, 77, 29
- speed, categorization of a moving target, 78, 249
- Spencer, Herbert, contributions to behavior analysis, retrospective review of *Principles of Psychology* (book review), 86, 123
- SPFs, see *serial position function*
- spike, neural recording with behavioral regularity in rats, 92, 113
- spontaneous recovery, and habituation, 76, 289
- spout-contact response, matching on VR schedules of drug reinforcement, 70, 23; ratio size and cocaine concentration effects, 70, 185
- spread of effect, and E. L. Thorndike, 72, 441
- squirrel monkeys, and response-contingent shock, 61, 135; repeated acquisition and GABA_A modulators, 82, 37; blood pressure and heart rate during schedule-controlled responding, 92, 379
- Staddon, J. E. R. *The new behaviorism: Mind, mechanism, and society* (review), 82, 73
- starlings, see *European starlings*
- state-dependent learning, drug discrimination without explicit training, 66, 193
- statistical decision theory, operant simulation of foraging in patches, 66, 327
- stay reinforcers, using a changeover delay, 79, 207
- stay schedules, local model of concurrent performance, 71, 57
- stay/switch model, of concurrent choice, 91, 21
- step size, effects on PR performance, 70, 123
- stereotypy, effects of delayed reinforcement on variability and repetition of response sequences, 86, 159; effects of *d*-amphetamine and ethanol on variable and repetitive key-peck sequences, 86, 285
- stimulants, effects on discrimination, 84, 77
- stimulus, see also *brief stimulus*
- stimulus bias, procedure to correct biases in matching-to-sample, 90 103
- stimulus classes, a discrimination analysis of training-structure effects on stimulus equivalence outcomes, 72, 117; stability of, 77, 29; concept learning and behavior analysis, 78, 237; covarying functions in stimulus class formation and transfer of function, 78, 509; naming and categorization in children, 78, 527; CARIN theory of conceptual combination, 78, 551; and psychological essentialism (book review), 78, 597; naming in the establishment of, 81, 267; naming and categorization in children, 83, 47; associative symmetry, antisymmetry and a theory of pigeons' equivalence-class formation, 90, 257
- stimulus compounding, effects of compounding drug-related stimuli, 73, 211; reversing composite-stimulus control, 92, 367
- stimulus control, and human drug discrimination, 61, 181; differential vocalization in budgerigars, 63, 111; pigeons' discrimination of paintings, 63, 165; visual search by chimpanzees, 63, 175; in the use of landmarks by pigeons in a touch-screen task, 63, 187; picture recognition in pigeons, 65, 465; stimulus effects on behavior allocation, 66, 149; drug discrimination without explicit training, 66, 193; effects of schedule history on response rate, 67, 311; rats and drugs of abuse, 68, 117; restricted, 68, 303; pigeons' discrimination of paintings, 69, 223; logical functions of joint control, 69, 327; integration of stimuli, reinforcers, and behavior, 71, 439; establishing functional classes in a chimpanzee, 72, 57; drug discrimination in rats, 73, 103; and generalization of punishment, 73, 261; equivalence relations and the reinforcement

SUBJECT INDEX

- contingency, 74, 127; drug discrimination and extinction, 74, 283; equivalence, naming, and conflicting baseline control, 75, 55; effects of response disparity, 75, 183; topographies in a simultaneous discrimination procedure, 77, 189; and choice in a variable environment, 79, 87; of cocaine self-administration, 79, 111; in conditional discriminations, 79, 383; typicality effects, 82, 253; effects of morphine on, 84, 401; contingency discriminability and peak shift, 86, 11; emergence of symmetry in a conditional discrimination task using different responses as proprioceptive samples in pigeons, 86, 65; intertrial sources of, and delayed matching-to-sample performance in humans, 86, 253; *JEAB* at 0, 50, and 100, 89, 111; in career of J. M. Harrison, 90, 131
- stimulus discriminability, in a signal-detection task, 65, 561; and symbolic matching to sample, 69, 311
- stimulus equivalence, basic research needed, 61, 529; transfer of self-discrimination response functions, 62, 251; transfer of respondent eliciting and extinction, 62, 331; formation of transitivity in conditional matching to sample, 62, 399; differential vocalization in budgerigars, 63, 111; and reversal of baseline relations in adults, 63, 225; and reversal of baseline relations in children, 63, 239; naming and symbolic behavior, 65, 185; speed analyses of, 65, 643; resurgence of derived stimulus relations, 66, 267; transformation of respondently conditioned stimulus function, 67, 275; incongruous stimulus pairing and conditional discrimination training, 68, 143; naming and verbal behavior, 68, 235; default-response option and untrained stimulus relations, 70, 87; operant processes and human category formation, 70, 267; in budgerigars, 70, 321; in preschool children, 71, 195; relations between visual stimuli, 71, 395; a discrimination analysis of training-structure effects on stimulus equivalence outcomes, 72, 117; symmetry in language-trained chimpanzees, 73, 5; in individuals with minimal verbal repertoires, 74, 101; naming and conflicting baseline control, 75, 55; classification by sea lions, 76, 131; speed contingencies, number of presentations, and nodality effect, 76, 265; precursor to the relational evaluation procedure, 76, 339; stability of, 77, 29; and contextual control, 78, 63; formation of equivalence classes in pigeons, 78, 397; contextual control of, 78, 433; expanding classes by exclusion in sea lions, 78, 449; tests of symmetry in pigeons, 78, 467; covarying functions in stimulus class formation and transfer of function, 78, 509; naming and categorization in children, 78, 527; differential sample responding without different exteroceptive stimuli, 79, 21; transfer of specific contextual functions, 79, 395; in individuals with language limitations and MR, 80, 131; and relation to stimulus function, 81, 257; typicality effects in, 82, 253; associative symmetry in pigeons, 84, 147; neuroimaging and, 84, 453; experimental control of nodality, 85, 107; equivalence relations, contextual control, and naming, 86, 337; conditional relations with compound abstract stimuli using a go-no-go procedure, 87, 89; contextual control by function and form of transfer of functions, 88, 87; instructional effects on matching-to-sample performance, 89, 333; and naming by preschool children, 89, 383; relational learning in children with deafness, 89, 407; common control by compound samples in conditional discriminations, 90, 81; transfer of aversive respondents, 92, 85; emergent relations in go/no-go procedures, 92, 233
- stimulus function, and equivalence class formation, 81, 257; effects of differential training procedures on linked perceptual class formation, 87, 97
- stimulus generalization, effects of VI value and training amount, 70, 139; operant processes and human category formation, 70, 267; and stimulus control of punishment, 73, 261; failure to find within pictorial categories, 78, 333; contextual control of, 78, 433; of behavioral history, 80, 173
- stimulus generalization peak shift, reversing composite-stimulus control, 92, 367
- stimulus location, and tests of symmetry in pigeons, 78, 467
- stimulus overselectivity, and reinforcer frequency, 68, 303; age trends in, 88, 369
- stimulus pairing, and conditional discrimination training, 68, 143
- stimulus presentation ratio, in signal-detection procedures, 72, 1
- stimulus relations, in conditional discriminations, 61, 487; a discrimination analysis of training-structure effects on stimulus equivalence outcomes, 72, 117; same-different learning in pigeons, 78, 345; in conditional discriminations, 79, 395; establishment and maintenance of consequential stimuli, 82, 177
- stimulus segmentation, and context specificity, 62, 157
- stimulus specificity, and habituation, 76, 289
- stimulus substitutability, maintained nodal-distance effects in equivalence classes, 64, 129
- stimulus topography, contextual control by function and form of transfer of functions, 88, 87
- stimulus value, transfer tests of, 68, 93; effects of differential training procedures on linked perceptual class formation, 87, 97
- stimulus-reinforcer contingencies, and resistance to change, 66, 169
- stimulus-reinforcer interaction, and selective associations, 71, 13
- stimulus-reinforcer relations, and stimulus class formation in pigeons, 72, 97
- stimulus-relation relations, in conditional discriminations, 61, 487
- stimulus-relation transfer, in conditional discriminations, 61, 487

SUBJECT INDEX

- stimulus-response discriminability, effects of number of sample stimuli and choices on, 72, 33
- stimulus-termination schedules, modulation of respiration in rhesus monkeys, 62, 57
- strength, see *response strength*
- stress, see *behavioral stress*
- striatum, discriminative stimuli and, 84, 505
- strict alternation, in concurrent VI schedules, 79, 65
- stroke, overcoming learned nonuse by shaping, 61, 281
- Stroop, medial prefrontal lesions and, 84, 485
- subjective effects, in human drug discrimination, 71, 417
- subjective reports, of human drug discrimination, 61, 169
- subjective time, decay process and timing of conditioned responses, 71, 264
- substitutability, of sucrose and wheel running, implications for activity anorexia, 86, 131
- substitution, and regulation in a closed economy, 65, 401
- successive discrimination, component transition as the relational basis for, 64, 185
- successive-choice schedule, and choice in humans, 62, 269
- successive-encounters procedure, choice in, and hyperbolic decay of reinforcement, 88, 73
- successive matching, associative symmetry, antisymmetry and a theory of pigeons' equivalence-class formation, 90, 257
- successive matching to sample, associative symmetry in pigeons, 84, 147
- successive matching trial format, equivalence in a stimulus pairing 2-response format, 92, 57
- successive-reversal training, establishing functional classes in a chimpanzee, 72, 57
- sucrose, effects of altering VR requirements in concurrent reinforcement, 64, 331; concentration effects, 79, 243; reinforcement value and substitutability of, with wheel running, implications for activity anorexia, 86, 131
- sucrose concentration, and reinforcer magnitude, 61, 505;
- sunk cost, in pigeons and humans, 83, 1; influence of prior choices on current choice, 85, 3
- superstitious behavior, unsignaled delayed reinforcement and VI schedules, 69, 103
- supplemental feeding, and the effects of cocaine, 77, 199
- swimming, response acquisition with delayed reinforcers, 61, 35
- switch schedules, local model of concurrent performance, 71, 57
- switching behavior, increasing the variability of, 68, 1
- symbolic behavior, and naming, 65, 185
- symbolic function, relational learning in children with deafness, 89, 407
- symbolic matching to sample, effects of reinforcer and sample-stimulus probabilities, 63, 53
- symbolic theories, mechanistic explanation of behavior, 84, 313
- symmetrical law of effect, asymmetry of reinforcement and punishment, 89, 157; token reinforcement review and analysis, 91, 257
- symmetry, transfer of relational stimulus control, 61, 487; match-to-sample performance in rats, 68, 27; control by sample location, 70, 235; derived stimulus control in budgerigars, 70, 321; in conditional discriminations of chimpanzees, 73, 5; transfer of matching to novel sample locations, 73, 141; sea lions and equivalence, 78, 449; stimulus control topographies, 78, 467; in a conditional discrimination task using different responses as proprioceptive samples in pigeons, 86, 65; and the origins of emergent differential sample behavior, 90, 61
- tactile discrimination, automated method for presenting stimuli to rats in a two-choice discrimination task, 90, 113
- tacting, naming and categorization in children, 78, 527; naming and categorization in children, 81, 267
- tandem ratio, and increased response rate by rats, 80, 159; bout rate and rate of VI reinforcement, 81, 65
- tandem schedules, and brief-stimulus presentations, 61, 417; response-rate differences, 61, 441; effects of d-amphetamine on response acquisition, 66, 349; body weight and response acquisition, 67, 131; response-reinforcer relation and delay-of-reinforcement effects, 71, 187; parameters of Herrnstein's equation vary with schedule order, 73, 319; response rate as engagement bouts, 75, 247; effects on FI responding, 79, 49; tolerance and, 82, 293; tolerance to effects of cocaine under response-initiated FI schedules, 90, 207
- target pigeons, and induced attack, 89, 31
- teaching, the psychology of learning, 70, 215, 72, 269
- technology development, basic research needed, 61, 529; coevolution of research and technology, 89, 129
- teleological behaviorism, and religion as a natural phenomenon (book review), 87, 143
- teleology, philosophical behaviorism (book review), 72, 273; self-control and impulsivity (book review), 78, 117
- temporal bisection, psychometric function and timing, 74, 25
- temporal contingencies, and mental rotation, 70, 203
- temporal control, in fixed-interval schedules, 61, 1; response-independent events in the behavior stream, 68, 375; nonlocalized effects of short interfood intervals, 70, 35; theories of timing, 71, 288; and the choose-short effect, 72, 473; factors involved in development of, 83, 221; behavior-analytic contributions to research on animal timing, 85, 125

SUBJECT INDEX

- temporal differentiation, behavior-analytic contributions to research on animal timing, 85, 125
- temporal discounting, of delayed rewards by individuals, 64, 263; and accounts of self-control choice, 71, 27
- temporal discrimination, and the behavioral theory of timing, 61, 19; and operant feeding in goldfish, 62, 1; ratio versus difference comparators in choice, 62, 409; biasing the pacemaker in the behavioral theory of timing, 64, 225; dynamics of waiting in pigeons, 65, 603; discrimination of relative frequency, 67, 11; theory of memory for event duration, 72, 467; effects of morphine on FI patterns and, 74, 229; disruption of temporally organized behavior by morphine, 77, 157; effects of d-amphetamine, 78, 195; morphine and, 82, 197; effects of morphine on, 84, 401; tests of the scalar expectancy theory and learning-to-time models, 90, 33; probability and RI preference, 91, 89; learning to time, 92, 423
- temporal integration, brain imaging and decision-making, 84, 537
- temporal patterns of behavior, VR histories and FI performances in rats, 63, 97
- temporal psychophysics, decay process and timing of conditioned responses, 71, 264
- temporal response differentiation, effect of drugs, 74, 295
- terminal-link cues, in concurrent-chains schedules, 62, 385
- terminal-link duration, temporal context in concurrent chains, 81, 215
- terminal-link effect, with terminal links following an ascending and descending series, 91, 1
- terminology, *In Search of Memory: The Emergence of a New Science of Mind* by Eric R. Kandel (book review), 90, 235
- testing schedule, effects on linked perceptual classes, 84, 243
- theories, modeling modeling, 71, 275; of equivalence relations, 74, 127
- theories of mind, domestic dog behavior review, 89, 247
- Thorndike, E. L., legacies of, 70, 325; 72, 425; 72, 429; 72, 433; 72, 441; 72, 447; 72, 451
- three-term contingency, individual differences and intelligence, 90, 219
- threshold, reduction by cocaine and ethanol, 61, 223; auditory, effects of cocaine, 61, 231; visual, effects of cocaine, 61, 231
- time allocation, human choice in concurrent ratio-interval schedules, 61, 453; by pigeons in concurrent VI VI schedules, 67, 109; by rats under varying frequencies of water delivery, 73, 195; between bouts and pauses, 81, 65
- time cost, procurement time and meal frequency and duration, 63, 295; currency of procurement cost, 78, 31
- time course, of human drug discrimination, 61, 181
- time discrimination, dynamics of, 66, 117
- time of day, and operant feeding in goldfish, 62, 1
- time perception, and duration comparison, 62, 15; evaluation of timing theories, 71, 253
- time-left procedure, and choice, 61, 349; ratio versus difference comparators in choice, 62, 409
- time-scale invariance, decay process and timing of conditioned responses, 71, 264
- timeout, postponement without increased reinforcement frequency, 74, 147
- timeout from avoidance, effects of cocaine on behavior maintained by, 63, 19; extinction of responding maintained by, 71, 1
- timeout from food, avoidance of timeout from response-independent food, 89, 169
- timeout-timeout interval, effects of chlordiazepoxide and cocaine, 61, 479
- timescale invariance, temporal tracking in cyclic-interval and single-alternation schedules, 83, 243
- time to completion, of web-based physics problems with tutoring, 88, 103
- timing, in fixed-interval schedules, 61, 1; behavioral theory of, 61, 19; foraging in a radial maze, 61, 331; duration comparison, 62, 15; biasing the pacemaker in the behavioral theory of, 64, 225; presence-versus-absence discrimination in pigeons, 65, 81; towards a pacemaker-free theory of interval timing, 71, 215; evaluation of quantitative theories of, 71, 253; without a timer, 71, 257; multiple time scales, 71, 272; models of, 71, 281; without internal clock, 71, 288; IRT sensitivity during concurrent VI schedules, 72, 317; psychometric function and models of, 74, 25; effects of morphine on, 74, 229; effects of d-amphetamine, 78, 195; morphine and temporal discrimination, 82, 197; in cyclic-interval and single-alternation schedules, 83, 243; effects of morphine on, 84, 401; remembering and discrimination, 87, 25; differential reinforcement of low rate schedule criterion changes, 92, 181; learning to time, 92, 423
- timing models, context effects in a temporal discrimination task, 90, 33
- tit for tat, prisoner's dilemma and the pigeon, 64, 1; in a prisoner's dilemma, 82, 161
- token deposit, stock optimizing in choice, 76, 245
- token exchange, and loss aversion in capuchin monkeys, 89, 145
- token reinforcement, choice and self-control, 66, 29; second-order schedules with pigeons, 76, 159; choice and self-control, 79, 207; unit price and choice, 81, 5; second-order schedules of, 85, 95; and reinforcer accumulation with pigeons, 90, 283; token reinforcement review and analysis, 91, 257
- tolerance, cocaine and reinforcement delay, 65, 375; in a rigorous science, 71, 284; to cocaine under behavior-correlated schedule, 76, 217; and tandem FI FR schedules, 82, 293; morphine, 83,

SUBJECT INDEX

- 281; to effects of cocaine under a response-initiated FI schedule, 90, 207; cocaine tolerance and conjunctive schedules, 92, 413
- tolerance, see also *behavioral tolerance*
- tools, chimpanzees' use of (book review), 79, 267
- topography, of pigeons' key pecks and gapes, 65, 21; of pecks under concurrent VI VI schedules, 67, 109
- touch circuit, touch or lick detector circuit, 91, 253
- touch screen, intertrial sources of stimulus control and delayed matching-to-sample performance in humans, 86, 253; stimulus-food pairings produce stimulus-directed touch-screen responding in monkeys, 92, 41
- trace stimulus-pairing two-response trial format, equivalence in a stimulus pairing 2-response format, 92, 57
- trained matching, do infants show generalized imitation of gestures? 87, 63; and hand-to-body gestures in children, 89, 183; effects of skills training and multiple exemplar matching training, 91, 355
- training, to overcome learned nonuse, 61, 281; protocols, 67, 367; effects of amount on stimulus generalization, 70, 139
- transfer, of self-discrimination response functions, 62, 251; of function through stimulus equivalence classes, 62, 331; of naming in differential vocalization in budgerigars, 63, 111; of training, 67, 367; of matching to novel sample locations, 73, 141; of function in human vocal behavior, 74, 363; of specific contextual functions to conditional discriminations, 79, 395; tests of response membership in acquired equivalence classes, 86, 81; transformation of the discriminative and eliciting functions of generalized relational stimuli, 88, 179
- transfer function, and behavioral dynamics, 66, 391; 77, 3; contextual control, 78, 63; and concept learning (special issue), 78, 237; Wiener filter estimation of, 81, 289; vocal tact training and, 83, 47
- transfer of function, contextual control by function and form of, 88, 87; and the implicit association test, 88, 263; transfer of aversive respondents, 92, 85
- transfer test, maintained nodal-distance effects in equivalence classes, 64, 129; of stimulus value, 68, 93; within-class sample responding and acquired equivalence, 89, 341
- transformation of function, with arbitrarily applicable relations, 64, 163; in accordance with arbitrarily applicable relations, 67, 275; contextual control, 78, 63; in accordance with the relational frames of more-than and less-than, 86, 317; contextual control by function and form of transfer of functions, 88, 87; discriminative and eliciting functions of generalized relational stimuli, 88, 179; in accordance with same and opposite relational frames, 88, 249; nodal structure and the partitioning of equivalence classes, 89, 359; transfer of aversive respondents, 92, 85
- transition, concurrent-schedule performance in reinforcer ratios, 79, 87; within-session transitions in choice, 91, 319
- transitive inference, neuroimaging and, 84, 453
- transitivity, in conditional matching to sample, 62, 399; of choices under different response requirements, 72, 235
- travel, locomotion vs. lever-press, 68, 177; and group choice by foragers, 69, 227; choice, changing over, and reinforcement delays, 74, 311; determinants of reinforcer accumulation, 76, 321
- travel time, leaving patches, 62, 89; 62, 185; 72, 373; and concurrent-schedule choice, 73, 65; overmatching and barrier choice, 75, 93
- treadle press, response type and sensitivity to reinforcer variation, 66, 297; blocking a selective association in pigeons, 71, 13; economic and biological influences on responding, 80, 43; reinforcement of, 80, 217; disruption of responding maintained by conditioned reinforcement, 86, 197
- trial-initiation response, simple and conditional visual discrimination, 70, 103
- trial-unique matching, intertrial sources of stimulus control and delayed matching-to-sample performance in humans, 86, 253;
- triazolam, human drug discrimination, 71, 417
- truth, tolerance in a rigorous science, 71, 284
- 2 x 2 games, prisoner's dilemma and the pigeon, 64, 1
- two-choice task, automated method for presenting olfactory or tactile stimuli to rats in a, 90, 113
- two-factor theory, of avoidance, 75, 311
- two-lever procedure, acquisition of lever pressing and, 84, 339
- typicality effects, in generalized equivalence classes, 82, 253
- unblocking, and blocking and overexpectation in autoshaping, 65, 575
- uncertainty, default-response option and untrained stimulus relations, 70, 87
- unconditional stimulus, and pigeons' key pecks and gapes, 65, 21
- uncorrelated stimuli, and resistance to change, 92, 199
- undermatching, and contrast, 61, 407; concurrent-schedule performance in cows, 65, 57; group foraging sensitivity, 78, 179
- understanding, in chimpanzees (book review), 79, 267
- unit price, and "demand" for food in baboons, 62, 293; analysis of opioid consumption by monkeys, 64, 361; normalized demand for drugs and other reinforcers, 64, 373; effects on demand, 71, 329; similar consumption and responding across single and multiple sources of drug, 72, 299;

SUBJECT INDEX

- and choice, 73, 45; in a token-reinforcement context, 81, 5; tests of, 83, 99; morphine tolerance and, 83, 281; second-order schedules of token reinforcement, 85, 95; assessing remifentanyl choice in rhesus monkeys, 86, 181; reinforcer accumulation in a token-reinforcement context with pigeons, 90, 283
- universal Darwinism, book review, 76, 351
- unreinforced conditional selection, in preschool children, 71, 195; generalized contextual control, 79, 383
- unsigned delay of reinforcement, effect on matching and resistance to change, 83, 201; contingency tracking during, 88, 229
- unsigned response, and acquired equivalence classes, 79, 21
- value, conditioned reinforcement and resistance to change, 89, 263
- variable delay, and reinforcer efficacy, 69, 77; evidence against a constant-difference effect, 77, 147
- variable-interval response function, separating food density from elapsed session time, 64, 95
- variable-interval schedules, and the behavioral theory of timing, 61, 19; response-rate differences, 61, 441; reinforcer magnitude and the matching law, 61, 505; within-session changes in responding for water during, 64, 75; component transition as the relational basis for successive discrimination, 64, 185; within-session changes in responding, 64, 237; undermatching in dairy cows, 65, 57; cocaine and reinforcement delay, 65, 375; within-session changes in responding, 66, 51; within-session response rates, 66, 135; within-session patterns on conjoint VI VT schedules, 66, 205; behavioral dynamics, 66, 391; and unsigned delayed reinforcement, 69, 103; effects of VI value on stimulus generalization, 70, 139; human sensitivity to concurrent, 71, 303; molar and molecular control in, 71, 319; IRT sensitivity during concurrent VI schedules, 72, 317; reward density and VI performance in an open economy, 72, 341; conditioned reinforcing and discriminative stimulus functions of stimuli, 73, 125; human performance on negative slope schedules, 73, 241; response rate, resistance to change, and preference, 76, 43; with a linear feedback loop, 79, 157; effect of signaled reinforcement on, 79, 367; bouts of responding from, 80, 159; sleep deprivation and positive reinforcement, 80, 253; relation between bout rate and rate of VI reinforcement, 81, 65; unsigned delay of reinforcement and matching, 83, 201; sensitivity of response rate and (review), 84, 99; formal and modern theories of matching, 84, 129; residence time in conc. VI performance, 87, 121; primacy of molecular processes in determining response rates under, 89, 5; interresponse time structures in, 90, 345; schedule discrimination based on reinforced IRT, 91, 157
- variable-interval-with-added-linear-feedback schedules, molar and molecular control in, 71, 319
- variable-ratio schedules, response-rate differences, 61, 441; delay reduction and optimal foraging, 61, 465; within-session changes in responding, 62, 109; and FI contingencies in rats, 63, 97; temporal control by PI schedules, 66, 311; and behavioral momentum, 67, 91; molar and molecular control in, 71, 319; behavioral momentum in mental retardation, 75, 15; changing behavior within session, 75, 235; response rate, resistance to change, and preference, 76, 43; second-order schedules of token reinforcement, 76, 159; and preratio pausing, 77, 273; response-rate differences, 79, 157; stimulus control and generalization, 80, 173; primacy of molecular processes in determining response rates under, 89, 5; interresponse time structures in, 90, 345; schedule discrimination based on reinforced IRT, 91, 157
- variable-time schedules, within-session patterns on conjoint VI VT schedules, 66, 205; and unsigned delayed reinforcement, 69, 103; response-independent milk delivery and persistence, 76, 179; avoidance of timeout from response-independent food, 89, 169
- variation, repetition and choice, 83, 147
- verbal behavior, bias in self-evaluation, 62, 235; language acquisition, 62, 323; human choice and diminishing returns, 62, 367; naming and symbolic behavior, 65, 185; self-reports of emergent relations, 65, 355; linguistic competence in apes (review), 65, 477; naming and, 68, 235; logical functions of joint control, 69, 327; symmetry in language-trained chimpanzees, 73, 5; equivalence classes in individuals with minimal verbal repertoires, 74, 101; and psychological essentialism (book review), 78, 597; human language and cognition (book review), 81, 189; equivalence relations, contextual control, and naming, 86, 337; *JEAB* at 0, 50, and 100, 89, 111; and stimulus categorization by preschool children, 89, 383; *Realism without Truth* (review), 91, 391
- verbal punisher, age trends in stimulus overselectivity, 88, 369
- verbal reinforcer, age trends in stimulus overselectivity, 88, 369
- video images, categorization of natural movements by pigeons, 70, 281
- vision, in rabbits, 61, 247; pigeons' discrimination of paintings, 63, 165
- visit duration, and concurrent performance, 69, 275; choice, contingency discrimination, and foraging theory, 71, 355; response rate as engagement bouts, 75, 247; 77, 211
- visit patterns, in concurrent performance, 81, 85; fix and sample with rats in the dynamics of choice, 86, 43
- visual acuity, in Asian elephants, 83, 15

SUBJECT INDEX

- visual discrimination, training in rats, 65, 173; within-session analysis of, 72, 385; neural recording with behavioral regularity in rats, 92, 113
- visual images, starlings' discrimination of size asymmetries in paired stimuli, 87, 39
- visual reinforcers, and response acquisition, 61, 35
- visual search, by chimpanzees, 63, 175
- vocal behavior, analysis of human, 74, 363; stability of functional equivalence and stimulus equivalence, 77, 29
- vocal naming, differential vocalization in budgerigars, 63, 111
- vocal operant, differential vocalization in budgerigars, 63, 111
- vocal tacting, naming and categorization in children, 83, 47
- voluntary behavior, and stochastic matching, 88, 1
- wait time, dynamics of time discrimination, 66, 117; time and rate measures in choice, 81, 135
- warning stimuli, and discriminated timeout avoidance in pigeons, 88, 51
- water, preroatio pausing and alternative reinforcers, 77, 273
- water budget, pigeons' preference for VI reinforcement, 64, 299
- water deprivation, and the response-strength equation, 61, 97; changes in Herrnstein's hyperbola as a function of, 72, 251
- water intake, food and water intake versus costs in a closed economy, 65, 527
- water reinforcers, within-session changes in responding during multiple VI schedules, 64, 75; pigeons' preference for VI water reinforcement, 64, 299; effects of d-amphetamine on response acquisition, 66, 349; response acquisition with delayed reinforcement, 69, 17
- Weber's law, preferences for fixed and variable food sources, 63, 313; and choice in concurrent chains, 66, 97; towards a pacemaker-free theory of interval timing, 71, 215
- wheel running, effects of reinforcer duration on, 67, 337; effects of FI schedule and reinforcer duration, 70, 69; simple and conditional visual discrimination, 70, 103; effect on revolution-PRP relation, 73, 225; parameters of Herrnstein's equation vary with schedule order, 73, 319; effects of cocaine on FI responding, 75, 77; matching law and choice on concurrent VI schedules, 75, 299; habituation and within-session changes in, 76, 289; currency of procurement cost, 78, 31; reinforcer duration effects, 79, 243; reinforcement value and substitutability of, with sucrose, implications for activity anorexia, 86, 131
- wheel-running reinforcement, and mice selected for high daily wheel-running rates, 88, 199
- Wiener filters, estimation of transfer functions, 81, 289
- willpower, consistency of choice, 79, 37
- within-session effects, separating food density from elapsed session time, 64, 95
- within-session patterns, measuring resistance to change, 86, 109
- within-session responding, changes in, 62, 109; patterns of responding for water during multiple VI schedules, 64, 75; changes in, 64, 237; changes in during autoshaping, 66, 51; changes in during concurrent VI schedules, 66, 75; representing rates proportionally and entirely, 66, 135; response patterns on conjoint VI VT schedules, 66, 205; on concurrent schedules with different reinforcers in the components, 66, 369; changes in and habituation, 69, 199; behavioral economics and changes in, 72, 355; analysis of visual discrimination, 72, 385; satiation and capacity, 72, 407; parameters of Herrnstein's equation vary with schedule order, 73, 319; criticisms of the satiety hypothesis, 74, 347; cyclicality and perseverance, 75, 235; habituation contributes to changes in, 76, 289; delay of reinforcement gradients, 82, 21
- within-session variation of reinforcer frequency, sensitivity of conditional-discrimination performance to, 90, 301
- within-subject comparison, analysis of reinforcement history effects, 86, 31
- within-trial contrast, pigeons prefer conditioned reinforcers that follow a relatively more rather than a less aversive event, 88, 131; extensive training and the work-ethic effect, 91, 143
- women as journal editors, *JEAB* at 50, 89, 95
- work ethic, extensive training and the work-ethic effect, 91, 143
- work-rate evaluation, assessing preference for reinforcers, 64, 313
- work-rate supply, assessing preference for reinforcers, 64, 313
- working memory, neural correlates of, 84, 521; individual differences and intelligence, 90, 219
- World Wide Web, *JEAB* and *JABA* on, 66, 265
- yoked schedules, response-rate differences, 61, 441; response persistence on, 70, 165; procedural factors in human performance, 74, 265; inter-response time structures in variable-ratio and variable-interval schedules, 90, 345
- young adults, age trends in stimulus overselectivity, 88, 369
- young children, imitation of hand-to-body gestures in children, 89, 183