

SUBJECT INDEX

JOURNAL OF THE EXPERIMENTAL ANALYSIS OF BEHAVIOR

January 1994 – November 2005

NOTE: This index covers Volumes 61 through 84 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.

- abstraction, levels of, 78, 315
accumulation, determinants of reinforcer, 76, 321
acquisition, see *repeated acquisition, response acquisition*
acts, behavioral economics without anomalies, 64, 397
adaptation, effects of reinforcer-ratio variation, 75, 207; evolution of learning and behavior (book review), 78, 225
addiction, and self-control (book review), 78, 117
adenosine, and modulation of respiration in rhesus monkeys, 62, 57
adjunctive behavior, punishment of schedule-induced drinking, 64, 47
adjusting-amount, discounting of delayed rewards, 81, 39
adult humans, see *humans*
adventitious reinforcement, and experimental control procedures, 70, 321; emergent differential sample behavior, 78, 409
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
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
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
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
anticipation, and operant feeding in goldfish, 62, 1
anticipatory contrast, varieties of contrast, 68, 133
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
apomorphine, effect on sensitivity to reinforcement, 84, 371
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
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
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
atomism, molecular to molar in behavior analysis, 78, 95
atoms of behavior, and in vitro reinforcement, 61, 155
attending, conditional discriminations and, 84, 281
attention, stimulus control in landmark use, 63, 187; picture recognition in pigeons, 65, 465; lapses of, 80, 273; to the sample, 83, 119
attention deficit hyperactivity disorder, and spontaneously hypertensive rats, 65, 129
auditing, effects of competitive reward distribution, 74, 115
auditory discrimination, pilocarpine seizures and, 84, 357
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

SUBJECT INDEX

- 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 control, response-contingent shock, 61, 135; and horse training (book review), 72, 139
- aversive sounds, quantifying aversiveness, 65, 37
- 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 et seq.
- avoidance conditioning, and hypertension in dogs, 61, 255
- 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
- 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
- base rates, unified theory of decision criterion learning, 78, 567
- base-rate error, choice as a function of reinforcement ratios, 66, 11; behavior analysis and decision making, 69, 355
- base-rate neglect, and sample accuracy in human matching to sample, 71, 155
- basic-applied continuum, for the development of behavioral technologies, 61, 529
- 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
- behavior categories, implications for (book review) 79, 137
- 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
- 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
- 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
- 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

SUBJECT INDEX

- behavioral pharmacology, and human drug discrimination, 61, 181; effects of marijuana in humans, 62, 73; diazepam and buspirone discrimination, 63, 277
- 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
- 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
- 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
- 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
- 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 motion, categorization by pigeons, 70, 281
- bipolar control, in fixed interfood intervals, 79, 1
- 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
- body weight, in SHR and WKY rats, 65, 129; and response acquisition, 67, 131; choice between constant and variable alternatives, 73, 79
- 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
- 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
- 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 stimulus class formation and transfer of function, 78, 509
- 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
- categorization, operant processes as components of, 70, 267; of natural movements by pigeons, 70, 281; concept learning and behavior analysis (special issue), 78, 237 et seq.; spontaneous, 78, 291; hierarchical, 78, 433; and naming in children, 81, 267; typicality effects, 82, 253; in children, 83, 47
- 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
- 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

SUBJECT INDEX

- chain schedules, value transmission in discrimination learning, 72, 177; stimulus control of cocaine self-administration, 79, 111
- changeover, and precurent 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 et seq.; 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
- 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, 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

SUBJECT INDEX

- 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
- 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
- circadian rhythms, simple and conditional visual discrimination, 70, 103
- class, molecular to molar in behavior analysis, 78, 95
- 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
- clock, towards a pacemaker-free theory of interval timing, 71, 215; timing without internal, 71, 288
- 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
- cocaine seeking, involvement of nucleus accumbens and prefrontal cortex in, 84, 653
- cocaine self-administration, unsignaled delayed reinforcement and, 84, 269
- codeine, unit price and progressive-ratio schedules, 64, 361
- cognition, logical functions of joint control, 69, 327; and Asian elephants, 83, 15
- cognitive neuroscience, philosophical foundations of (book review), 84, 683
- cognitivism, philosophical behaviorism (book review), 72, 273
- college students, see *humans*
- combinatorial entailment, derived relational responding as generalized operant behavior, 74, 207
- commitment, self-control achieved by response persistence, 64, 117; using punishment, 65, 593
- 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
- 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
- computational modeling, of selection by consequences, 81, 297
- 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 responding, linked perceptual classes in humans, 84, 243
- 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
- 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 et seq.; 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
- 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 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; 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

SUBJECT INDEX

- 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
- 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
- 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
- conditional matching to sample, formation of transitivity, 62, 399
- conditional probability of reinforcer location, local preference and, 84, 37
- conditional-stimulus duration, and cocaine administration, 81, 169
- 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 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
- 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
- connectionism, and E. L. Thorndike, 72, 441; 72, 451; mechanisms underlying behavior, 84, 313
- consciousness, naming and symbolic behavior, 65, 185 et seq.
- consequential functions, transformation of, 82, 177
- 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
- context, discrimination of relative frequency of events, 72, 151
- contextual choice model, in concurrent chains, 66, 97; in concurrent chains, 81, 215; independence

SUBJECT INDEX

- of entry rate and immediacy, 82, 235; for concurrent-chains performance, 83, 169
- contextual control, of transformation of functions, 78, 63; transfer to conditional discriminations, 79, 395
- contiguity, and the S-R issue, 67, 193; theory of, 79, 193
- contingencies, Pavlovian versus operant, 72, 81
- 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
- contingency-discriminability model, quantitative analysis of extreme choice, 64, 147; choice and foraging theory, 71, 355; synthesizing concurrent interval performances, 74, 189
- 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
- cooperation, prisoner's dilemma and the pigeon, 64, 1
- 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
- crows, use of number by, 73, 163
- cumulative dosing, in human triazolam discriminators, 71, 417
- 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
- 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
- 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 et seq.; 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
- 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
- delay-reduction hypothesis, and concurrent-chains choice, 61, 113; and choice, 61, 349; and optimal

SUBJECT INDEX

- foraging, 61, 465; and different accessibility of 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
- 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, 73, 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
- delayed reinforcement, response acquisition with, 81, 51; and choice, 83, 263; effects on cocaine self-administration, 84, 269
- delayed rewards, temporal discounting of, 64, 263
- delayed stimulus control, component transition as the relational basis for successive discrimination, 64, 185
- 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
- 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
- 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 stimulus relations, resurgence of, 66, 267
- 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
- devaluation, behavior analysis and revaluation, 74, 331
- dexfenfluramine, anorectic drugs and food access, 82, 275
- dextropropoxyphene, unit price and progressive-ratio schedules, 64, 361
- diazepam, and buspirone discrimination, 63, 277
- 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
- differential reinforcement of low rate schedules, stimulus generalization of behavioral history, 80, 173
- differential sample responding, development of in pigeons, 78, 409
- differential-outcomes effect, investigation of within sessions, 61, 389; in delayed matching performance, 63, 33; in the horse, 74, 245
- 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

SUBJECT INDEX

- 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
- 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
- discriminated operant, integration of stimuli, reinforcers, and behavior, 71, 439; and MTS performance, 79, 323
- 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
- discrimination, see also *conditional discrimination*, *drug discrimination*, *olfactory discrimination*, *temporal discrimination*
- 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
- 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
- dishabituation, and within-session changes in wheel running, 76, 289
- dispositions, philosophical behaviorism (book review), 72, 273
- distance, determinants of reinforcer accumulation, 76, 321
- diversity, tolerance in a rigorous science, 71, 284
- dogs, behavior analysis and hypertension, 61, 255
- domain, specificity and generality (book review), 78, 225
- Donahoe, J. W., and Palmer, D. C. *Learning and complex behavior* (review), 63, 347; 67, 193 et seq.
- 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 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
- drugs, of abuse, and behavior of rats, 68, 117; discrimination by pigeons, 68, 193; effects of compounding drug-related stimuli, 73, 211

SUBJECT INDEX

- 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
- earning reinforcers, generalized matching law and, 84, 167
- ecologics, 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
- 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
- elasticity, of demand for cigarettes, 61, 191; normalized demand for drugs and other reinforcers, 64, 373
- electric shock, see *shock*
- 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
- 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
- equivalence, see *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
- equivalence relations, in preschool children, 71, 195; functional-analytic model of analogy, 78, 375; acquired, 78, 409
- 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
- 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
- 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
- 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
- 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

SUBJECT INDEX

- extraneous reinforcers, contrast and reallocation of, 163, 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
- fear, transfer through stimulus equivalence classes, 62, 331
- feedback, performance and competitive responding, 69, 263; 74, 115; and avoidance of electric shock, 75, 311 et seq.
- feedback functions, human performance on negative slope schedules, 73, 241; relating response to reinforcement on VI schedules, 79, 157
- feeding schedules, and temporal discrimination in goldfish, 62, 1
- 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
- fixed consecutive number schedule, behavior of rats, 68, 117
- 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
- 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 preratio 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
- 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
- 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 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

SUBJECT INDEX

- the effects of morphine, 69, 295; effects on leaving patches, 72, 373
- 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 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*
- 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
- 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
- free operant, and precurrent contingencies, 61, 427
- frequency discrimination, by pigeons, 67, 11
- frequency domain, and behavioral dynamics, 66, 391
- frequency reduction, of shock is inherently reinforcing, 75, 311 et seq.
- frustration, determinants of key-peck speeds, 64, 215
- function transfer, in human operant experiments, 81, 239
- 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 reinforcer 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
- GABA_A modulators, effects on acquisition of response sequences in squirrel monkeys, 82, 37
- Gallistel, C. R. *The organization of learning* (review), 62, 435
- 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
- generalized contextual control, of conditional discriminations, 79, 383
- generalized equivalence classes, and linked perceptual classes, 78, 271
- 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
- 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;

SUBJECT INDEX

- synthesizing concurrent interval performances, 74, 189; alternative to, 79, 219; earning reinforcers and, 84, 167
- generalized operant class, derived relational responding as, 74, 207
- genes, roles and categorizations in behavior-environment relations (book review), 79, 137
- 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
- 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
- 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
- Harvard Pigeon Lab, tribute to, 77, 301 et seq.
- 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
- 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
- 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_e , 185
- heuristics, psychology of decision making (book review), 79, 409
- hippocampus, in vitro reinforcement, 61, 155; pilocarpine seizures and auditory discrimination, 84, 357; role in episodic memory, 84, 619
- historicity, tolerance in a rigorous science, 71, 284
- history effects, temporal control by PI schedules, 66, 311; instructions as discriminative stimuli, 72, 205; changing behavior within session, 75, 235
- 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
- human/nonhuman differences, VR histories and FI performances, 63, 97; legacies of E. L. Thorndike, 70, 325
- 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 precurent 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 equiva-

SUBJECT INDEX

- lence classes, 68, 67; incongruous stimulus pairing and conditional discrimination training, 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 disparity 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
- humans, see also *children*
- 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
- hyperbolic discounting, tolerance for delay, 79, 37; choice in dynamic environments and, 84, 581
- hyperbolic value added model, in concurrent chains, 81, 214; independence of entry rate and immediacy, 82, 235; in concurrent chains, 83, 169
- hypercapnia, behavior analysis and hypertension, 61, 255
- hypertension, and behavior analysis, 61, 255; sodium and stress in baboons, 61, 263
- 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
- impaired movement, overcoming learned nonuse by shaping, 61, 281
- 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
- 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 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

SUBJECT INDEX

- individual, molecular to molar in behavior analysis, 78, 95
- 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 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
- intentional act, philosophical behaviorism (book review), 72, 273
- interchangeover time, in strict and random alternation conditions, 79, 65
- 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
- interreinforcement interval, and the behavioral theory of timing, 61, 19; distribution of and 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
- 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
- isovalue function, assessing preference for reinforcers, 64, 313
- jaw movement, the conditioned pecking response, 61, 517
- 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
- Keller, Fred S. 66, 1; 66, 7
- key area, pigeons' preference for free choice, 68, 349
- 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; pro-

crastination 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

SUBJECT INDEX

- in concurrent schedules, 75, 25; computational 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 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
- 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
- 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
- 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 et seq.; 68, 235 et seq.; and animal training (book review), 72, 139; conditional discriminations of language-trained chimpanzees, 73, 5
- 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

SUBJECT INDEX

- law of exercise, and E. L. Thorndike, 72, 441
- 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
- learning, see also *matched-dependent learning, relational learning*,
- 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, 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 reinforcement, 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;

SUBJECT INDEX

- 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
- lever pull, and human drug discrimination, 61, 169; sodium and stress in baboons, 61, 263; and "demand" for food in baboons, 62, 293; food and cocaine self-administration by baboons, 72, 215
- lick, punishment of schedule-induced drinking, 64, 47
- Lindsay plunger pull, avoidance of CO₂-enriched air, 70, 79
- 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
- listener behavior, naming and symbolic behavior, 65, 185 et seq.; naming in children, 81, 267
- local analyses, of reinforcer magnitude, 80, 95; concurrent schedules and, 84, 37
- 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
- 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
- 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
- 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
- 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; changeover 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
- 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 behavior, 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
- 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_e , 84, 185

SUBJECT INDEX

- 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 et seq.; self-reports of emergent relations, 65, 355; speed analyses of stimulus equivalence, 65, 643; naming and verbal behavior, 68, 235 et seq.; 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 preschool 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
- matching to sample, see also *conditional matching to sample*, *delayed matching to sample*
- mathematical model, discrimination of relative frequency, 72, 151; selection by consequences, 81, 297
- 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
- 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 et seq.
- 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
- mental retardation, and behavioral momentum, 75, 15; equivalence relations in individuals with, 80, 131
- mental rotation, and temporal contingencies, 70, 203
- mentalism, and behaviorism (book review), 76, 115
- mereological fallacy, and neuroscience (book review), 84, 683
- 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
- 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
- milk, response-independent delivery of, 76, 179
- mind, mentalism and behaviorism (book review), 76, 115
- mirror image, as visual reinforcer in response acquisition, 61, 35
- mistaken identity, match-to-sample performance in rats, 68, 27
- mixed schedules, and variable patterns of responding, 79, 49
- 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
- Moerk, E. L. *First language: Taught and learned* (review), 62, 323
- molar analyses, of fixed-interval performance, 61, 11; effects of ITI duration on discrete-trial

SUBJECT INDEX

- choice, 71, 375; feedback stimuli are safety signals, 75, 311 et seq.
- 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
- molar view, of behavior, 81, 85
- 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
- money, behavioral economics of cigarette smoking, 61, 191; as reinforcer for humans, 62, 225; as a reinforcer for humans, 79, 193
- monkeys, overcoming learned nonuse by shaping, 61, 281; substitution and caloric regulation, 63, 401; choice and differential reinforcement, 66, 143; response-by-response models of matching, 84, 555
- monkeys, see also *rhesus monkeys*, *squirrel monkeys*
- Monte Carlo, algorithm for Weiner transfer functions, 81, 289
- more than, transformation of self-discrimination response functions with arbitrarily applicable relations, 64, 163
- 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
- Morris swim task, navigation as a baseline for drug discrimination, 78, 215
- 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
- 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 delays, and the forgetting function, 80, 295
- 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
- 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
- mutual selection and class definition, test schedules and, 84, 243
- nalbuphine, normalized demand for, 64, 373
- naming, and other symbolic behavior, 65, 185 et seq.; 68, 235 et seq.; 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; and categorization in children, 83, 47
- NASA, repeated performance testing during space-flight, 84, 227
- natural categories, perceptual classes in humans, 76, 95
- nature-nurture, relation to developmental and evolutionary principles (book review) 79, 137
- 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, 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
- negative slope schedules, human performance on, 73, 241

SUBJECT INDEX

- neural network models, 67, 193 et seq.; and theories of timing, 71, 257; behavior analysis and revaluation, 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
- neuroscience, relations with human behavioral science, 61, 307; and theories of timing, 71, 257; drug addiction and, 84, 667
- neuroscience methods, relationship between learning and the brain, 84, 631
- 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 relations, speed analyses of stimulus equivalence, 65, 643
- nodality, effect in equivalence class formation, 76, 265
- nonlocalized effects, of short interfood intervals, 70, 35
- nonstationary Markov chain model, and behavioral variability, 68, 1
- normalized demand, for drugs and other reinforcers, 64, 373
- 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
- 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
- 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
- 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
- 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
- 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
- odd-item search, visual search by chimpanzees, 63, 175
- oddity from sample, use of number by crows, 73, 163
- odor discrimination, episodic memory in nonhuman animals, 84, 619
- olfactory discrimination, procedure for mice, 73, 305
- one factor theory, of punishment, 80, 1
- one-lever procedure, acquisition of lever pressing and, 84, 339
- 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
- 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
- operant conditioning, within-session changes in responding, 66, 51; response acquisition with immediate and delayed reinforcement, 81, 51
- 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
- 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
- optimization, human choice and time-based diminishing returns, 65, 5; unified theory of decision criterion learning, 78, 567
- oral route, of drug self-administration, 77, 49
- 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

SUBJECT INDEX

- 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
- 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
- pacing, 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
- 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
- Pavlovian Society of North America, 72, 455
- peak procedure, and temporal control, 61, 1; disruption of temporally organized behavior by morphine, 77, 157
- peck, stimulus control in the use of landmarks by pigeons, 63, 187
- 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
- per-visit analysis, optimality and concurrent schedules, 71, 75
- percentage reinforcement, choice between reliable and unreliable reinforcement, 62, 353
- 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
- phencyclidine, normalized demand for, 64, 373; discrimination under concurrent FI FI schedules, 74, 55; and response-force requirements, 74, 295
- 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
- picture perception, in pigeons, 65, 465; categories in pigeons, 78, 333
- 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; 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; 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 match-

SUBJECT INDEX

ing 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 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;

SUBJECT INDEX

- 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; 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
- 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
- points, exchangeable for money, 76, 1

SUBJECT INDEX

- polydipsia, and drinking opportunities in a fixed-interval schedule, 62, 307
- position, of behavior under varying frequencies of water delivery, 73, 195
- positive reinforcement, and sleep deprivation, 80, 253
- 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
- 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
- preference pulses, and reinforcer magnitude, 80, 95
- 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
- preratio pause, effects of an alternative reinforcer, 77, 273
- presence-versus-absence discrimination, in pigeons, 65, 81
- prey probability, a laboratory analogue, 62, 89; and foraging by starlings, 67, 181
- 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
- probabilistic epigenesis, relation between development, evolution, and behavior principles (book review), 79, 137
- probabilistic reinforcement, and choice, 68, 317, 70, 253
- probability, area under the curve as a measure of discounting, 76, 235; principal components of response strength, 78, 127
- probability discounting, effect of alcohol on impulsive behavior, 71, 121
- 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
- procrastination, by pigeons, 65, 159, 69, 185
- procurement cost, and meal patterns of cats, 67, 303
- profitability, drinking in a patchy environment, 62, 169; patch choice by foraging rats, 69, 5
- 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
- progressive-time schedules, and control of human choice, 62, 367
- 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
- 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
- psychopharmacology, of contrast, 68, 133

SUBJECT INDEX

- 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
- punishment of interresponse times, with shock, 61, 135
- 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
- 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
- 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
- random ratio, labor supply and consumption of food, 83, 99
- 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
- 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 re-

SUBJECT INDEX

- inforcement, 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 patterns, 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 r_e , 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
- 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
- recency and primacy effects, discrimination in pigeons, 72, 151
- 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
- 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

SUBJECT INDEX

- 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
- 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
- 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
- reinforcer control, effects of response disparity, 75, 183
- reinforcer delay, effect on the form of the forgetting function, 80, 77
- 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
- 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
- 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 choice, 79, 351; sensitivity to in concurrent chains, 83, 169; formal and modern theories of matching and, 84, 129
- reinforcer quality, and key-peck probability and topography, 67, 109; residence time in concurrent foraging, 67, 161
- 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
- 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 et seq.; 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 et seq.; response to Hayes and Barnes-Holmes (book review commentary), 82, 225 et seq.
- 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

SUBJECT INDEX

- relational-control kernel, maintained nodal-distance effects in equivalence classes, 64, 129
- relating relations, relational frame theory and, 84, 435
- relative frequency discrimination, by pigeons, 72, 151
- 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 frequency, and delayed matching-to-sample performance, 63, 33
- relative time, unsignaled delay of reinforcement and, 83, 201
- relativity, of time, 71, 281
- religious behavior, and William N. Schoenfeld, 67, 1
- remembering, psychophysics of, 71, 91; generalization of DMTS, 75, 1
- repeated acquisition, and GABA_A modulators, 82, 37
- replication, publication of failed, 83, 85
- Rescorla-Wagner model, in autoshaping with pigeons, 65, 575
- 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; 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
- resistance to extinction, Pavlovian contingencies and behavioral momentum, 65, 389
- 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 et seq.; 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
- 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
- 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
- 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 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 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
- 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 persistence, on ratio and interval schedules, 70, 165

SUBJECT INDEX

- 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; 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
- 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
- response speed, determinants of, 64, 215; speed analyses of stimulus equivalence, 65, 643; effect in equivalence class formation, 76, 265
- response stereotypy, development of functional response units, 76, 303
- 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
- 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 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 et seq.
- 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-timeout interval, effects of chlordiazepoxide and cocaine, 61, 479
- responses per reinforcer, within-session changes, 62, 109
- restriction, to overcome learned nonuse, 61, 281
- resurgence, of derived stimulus relations, 66, 267; analysis of, 80, 217
- 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
- reversal learning, and context specificity, 62, 157
- reversal procedure, equivalence classification by sea lions, 76, 131
- 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
- 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; unsignaled delayed reinforcement, 84, 269
- rise time, use of cues in labeling of sounds, 80, 205
- 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
- risky choice, tests of an energy-budget model, 80, 59
- rod push, self-control, impulsiveness, and food preferences, 64, 33

SUBJECT INDEX

- rule governance, naming and symbolic behavior, 65, 185 et seq.; consequences of advice on rule control and choice, 70, 1
- 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 et seq.
- safety signal, for shock avoidance, 75, 311 et seq.
- 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
- 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-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 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 variability, preference between VR and FR schedules, 66, 283
- schedule-dependent, responding following sleep deprivation, 80, 253
- schedule-induced attack, effects of reinforcer amount, 65, 93
- schedule-induced drinking, food-deprivation effects on, 64, 47
- Schoenfeld, William N. 67, 1
- Science and Human Behavior*, golden anniversary of, 80, 311 et seq.
- science, philosophy and society (book review), 71, 483
- 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
- sea lion, equivalence classification by California, 76, 131; expanding classes by exclusion, 78, 449
- search, stimulus control in landmark use, 63, 187
- 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
- seizures, effects on auditory discrimination, 84, 357
- selection by consequences, a computational model of, 81, 297
- selection-based responding, formation of a generalized categorization repertoire, 78, 291
- selectionism, and E. L. Thorndike, 72, 425; 72, 451
- 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

SUBJECT INDEX

- amphetamine by baboons, 68, 47; of food and cocaine by baboons, 72, 215
- 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
- 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; spaceflight 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
- 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
- sensitization, and behavioral contrast, 69, 199; criticisms of the satiety hypothesis, 74, 347
- 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
- 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
- shock, schedule interactions involving punishment, 68, 161; avoidance and safety signals, 75, 311 et seq.
- shock postponement, 61, 135
- shock-maintained responding, 61, 135; and tolerance to rate-increasing effects of cocaine, 62, 45
- Siamese fighting fish, response acquisition with delayed reinforcers, 61, 35
- 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
- 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
- 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 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 et seq.
- single-unit electrophysiology, testing neuronal substrates of drug relapse using, 84, 653
- 6-hydroxydopamine, effects of, 61, 213
- SKF 38393, effect on sensitivity to reinforcement, 84, 371
- SKF 82958, and in vitro reinforcement of hippocampal bursting, 61, 155

SUBJECT INDEX

- 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
- 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 et seq.; and *Behavior Theory and Philosophy* (book review), 83, 315
- sleep deprivation, effects of on free-operant avoidance, 73, 333; and positive reinforcement, 80, 253
- social behavior, group choice in humans, 76, 21
- social context, and humans' choice to compete, 62, 133
- social influence, role of differential reinforcement in pigeons, 79, 175
- 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
- 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 et seq.
- 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
- 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
- Staddon, J. E. R. *The new behaviorism: Mind, mechanism, and society* (review), 82, 73 et seq.
- 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
- step size, effects on PR performance, 70, 123
- stimulants, effects on discrimination, 84, 77
- stimulus, see also *brief stimulus*
- 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 et seq.; 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
- stimulus compounding, effects of compounding drug-related stimuli, 73, 211
- 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 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
- 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 elic-

SUBJECT INDEX

- ing 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 et seq.; 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 et seq.; 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
- stimulus function, and equivalence class formation, 81, 257
- 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 location, and tests of symmetry in pigeons, 78, 467
- stimulus overselectivity, and reinforcer frequency, 68, 303
- 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 value, transfer tests of, 68, 93
- 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
- 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
- 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 matching to sample, associative symmetry in pigeons, 84, 147
- 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
- sucrose concentration, and reinforcer magnitude, 61, 505;
- sunk cost, in pigeons and humans, 83, 1
- superstitious behavior, unsignaled delayed reinforcement and VI schedules, 69, 103
- supplemental feeding, and the effects of cocaine, 77, 199

SUBJECT INDEX

- 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 et seq.
- symbolic matching to sample, effects of reinforcer and sample-stimulus probabilities, 63, 53
- symbolic theories, mechanistic explanation of behavior, 84, 313
- 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
- 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
- teaching, the psychology of learning, 70, 215, 72, 269
- technology development, basic research needed, 61, 529
- 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
- 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
- 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
- testing schedule, effects on linked perceptual classes, 84, 243
- theories, modeling modeling, 71, 275; of equivalence relations, 74, 127
- Thorndike, E. L., legacies of, 70, 325; 72, 425; 72, 429; 72, 433; 72, 441; 72, 447; 72, 451
- 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-timeout interval, effects of chlordiazepoxide and cocaine, 61, 479
- timescale invariance, temporal tracking in cyclic-interval and single-alternation schedules, 83, 243
- timing, in fixed-interval schedules, 61, 1; behavioral theory of, 61, 19; foraging in a radial maze, 61,

SUBJECT INDEX

- 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
- 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 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
- 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, 281
- 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
- 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
- transfer function, and behavioral dynamics, 66, 391, 77, 3; contextual control, 78, 63; and concept learning (special issue), 78, 237 et seq.; Wiener filter estimation of, 81, 289; vocal tact training and, 83, 47
- transfer test, maintained nodal-distance effects in equivalence classes, 64, 129; of stimulus value, 68, 93
- transformation of function, with arbitrarily applicable relations, 64, 163; in accordance with arbitrarily applicable relations, 67, 275; contextual control, 78, 63
- transition, concurrent-schedule performance in reinforcer ratios, 79, 87
- 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
- trial-initiation response, simple and conditional visual discrimination, 70, 103
- triazolam, human drug discrimination, 71, 417
- truth, tolerance in a rigorous science, 71, 284
- 2 × 2 games, prisoner's dilemma and the pigeon, 64, 1
- two-factor theory, of avoidance, 75, 311 et seq.
- 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
- 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; and choice, 73, 45; in a token-reinforcement context, 81, 5; tests of, 83, 99; morphine tolerance and, 83, 281
- 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
- unsigned response, and acquired equivalence classes, 79, 21
- variability, utility of, 83, 129
- 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

SUBJECT INDEX

- 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 unsignaled 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; unsignaled delay of reinforcement and matching, 83, 201; sensitivity of response rate and (review), 84, 99; formal and modern theories of matching, 84, 129
- 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
- variable-time schedules, within-session patterns on conjoint VI VT schedules, 66, 205; and unsignaled delayed reinforcement, 69, 103; response-independent milk delivery and persistence, 76, 179
- 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 et seq.; self-reports of emergent relations, 65, 355; linguistic competence in apes (review), 65, 477; naming and, 68, 235 et seq.; 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
- 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
- visual acuity, in Asian elephants, 83, 15
- visual discrimination, training in rats, 65, 173; within-session analysis of, 72, 385
- 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
- wait time, dynamics of time discrimination, 66, 117; time and rate measures in choice, 81, 135
- water, preratio 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

SUBJECT INDEX

- 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 pro-
curement cost, 78, 31; reinforcer duration
effects, 79, 243
- 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 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; re-
sponse 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 econom-
ics 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; cyclicity and
perseverance, 75, 235; habituation contributes
to changes in, 76, 289; delay of reinforcement
gradients, 82, 21
- work-rate evaluation, assessing preference for re-
inforcers, 64, 313
- work-rate supply, assessing preference for reinfor-
cers, 64, 313
- working memory, neural correlates of, 84, 521
- 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