Cambridge University Press 978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index More information

Index

Page entries for headings with subheadings refer to general aspects of that topic. Page entries in **bold** refer to figures and diagrams.

acquired behavior patterns xi action specific energy xviii activation energy 52-53 Adaptation and Natural Selection (Hamilton & Williams) 129 adaptationist stance 108, 112, 166, 167; see also function adaptations and aptations 110-111 ontogenic 56, 103 adaptive specializations approach, critique of 167, 170 adult development 18; see also postnatal environment age effects, leopard gecko 76 aggressive behavior development of individual differences 60 mice 77, **78** sticklebacks 15, xv-xvi allogrooming in horses 46 altruism, reciprocal 129 American experimental psychology ix amphibians, mating calls 20, 149; see also túngara frog analytical phase of ethology 3 androgens, in birds 68-69, 79-80 between clutch variation 73-74 long-lasting effects 74-75 within clutch variation 69-73, 69, 71 androgen to estrogen ratios, geckos 60 Animal Minds (Griffin) 40 animals; see also birds cognition see animal cognition

integrative approach to animal behavior 127-128, 131 social relationships 46 welfare 44–46, xix-xx anthropocentric program 164 anthropomorphism 36, 40, 43 applied ethology xix, 43-46; see also behavioral biology; ethology animal welfare 44-46 dustbathing in poultry 45-46 expression of normal behavior 44-46 feather pecking in poultry 43-44 pleasure, animal 44–46 social relationships in horses/ allogrooming 46 aptations/adaptations 110-111 architectural metaphor xiv Aristotle 28 Art of the Soluble (Medawar) xii attachment behavior 101-102 auditory localization, barn owls 157-158 templates, bird song 91-92 avian species see birds babbling, infant 93, 98 barn owls, auditory localization 157-158 bees 9, 14, 119-120 behavior genetics xv-xviii behavior mechanisms 36-37, 193-195 developmental changes 55, 82; see also development; ontogeny

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

Index 229

hierarchy of 6 integration with function 166–167; see also function; survival value modularity 105-106 perceptual/central/motor 36-38 releasing mechanisms (RM) x, 5, 10-11, 31-32, 36, 47-48 behavior systems 37, 94-97 contentment mechanism 86, 87 dustbathing, fowl 95-97, 96 filial imprinting 85-86, 86 human language as 101 hunger system, junglefowl 94-95, 95 levels of analysis 37-38, 39 behavior theory critique, Lehrman x-xi behavioral biology xxi, 1, 2, 25; see also behavioral ecology; ethology; four questions ecology see below endocrinology 39 genetics 39 syndromes (personality) 30 behavioral ecology xiii, 113-115, 122-125 comparative method 120-122 critiques 124-125 design approach 123-124 developmental/genetic constraints 117 experimental manipulations 117-118 field experiments 118 phenotype manipulation experiments 117, 124 mathematical modeling 114, 115, 118-120, 125 mechanisms 123-124 observational studies 115-117, 125 optimality 114, 124 optimization model 117 phylogenetically independent contrasts method 121-122 selection experiment 117 and sociobiology 122-123 Tinbergen's methodology 114-115, **115** biological method 2, 25 biological study of behavior, ethology as xxi, 2, 17, 20, 25 biology, behavioral xxi, 1, 2, 25; see also behavioral ecology; ethology; four questions

birds; see also fowl auditory localization, owls 157-158 beaks xiv, 10 clutch variation see androgens domestic see fowl dunnocks (Prunella modularis) xvii-xviii eggshell removal behavior, gulls xiv, 13-14 feeding behavior xiii, 10 food-caching 41-42, 153-154, 187-188; see also hippocampal hypothesis; neurobiology kittiwake behavior 2, 12-13, 20 postnatal influences on development 77-80 pre-hatching experiences, maternal calls 87-88 sexual imprinting 89-91 social interactions 79 song see below ultraviolet vision 110-111 bird song xiv, xvi, 128 auditory templates 91-92 and development 15, 91-94, 103 conspecific song 92 and four questions 26 hippocampal neurogenesis 155 memorization 92, 179-181; see also song systems neurobiological studies 103, 128 seasonal brain variations 181-183 song systems 168-170, 169, 172, 176 stages in song production 93 synapse density 180 black-headed gulls, eggshell removal behavior xiv, 13-14 blackbird's bill 10 brain modularity 175–177; see also hippocampal hypothesis; neurobiology/neuroecology brain nuclei metabolic activity 66 reorganization of functional associations 76 brain regions, localization 168-170, 169; see also hippocampal hypothesis; neurobiology/ neurecology; song systems caching of food 41-42, 153-154, 187-188; see also hippocampal hypothesis; neurobiology calls, mating 20, 149; see also bird song; song; túngara frog camouflage 11-12

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

230 Index

cats, sexual experience 75 caudomedial mesopallium (CMM) 180-181 caudomedial nidopallium (NCM) 180-181 causal criterion 83 causal models 46 dustbathing in fowl 48-49 neural network models 46-48 psycho-hydraulic model of motivation 50-52, 51 two process model of human sleep 49-50 causal questions 163, 165; see also causation; development causation xii, 35, 52–53, xv-xviii; see also applied ethology; causal models; cognition (animal) activation (energy) 52-53 complexity 4, 5-6, 38 conception of 35-38 definitions 27-28 and function see below functional units of behavior 36, 38 Huxley on xxii, 2, 54, 108, 147 internal causes of behavior 4, 6, 38 levels of analysis 36-38, 52-53 organs of behavior 4-5, 8, 19, 35 proximate 29-30, 35, 173 structure (threshold) 52–53 studies of 38-40, 40 and survival value 8 Tinbergen's conceptualisation 4-6 ultimate 29–30, 173; see also function; survival value causation/function, distinctions/ synthesis 30, 147–150, 161; see also auditory localization; magnetic field orientation; major histocompatibility complex; memory in food-storing birds behavior patterns as organs 149 causal/functional distinctions 147-148, 165 causal/functional synthesis 150, 160 - 161criteria for causal explanations 157 discrete functional/causal units, non-equivalence 150 function as clue to causation 150 hammer example 147 human foresight 148 interaction of four questions 147 limitations/hazards of functional approach 149-150 natural selection 148 same functions having different causes 149

cause 27-28; see also causation chaffinches, song development 16 challenge hypothesis 79–80 chickens see fowl circadian rhythms dustbathing in fowl 49, 51 uncoupling 49 cliff-nesting, kittiwake behavior 2, 13.20CMM (caudomedial mesopallium) 180-181 cognition, animal 40-43 definition of cognition 41 episodic memory 41-42 jumping spiders (Portia fimbriata) 42 - 43primate studies 41 scrub jays, food-caching behavior 41-42 cognitive ecology 163, 166, 167 Cognitive Ethology; the minds of other animals (Ristau) xx color mutations 14 communal nesting/nursing 152 communication, sexual see bird song; mating calls; song; túngara frog comparative method 120-122 psychologists 27 "compass," animal 159 competitive exclusion model 84, 85 complexity, behavioral 4, 5-6, 16, 38 computational question 112 conflict hypothesis xviii consciousness, animal xix-xx; see also cognition (animal) contentment mechanism 86, 87 controls, experimental 10 corticosterone levels, food-hoarding species 186-187 COX (cytochrome oxidase) activity 62-64, **65-66** crickets, song xvi critical (sensitive) periods 84-85, 106 "Critique of Konrad Lorenz's Theory of Instinctive Behavior" 54, x-xi crossbill (Loxia curvirostra), beaks xiv crowding in Vanessa caterpillars 9 current utility 109-111, 112-113, 116, 117; see also survival value cytochrome oxidase (COX) activity 62-64, **65-66** dance, bee 9, 14

dance, bee 9, 14 Darwinism 108 deaf children/signing 101

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

Index 231

deep synthesis 164; see also integration definitions/terminology 6, 21 behavioral biology (ethology) xxi, 1, 2, 25 biological study of behavior, ethology as xxi, 2, 18, 21, 25 cause/causation 27-28, 35-38 causal/functional distinctions 147-148 cognition 41 current utility 109-111, 112-113 development 55, 82 dictionary vs. scientific 29-30, 31 evolution 32 four questions, integration/ distinctions 163-164, 165-166 function 28, 109-111; and see below historical definitions of function 110-111, 112-113, 114 innate behavior 16-18, 104-105 levels 31 and nature-nurture debate 104-105 neuroecology/neuroethology, distinctions 172-173 neurophysiology/ethology boundaries 6-7 ontogeny 14 physiology of behavior 6, 31, 38 survival value 28, 109, 113 ultimate 31 descriptive/observational phase of ethology 2-4 development, post-Tinbergen conceptualizations xii, 82-83, 102–106, xvii–xix; see also attachment behavior; behavior systems; bird song learning; filial imprinting; four questions; human development; maternal environment; ontogeny; postnatal environment; sexual imprinting causal criterion 83 as change in behavior machinery 55.82 developmental perspective xi, xii, xiv functional criterion 83 interactionist interpretation 83-84, 106 irreversibility 84, 85, 106 modularity 105-106 nature-nurture debate 83-84, 104-105 ontogenic adaptations 103 oversimplifications 84 predispositions 104-106

psychological insights/crossfertilization 104 questions 163, 165 developmental neurobiology xvi-xvii bird song learning 103 filial imprinting 65, 103 displacement activities 6 domain-specific modules 174-175 drives xviii-xix duck study, sexual imprinting 89 dunnocks (Prunella modularis) xvii-xviii dustbathing in fowl 45-46, 48-49 as behavior system 95-97, 96 circadian rhythms 49, 51 ecological approach 166 program 164 ecology behavioral see behavioral ecology cognitive 163, 166, 167 functional 163 eggs clutch variation see androgens incubation temperature see temperature-dependent sexual determination eggshell removal behavior, blackheaded gulls xiv, 13-14 ejaculation in rats 17 embryonic environment 57; see also maternal environment; temperature-dependent sexual determination (TSD) endocrinology, behavioral 39 engineering, and behavioral ecology 124 "English-speaking ethologists" x episodic memory 41-42 estrogen to androgen ratios 60 to testosterone ratios 66 ethics of research 102 ethologists 27 "English-speaking" x "German group" x ethology, classical ix; see also applied ethology; behavioral ecology; four questions; On aims and methods of ethology analytical phase 3 as biological study of behavior xxi, 2, 18, 21, 25 descriptive/observational phase 2-4 father of (Lorenz) 1, 2, 21 modern perspectives xii and neurophysiology 6-7 rise of 26-27

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

232 Index

European school (Lorenz) 54 evolution 17-19, 32, 127, 146; see also ontogeny; phylogeny; túngara frog aims of evolutionary study 19 behavioral xxii, 2, 54, 108, 147 comparison of closely related species 19 definition 32 difficulties of studying 17 dynamics 19 and four questions xii, xiii, xiv-xvii Huxley on xxii, 2, 54, 108, 147 influence of selection on behavior evolution 19-20 integrative approach 127-128, 131 role 173 specific examples 128-131 trait/preference evolution 138-139, 146 Evolution, function, development, causation symposium xxi evolutionary biologists 27 psychology xiii, 163, 166, 167 evolutionarily stable strategy concept xiii experimental psychology, American ix experimental work controls 10 ethics 102 methodology 19, 117-118 observational studies 2-4, 115-117, 125 practical difficulties 10 survival value 8-9 eye spots in moths 9 face/facial expressions, humans/primates 129 recognition, humans 87 fanning, male sticklebacks 9 farming 44; see also applied ethology feather pecking, poultry 43-44; see also applied ethology; fowl feeding behavior, birds xiii

field experiments 118 fighting behavior in sticklebacks 15,

xv-xvi filial imprinting 84-88, **86**, 103 behavior system concept 85-86, **86** competitive exclusion model 84, 85

contentment mechanism 86, 87 and face recognition in humans 87 neural network model 85

neurobiological studies 103 and operant conditioning/ reinforcement 88 pre-hatching experiences, maternal calls, 87-88 predispositions 86-87, 106 sensitive/critical periods 84-85, 106 finch studies, sexual imprinting 89-91 fish 9, 15, 152, xv-xvi fitness effects 112-113 flower color xiv food-caching 41-42, 153-154, 187-188; see also hippocampal hypothesis; neurobiology forced desynchrony protocol 49 foresight, human 148 four questions on behavior ix, 25-26, 33-34, xi-xii, xxi-xxii; see also causation; development; evolution; function; ontogeny; survival value cause 27-28 definition problems 27-28, 29-30, 31, 32 distinction of questions 165 formulation of questions 26-27 interaction of questions 147 integration of questions 163-164, 165-166 levels of analysis issue 31-32 proximate causation 29-30, 35; see also causation ultimate causation 29-30; see also phylogeny; survival value fowl; see also dustbathing feather pecking 43-44; see also applied ethology human face preference in chickens 47 hunger system, junglefowl 94-95, **95**-95 pecking movements, newly hatched chicks x frogs, mating calls 20, 149; see also túngara frog fruit fly (Drosophila melanogaster) 20, 39 function xii, 107, xii-xiv, xiv-xvii; see also behavioral ecology; causation/function (distinctions/synthesis); survival value aptations/adaptations 110-111 adaptationist stance 108, 112 current utility definition 109-111, 112-113 definitions, multiple 28, 109–111 fitness effects 112-113

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

Index 233

historical 110-111, 112-113, 114, 118 Huxley's three divisions 108 ideal free theory 114 integration of function and mechanism 166-167 marginal value theorem 114 and neuroecology 163-164, 195–196; see also neuroecology philosophical conceptions 111-113 proximate-ultimate dichotomy 109, 113 as survival value 28, 107, 109, 113 teleology 111, 166 Tinbergen's conception 107-109, 165-166 ultraviolet vision in birds 110-111 weak/strong functions 109 functional approach 166, 167 criterion of development 83 ecology 163 hypothesis xii, xii-xiv questions 163, 165 units of behavior 36, 38 game theory 114 gecko, social experience 75-76; see also temperature-dependent sexual determination gender roles of girls 67 generative grammar 100 genetics behavioral 39 molecular xvi sexual determination 57-58 and species-specific behavior 19 "German group" of ethologists x grammar 100 grooming allogrooming in horses 46 hammer example of causation and function 147 haplodiploidy 129 "hard core" x Heidegger, Martin 147 helpers at the nest xiv hierarchy of behavior mechanisms 6 hippocampal hypothesis, foodhoarding species 153-154, 170, 171-172, 175-177; see also neurobiology; spatial information storage corticosterone levels 186-187 Eurasian/N. American bird

comparisons 154-155

neurogenesis 155-157 size/volume of hippocampus 154-155, 183-187, 184, 192-193 seasonal variation 156, 188-192 historical contingency hypothesis 143-144 homeostatic processes, human sleep 49 hormones 6, 39, 66, 67, 79-80; see also androgens; maternal environment horses, allogrooming 46 "how" questions 163, 165 human/s development 106 face recognition 87 facial expressions 129 foresight 148 language see language neuronal stem cell therapy 157 research ethics 102 sleep 39, 49-50 Hume, David 194 hunger system, junglefowl 94-95, 95 Huxley, Julian xxii, 2, 25, 54, 108, 147; see also four questions hyena 67 ideal free theory 114 imprinting see filial imprinting; sexual imprinting inbreeding avoidance 152 incubation temperature, eggs see temperature-dependent sexual determination independent contrast method 143 infants babbling 93, 98 developmental influences see postnatal environment information storage, spatial 41-42, 153-154, 187-188; see also hippocampal hypothesis; neurobiology innate behavior patterns x, xi, 15-17; see also internal causes of behavior definitions 14-16, 104-105 modules 174 releasing mechanisms (RM) x, 5, 31-32, 36, 47-48 insects bees 9, 14, 119-120 caterpillars, crowding 9 crickets, song xvi fruit fly 20, 39 moths 7.9 sociality 129

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

functional criterion of development 83

More information

234 Index

Instinkt-Dressur-Verschräkung 16 instinctive drives xviii-xix integration animal behavior 127-128, 131 causal/functional synthesis 9, 160-161 four questions 163-164, 165-166 function and mechanism 166 - 167internal causes of behavior 4, 6, 14-16, 38; see also innate behavior patterns jays feeding on caterpillars 11 food-caching behavior 41–42; see also hippocampal hypothesis jumping spiders (Portia fimbriata) 42 - 43junglefowl, hunger 94-95, 95 kaspar-hauser/isolation experiments xvi. 79 kin recognition 150-151, 152 kittiwake behavior 2, 12-13, 20 language, human 87, 97-101 as behavior system 101 components 100 deaf children/signing 101 grammar 100 infant babbling 93, 98 morphemes 99 phonemes 98-99 semantic systems 99–100 syntax 100 learning, within-event 88; see also memory Lehrman, D. S. 54-55, 82, 83, x-xi leopard gecko, social experience 75-76; see also temperaturedependent sexual determination levels of analysis issue 31-32, 128; see also four questions behavior systems 37-38, 39 and causation 36–38, 52–53 level-adequate concepts 38 perceptual/central/motor behavior mechanisms 36-38 litter composition in mice 77, 78 Lorenz, Konrad, ix behavior theory critique by Lehrman x-xi European school 54 as father of ethology 1, 2, 21 first meeting with Tinbergen xxi

imprinting, sexual 54 influence on Tinbergen 108 nature-nurture debate 83-84 maestro ix, xx, xxii, 165–166; see also Tinbergen magnetic field orientation 158-160 magnetic sensory reception 160 major histocompatibility complex (MHC) 150-152 mallard duck study, sexual imprinting 89 mammals; see also humans; rats allogrooming in horses 46 cats, sexual experience 75 mice 77, 152 primate studies 41 sibling effects 64-67 spotted hyena 67 squirrels 16 "map and compass," animal 159 marginal value theorem 114 matched-filter hypothesis 134 mate choice individual differences 60, 61 neurobiology of 133-136, 135 recognition 150-151, 152 stability of preferences 90-91 mating calls 20, 149; see also bird song; song; túngara frog maternal calls 87-88 environment see below stress 67-68 maternal environment, hormonemediated, 64, 80-81 androgens in birds 68-69 hormonal condition during pregnancy 67-68 mathematical modeling 114, 115, 118-120, 125 mating calls see bird song; song mechanisms, behavior see behavior mechanisms memory see also neurobiology bird song 92, 179-181; see also bird song; song systems episodic 41-42 food-caching 41-42, 153-154, 187-188; see also hippocampal hypothesis; neurobiology methodology, Tinbergen's 114-115, 115 MHC (major histocompatibility complex) 150-152 mice 77, 152

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

modeling, mathematical 114, 115, 118-120, 125 modularity 105-106, 173-174 molecular biology 6 genetics xvi morphemes 99 moths 7, 9 motivation xviii-xix; see also psychohydraulic model mutations, and differential survival 13 natural selection 148 naturalistic fallacy 194 naturalists, role of 4 nature/nurture debate 55-56, 79, 81, 83-84, 104-105; see also maternal environment; postnatal environment; temperaturedependent sexual determination (TSD) NCM (caudomedial nidopallium) 180-181 needs, ethological 44-46; see also welfare nesting communal 152 kittiwake behavior 2, 12-13, 20 rats 16 neural networks 46-48 artificial 144-146 filial imprinting 85 releasing mechanism as 47-48 neural phenotypes 61 neurobiology/neurocology 163, 166, 167, 178; see also hippocampal hypothesis adaptive specializations approach, critique of 167, 170 behavioral/neural correlations, causal links 171–172 bird song learning 103, 179-181; see also song systems current debate 192-195 developmental xvi-xvii filial imprinting 103 functional approach, critique 167-168 limitations of 193-195 localization of brain regions 168-170, **169** of mate preference 133-136, 135 misunderstandings/confusions 172-178 and neuroethology, distinctions 172-173 spatial memory tasks, failure of behavioral predictions 170-171

neuroethology 38-39, 172-173 neurogenesis 155-157 neuronal stem cell therapy 157 neurophysiology/ethology boundaries 7-8 Niko's Nature. A life of Tinbergen and His Science of Animal Behavior (Kruuk) xi, xxii niveau-adäquate terminologie 6, 38 non-genomic developmental influences 56: see also maternal environment; postnatal environment; temperature dependent sexual determination (TSD) North American school 54-55 nursing, communal 152 nut cracking in squirrels 16 observational studies 2-4, 115-117, 125 odor cues in urine 152 offspring/parent conflict 129 On aims and methods of ethology (Tinbergen) xxi-xxii, 1, 20-22, 23-24; see also causation; evolution; ontogeny; survival value analytical phase of ethology 3 as biological study of behavior 2, 18.21 causal/functional synthesis 8, 160-161 definitions/conceptualizations 1 descriptive/observational phase of ethology 2-4 Lorenz as father of ethology 1, 2, 20-21 terminology 6, 20 ontogeny 14-18, 31, 32, 54-57, 80-81; see also development; four questions; nature-nurture debate adult development 18 characterization 15 conceptualization (Tinbergen) 55, 82 control of developmental changes 17-18 controversy 54-55 elimination of environmental influences 15 embryonic environment 57; see also maternal environment; temperature dependent sexual determination (TSD) infant and adult influences see postnatal environment innate behavior 15-17

Index 235

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

236 Index

ontogeny (cont.) ontogenic adaptation 56, 103 proximate/ultimate approaches 80 sexual/individual differentiation 54-57 species-typical behaviors 56 and survival value 17 operant conditioning/reinforcement 88 optimal foraging theory xiii, 114, 123 optimality 114, 124 optimization model 117 optomotor response 6 organs of behavior 4-5, 8, 19, 35, 149 oversimplifications 4, 5-6, 55, 84 owls, auditory localization 157-158 parent/offspring conflict 129 parental investment 129 pathogen resistance 152 Patterns of Behavior: Konrad Lorenz, Niko Tinbergen and the Founding of Ethology (Burkhardt) xi pecking movements, newly hatched chicks x personality 30 phenotype/s manipulation experiments 117, 124 neural 61 plasticity 120 phonemes 98-99 Phylogenetic Systematics (Hennig) 130 phylogenetic systematics 130; see also evolution phylogenetically independent contrasts method 121-122 phylogeny 31, 32, 127, 146; see also evolution; túngara frog physics, and behavioral ecology 124 physiology of behavior 6, 31, 38 placenta 67, 68 plasticity, phenotypic 120 pleasure, animal 44-46 polarity detection 158-160 postnatal environment 75 avian species 77-80 sexual experience in rats/cats 75 social experience in leopard gecko 75-76 social experience in mice 77 poultry see fowl predispositions 86-87, 104-106 prefunctionality 104-105 pregnancy, maternal hormonal condition 67-68 primate studies 41, 129 problems, solvable and intractable xii, xvii, xx

proximate causation 29-30, 31, 35; see also causation proximate-ultimate dichotomy 80, 109, 113 psycho-hydraulic model x, 6, 50-52, 51 psychology American experimental ix cross-fertilization with biology 104 evolutionary xiii, 163, 166, 167 questions; see also four questions causal 163, 165; see also causation; development "how" 163, 165 "what for" 163, 165 rats ejaculation 17 nest building 16 sexual behavior 39, 75 reciprocal altruism 129 recognition humans 87 kin 150-151, 152 mate 150-151, 152 species 141-142 reinforcement 88 releasing mechanisms (RM) x, 5, 10-11, 31-32, 36, 47-48 reptiles, social experience 75-76; see also temperaturedependent sexual determination research ethics 102; see also experimental work ritualization 129 rocking, of cryptic animals 11-12 scrub jays, food-caching behavior 41-42; see also hippocampal hypothesis selection experiments 20, 117 influence on behavior evolution 19-20 sexual 129 semantic systems 99-100 sensitive periods 84-85, 106 sensory exploitation hypothesis 139-140, 140, 141 sex ratio evolution 129 sexual behavior 39, 75, 77, 78 communication see bird song; mating calls; song; túngara frog determination 57-58; see also temperature dependent sexual determination differentiation 54-57

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

Index 237

dimorphism 62 imprinting xv, 54, 88-91 selection 129 sibling effects in mammals 64-67 signing in deaf children 101 sleep, human 39, 49-50 Social Behaviour in Animals (Tinbergen) xiii social behavior xv evolution 129 in horses/allogrooming 46 insect 129 social experience, influences of birds 79 leopard gecko 75-76 mice 77, **78** sociobiology xiii, xiv, 122-123, 129 Sociobiology (Wilson) xii, 40 solvable and intractable problems xii, xvii, xx song; see also bird song crickets xvi cross-species attraction to 129 maternal calls 87-88 song systems 168-170, 169, 172, 176 Spandrels of San Marco (architectural metaphor) xiv spatial information storage 41-42, 153-154, 187-188; see also hippocampal hypothesis; neurobiology species recognition 141-142 species-specificity xv, 5, 19-20 species-typical behaviors 56 spiders (Portia fimbriata) 42-43 spotted hyena 67 squirrels 16 stem cell therapy 157 sticklebacks 8, 14, 152, xv-xvi strange situation test 102 stress, animal 44, 67-68; see also applied ethology strong functions 109 The Study of Instinct (Tinbergen) ix, xx, 82, 109-111 subjectivism 4, 36, 40, 43 survival value 7-13, 39-40; see also function blackbird's bill 10 and causation 9 current utility 109-111, 112-113, 116.117 differential survival, Biston betularia 14 experimental work 7-8 and function 28, 107, 109, 113 Huxley on xxii, 2, 54, 108, 147 "insignificant" behavior 12

misfiring behavior 12 of ontogeny 17 rocking of cryptic animals 11-12 similarity/difference comparisons 12-13 of species-specific behavior 19-20 and teleology 8 synapse density 180 syntactic chains syntax 100 synthesis, deep 164; see also integration synthetic approach 166 systematics, phylogenetic 130; see also evolution teleology 4-5, 28, 36, 40 and function 111, 166 and survival value 8 temperature dependent sexual determination, leopard gecko, 58-59, 59, 80 cytochrome oxidase (COX) activity 62-64, **66** development of individual differences 59-61 unitary neuroanatomical framework 61-64 templates, behavior 105-106 terminology see also definitions Instinkt-Dressur-Verschräkung 16 niveau-adäquate 6, 38 testosterone 66, 67, 79-80 The Question of Animal Awareness (Griffin) xix theory of mind 41 three major problems of biology xxii, 2, 25, 54, 108, 147; see also four questions Tinbergen; see also "On aims and methods of ethology' conception of function 107-109, 165-166 first meeting with Lorenz xxi influence of Lorenz 108 methodology 114-115, 115; see also observational studies Tinbergen's approach to function Tinbergen's Legacy credits, xxii-xxiii structure of text xxii treefrogs 149 TSD see temperature dependent sexual determination túngara frog (Physalaemus pustulosus spp.), sexual communication 131, 140-141 behavior 142-144

978-0-521-69755-2 - Tinbergen's Legacy: Function and Mechanism in Behavioral Biology Edited by Johan J. Bolhuis and Simon Verhulst Index

More information

238 Index

túngara frog (cont.) calling behavior 131–133 evolution 136–140, **137** historical contingency 143–144 sensory exploitation hypothesis 139–140, **140**, 141 trait/preference evolution 138–139, 146 neurobiology of mate preference 133–136, **135** species recognition 141–142 two-process model of sleep 49–50

ultimate causation 29–30, 31, 173; *see also* evolution; function; survival value ultimate-proximate dichotomy 80,

109, 113 ultraviolet vision in birds 110–111 unitary neuroanatomical framework 61-64, **65-66**; *see also* neurobiology/neurecology urine, odor cues 152 vision bees 119-120 birds 110-111 weak/strong functions 109 welfare, animal 44-46, xix-xx; *see also* applied ecology "what for" questions 163, 165 within-event learning 88

zebra finch studies 89–91 Zeitschrift (journal) xi zoophysiology 166