

Index

Page numbers in italics refer to figures and illustrations.

```
Abegglen H, 201
                                                 affectional bond, 304, 305, 307
abortion refusal, 337
                                                 affectionate care, 345
access, competition for, 278
                                                 affectionless psychopathy, 343, 344
                                                 affective disorders, 345
acridid grasshopper, 94, 95, 109
ACTH
                                                 African buffalo, 238
  analogue ORG 2766, 174
                                                 African monkeys, travel lengths, 266
  attention effects, 186
                                                 aggression
  behavioural effects, 172
                                                   and attachment, 434-5
  corticosteroid response to administration,
                                                   augmenting factors, 420
                                                   brain hormonal influences, 441
                                                    control, 420
  functional grouping of effects, 172
  LH release, 173
                                                    development of intergroup, 441
  site of action, 174
                                                    expressions, 442
  systemic administration effects, 173
                                                    frustrated desires, 439
  taste aversion effect, 173-4
                                                    frustration, 444
  testosterone response to administration,
                                                    gender difference, 354
     173
                                                    institutional restraint, 438
action patterns, 85
                                                    intercommunity, 430
action properties, relational invariants, 85
                                                    intergroup, 437
                                                    learning, 439-40
acts as basic units, 86
acute distress reactions, 342
                                                    non-human primate studies, 423-6
adaptation
                                                    observational learning, 442
  observational learning in primates, 442
                                                    patterns in chimpanzees, 427-8
   sources, 20
                                                    predisposing factors, 420
adaptiveness of traits, 353
                                                    primate studies, 420
adoption
                                                    redirection to vulnerable groups, 437
  family influences, 349
                                                    reduction, 420
   of infants, 210-11
                                                    regulation, 437
   IQ of children, 349
                                                    reproductive function, 431
  late, 359
                                                    towards strangers, 437
   social class of parents, 334, 335
                                                    see also human aggression
adrenocorticotrophic hormone see ACTH
                                                  aggressive behaviour
adult behaviour, manipulations in early life,
                                                    of chimpanzees, 428, 429
                                                    development, 420
adversary, dehumanisation of, 436
                                                    development in individual life span,
adversity exposure, sex differences, 354
                                                      439-45
```



aggresive behaviour (cont.)	sexual behaviour organisation, 162
evolution, 424	sexual interaction, 152
human capacity for, 431	Animal Behaviour, 121, 303
human history, 435	Animal Behaviour – a Synthesis of Ethology
non-human primates, 434	and Comparative Psychology, 463
protective function, 434	anthropomorphism, 13
species comparison, 424	antisocial behaviour, 335, 342
see also human aggression	antler size, 236
agriculture development, 435	anubis baboon, 274, 284
Ainsworth M D S	Aplysia networks, 107
attachment behaviour system, 319, 320, 321	Appelbaum, M I, 391
individual differences, 356	longitudinal method in developmental
mother-infant reactions, 323-4	science, 399
patterns of attachment, 308	approval, gestures of, 286
relationship quality, 341	Archer J, 177
reunion behaviour, 323	aromatase, 155, 156
Strange Situation model, 317–18, 395	activity increase by oestradiol, 161
alarm, 27	activity with injected steroids, 159–60
behaviour, 320	activity and testosterone effects, 161-2
call, 318	behavioural stimuli, 161–2
Alexander R D, 295	induction effect in adult quail, 164–5
Allee W C, 260	seasonal factors affecting, 161
Allen T F H	visual stimuli, 161
hierarchical organisation, 267	arousal, 141
levels of analysis in ecology, 258	Asquith P J
Alouatta seniculus, 201	primate social behaviour, 261
alternative descriptive frameworks of	species-wide social systems, 266
behaviour, 92	assessment mechanisms, 41
Altman M, 213	associative learning, 20
Altman J S, 107	Attachment, 303, 332
altruism, 284–5	attachment
American Psychiatric Association, 344	and aggression, 434-5
analysis of stimulus, 28	anxious avoidant, 308, 309
Analysis of Variance, 23	anxious resistant, 308, 309
Analysis-Recognition-Execution model,	between individuals, 433
27–8	bond, 306
Andrew R J, 6	components of relationships, 359
chick memory formation, 184	concepts in clinical situation, 360-1
communication analysis, 89	disorders, 360
delay of extinction by testosterone, 176-7	and emotional security, 257
distraction tests, 177	human, 9
hormone effects on brain, 224-5	infant and parental contributions, 358
androgens	insecurity, 360
action on brain, 153, 154, 156	insecurity in physically abused toddlers,
balance in brain cells, 167	346
behavioural influence, 153	and maternal deprivation, 356-61
behavioural masculinisation, 162-3	non-human primates, 434
behavioural responsiveness to, 153	psychopathology, 360
behavioural role, 155	qualities, 345, 357
brain metabolism, 157	quality and later peer relationships, 358
effect on search, 183	secure, 308, 309
effort into overcoming obstacles, 171-2	and social relationships, 357
environmental effects, 152	in survival and reproductive success, 448
latency in chicks, 175	attachment behaviour, 304, 305-7, 317
oestrogen formation, 155	adult, 307
secretion and behavioural cues, 152	anxious, 307



1	
changes in objects, 322	tit for tat model of reciprocal altruism,
evolution, 432–3	284
goal directed, 320	P. 1. G. 250
harm risks, 306	Bachmann, C, 278
outcome, 320	Baerends G P, 317
protection of attached individual, 306	Bandura A, 442
range of objects, 321	Barlow G W
reunion, 323–4	fixed action pattern, 85
social influences, 323–4	patterns of behaviour, 22
attachment behaviour system, 317, 319–24	barn owl
context of stimuli, 319	coding of sensory space, 105
development, 321–2	mobbing, 25
early appearance, 321	spatial information processing, 109
function, 320	Bateson P, 4–5
attachment patterns, 308-11 and fear of strangers, 324-5	aggressive behaviour, 431
persistence, 309, 310	chick social behaviour, 28–9 imprinting studies, 23, 27, 72, 223, 480
stability, 310–11	individual difference attribution, 23
attachment relationships, 341	Baumrind D, 414
development between mother and child,	Beach F, 225
380	sexual behaviour studies, 316
emotional intensity, 306	Beck B B, 202
importance of early years, 349	behaviour
quality, 345, 357, 358	dichotomy, 20–1
attachment theory, 304-8, 315, 411, 412	evolution and proximate and ultimate
limitations, 361	factors, 65
separation of mother from child, 380	mechanisms, 11
attack behaviour, 427–8	pattern function, 35
attention	study, 3–4
ACTH effects, 186	systems, 317, 390
effects of pituitary peptide hormones,	behavioural analysis and neural analysis,
186	5
effects of testosterone, 186	behavioural coherence, 80-1
hormonal effects, 172	behavioural constructs, reified, 83
oestrogenic effect, 177, 182-3	behavioural development, 13
attentional fields, higher order, 109	continuities and discontinuities, 73
attentional mechanisms, testosterone effects,	and control, 14
175, 180–1, 182	dichotomy, 43
auditory experience	environmental influence, 42
hypothesis, 55	flexibility, 81
unhatched and young birds, 55	general principles, 34–5
auditory feedback, 45	genetic factors, 42–3
absence and species song differences, 52	genomic-environmental interactions, 43
song development, 54	individual, 389–90
auditory mechanisms in birdsong	individual and environment, 22
development, 54	inherited contribution, 42
auditory neuron, 94, 95, 109	predictive value, 390
auditory stimulation, song ontogeny effects,	behavioural differences, 21, 23
49	behavioural disinhibition, 90
Australopithecus, 427	behavioural ecology, 12
autism, childhood, 360, 464	behavioural evolution, 41
autocatalysis, 107, 108, 109	behavioural fields, higher order, 105
avian brain enzyme systems, 167	behavioural form, 88
avian vocal behaviour, 42	behavioural habituation, 318
awareness, 13 Axelrod R, 274	behavioural habituation, 318 behavioural inhibition in children, 316
Androu II, 2/7	ochavioural illifornion ill clindren, 510



behavioural operations, anatomical region connections, 102, 104	evolution of attachment behaviour, 433 function of fear and attachment systems,
behavioural outcome, 24–5, 26	320
behavioural process, nature of, 36	infant real-life experiences, 347
behavioural research, analytic and synthetic,	institutionalised children, 340
88	internal working models, 379, 415
behavioural science, problem-oriented, 411	Maternal Care and Mental Health, 331
behavioural sequence, linear dimension, 94	maternal deprivation concepts, 332, 345,
behavioural stream, 91	346
behavioural units, 83–4	mother-child relationship studies, 316,
behavioural variation, 20	411
Bell R Q, 336, 391	separation effects, 339
Belsky J	work with Hinde, 303
attachment concepts, 360	Bradley P, 127, 129
group day care, 360	brain
maternal employment consequences, 380	changes in imprinting, 27
bereavement, effects on children, 382	developing, 109
Berridge K C	domestic chick, 126
kainic acid lesions of corpus striatum, 96	enzymes and development, 164-6
rat trigeminal deafferentation study, 95	function analysis, 88
rodent grooming, 92–3	hemispheres in memory formation, 184–5
Bewick's wren, 48	hormonal influences, 441
bi-directional perspective, 5	male and hormone effects, 151
bifurcation theory, 82	maturational state, 163
biological psychiatry, 338	metabolism of androgen, 155
birds	modularity of selective operations, 102
early experience, 9	protective mechanism to prevent
migratory, 266	differentiation by steroids, 165
song-learning, 5	protein changes in imprinting, 124, 125
birdsong see song	RNA changes in imprinting, 124, 125
birth	sensitivity to steroid sex hormones,
multiple, 213–14	166
postural changes of mother, 195	sites of hormone action, 163
primate assistance, 205	steroid amplification system, 161
single, 213	brain-behaviour relations, 97
Bleichfeld B, 206	Brandt E M, 206
human response to infant's cry, 211	breeding season, 238
blindsight, 105	breeding success
blue monkeys, territoriality, 265–6	age differences, 235
body	female rank, 243
condition in male primate behaviour, 7	primate multi-male troops, 233
fat of juveniles, 236	red deer, 232–3
weight, 239	selection, 234
Bogomolova E M, 195	Bretherton I
Bolhuis J J	internal working models, 415
preference test studies, 135	mother-infant communication, 310
strength of preference in chicks, 141	Brodie B, 436
Bond A B, 274	Brookhart J M, 103
bond formation, 303	brown-headed cow bird, 60-1
Bowden D, 201	conspecific song classification, 62
Bowlby J, 8	Bull J J, 26
affectionless psychopathy, 343	Burrows M, 100
Attachment, 332	Burundi, 450
attachment behaviour system, 319, 321	bushbaby behaviour changes during
attachment relationship quality, 345	pregnancy, 205-6
attachment theory, 411	Bushnell M C. 95



Index

business meetings, 288 Chernobyl, 422 Buss D M, 354 chick see domestic chick child Cairns R B, 391 effects, 391 calcium influx to cell in memory, 132 qualities and effects on environment, 399 child development, 12, 315 Calithrix jacchus, 207 Callimico goeldii, 200 environment, 9 canary in environment, 393-9 brood patch, 154 group differences, 404 hormones, behaviour, somatic individual studies, 10, 404-6 longitudinal methods of study, 399 development and environmental stimuli lost children in group studies, 404 relationship, 150 nest-building behaviour, 84 mutual influences, 9, 10, 403 song control system, 166 organisation of behaviour, 404 canid group size, 263 social behaviour levels, 10 canine size, 236, 237 study methods, 9 caregiver, threats to bond, 434 child-rearing caregiving, 306 analogue studies, 394 outside family, 359 environment conceptualisation, 397-9 stability, 309 children Carpenter C R, 260 abused, 344 case studies, disciplined, 405 acute distress reactions, 342 and group findings, 405-6 adverse patterns of rearing, 353 affectional bond for mother-figure, 304 affectionate care, 345 prestriate cortex, 105 transmission gating during mastication, 95 attachment behaviour system, 317 categories of behaviour, 20 as attachment figure, 310 causal arrow approach to development, 23 attachment relationships, 341 causal nexus, 151 attachment theory, 315 causes and effects of behaviour, 89 autistic, 360, 464 Center for Advanced Study in the behaviour prediction, 414 Behavioural Sciences, 424 behavioural research, 391-2 behaviourally disordered, 336-7 central-peripheral bereavement effects, 382 control dichotomy, 93-6 characteristics and maternal caregiving, dynamics, 108 centre-surround conceptualisation in 395 cognitive development, 334 neurobehavioural control systems, 108 conduct disturbance, 335 Cercopithecus mitis, 265-6 in context of family relationships, 384-5 cerebellar timing mechanisms, 86 continuity in personalities and chacma baboon, 201 Chadwick-Jones J K, 284 relationships, 380 chaffinch continuous personal parenting, 349 of depressed mothers, 401 alarm behaviour, 320 depression in, 382 copulatory attempts, 152 disrupted mother-figure relationships, deaf, 53 mobbing behaviour, 25, 31, 318 302 - 3studies, 72-3 divorce effects, 339-40, 382 dyadic relationships, 391 Chambers K C, 176 emerging sensitivity to emotions, 401-2 change-stability, relative, 82 exposure to negative features of chaos, 24, 26 Chapais B, 280 environment, 353 family responsibilities, 356 Chapin J K, 94 family-fostered, 336, 340 character development, 26 Charles-Dominique P, 262 fear behaviour system, 36, 317-19 firstborn and birth of sibling, 379-80, Cheney D L, 441 381-2Cheng M, 225



children (sout)	recognish most hade 106.7
children (cont.)	research methods, 426–7
gender difference and psychosocial stress,	rules in society, 427
354	society structure, 427
genetic risk groups, 335, 336, 353	ties of kinship and friendship, 428
group day care, 331, 332, 359–60, 380, 381	violence, 430
home environment effects, 348-9	Chism J, 213
hospital admission, 337, 342, 347-8	circuit properties
hyperactivity, 336	dynamic, 102
institution-reared, 33, 335–6, 340, 343	modulatory substances, 101
	classical conditioning, 6
interpersonal perception, 414	
late-adopted, 359	classification of behaviour, 20
latency to approach, 319	Clethrionomys britannicus, 90
linkages across developmental transitions,	Clifton P G, 179
350	close tracking study methods, 400
long term effects of deprivation, 350	Clutton-Brock T H, 7
maturity, 316	Colobus monkey studies, 295
mentally-ill parents, 335, 353	feeding patterns of polygamous males, 239
moral understanding, 384	juvenile mortality, 240
mutual influence with environment, 402	offspring sex ratio, 245
mutual interacting influences in	offspring survival, 232
behaviour, 392	polygyny studies, 231
observation within own world, 385	red deer fitness costs, 242
over-indulgence in, 310	redtail monkey studies, 229
parental behaviour effects, 337, 339–40	cognition studies, 13
parental loss, 331	cognitive development, 343
patterns of interaction with mother, 307–8	maternal deprivation, 334
peer relationships, 348, 359	cognitive impairment, deprivation
psychiatric risk, 340	experiences, 343
recovery from depriving experiences, 346	cognitive processing, 102
relationships, 315–16, 375	in infants, 346–7
reunion behaviour, 323	collaborative research, 406
scholastic attainment, 337-8	Colobus monkey studies, 295
separation experiences, 303, 342	commitment, 289
social understanding development, 346,	expression, 283
383–6	human applications, 283-5, 286
stressful events, 382	in partnerships, 287–8
systematic study of individual, 404	and social grooming, 281
temperament theory, 315	to partners, 275–6
temperamental patterns, 352	common ancestor, 426
vulnerability to stress separation, 381	common marmoset, 207
working model of mother-figure, 307	communication
chimpanzees, 202, 426–31	analysis, 89
aggression patterns, 427–8	mother-infant, 309-10
aggressive behaviour, 428, 429	non-primate, 271
attacks, 429	primate, 261
between-community interaction, 428	rules of, 259
commitment, 276	skills development, 382
community boundary patrolling, 429, 430	companions, 277
display, 288	competition tests, 179-82
grooming, 279–80	latency of action of testosterone, 181
group changes, 441	competitive exclusion rule, 35
Hinde working with, 467–70	complacency, 445, 446
intercommunity encounters, 429	complex activity organisation, 97
intergroup violence, 441	complex functions, 102
male ranges, 429	complex networks, 111, 113
ranging patterns, 428	comradeship, 289
inneme pations, 740	community, 207



Index

pituitary peptide hormone effects, 174 deaf birds, 52, 53 conceptual problems, 84 conciliation, 279 conditioning, 6 song variability, 53-4 conduct disorders, 342 decision making in groups, 264-5 conflict deer antler size, 236 human, 10 resolution, 447 testis size, 237 conspecific song classification, 62 dehumanisation of adversary, 10, 436 5α-dehydroxytestosterone see 5α-DHT Constantine-Paton M, 109 constraints on developmental processes, 41 delinquency, 335, 337 contact comfort studies, 412 social withdrawal as protection against, continuity-discontinuity, relative, 82 continuous tracking studies, 401 delinquency, parent-child relationship, 343 control dendrites, synapses, 127, 129 polymorphic networks, 99 depressed mothers, studies of children, processes, 86 400 - 1system classification, 98-9 depression cooperation, 284-5 institutionalised children, 390 cooperative tasks, 290 long-term risks, 339 coping, adaptive changes, 355-6 mothers' attitude to daughters, 354 Cords M, 265-6 descriptive order levels, 93 destructive power of technology, 436 corn bunting, 64 corn and sand separation, 20 development, measurement, 392 corpus striatum development stages, sensitive periods, 23 function, 96 developmental differences, causes, 42 kainic acid lesions, 95 developmental processes, 24-6 corticosteroids, 173 constraints, 41 cortisol levels in humans and maternal prospective case studies, 407 behaviour, 208 developmental psychology, Hinde's work, countersinging, 60 375 courtship DeVore I, 425 aggressive, 156 5α-DHT, 176, 177 behaviour of ring dove, 155, 156 search effects, 183 behavioural analysis, 6 diethylstilboestrol, 156 display, 283 difference sources, 20, 21 crystallisation process, environmental differences in behaviour, mechanisms of, 230 5α-dihydrotestosterone, 156 shaping, 59-61 crystallised birdsong, 46-7 display, 288 cultural change, 450 distractibility, reduction by testosterone, 186 culturally transmitted behaviour, 20, 44 distraction tests, 177-9 bias by heritable predisposition, 41 distress response, 354 genetic mechanisms, 43 distributed circuit properties, 97-8 cutaneous sensory transmission, 94 diversity, 77 cycle of interaction, 316 divorce effects on children, 382 Daniels D N, 443 psychiatric risks to children, 339 Darwinian evolution, 20 domestic chick data, collection of standardised, 229 acquired preference, 139 Dawkins R, 35 De Vries M W, 353 active behaviour, 28-9 androgenic effect on extinction, 176 de Waal F B M artificial object preference, 139 conciliation, 279 attention to environment, 172 grooming consequences, 279 box-trained, 133, 135-7, 139 similarity principle, 279 brain, 126 de Wied D brain function asymmetry, 6 hormonal effects on behaviour, 172 competition test, 179-82



Index

domestic chick (cont.) Edelman G M, 101 conspecific stimuli, 138, 139 group confinement, 100 education, 445 distraction tests, 177 DSP-4 treated, 133 Eibl-Eibesfeldt I, 443 Elder G H, 356 emerging preference for jungle fowl, 141 element chains, 91-2 equations for withdrawal and approach to elephant seals, 233, 234 novel object, 30 fowl-trained, 133, 135-7, 138, 139 Emery R E, 340 habituation studies, 122 emotion and affectional bonds, 306 IMHV-lesioned, 125-6, 133, 134 pleasurable on reunion, 435 imprinting, 5-6, 123 imprinting studies, 23-4, 27 reactivity and maternal deprivation information storage and processing, 6 effects, 333 emotional development of children, 392 neural systems in response to fowl, 140 emotional problems, 302 NMDA levels in trained chicks, 130 emotional security and attachment, 257 plasma testosterone concentration, 134, 135 emotionality, developmental shift, 321 predisposition control, 139-40 preference modification, 139-40 en face behaviour, 204 preference tests, 135-9 enabling signals, 59 energetic requirements of polygynous males, recognition system, 140 239 running-wheel tests, 138-9 searching tests, 182-3 environment sensitive period for predisposition, 139 and behaviour, 392 change of human with industrialisation, sequential preference test, 135 simultaneous choice test, 135, 139-40 424 child development in, 393-9 social behaviour control, 29 combinations of experiences, 397 stimulus analyser, 28 complex and dynamic characteristics, 394 taste aversion extinction, 175 testosterone effects on attention, 172 conceptualisation of child-rearing, 397-9 training procedures and objects, 124 crystallisation process, 59-61 dominance, 437 and developing animal, 5 hierarchy, 256 and developing individual, 23 Doyle GA, 205 and development, 414 drive concept, 303 in developmental research, 406 DSP-4, sequential preference test effects, 133 effects of child qualities, 399 Dunbar R I M, 201 experimental studies, 394 collaborative behaviour, 283 human adaptation to changing world, 435 Gelada baboons, 278 indirect measurement, 394 in individual development, 390 social grooming, 272, 273 Dunn J, 10 infant research sampling methods, 395-9 continuity in personalities and interdependence with person, 391 relationships of children, 380 macrostructural characteristics, 394 developing relationships between young manipulation, 4 siblings, 383-4 measuring, 393-5 family interaction, 346 mothers' reports, 394 family relationships, 381 mutual influence with child, 402 rate of change of human, 449 interpersonal perception in children, 414 mother-infant relationship studies, 379-80 sampling choices, 395 mutual influences, 414-15 shaping of own, 353 social complexity levels, 296-7 single dimension of adult behaviour, 294 stressful events for children, 382 situational variation, 396 dynamic network analyses, 98-101 dynamic pattern formation, 82 speed of change of human, 437 theoretically justified sampling, 395 dynamic theory models of behaviour environment-child interaction, 398 organisation, 108 environment-free studies, 395 dynamics of behaviour, 229



environmental effect	fantasy, 347
on androgens, 152	father-infant relationship, 358
on behaviour development, 42	fear, 434
hypothesis of maternal deprivation, 338–8	index, 318
environmental stimuli	irrational, 320
hormone sensitivity, 153	response tuning, 321
hormone-sensitive brain mechanism	of strangers, 317–18
effects, 151	of strangers and attachment patterns,
enzyme systems, 155	324–5
Ermisch A, 172	fear behaviour, 316–17
Erythrocebus patas, 199–200	changes in objects, 322
escape system, 317	goal directed, 320
Estes, W K, 411	individual differences, 324
ethnocentrism, 445, 446, 448	insecure children, 324-5
Ethology, 377	outcome, 320
ethology	range of objects, 321
Hinde's influence, 377	social influences, 322–3
neuroscience links, 78	fear behaviour system, 317, 319–24
prejudice against psychology, 411	activation, 325–6
in study of human behaviour, 421	context of stimuli, 319
evolution	development, 321–2
assessment mechanism impact, 41	function, 320
of behaviour, 230	fecundity, 231
in behavioural studies, 425	Feldmann S S, 206
consequences, 81	Fentress J, 5
Darwinian, 20	brain-behaviour relations, 223
shifting balance process, 242	corpus striatum function, 96
exaggeration of prowess, 274	handling of observations, 77
execution of behaviour, 28	interrelationships between concept, 413
experiences	work with voles and wolves, 223
cognitive processing, 346–7	α-fetoprotein, 165
and opportunities, 351	fieldwork, quantitative techniques, 230
past behaviour and experiences, 351-2	filial behaviour, 28
explanations of behaviour, 35	filial imprinting, 27, 35, 123
exposure learning, 141–2	fixed action patterns, 85–7
	fixed patterns in insect neuroethology, 85
face neurones, 140	flashing rotating box stimulus, 27
face-detecting system, 141	Flathead Indians of Montana, 206
families with out-of-control children study, 403	Fleming A S, 206, 207
family	hormone levels in human pregnancy,
acutely stressed, 403	208
adversities and multiple risk factor	flexibility in behavioural development, 81
clusters, 342	following behaviour, 142
disturbance, 336–7	football hooligans, 289
environment, 397, 399	foraging skills, 281
history building, 403–4	fractal theory, 82
interaction at home, 346–7	Freud, S, 301, 302
multi-child, 403-4	friendship, 285
observation in diversity of situations, 398	Fringilla coelebs see chaffinch
system analysis in aggressive families, 403	frustration
systems research, 394	coping strategies, 444
family relationships	recurrent major, 443-4
children in context of, 384-5	full-face threat, 442
disturbed, 342	function of behaviour, 230
key subtractions, 351	functional approach to behaviour, 11
quality 339	fur seals, milk untake of puns, 238



GABA receptor complex, 175	gratitude, 286
GABA-mediated inhibitory postsynaptic	groomee, 272–3
currents, 175	chimpanzees, 280
Galago senegalensis moholi, 198	potential value, 280–1
Galdikas B M F, 202	grooming
Gallus gallus domesticus, 122	alternative perspectives, 89
Gaston E E, 176	behaviour, 8
gaze aversion, 320	causal relations, 90
Gelada baboon, 7, 201	stimulus presentation effects, 90
fighting, 278	talk, 282
harem groups, 282-3	Grossmann K
mutual sexual activity, 282–3	insecure children, 325
gender difference	maternal sensitivity, 323–4
in parental response, 354–5	patterns of attachment, 308
and psychosocial stress, 354	group day care, 331, 332
gene expression, 21, 22	consequences for babies, 380, 381
generalisations of animal groups, 256	maternal deprivation, 359–60
genetic behaviour, 20	quality, 381
genetic factors, 4	group interaction, 258, 259
in behaviour development, 42–3	territoriality, 265–6
genetic mechanisms in culturally transmitted	group membership, 431–3
behaviour, 43	cooperation within, 433
genetic structure of populations, 241–2	personal worth, 433
Georgopoulos A P, 99	groupings of animals, 256
Getting P A, 102, 103	groups, 262–5
gibbon, 201–2	advantages, 263
gifts, 285	behaviour, 261, 297
Gillman J, 201	confinement, 100
L-glutamate, 128, 130	decision making, 264–5
binding to NMDA receptors, 131	differentiation, 460
receptor subtypes, 130	eating time, 263
L-[³ H]glutamate binding in IMHV, 128, 130	emergent properties, 258
goat, postpartum behaviour, 214	in-group favouritism, 448
Goertzel V, 389 Goldschmidt W, 433	interaction with environment, 264 leaders, 264–5
Goldsmith H H	
	movement between by non-human
child development, 315, 316 temperament, 316	primates, 440–1 multimale, 263
Gombe Stream Reserve (Tanzania), 426	
Hinde at, 467–70	resource use, 263 social behaviour, 261–2
Gomendio M, 238	sociality, 267
Goodall, J, xii, 202	species-typical size, 263
aggression in chimpanzees, 427	structure, 256
chimpanzee studies, 426	traditions, 264
Clutton-Brock as student, 295	watching time, 263
Hinde's work with, 467, 472	Growing Points in Ethology, 11
intergroup violence in chimpanzees, 441	gulls, pecking at parents' bill by young, 20, 22
observational learning, 442	Guze S B, 338
PhD thesis, 468–9	Guze 3 b, 330
rules of chimpanzee society, 427	habituation 30
Goren C C, 142	habituation, 30
Gorilla gorilla, 202–3	neuronal mechanisms, 122
gorilla, social isolation, 209	to stimuli, 27 Hamadryas baboon, 201
Goswell M J, 205	decision making, 265
patas monkey parturition, 199–200	fighting desired object, 278
Graham-Jones O, 202	social organisation, 256–7
,	



Index

Hamburg DA, 10-11 criticisms, 20 animal studies and human aggression, 421 development and control of behaviour, 22 human aggression studies, 459 development psychology work, 375 new vision of humanity, 446 diversity, 77 nuclear explosions, 42 drive concept, 303 temper tantrums, 439 ethology, 113 work with Hinde, 459 ethology and other social sciences, 377 Hamilton W D, 277 factors affecting behaviour and Handbook of Personal Relationships, 378 behavioural outcome, 24-5 Harcourt A H, 272, 273 factors in war, 460 Hardy, Sir A, 463, 471 following behaviour, 142 Harlow H F function of behaviour pattern, 35 contact comfort studies, 412 function and evolution of behaviour, 230 maternal deprivation studies, 333-4 gender difference in parental response, 355 Harris T, 339 genetic component in behaviour development, 42-3 Hartup W W, 382 herring gull, incubating, 317 goal directed behaviour, 320 heterogametic sex, 163 hard data, 77 heterotypic continuity, 321 hierarchy of lower levels, 267 hierarchical organisation, 267 higher order studies, 82 hierarchy of behavioural actions, 91-2 hormone and behaviour relationships, 149 higher order hormone effects on systems of response, coherence in social behaviour, 84 171 human aggressiveness, 419-22 networks, 102, 105 Hinde, Robert, xi, 11, 14, 474 human nature, 315 adaptiveness of traits, 353 human social interaction, 92 in Africa, 467-70, 472 imprinting studies, 122 alternative descriptive frameworks, 92 infant-mother relationships, 304 Animal Behaviour, 121 innate and learned components of approach to behavioural development, 19 behaviour, 43 attachment concepts, 357 integration of approaches, 377-8 avian life cycles, 149 integration of research on different groups behaviour development continuities and of animals, 229 discontinuities, 73 interactions, 315 behaviour systems, 317 internal working models, 379, 415 behavioural evolution, 41 interrelated relationships, 390-1 behavioural habituation, 318 learning studies, 121-2 behavioural organisation, 83 levels of analysis of relationships, 375-6 maternal behaviour in primates, 191-2 canary brood patch, 154 canary nest-building behaviour, 83-4 maternal deprivation studies, 331, 333, career, 475-7 346, 411 categories of behaviour, 20 mediating processes in animal behaviour, causal nexus, 151 chaffinch copulatory attempts, 152 model of infragroup structure, 258-9, 262 child development, 316 mother-infant relationship, 431 childhood autism, 464 mutual influences of relationships, 402 comments on innate releasing mechanism, nature of relationships, 143 88 nest-building behaviour, 224 commitment, 284 neuroethology, 83 nexus of causal relations, 98 communication analysis, 89 non-human primate development of concentration on aspects of behaviour, 229 behaviour, 42 concept of roles, 260 non-human primates in human behaviour consequences of demands, 34-6 research, 425 continuity and discontinuity of ontogeny of behaviour studies, 42 development, 350 organisation levels of behaviour, 80



Hinde, Robert (cont.)	human behaviour, 8-10
patterns of behaviour, 22	as adaptation, 421
proximate and ultimate factors in	ethology in study, 421
behaviour evolution, 65	hostility to strangers, 431
psychosocial influences, 338	patterns, 436–7
quality of mother-infant relationship in	problems of war and peace, 423
separation studies, 381	sex differences, 295
records of ongoing behaviour, 89–90	human conflict, 10, 446, 449
'Relations among relationships', 378	factors, 437
relationships, 359	study, 447
relationships and development, 378	human development
rhesus monkey mother-infant studies,	close tracking study methods, 400
379, 380	multideterminism, 390
separation experiences of rhesus monkeys,	human error, 422
339	human institutions, 267
shyness studies, 322	human maternal behaviour
simplifying models, 79 social behaviour levels of analysis, 258	adoptive mothers, 215 Caesarian section, 210
social organisation, 257	cortisol levels, 208
social relationships, 361	hormone levels, 208
social structure of humans, 295–6	postpartum physical contact, 214
sources of difference, 20, 21	response to infant's cry, 211
theoretical models, 378	response to infants during parturition,
value of relationships, 271	214–15
work with Bowlby, 302-3	human social behaviour, 82
work with Tinbergen, 463-4, 471	human social interaction, 92
Hodges J, 344	human society
children in residential nursery care, 349	attachment and aggression patterns, 436
Homans G C, 286	biobehavioural patterns, 436
home environment, 348–9	interdependence, 439
hormones	mass, 439
and behaviour relationships, 149	human violence, 437
behavioural action, 152-4	contemporary, 422-3
effects on specific systems of response, 171	human warfare, analogy to chimpanzee
environmental effects on metabolic	attacks, 430
formation, 159	humans
gene expression regulation, 155	adult behaviour, 8
infuence on peripheral sensory systems, 154	ancestors, 423
Horn G, 5–6	attachment and temperament, 9
habituation studies, 223–4 imprinting studies, 223	birth, 203–5 cognitive processing, 102
neurones and learning, 132	
hospital admission, 337, 342, 347–8	commitment, 283-5 commitment in partnership, 287-8
repeated, 348	complicated society, 260
hostility to strangers, 431	cooperation, 288–9, 433
Howes C, 381	copulation frequency, 282
howler monkey, 200–1	emotional life, 301
Hoyle G, 85	exchange of skills, 287–8
Huber F, 85	happiness, 301
human aggression, 10	modification of dangerous behaviour, 10
areas of study, 447	parental discrimination, 238, 241
conflict resolution, 447	partnerships, 286–9
crucial world problems, 446	projections to from animals, 13-14
Hinde's contribution, 419-22	relationship to African apes, 424
precursors, 427	relationships, 286-9
problems in study, 421	response to faces by newborn, 142



Index

risk, 288-9 in-group/out-group distinctions, 436, 437, rivalry, 288-9 445, 448 service exchange, 286-7 inbreeding, 242 speed of change in society, 435 incisor arcade breadth, 239 subjective insights into behaviour, 11 incubation system, 317 individual behaviour, continuous tracking, technical development, 423 hunter-gatherers, 431-2 individual characteristics and relationships, bands, 432 own and other groups, 436 415 hunting trips, 288 individual difference, 73 Hutchison J B, 6 attribution, 23 androgen levels and sexual interaction, in behaviour, 42 studies, 414 individual interactions, 8 courtship of male doves, 224, 225 degree of behavioural response to individual survival and reproduction, 433 individual-based investigation, 405, 406 hormone, 153 endocrine-behaviour relations of birds, individuality, 255-6 224 individuals attachment between, 433 hyenas, social behaviour, 261 Hylobates lar, 201-2 relationships between, 258 hyperactivity, 336 industrial revolution, 424 hyperstriatum ventrale, intermediate and speed of change, 435 infancy as sensitive period, 345-9 medial part see IMHV infantile experiences, 346 Ibscher, Von L, 201 IMHV, 125, 126 infants adult conflict sensitivity, 346 ablation, 140 cognitive processing, 346-7 in learning process, 139 contribution to attachment, 358 NMDA binding, 130-1 discrepant relationships, 359 receptor binding and training, 131 fear, 434 synaptic transmission, 131 hunter-gatherers, 432 training effects, 128-9 odour, 204 imitation of behaviour, 439-40 persistence of effects of experiences, 350-2 imprinting, 4, 71-2, 141, 412 reality effects, 347 relationships, 347 analysis, recognition and execution, 27, 28 research methods, 395 brain changes, 27 visual cliff experiences, 346 brain lesion effects, 133 information storage and processing, 6 critical period, 412-13 infragroup structure models, 256-61 domestic chicks, 5-6, 123 Hinde's model, 258-9 experiments, 23-4, 122 Kummer's model, 256-7 filial, 6, 35, 123 Strum and Latour's model, 259-61 and human bonding, 303 inheritance in behaviour development, 42 humans, 8 IMHV role, 126 cultural transmission of behaviour bias, 41 IMHV synapses, 127-32 innate releasing mechanism, 88 innateness, 21, 22 model of, 26-34 plastic change, 31 insects protein and RNA changes in brain, 124, fixed patterns, 85 125 locomotion, 85 sensitive period simulation, 32-3 insecurity, 309, 310 sensitive periods, 35 insemination, multiple, 236 sexual, 35-6 instinct, 21, 22 storage process, 124-5 relationship with learning, 71 sub-processes, 21 Institute of Animal Behaviour (New Jersey). withdrawal and approach equations, 30



institutional care, 332	prior possession, 274
integrated performance networks, 106	tripartite social interaction, 261
integration and development organisation,	value of relationship, 271
112, 113	!Kung San, 436
integrative networks, 110, 111	
ontogeny, 111, 113	language
integrative specificity, 108	processing, 102, 104
interactions	use, 14
attachment in, 357–8	Lashley K S, 84
measures, 323	latency to approach, 319
mother-infant, 323	lateral inhibition, 109
intergroup encounters, 441	Latour B, 259
intergroup hostility, 435	leaders
internal working models, 379, 415	avoidance of war issues, 438
international affairs management, 421	errors of judgement, 438
international restraint, 438	Leakey L, 468
interpersonal perception in children, 414	learned behaviour, 20
interrupted ongoing behaviour, 89–90	learning
intragroup violence patterns, 435	biochemical changes, 124–5
IQ	constraints, 142
difficult temperament, 353	developmental process link, 132
late-adopted children, 348–9	genetic mechanisms, 43–4
socially disadvantaged children, 334 Itani J, 261	IMHV in process, 139
Haii 3, 201	inherited preferences, 443
Innua M.C. 204 5	neuroethological approach, 82
Janus M C, 284–5	and predisposition, 139
Japanese macaque, 20	processes, 73, 139
Japanese quail	relationship with instinct, 71
corticosterone levels, 173	studies, 121–2 and survival, 443
testosterone levels, 173	LeBoeuf B, 233
Johnson M H, 135, 136–7 Johnston T D, 55	Lee P C, 238
jungle fowl, 24	Lehrman D S
imprinting studies, 27	reproductive development, 225
imprinting stadies, 27	ring dove reproductive behaviour, 191
Kagan J	ring dove studies, 153
behavioural inhibition in children, 316	Lemur spp, 199
cognitive processing of experiences, 346	nest-building, 206
heterotypic continuity, 321	Lenski G, 423
knowledge of development, 390	contemporary society, 426
temperament, 316	intergroup hostility, 435
kainic acid lesions of corpus striatum, 95	lesser bushbaby, 198
Kawai M, 264	Lewin K, 391
kinship, 281–2	LH, 156
bonds of hunter-gatherers, 432	release caused by ACTH, 173
Kirkendall M, 205	licking
Klaus M H, 214	at parturition, 194-5, 197
Klopfer P H, 141	newborn, 214
Konishi M	life experiences, 345
barn owl studies, 109	age differences in response, 349
canary brood patch, 154	age-related variation, 349
deaf birds, 53	life pattern alterations, 351
Kummer H	Light P, 307
decision making in groups, 264	locomotor response in imprinting, 123
Hamadryas baboons, 256-7, 278	locust, 85
model of infragroup structure 256-7	interneurons 101



long-tailed macaques, 281	psychobiology, 193
longitudinal methods of research, 399, 406	pup stimulation, 196
Lorenz K, 20	Maternal Care and Mental Health, 331
classification of behaviour, 20	maternal caregiving and child characteristics
imprinting, 24, 141, 303	395
influence on Madingley, 479	maternal depression and infant attachment,
sign stimuli, 59	346
social behaviour studies, 256	maternal deprivation, 9, 331-2
social structure, 295	1951 postulates, 332-3
lorisoid social systems, 262	adoption studies, 335
Lowther F de, 206	caregiving outside family, 359
loyalty, 285	child behaviour role, 336–7
Lund M, 297	and cognitive development, 334
Lundblad E G, 209	effects on children, 332
luteinising hormone see LH	environmental effect hypothesis, 333-8
Lütkenhaus P, 309	gender difference, 355
	group day care, 359-60
Macaca mulatta, 200	individual differences in outcome, 352-6
macaques group size, 263	infancy as sensitive period, 345-9
McCartney K, 360	interplay of environmental and genetic
Main M	influences, 338
attachment components of relationships,	maternal love hypothesis, 339-41
359	other relationships, 341
painful experience memories, 361	protective mechanisms, 355
patterns of attachment, 308	risk factors and outcomes, 342
male	school studies, 337-8
courtship behaviour, 159	temperamental features of child, 352
parental behaviour, 207	maternal dimension observation, 398
marital breakdown, intergenerational	maternal employment, 331, 332
transmission, 351	consequences for babies, 380
Marks I M, 320	maternal love hypothesis of maternal
Marler P, xii, 4–5	deprivation, 339–41
research areas, 72	maternal phenotype, 243
marriage of girls with institutional rearing,	maternal qualities and child behaviour
352	prediction, 398
Martin R D, 198	maternal responsiveness, 192, 205-7
Maslow A H, 260	hormonal effects, 214
mate choice, 6	human, 206
maternal aggression, 193	maintenance, 197
maternal behaviour, 7	retention in rat, 210
associations with child behaviour, 380	social isolation in gorillas, 209
Caesarian section, 209	maternal sensitivity, 323-4
child's characteristics, 398–9	mates, assessment of prospective, 41
family consequences, 398	mating
hormonal basis, 207–8	preferences, 35–6
hormonal changes in pregnancy, 193	primate system, 7
interaction with newborn, 195	rate, 231–2
non-primate animals, 193–8	success of polygynous males, 233
oestradiol stimulation, 194	systems, 231–2, 242, 246, 295, 296
onset at parturition, 194-6, 203, 211	Maynard Smith J, 64
oxytocin stimulation, 194	Mayr E, 81
parturition, 192	Maziade M
postpartum hormonal stimulus, 196	IQ and difficult temperament, 353
in pregnancy, 193	temperamental character of children,
in primates, 191–2	352
prolactin effects, 194	mechanisms for phenomena, 88–9



mechanoreceptors of canary brood patch,	breakdown, 9
154	firstborn and birth of sibling, 382
α-melanocyte stimulating hormone, 174	functioning of family, 398
memory	research situations, 396
neural basis theories, 126	Strange Situation method, 357, 360, 395
neuroethological approach, 82	verbal communication, 396
retrieval, 172, 183, 184–5	mother-figure, 302, 303
system of brain and attentional	mother—infant relationship, 304, 341, 358
mechanisms, 131	aggression and submission learning, 439
memory formation	firstborn child, 379–80
competition, 183, 184, 185	hunter-gatherers, 432
effects of testosterone, 183–6	quality and stress of separation, 381
hormonal effects, 172	rhesus monkeys, 379
OSLE role, 187	mother-young relationship in postpartum
threshold effects, 181	period, 196–8
mental health, 302	mothering, variation in sensitivity, 380
N-methyl-D-aspartate (NMDA)	mothers
binding, 130	adolescent, 337
receptors, 131, 132	verbal communication with toddler-age
methyltrienolone (R1181), 156	children, 396–7
Microtus agrestis, 89	motor development in swamp sparrow, 48
military-industrial complex, 438	motor equivalence, 84
milk production, 243	motor neuron activity patterns, 99
mini-domes, 154	motor programs, 85
Minuchin P, 316	centre, 87
mobbing	mountain sheep horn size, 236
behaviour, 31	multiple birth, 195
response, 25	multiple independent variables, 90
modal action patterns, 85	mutual influences, 414–15
Modern Learning Theory, 411	mutualism, 284–5
money, 287	mutually interacting influences, 402–4
monogamous species, 152–3	clinical studies, 403
monogamy, 230–1	measurement, 402
breeding success, 231, 232	methods of study, 402–4
sexual dimorphism, 236	multi-child families, 403-4
Moores J, 285	N H B B 400
moose cow's behaviour, 195	Nadler R D, 203
moral understanding of children, 384	nature/nurture controversy, 23
Moran J, 105	nervous system
mortality, differential	feature development, 31
juvenile, 240–1	plasticity, 27
in polygyny, 239–41	processing, 97
population dynamics, 241	simpler networks approach, 78
mother	nest orientation behaviour, 157
attachment relationships, 308–9	nest-building
behaviour in play, 396	appearance of newborns, 193
child interaction, 307–8	commitment expression, 283
facial expressions, 346	prepartum, 206
model, 307	prolactin stimulation, 194
over-indulgence in child, 310	nest-orientated behaviour
relationships, 302	brain oestrogen levels, 156
mother-child	oestradiol, 156
dialogue of influences, 402	oestrogen-sensitive mechanisms of brain,
interaction, 414	156
mother-child relationship, 8, 9	nesting behaviour, 151
behaviour prediction, 414	network interactions, 113



neural analysis	Oedipal relationships, 302
and behavioural analysis, 5	oestradiol
imprinting in domestic chicks, 5–6	aromatase activity effects, 161
neural network	end of pregnancy, 207
models, 109	levels in pregnancy, 193
polymorphy, 101	nest-orientated behaviour, 156
neural organisation of behaviour, 108	production from testosterone, 173
neural process dynamic relations, 99, 101	stimulation of maternal behaviour,
neural subsystems, 98	194
neurobehavioural systems	oestrogen
analysis, 81	attention stabilisation, 171
centre-surround conceptualisation, 108	brain differentiation in zebra finch, 166
constituent parts, 113	effect on female canaries, 154
higher-order rules of connectivity, 113	formation from testosterone, 157, 164
neurobehavioural units, 83-4	sexual differentiation effects, 163
neuroendocrine system, male, 152	oestrogens
neuroendocrinology, 6	effect on attention, 182–3
neuroethology, 5, 11, 12, 79–80	latency in chicks, 175
neuronal activity, organisational boundaries,	metabolic pathway of formation, 155
100	offspring survival, 232
neurons	ongoing system states, 103, 105, 107
changes during ontogeny, 132	ontogeny of behaviour
multifunctional, 102	genetic component, 42
receptive field boundary, 105	studies, 42
variation in operation, 100	operant conditioning, 6
within-field response modification, 105	orang utan, 202
neuroscience, ethology links, 78	order, principles of, 82
nexus of causal relations, 98	ORG 2766, 174
Nice M M, 60	organisation
Nicolson N A, 432	levels of behaviour, 80
Nisbett A, 21	themes, 78
Nishida T, 430	organisational dynamics, common themes,
Nissen H W, 202	106, 108
NMDA-channels, calcium ion flow, 132	organisational hypothesis of sexual
Norton G W, 264	behaviour, 162–3
note duration, 50	Orpen B G, 210
species difference, 45	orthogonal model of sexual differentiation,
Nottebohm F, 53	163
novel object, 31–3, <i>34</i>	oscine birdsong
nuclear accidents, 422	individual variation, 61
nuclear danger, scientific community's	motor development, 44
response, 423	song crystallisation, 46
nuclear powers, rules of prudence, 446	outcome, behavioural and animal intentions,
nuclear war	13
consequences, 422	ovarian hormone effects, 151
destructive power, 436	owl see barn owl
mistake capability, 439	Oxford Animal Behaviour Group, 19
reduction of risk, 422	oxytocin, 172, 194
time scale, 438	
nuclear weapons spread, 450	Packer C, 274
nursing, 195	anubis baboons, 284–285
	pair behaviour, 261
observation of behaviour, 439-40	Pan troglodytes schweinfurthii, 202
ocularity domains of mammalian visual	panel test, 178–9
cortex, 109	Papio hamadryas, 201
Odent M, 203	P. ursinus, 201



parent-child relationship, 341, 359	primate, 198–205
and consequences of day care, 381	patas monkey, 199–200
quality, 343	behaviour changes during pregnancy, 205
parental behaviour	pattern
dimensions, 397	of control, 81
effects on child, 337	formation during ontogeny, 109
relationship to child behaviour, 397	generation of dynamic circuits, 102
parenting	generators, 78, 86
continuous personal, 349	patterning of behaviour, 85–6
disrupted, 335	patterns of behaviour, 20, 21–2
intergenerational transmission of	development, 22
breakdown, 350–1	Patterson G R, 403
quality, 342	peace, 420, 423
parents	Pearson K G, 86
care quality, 339	peer relationships, 348
child's behavioural environment, 393	attachment quality, 358
contribution to attachment, 358	children in institutional care, 349
criminal, 342	prediction of social function, 359
deviant, 336–7, 344	Peking ducklings, 141
discrimination, 238, 241	pelicans, 277
effects of behaviourally disordered	peripheral events response, 93–5
children, 336–7	personal characteristics, 310–11
gender difference in comforting, 354	personality
as longitudinal observers, 401–2	access to memories of painful experiences,
loss, 331, 339	361 dayslanment 302 361
mentally ill, 340	development, 302, 361
remarriage, 337	responsiveness to environment, 311
response to high activity, 354 Parkes C M, 433	phenotypes, behavioural, 80
partners	photoperiod effects on song development, 48 physical contact, grooming, 272
assessment of potential, 275	physical contact, grooming, 272 physiological analysis of behaviour, 149
assets, 288	Pickles A, 351, 352
choice of, 273	pituitary peptide hormones, 174
coalition, 289	attention effects, 186
commitment to, 276, 282, 289	plastic song, 46
declaration of commitment, 272, 275	analysis, 63
exchange, 284	overproduction, 60–1
human applications, 286–9	variation, 47
identities in relationships, 271	play, 439
prowess value, 283–4	Pleurobranchi, 85
reciprocation, 274, 284	polygyny, 230–1
service exchange, 286–7	age difference and success, 235
sexual, 282–3	birthweight, 236
territory owning, 277	breeding success, 232
transactions between, 284	costs of rearing males, 242
value of, 277, 281, 283	differential mortality, 239–41
value to social group, 276	distribution of reproductive success, 231–5
partnership	effective population size, 241–2
commitment in, 287–8	energetic consequences, 238–9
declarations of gratitude, 286	female breeding success, 231
parturition	female competition, 235
herd-living moose and elk, 213	fitness of mothers, 242–3
hormonal changes, 192, 193	genetic structure of populations, 241–2
maternal behaviour onset, 194–6	human societies, 233–4
mother and newborn interaction, 195	juvenile body fat, 236
predation effects, 213	juvenile mortality, 240–1



male breeding success, 231 male competition, 235 male reproductive activity, 238 male size, 238, 0	primate maternal behaviour adoption of infants, 210-11 Caesarian section, 209, 215
male size, 238–9	changes at parturition, 211–12
male weaponry, 236	hormonal basis, 207–8
male-biased dispersal, 241	onset at parturition, 198–205
mating success, 233	postpartum maintenance, 215
secondary sexual characters, 235–9	prepartum, 212
selection pressures, 235 sex ratio variation, 242–6	psychobiology, 198–211
sex ratio variation, 242–6 sexual dimorphism, 236–238	primates adaptation, 422
population	canine size, 236, 237
coding, 99	complex society, 259
dynamics, 241	feeding patterns, 239
effective size, 241–2	mating system, 7
genetic structure, 241–2	matrilineal kin group, 243
habitat-constrained, 266	multi-male troops, 233
network of acquaintance, 266	observational learning, 442
social structure, 265–6	offspring sex ratio, 243, 245
porcupines, 282	partnership combinations, 275-4
Posner M I, 102	relationships, 8
postpartum period, hormonal stimulus for	sociality models, 260
maternal behaviour, 196	team relationships, 273-4, 275
postpartum resting interval, 195-196	testis size, 237
primate, 199	see also social grooming, primate
postsynaptic density (PSD), 127, 129	principles of behaviour, 81
power, advertising, 274	prior possession, 274
predation	problem-solving, 444
of breeding males, 239	progesterone
group protection, 263	end of pregnancy, 207
prediction, 390	levels in pregnancy, 193
of actions, 91	prolactin, 194
predisposition	end of pregnancy, 207
control, 139, 140 emerging, 140–1, 142	levels and male parental behaviour, 207
influence, 142	propaganda, 460
and running wheel experience, 138–9,	Propithecus verreauxi, 199
140	prosocial behaviour fostering, 445
preference tests in chicks, 135–9	protective mechanisms in maternal
pregnancy	deprivation, 355
endocrine regulation, 207–8	psychoanalysis, 301, 302
hormonal changes at end, 207	psychosocial adversity, individual
human hormone levels, 208	susceptibility, 353
human relationship with foetus, 206–7	psychosocial development, environmental
maternal behaviour, 193	effects, 353
oestradiol levels, 193	psychosocial stress, and gender difference
primate maternal responsiveness, 205	354
progesterone levels, 193	pup-killing, 194
pregnane steroids binding to GABA	•
receptor complex, 175	quail embryo
prehumans, ancient, 427	aromatase induction, 164-5
prejudice, 443, 446	brain enzymes, 164-5
overcoming, 445	Quinton D
prestation, 285	institution-reared girls, 340
Primate Behavior, 425	parenting breakdown, 351



Index

Radke-Yarrow M, 9-10 5β -reduction, pathway of testosterone children's emerging sensitivity to metabolism, 166 emotions, 401-2 reductionism, unidirectional, 79, 80 close tracking studies, 400-1 reindeer population decline, 240 depressed mothers, 354 relational properties of behaviour, 98 developmental research, 413 relationships, 271 alteration of individual qualities, 358 environment and development, 413 individual characteristics and attachment, 316 relationships, 415 attachment between mother and child, 380 individual difference studies, 414 attachment components, 359 mutual influences, 414-15 balances between, 358 observation of family in diversity of between individuals, 258 situation, 398 childhood as basis for later relationships, overcoming prejudice, 445 shyness studies, 322-3 childhood with parents, 302 Rajecki D W, 357 children, 315-16, 375 commitment, 289, 302 cutaneous sensory transmission, 94 deteriorating, 285 development, 341 pups, 196–197 snout sensitivity, 196 development between young siblings, trigeminal deafferentation study, 95 383 - 4rat maternal behaviour, 196-8 dyadic, 359 Caesarian delivery, 197 in emotional and social development, 382 contact with pups, 197 environment in research, 394 maintenance, 197-8 ethology and other social sciences in, 377, onset at parturition, 197 reactive attachment disorder, 344-5 group, 431 rearing, adverse patterns, 353 in human ailments, 301 rearing environment human applications, 286-9 conceptualisation, 397 identities of partners, 271 influences in, 398 and individual characteristics, 415 receptive field dynamics, 109 interrelated, 390-1 reciprocal altruism model, 284 kinship in, 281–2 reciprocal centre-surround model, 101 levels of analysis, 375–6 long-term in primates, 425-6 reciprocal sharing, 285 reciprocation in partnerships, 274 love, 302 reciprocity, 284-5 mother-infant reciprocal nature, 379, 380 hypothesis of Smuts, 279-281 with mothers, 302 mutual influences, 402 recognition mutualistic, 273 memory, 6, 131 of stimulus, 28, 29 personal in development, 376 system in chicks, 140 primates teams, 273-4, 275 problems, 302 processes affecting development, 378 breeding success, 232-3 calf sex ratio, 245 quality, 341 feeding patterns, 239 reciprocation, 274 fitness costs, 242 territorial animals, 277 maternal phenotype, 243 with therapists, 302 value of, 271 reproductive success, 244 seasonal breeding, 238 reproductive performance red-bellied tamarin, 207 components, 233 red-winged blackbird mechanisms underlying, 246 reproductive success, 232 conspecific song classification, 62 distribution, 231-5 improvisation of song, 64 5β -reductase, 165 elephant seals, 234



mating systems, 231–2 parental characteristics, 232 red deer, 244 selection, 234 reptile sex determination, 26 research methods, 406, 407 residential nursery care, 349 resource distribution, 263 reunion behaviour, 323–4 remonkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship. 155 brain metabolism of androgen, 155 courtship behaviour, 155 SpF-eductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 hierarchical structure, 92, 95 timing properties, 92 trigeminal deafferentation study, 95 rotating box studies, 31–2 Rowell T E, 8 decision making in groups, 264 group behaviour, 297 rhesus mokely, 207 chosel of spouse, 304 social complexity levels, 204 social complexity levels, 204 social complexity levels, 204 social complexity levels, 204 running wheel experience precisions in chicks, 138–9, 140 synapse transmission, 141 Rushton P, 396 Rutter M, 9 attachment theory, 412 brain as organ of mind, 338 cognitive development, 334 genetic expression in relation to environment, 391 imprinting, 412 individual difference studies, 414 individual difference studies, 414 individual difference studies, 414 individual difference studies, 31–2 Rowell T incessident towhees, 62 running wheel experience precisposition in chicks, 138–9, 140 synapse transmission, 141 Rushton P, 396 Rutter M, 9 attachment theory, 412 brain as organ of mind, 338 cognitive development, 334 genetic expression in relation to environment, 391 imprinting, 412 individual difference studies, 414 individual difference studies, 414 individual differe		
red deer, 244 selection, 234 reptile sex determination, 26 research methods, 406, 407 residential nursery care, 349 residential nursery care, 349 resource distribution, 263 reunion behaviour, 323-4 in non-human primates, 428, 435 patterns of attachment, 324 Reynolds V, 288 rhesus monkey, 200 adoption of infants, 210-11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333-4 maternal responsiveness, 205 maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 spβ-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92, 95 timing properties, 92 decision making in groups, 264 group behaviour, 297 rhesus monkey studies, 304 social complexity levels, 296-7 work with Hinde, 472 rufous-sided towhees, 62 running wheel experience predisposition in chicks, 138-9, 140 synapse transmission, 141 Rushton P, 396 Rutter M, 9 attachment theory, 412 brain as organ of mind, 338 cognitive development, 334 conduct disturbance in children, 335 gender difference and psychosocial stress, 354 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual differences tudies, 414 individual differences in outcome of maternal deprivation, 355 school studies, 337-8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Samitris cincurses, 201 scapegoating, 437 Scart S, 336 Schiff M, 334 schools, pupil outcome, 337-8 scr		
selection, 234 reptile sex determination, 26 research methods, 406, 407 residential nursery care, 349 resource distribution, 263 reunion behaviour, 323-4 in non-human primates, 428, 435 patterns of attachment, 324 Reynolds V, 288 rhesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333-4 maternal responsiveness, 205 maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92 group behaviour, 297 rhesus monkey, 206 work with Hinde, 472 rufous-sided towhees, 62 running wheel experience predisposition in chicks, 138–9, 140 synapse transmission, 141 Rushton P, 396 Rutter M, 9 attachment theory, 412 brain as organ of mind, 338 cognitive development, 334 conduct disturbance in children, 335 gender difference and psychosocial stress, 354 genetic expression in relation to environment, 391 imprinting, 412 individual differences in outcome of maternal deprivation, 352 infantile experience, predisposition in chicks, 138–9, 140 synapse transmission, 141 Rushton P, 396 Rutter M, 9 attachment theory, 412 brain as organ of mind, 338 cognitive development, 334 espentic expression in relation to environment, 391 imprinting, 412 individual differences in outcome of maternal deprivation, 352 infantile experience, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 318–9, 1	- · · · · · · · · · · · · · · · · · · ·	
reptile sex determination, 26 research methods, 406, 407 residential nursery care, 349 resource distribution, 263 reunion behaviour, 323-4 in non-human primates, 428, 435 patterns of attachment, 324 Reynolds V, 288 rhesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333-4 maternal responsiveness, 205 maturation and learning, 440 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 5β-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92	· · · · · · · · · · · · · · · · · · ·	
research methods, 406, 407 residential nursery care, 349 resource distribution, 263 reunion behaviour, 323-4 in non-human primates, 428, 435 patterns of attachment, 324 Reynolds V, 288 rhesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333-4 maternal responsiveness, 205 maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155-6 trivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92		
residential nursery care, 349 resource distribution, 263 remain obehaviour, 323-4 in non-human primates, 428, 435 patterns of attachment, 324 Reynolds V, 288 rhesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333-4 maternal responsiveness, 205 maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92, 95 timing properties, 92		
resource distribution, 263 reunion behaviour, 323–4 in non-human primates, 428, 435 patterns of attachment, 324 Reynolds V, 288 rhesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother–infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 sof-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92 running wheel experience predisposition in chicks, 138–9, 140 synapse transmission, 141 Rushton P, 396 Rutter M, 9 attachment theory, 412 brain as organ of mind, 338 cognitive development, 334 conduct disturbance in children, 335 gender difference and psychosocial stress, 354 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual difference studies, 414 individual differences in outcome of maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asseparation effects, 381 Steeling effects from stress experiences, 355 temperament of child, 352 school studies, 337–8 separation effects, 381 Steeling effects from stress experiences, 355 temperament of child, 352 school studies, 337–8 separation effects, 381 Steeling effects from stress experiences, 355 temperament of child, 352 school studies, 337–8 separation effects, 381 Steeling effects from stress experiences, 355 temperament of chil		
reunion behaviour, 323-4 in non-human primates, 428, 435 patterns of attachment, 324 Reynolds V, 288 thesus monkey, 200 adoption of infants, 210-11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333-4 maternal responsiveness, 205 maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierar dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92, 95 timing properties, 92 running wheel experience predisposition in chicks, 138-9, 140 synapse transmission, 141 Rushton P, 396 Rutter M, 9 attachment theory, 412 brain as organ of mind, 338 conduct disturbance in children, 335 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual difference studies, 414 individual differences in outcome of maternal deprivation, 352 infantile experience, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337-8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Samiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe S, 166 Schiff M, 334 schools, pupil outcome, 337-8 serarch, androgenic effect, 183 search, androgenic effect, 183		
in non-human primates, 428, 435 patterns of attachment, 324 Reynolds V, 288 rhesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 brain metabolism of androgen, 155 courtship behaviour, 155 schoil model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92		
patterns of attachment, 324 Reynolds V, 288 rhesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother–infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 brain metabolism of androgen, 155 courtship behaviour, 155 brain metabolism of androgen, 155 rourtship behaviour, 155 sp-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92		
Reynolds V, 288 thesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother–infant relationships, 304 motor neurons, 99 suckling frequency, 238 thinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5\(\beta\)-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92 Rutter M, 9 attachment theory, 412 brain as organ of mind, 338 cognitive development, 334 conduct disturbance in children, 335 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 search, greation from the conduct disturbance in children, 335 gender difference and psychosocial stress, 354 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual differences in outcome of maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects, 381 Scheffer H, 321 Schefderup-Ebbe T, 256 Schiff M		
rhesus monkey, 200 adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother—infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5\(\beta\)-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92		
adoption of infants, 210–11 Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother–infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92 attachment theory, 412 brain as organ of mind, 338 cognitive development, 334 conduct disturbance in children, 335 gender difference and psychosocial stress, 354 genetic effects and child behaviour, 336 genetic effects and child behaviour, 356 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupi outcome, 337–8 serarching test, 182–3 serarching test, 182–3 serarching		
Caesarian section delivery, 209 colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92		
colony at Madingley, 479 hypophysectomised and pregnancy, 208 maternal deprivation, 333-4 maternal responsiveness, 205 maturation and learning, 440 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 Sβ-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92, 95 timing properties, 92 cognitive development, 334 conduct disturbance in children, 335 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual differences in outcome of maternal deprivation, 355 school studies, 337-8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 conduct disturbance in children, 335 genetic effects and child behaviour, 336 genetic effects and child behaviour, 336 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual difference studies, 414 individual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 357 school studies, 37-8 separation effects, 381 steeling effects from stress experiences, 355 temperation effects, 381 steeling effects from stress experiences, 355 temperation effects, 381 st	adoption of infants, 210–11	attachment theory, 412
hypophysectomised and pregnancy, 208 maternal deprivation, 333-4 gender difference and psychosocial stress, 354 gender difference studies, 414 individual difference studies, 414 individual differences in outcome of maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 askett G P, 441 Sequence, 94 scapegoating, 437 Scarr S, 336 Scheffer H, 321 Schederup-Ebb	Caesarian section delivery, 209	brain as organ of mind, 338
maternal deprivation, 333–4 maternal responsiveness, 205 maturation and learning, 440 mother–infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92		cognitive development, 334
maternal responsiveness, 205 maturation and learning, 440 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5\(\beta\)-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92, 95 timing properties, 92 354 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual differences in outcome of maternal deprivation, 355 school studies, 337-8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182-3 Sears P S, 391		conduct disturbance in children, 335
maturation and learning, 440 mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92, 95 timing properties, 92 genetic effects and child behaviour, 336 genetic expression in relation to environment, 391 imprinting, 412 individual difference studies, 414 individual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337-8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182-3 Sears P S, 391	maternal deprivation, 333-4	gender difference and psychosocial stress,
mother-infant relationships, 304 motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92	maternal responsiveness, 205	354
motor neurons, 99 suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5\(\beta\)-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92, 95 timing properties, 92 environment, 391 imprinting, 412 individual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337-8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 seratch, androgenic effect, 183 searching tests, 182-3 timiovidual differences sin outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337-8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 sackett G P, 441 Saquinis labiatus, 207 Scarr S, 336 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 seratch, androgenic effect, 183 searching tests, 182-3 Sears P S, 391	maturation and learning, 440	genetic effects and child behaviour, 336
suckling frequency, 238 rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during pre- copulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5\(\beta\)-reductase levels, 166 threshold model of courtship, 155-6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92 timing properties, 92 imprinting, 412 individual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337-8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Sackett G P, 441 Sackett G P, 441 Sackett G P, 441 Schools, pupil outcome, 337-8 Schools, pupil outcome, 337-8 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182-3 Sears P S, 391	mother-infant relationships, 304	genetic expression in relation to
rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 individual difference studies, 414 individual difference studies, 414 individual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch, androgenic effect, 183 search, androgenic effect, 183 search, androgenic effect, 183 search, androgenic effect, 183 search ingividual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Scapinis labiatus, 207 Scaimiri sciureus, 201 Scapegoating, 437 Scarr S, 336 Schiff M, 334 schools, pupil outcome, 337–8 seratch, androgenic effect, 183 search, androgenic effect, 183 search, androgenic effect, 183 search ingividual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 37–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Scapinis labiatus, 207 Scain	motor neurons, 99	environment, 391
rhinoceros group size, 263 rhythm production, 78 ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 individual difference studies, 414 individual difference studies, 414 individual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch, androgenic effect, 183 search, androgenic effect, 183 search, androgenic effect, 183 search, androgenic effect, 183 search ingividual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Scapinis labiatus, 207 Scaimiri sciureus, 201 Scapegoating, 437 Scarr S, 336 Schiff M, 334 schools, pupil outcome, 337–8 seratch, androgenic effect, 183 search, androgenic effect, 183 search, androgenic effect, 183 search ingividual differences in outcome of maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 37–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Scapinis labiatus, 207 Scain	suckling frequency, 238	imprinting, 412
ring dove, 152 behavioural interaction during precopulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5\$\beta\cdots\$-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 maternal deprivation, 352 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92		individual difference studies, 414
behavioural interaction during pre- copulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 infantile experiences, 346, 350 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Sainri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92 Sears P S, 391	rhythm production, 78	individual differences in outcome of
copulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 sackett G P, 441 Sackett G P, 441 Sackett G P, 441 Scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92	ring dove, 152	maternal deprivation, 352
copulatory courtship, 155 brain metabolism of androgen, 155 courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 protective mechanisms in maternal deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 sackett G P, 441 Sackett G P, 441 Sackett G P, 441 Scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92	behavioural interaction during pre-	infantile experiences, 346, 350
brain metabolism of androgen, 155 courtship behaviour, 155 5\(\beta\)-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 deprivation, 355 school studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asseparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asseparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 asaeparation effects, 381 steeling effects from stress experiences, 207 scaptures, 207 Scart S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 screated H		
courtship behaviour, 155 5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 session studies, 337–8 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 sequantis labiatus, 207 Sadmiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92		
5β-reductase levels, 166 threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 separation effects, 381 steeling effects from stress experiences, 355 temperament of child, 352 sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92		
threshold model of courtship, 155–6 rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 steeling effects from stress experiences, 355 temperament of child, 352 Sackett G P, 441 Saquinis labiatus, 207 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92 Sackett G P, 441 Sackett G P, 441 Scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92		
rivals, 289 assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 timing properties, 92 temperament of child, 352 ascatet G P, 441 Scamiri sciureus, 207 scamiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92 sackett G P, 441 Sackett G P, 441 Scamiri sciureus, 207 Scamiri sciureus, 201 scapegoating, 437 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 search, reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92	threshold model of courtship, 155-6	
assessment of prospective, 41 rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92 timing properties, 92 Sackett G P, 441 Saquinis labiatus, 207 Scairr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 sear ch, androgenic effect, 183 search, androgenic effect, 183 searching tests, 182-3 timing properties, 92 Sackett G P, 441 Saquinis labiatus, 207 Scairr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 search reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92 Scair S, 391	rivals, 289	
rodent grooming, 89, 91 body, 90 central machinery, 96 comparative perspective, 92–4 face, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92 species commonality, 92–3 syntactic structure, 92 body Sackett G P, 441 Saquinis labiatus, 207 Scaimri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92 Sears P S, 391	assessment of prospective, 41	•
body, 90 central machinery, 96 comparative perspective, 92-4 face, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92 species commonality, 92-5 timing properties, 92 Saimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 seracth reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182-3 timing properties, 92 Sears P S, 391		Sackett G P, 441
central machinery, 96 comparative perspective, 92-4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93-5 sequences, 91-2 species commonality, 92-3 syntactic structure, 92 timing properties, 92 Scaimiri sciureus, 201 scapegoating, 437 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182-3 timing properties, 92 Scaimiri sciureus, 201 scapegoating, 437 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337-8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 searching tests, 182-3 Sears P S, 391		
comparative perspective, 92–4 face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92 scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 scratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92 Scarr P S, 391		
face, 91 hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 search reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 Scarr S, 336 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 search reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 search spinal turtles, 86 search, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 search reflex of spinal turtles, 86 sea slug, 85 search, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 search reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 search search, 321		
hierarchical structure, 91 linear dimension of behavioural sequence, 94 orientation, 91 peripheral events response, 93–5 sequences, 91–2 species commonality, 92–3 syntactic structure, 92, 95 timing properties, 92 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 timing properties, 92 Schaffer H, 321 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 seratch reflex of spinal turtles, 86 sea slug, 85 search, androgenic effect, 183 searching tests, 182–3 Sears P S, 391		
linear dimension of behavioural sequence, 94 Schelderup-Ebbe T, 256 Schiff M, 334 schools, pupil outcome, 337–8 scatch reflex of spinal turtles, 86 sequences, 91–2 species commonality, 92–3 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92 Sears P S, 391		
94 Schiff M, 334 orientation, 91 schools, pupil outcome, 337–8 peripheral events response, 93–5 sequences, 91–2 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92 Sears P S, 391		
orientation, 91 schools, pupil outcome, 337–8 peripheral events response, 93–5 sequences, 91–2 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92 sending tests, 182–3 Sears P S, 391	- · · · · · · · · · · · · · · · · · · ·	
peripheral events response, 93–5 scratch reflex of spinal turtles, 86 sequences, 91–2 sea slug, 85 search, androgenic effect, 183 syntactic structure, 92, 95 timing properties, 92 search sear	orientation, 91	
sequences, 91–2 sea slug, 85 species commonality, 92–3 search, androgenic effect, 183 syntactic structure, 92, 95 searching tests, 182–3 timing properties, 92 Sears P S, 391		
species commonality, 92–3 search, androgenic effect, 183 syntactic structure, 92, 95 searching tests, 182–3 timing properties, 92 Sears P S, 391		
syntactic structure, 92, 95 searching tests, 182–3 timing properties, 92 Sears P S, 391		
timing properties, 92 Sears P S, 391		
	I i i i i i i i i i i i i i i i i i i i	
	rodents, control of maternal state, 7	
	role concept, 260	
	role-playing, 260	
Rosenblatt J S, 7, 209 measurement, 235		
reproductive development, 225 pressures, 296		
	Rosenblum L A, 205	



sensitive periods in imprinting, 32-3, 35	singing
sensory receptive field, 105	tutor, 55, 56
sensory space coding, 105	see also song
separation	singing behaviour
experiences, 342	maturation stages, 44
vulnerability of children, 381	motor programmes, 55
sequential preference test, 133	trill development, 46
service exchange, 286–7	single hormone threshold model, 157, 158
Sever Z, 282	single mechanism models, 99
sex differences	situational differences in behaviour, 396
early development, 236	Skarin K, 319
evolution, 230	skill advertising, 274
juvenile body fat, 236	Slater P J B, 255
sex hormones	slaughter, 450
behavioural actions, 153	Sluckin W, 141–2
behavioural development influences, 162–3	Smuts B
sex ratio	primate long-term relationships, 426
and breeding systems, 243	primate society research, 425
parental diet, 246	reciprocity hypothesis, 279, 281
and social rank, 243	social approval, 286
variation in polygyny, 242–6	social behaviour
sexual differentiation, 163	chimpanzee, 426
sexual dimorphism, 237	functional significance, 230
energetic consequences, 238–9	group, 261–2
energetic requirements, 242	higher order coherence, 84
feeding of males, 238–9	internal to group, 261
food requirements of young males, 238	levels, 10
juvenile mortality, 240	levels of analysis, 258
mammalian species, 235–6	survival strategies, 425
mortality differences, 239–40	social class and antisocial behaviour, 335
suckling rate, 238	social complexity levels, 296
sexual imprinting, 35–6	social cues in male neuroendocrine system,
sexual interaction and male behaviour, 152	152
Seyfarth R M	social development
competition for access, 279	age differences, 349
fear response tuning, 321	institution-reared children, 343–4
vervet monkeys, 281	models and methods for children, 392
Shaw E, 256	social environment
sheep	changes in human, 420
group traditions, 264	male primate behaviour, 7
huddles, 261	social grooming
oxytocin role in maternal behaviour, 194	potential rivals, 277–8
postpartum behaviour, 214	potential value of groomee, 280–1
shifting balance process in evolution, 242	relationship success, 271
shyness, 322–3	social grooming, primate, 272–3
gender difference, 355	chimpanzees, 279–80
Sigg H, 265	commitment, 281
sign-stimuli, 59	commitment-declaring function, 276
baboons, 257	competition for access, 278
signals in communication, 259	conciliation by dominant individual, 279
similarity principle, 279	consequences, 279
simpler networks, 78–9	foraging skills and, 281
Simpson M, 8	kinship in, 281–2
chimpanzee grooming, 279–80	physical condition assessment, 274, 278
relationship of human concepts to animal	potential rivals, 277–8
data, 297	potential value of groomee, 280–1



prowess assessment, 274	auditory mechanisms, 54
rank in hierarchy, 278-9	component re-editing, 61, 63
recipients, 272	conspecific stimuli, 58–9
token of potential attention, 273	control system, 165–6
trust, 272	crystallisation, 46–7
value in relationships, 272	deaf birds, 52
social group, attachment of non-human	dialects, 57
primates, 434	immediate variety, 46
social influences	improvisation, 64
attachment behaviour, 323-4	invention, 64
fear behaviour, 322–3	learned models, 61
social inheritance, 41	microvariation, 47
social isolation	note duration, 62–3
abnormal song phonology, 49–50	ontogeny, 42
abnormal song repertoire, 49	phonology, 49–50
birdsong development, 49–55	segments, 51
rhesus monkeys, 334	species difference, 51, 52, 61–4
song syntax, 50–1	species-specific differences, 49
species difference in birdsong, 51–2	ultimate variety, 46
species difference in song phonology, 50	song development
trill species difference, 51–2	auditory feedback effects, 52
social mammals, population size, 242	local constraints, 64
social organisation of Hamadryas baboons,	motor development, 49
256–7	photoperiod effects, 48
social preference development, 4	proximate factors, 64
social rank and sex ratio, 243	social factors, 48
social relationships, 8	social transmission, 44
attachment and, 357	species differences, 43, 44, 49–55
in childhood, 359	variation in patterns, 48
discontinuous parenting, 333	song learning
hunter-gatherers, 431–2	acoustic basis of learning preferences,
non-human primates, 425, 432	56–7
significance, 383	adherence to model, 63–4
social structure, 8	component-partitioning, 62–3
complexity, 267	crystallisation process, 59–61
hierarchy, 267	enabling signals, 59
ostensive model, 259	genetic basis, 57
population-wide system, 266	heterospecific songs, 58
primates, 255	loss of overproduced songs, 60
signals, 259	parallel processing, 58–9
social system, species-wide, 266	perceptual process partitioning, 63
social transmission of song development, 44	responsiveness to cues, 59
social understanding of children, 346–7,	species-specific learning preferences, 56
383-6	song sparrow, 44
socialisation and relationships, 382	laboratory reared, 55
society	learning preference, 57
of behaviour, 97–8	note complexes, 49–50
complex, 259	note duration, 50
complicated, 260	plastic song development, 48
performative view, 259	rival singing, 60
Sociobiology, 73	song of deaf, 53, 54
sociobiology, 12	song segments, 51
song	species-specific song-learning preference, 56
abnormal repertoire, 49	subsong, 45
acquisition and active processing, 63	trills, 49–50
analysis, 62, 122	variation in song. 47



20m2 gymtov 50 1 62	individual resmance 352
song syntax, 50–1, 62	individual response, 352
abnormal, 52	minor, 141 of separation, 381
deafened birds, 54–5 song-learning	sex differences in exposure, 354
in birds, 4–5, 41	steeling effects of experiences, 355
preferences, 55–61	stretching behaviour, 174
songbirds	stridulation, 94, 95, 109
live tutors, 56	Strum and Latour's model of infragroup
motor development, 45	structure, 259–61, 262
sources of difference, dichotomy, 72	Strum S B, 259
species	social complexity levels, 297
comparison, 424	Sub-Department of Animal Behaviour
differences in patterns of development, 36	(Madingley), 478, 479–80
Spencer-Booth Y, 304	current work, 480
sperm competition, 236–7	staff, 480
spinal turtles, 85	sub-plastic song duration, 47
Spitz R, 390	submission learning, 439-40
squirrel monkey, 201, 203	subsong, 44–5
behaviour changes during pregnancy, 205	duration, 47
maternal responsiveness, 205	functional significance, 45
Sroufe L A, 310	motor development, 45
attachment theory limitations, 361	suckling, 197
cognitive development, 343	rate in sexually dimorphic species, 238
fear behaviour system, 319, 320	Suomi S L, 440
Stammbach E	superpowers, 422
hamadryas baboons, 278	surround inhibition, 108
long-tailed macaques, 281	survival
Stamps J A, 41	individual, 433
Staub E, 450	requirements for, 445
Steel E, 224	swamp sparrow, 44
Steimer T, 157	environmental shaping in crystallisation
Stern D N, 347	process, 59-60
steroids	laboratory reared, 55
amplification system in brain, 161	learning preference, 56–7
gene transcription, 175	motor development, 48
Stevenson-Hinde J, 9	note duration, 50
development of attachment theory, 412	plastic song, 48, 60
fearful behaviour, 316	song analysis, 62–3
gender difference in parental response, 355	song crystallisation, 46
individual personality of primates, 258	song of deaf, 53, 54
insecure children, 325	song dialects, 57
longitudinal studies, 400	song segments, 51
shyness studies, 322	song type repertoire, 46
situational sampling, 397	song variation, 47
stimulation, motivational state, 33	species-specific song-learning preference,
stimulus	56
analyser, 28	sub-plastic song duration, 47
naturalistic, 27	subsong, 45, 47
novel object value, 31–3, 34	transition to full song, 60
value of object, 23-4, 25-6	trill development, 46
Strange Situation, 395	synapses
model, 317–18	changes with training, 132
procedure, 357, 360	on dendrites, 127, 129
Streptopelia risoria, 152	of IMHV in imprinting, 127–32
stress	training effects, 129
adults immune to, 356	synergetics, 82



syntactic chains, 92	oestrogenic route of action, 179
synthetic neuroscience, 80	oestrogenic short latency effect (OSLE),
relation among properties, 97	177, 181
To:fal II 440	panel test, 178–9
Tajfel H, 460 taming, 27	range of effects, 175
taste aversion	response to ACTH administration, 173
ACTH effect, 173–4	searching tests, 182–3 sexual interaction effects, 156
delay of extinction by testosterone, 176–7	short latency oestrogenic effects, 186
extinction in domestic chick, 175	site of action, 174
Teas J, 200	social interaction, 187
technology	threshold model of courtship, 155–6
destructive power, 436	trained chicks, 134, 135
role in war, 438	The Study of Instinct, 463
speed of major change, 438	Theropithecus gelada, 201
temper tantrums, 439	Thomas W D, 202
temperament, 315, 316	Thorpe W H, 71–2
environmental conditions, 353	bird song-learning, 480
and famine survival, 353	bird studies, 224
human, 9	work at Cambridge, 479-80
psychiatric risk, 353	threat behaviour, 427–8
theory, 315	Three Mile Island, 422
temperamental patterns, 352	Tiger L, 282
temperature in reptile sex determination, 26	American men study, 288
temperature-sensitive mutants, 21	timing mechanisms, 86
temporal lobe receptive fields, 109	Tinbergen N, xii, 12
Terborgh J, 263	sign stimuli, 59
territoriality, 265-6	work with Hinde, 463-4, 471
Test-Operate-Test-Exit rule, 35	Tinklepaugh O L, 205
testis size, 237, 246	tit for tat model of reciprocal altruism, 284,
testosterone, 6, 47	285
androgenic effect, 186-7	tits, flock-living, 463, 472
attention effects, 175, 186	Tizard B
attention span in humans, 6	children in residential care, 340
attentional mechanisms, 180-1, 182	institution-reared children study, 344
behaviour effects, 172-5	Towards Understanding Relationships, 377, 379
behavioural sensitivity to, 153	traditional societies, 433
brain sensitivity to, 153	training approach activity, 130
competition in memory formation, 185	translation, 286–7
competition test, 180–2	travel lengths of monkeys, 266
delay of extinction of taste conditioned	tree shrews, 198
aversion, 176–7	nest building prepartum, 206
distractibility reduction, 186	Trevathan W R, 204
distraction tests, 178	trills, 49–50
effects on aromatase activity, 161	species difference in isolation, 51–2
extinction opposition of approach to	Tritonia neural network, 102
food, 176–7	trust, 272
extinction resistance, 186-7	Tupaia belangeri, 198
information transfer effects, 186	turning points in development, 351
latency of action, 175, 181	twins, behavioural variation, 21
memory formation effects, 183–6	Haanda kah 220
metabolic activation, 161	Uganda kob, 238
metabolism studies, 157	ungulates
metabolites in birds, 165–6	male segregation, 239 winter starvation, 239
oestradiol production, 173	US-Soviet relations, 450
oestrogen formation, 156	Ob Dovice relations, 700



Index

ancient prehumans, 427 value declaration, 277 van Lawick-Goodall J human aggression study, 424 aggressive behaviour of chimpanzees, 428 Waters E, 321 rules of chimpanzee society, 427 patterns of attachment, 308 vasopressin, 174 weaning, 432 verbal communication, depressed mothers conflict, 439 and toddler-age children, 396-7 weapons Verplanck W, 411 destructive power, 422 vervet monkey, 281 interactive cycles, 437-8 commitment and social grooming, 281 white-crowned sparrow fear response tuning, 321 deaf, 52 violence, 10 heterospecific imitation, 58 chimpanzee, 430 improvisation, 64 historical record, 437 WHO psychiatric classification, 344 intergroup in chimpanzees, 441 Widdowson E, 240, 241 Wilson E O, 11, 73 visual orienting, 102 vocal imitation, 44 wing stroke response, 61 vocal stimuli, 152 withdrawal executive system, 29 Wolf H, 94 vole studies, 90 von Holst E, 97 Wolkind S, 349 wolves, pre-hunting ceremony, 261 Wrangham R W, 263, 273 and aggression, 459-60 chimpanzee diet, 428 evolution in behavioural studies, 425 destructive power, 438 errors of judgement, 438 Wright S, 242 factors involved, 450 yawning behaviour, 174 group loyalty, 438 in human history, 437 Young C E, 183 Young WC, 225 instigators, 437 Youniss J, 285 interactive cycles, 437-8 modern, 10 role of science and technology, 438 Zahavi A, 288 Washburn S L, 423 zebra finch, song control system, 166