Index

Adrenaline, 86
Affective disorder, 553–554
Aging
affective decision making, 644–645, 646
anatomical preservation, 636–637, 648–649
By-Product of Biological Decline Theory, 653–654, 655
Dynamic Integration Theory, 651–652
effects on emotional episodic memory, 642–643, 644
effects on emotional perception, 639, 641–642
effects on emotional regulation, 646–647, 648
functional compensation, 637–638, 649–650
Amgydala
autonomic activation of, 63–64
during development, 612
effects of aging, 636
emotional bias, 342–343, 345
fear conditioning, 420–421
lesions, 69, 178
link to trait anxiety, 577–579
in music, 289
olfaction, 244–245, 248–250
Amygdala, 63, 65, 69, 71, 72, 84, 144, 145, 178, 179, 180, 181, 420–421, 612, 636
Anger
angry faces, 184
autonomic response to, 90–92
sex differences, 597–598
Anterior cingulate cortex, 184, 185, 227, 229, 230–231, 612
Anterior cingulate cortex – in music, 295–296
Anterior insula, 181, 182
Anxiety
anxiety disorder, 554–556, 558
trait anxiety, 554–556, 560, 561, 562
Aphasia, 157
Arousal, 70
effects on encoding, 466–469, 470
Attention
attentional blink, 69, 333
attentional control, 380–382, 383
change blindness, 334
emotional biases in, 332–333, 334, 336–338, 345–347
in facial expression, 183
top-down processing, 357–359, 360, 361
Autonomic Nervous System
anatomy of, 83
autonomic control, 84
autonomic response, 84
central autonomic network, 83–85
functional architecture of, 86–88
Basal ganglia, 172
Basic prototype theory of emotion, 71
Beck Depression Inventory, 555
Blindsight, 347
Bodily Expressions of Emotion

Body expression, 199, 210, 211, 216
Body motion, 202–203, 204
Neural processing of, 206–207, 209, 212–213
Visual cues, 202, 203–205, 206

BOD. See also Functional MRI, 143, 144, 145
Negative BOLD, 143–144
Neural correlates, 142–143

Brainstem, 54

CBF PET, 135
Childhood antisocial behavior, 622–623
Childhood maltreatment, 625–626, 626–627

Classical conditioning, 422

Communication, 383–384

Compassion, 536–537

Component Process Model of Emotion, 73
Computed tomography, 159
Corrugator supercili, 100

Dance, 200
Default network, 76
Depression, 156

Development
Neural bases of affective processing, 613
Childhood and adolescence, 614–615
Infancy, 615–616
Neural circuitry, 617
Childhood and adolescence, 618–620
Infancy, 618

Disgust
Autonomic response to, 91–93
Facial expression of, 181–182
Facial muscle activity, 60–61
Sex differences, 598–599

Dopamine, 136, 446–448
In impulsivity, 531–532
In music, 291–293
Overview of dopaminergic system, 136–137
Reward, 446–448

Dorsal ACC, 77
Dynamic Integration Theory, 651–652

EEG, 107, 108, 110, 112
EEG—language, 315–317, 318, 319, 320–322
Electro and Magneto-Encephalography
History, 108–109
Neurophysiological underpinnings, 109–110
Recording process, 110–112
Source analysis, 120–122
Electrodermal Activity, 61, 64, 92, 93
Electromyography, 61, 62

Emotion
Definitions of, 15–17
Facial expression of, 59, 60, 62, 171, 172, 174
Temporal response to emotional faces, 185
Taxonomies of, 9
Aesthetic emotions, 12–13
Counterfactual emotions, 13
Epistemic emotions, 14–15
Make believe emotions, 13
Moral emotions, 14
Social emotions, 15–14

Emotion regulation
Facial expression of, 60
Neural correlates, 175, 180

Emotional contagion
Characteristics of, 598

Emotional memory
Age related changes, 643, 647
Confidence of, 482–483
Consolidation and retention of, 473–474
Emotional enhancement of memory, 63, 653
Mood congruent memory, 477–478
Retrieval of, 474–477

Emotionally salient cues, 334–336

Empathy
Characteristics of empathizer, 542–543
Components of, 533–536
Definition of, 534
Empathic distress, 536
For pain, 539–540
For touch, smell and taste, 543–544
Modulation of, 542–544
Relation to prosocial behavior, 538
Research on empathy, 537–538

Endocannabinoids, 582
Epigenetics, 518
Episodic memory, 63, 465–466, 468, 469–470, 472, 473, 474
Event related potentials, 109, 145
Extinction, 391–392
Extrastriate Body Area, 206, 207, 208, 210

Facial processing
Face neurons, 175
Face perception, 175, 176, 179, 180, 185, 186, 192
Face recognition, 175, 180
Facial Action Coding System, 172
FBA, 210
FDG, 135
FDG PET, 135
Fear, 59, 89, 90, 172
autonomic response to, 89–90
extinction of, 432–433, 434
fear conditioning, 420–422, 425–426
  link to trait anxiety, 565–566
fear learning, 391–392, 419, 420, 422, 423,
fearful faces, 178, 183
generalization of learned fears, 436–437
  indirect fear learning, 426–428
lesion studies of fear acquisition, 423–425
pathways in brain, 409–412
reconsolidation of fear memories, 434–436
Flashbulb memory, 491–492
fMRI, 76, 134, 140, 143, 144, 154, 155
Functional MRI
  BOLD fMRI, 140–141
  BOLD response, 141–142
  physical basis of MRI, 138–140
  studies of emotional language, 311–312, 314, 315
Fusiform, 175, 183
Fusiform body area, 206, 207, 210
Fusiform face area, 206, 207, 210
Gastric response, 99
Gaze, 184, 192
Guilt, 498
Happiness
  autonomic response to, 94–95
  sex differences, 595–596
HDR, 146
Heart rate, 93
Hemispheric asymmetry, 305–306, 307–308, 315
  reduction in older adults, 638
Hemodynamic response. See BOLD
HPA Axis, 500–510, 511, 624–625
Huntington’s disease, 181
Hypothalamus, 172
Impulsivity, 580–581, 582
Insula, 61, 99, 181
  in empathy, 540–542
  in music, 295–296
James-Lange theory, 97
Language
  as a symbol system for emotions, 304–305,
  306–307, 309
  hemodynamic studies of emotional language,
  311–312, 312–315
  lesion studies of emotional language, 309–310,
  311
  temporal dynamics in emotional language
  315–320
  processing, 315–320
  Lateral prefrontal cortex, 77
  Lateral tegmentum, 84
Laughter
  perception of, 274–275
Learning and Practice Theory, 653
Lesion studies, 154, 155, 156, 158
  lesion-symptom mapping, 160
  studies of fear acquisition, 423
  voxel based methods, 162–163
Limbic cortex, 84
Local field potentials, 143
Locus coeruleus, 84
Medial prefrontal cortex
  in old age, 536–537
Meditation, 392, 394
Medulla oblongata, 172
MEG, 107, 109, 110
Memory. See Emotional memory
Meta-awareness, 76
Microneurography, 99
Mimicry, 535. See also emotional contagion
Mind wandering, 76, 77
Mindfulness, 392, 394
Mood and Anxiety Symptoms, 555
Moral emotions, 14, 491–492, 494, 495–497,
  499–500, 501–502, 505
  moral cognition-emotion interaction, 499–501,
  502
  morality, 61
  neuroanatomical basis of, 494–495, 497
  neuroanatomical separation from selfish
  motivation, 502–503
  psychopathology of, 494
MRI, 159
MUA, 143
Multi-unit spiking activity, 143
Music and emotion
  as a tool of affective neuroscience, 280–288
  effects on dopaminergic activity, 201–203
  effects oninsula and ACC, 205–206
  electrophysiology of, 207–208
  involvement of hippocampus, 203–204, 205
  mechanisms, 288–289
  musical expectations, 296–297
  neural correlates, 289–291, 292
Neurophenomenology, 76, 77
Neuroticism, 554–556
  influence on attentional capture, 564–565
NMR, 159
Nociception, 224
  nociceptive pathways, 225–227
  non-vasoconstrictor neurons, 86
Noradrenaline, 86
Obsessive compulsive disorder, 181
Olfaction
- anatomy, 243
- link to emotion, 245–247
- odor hedonics, 253–254
- odor memory, 258–259
- olfactory hedonic plasticity, 254–255
Orbitofrontal cortex
- in face processing, 184
- role in olfaction, 245, 251–252
Oxytocin, 519–520, 521, 522, 525, 526–527
Pain
- brain imaging of, 227–228
- emotional modulation of, 222–223
- empathy for, 538–540, 540
- facial expression of, 234, 235
- neural correlates of, 232–234
- non-verbal expression of, 234–235
- self reports of, 220–230
Panic disorder, 135
Parasympathetic nervous system, 86
Perception change, 380–382, 383. See also Emotion Regulation
Perceptual processing – emotional biases, 338–339, 342
PET, 114, 146
Physical basis of MRI, 140
Piniform cortex
- role in olfaction, 243–244, 247–248
Pity, 498
Pons, 172
Positron Emission Tomography
- CBF PET, 135
- FDG PET, 135–136
- Ligand PET, 116
- physical basis of PET, 134–135
- posterior cingulate/precuneus, 76
- posterior-anterior shift in aging, 617–618
- Post-traumatic stress disorder, 148
Prefrontal cortex
- in affective processing, 612–613
- in reward processing, 451–452
Pride, 499
Prosody
- network, 266
- prosody processing, 265–266, 267, 268–269, 270, 271
- stimulus-driven activation in affective prosody, 266–267
- task dependent activation in affective prosody processing, 268–269
Pulvinar, 182
Putamen
INDEX

role in disgust, 181
Pyramidal neuron, 109
Respiration
- as objective measure, 59, 60
Reticular formation, 172
Reward
- neuroanatomy of reward processing, 444–445, 446
- role of dopamine, 446–448
- social reward, 453–454
RIII-reflex, 230, 231, 232, 233
Sadness
- autonomic response to, 93–94
- crying sadness, 93, 94
- in music, 287–288
- non-crying sadness, 93, 94
- ScanStress Test, 513–514
- Self-awareness, 392, 393
- Semantic processing, 306, 309–310
Serotonin
- overview of serotoninergic system, 137–138
- trait anxiety, 579–580
Sex differences
- affective development, 615–616
- anger, 597–598
- cognition, 603–602
- contributing factors to, 602–604, 605
- disgust, 598–599
- emotional perception and expression, 592
- fear, 592–593, 594
- happiness, 595–596
- sadness, 593–595
Skin conductance response, 84, 92, 100
response to pain, 233
Social anxiety disorder, 523–526
Social approach, 518–519, 522–524
Social memory, 522
Social rewards
- acquisition of social values, 458–459
- social interactions, 454–455, 456–457, 458
- social preferences, 453–454
Socioemotional Selectivity Theory, 650–651
Spatial frequency bands, 176, 177
SPECT (single photon emission computer tomography), 134
Spielberger State Trait Anxiety, 554
SQUID, 111
Stress, 509
- hormones, 428
- measurements of, 511–512, 513
- Montreal Imaging Stress Test, 513
<table>
<thead>
<tr>
<th>INDEX</th>
<th>667</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trier Social Stress Test, 511–513</td>
<td></td>
</tr>
<tr>
<td>psychobiology, 509–510, 511</td>
<td></td>
</tr>
<tr>
<td>psychopathology, 624–625</td>
<td></td>
</tr>
<tr>
<td>Striatum</td>
<td></td>
</tr>
<tr>
<td>activation in gaze perception, 192</td>
<td></td>
</tr>
<tr>
<td>in old age, 636–637</td>
<td></td>
</tr>
<tr>
<td>role in affective learning, 450–451</td>
<td></td>
</tr>
<tr>
<td>role in reward processing, 450–451</td>
<td></td>
</tr>
<tr>
<td>Subgenual cingulate, 85</td>
<td></td>
</tr>
<tr>
<td>Superior temporal sulcus, 175, 185, 184, 208–209</td>
<td></td>
</tr>
<tr>
<td>Supression, 391</td>
<td></td>
</tr>
<tr>
<td>Surprise, 172</td>
<td></td>
</tr>
<tr>
<td>Sympathetic nervous system, 86</td>
<td></td>
</tr>
<tr>
<td>Taylor Manifest Anxiety Scale, 555</td>
<td></td>
</tr>
<tr>
<td>Temporoparietal cortex, 76</td>
<td></td>
</tr>
<tr>
<td>Thalamus, 84</td>
<td></td>
</tr>
<tr>
<td>Thermoreceptors, 86</td>
<td></td>
</tr>
<tr>
<td>Two-dimensional model of affect, 70</td>
<td></td>
</tr>
<tr>
<td>Ultimatum Game, 62</td>
<td></td>
</tr>
<tr>
<td>Vagal activity, 92</td>
<td></td>
</tr>
<tr>
<td>Valence, 70</td>
<td></td>
</tr>
<tr>
<td>effects on encoding, 470</td>
<td></td>
</tr>
<tr>
<td>Values</td>
<td></td>
</tr>
<tr>
<td>action values, 407–409, 410</td>
<td></td>
</tr>
<tr>
<td>chosen values, 403–404, 406, 407</td>
<td></td>
</tr>
<tr>
<td>decision values, 407–409, 410</td>
<td></td>
</tr>
<tr>
<td>outcome values, 401–402, 403</td>
<td></td>
</tr>
<tr>
<td>value-based decision making, 401</td>
<td></td>
</tr>
<tr>
<td>Vasoconstrictor neurons, 86</td>
<td></td>
</tr>
<tr>
<td>Ventral ACC, 76</td>
<td></td>
</tr>
<tr>
<td>Ventral forebrain, 172</td>
<td></td>
</tr>
<tr>
<td>Ventral medial PFC, 144</td>
<td></td>
</tr>
<tr>
<td>Ventral premotor cortex, 209</td>
<td></td>
</tr>
<tr>
<td>Ventral striatum, 71</td>
<td></td>
</tr>
<tr>
<td>role in impulsivity, 580–581</td>
<td></td>
</tr>
<tr>
<td>Ventromedial prefrontal cortex, 84, 184</td>
<td></td>
</tr>
<tr>
<td>Visual cortex, 144</td>
<td></td>
</tr>
<tr>
<td>Vocalizations</td>
<td></td>
</tr>
<tr>
<td>audiovisual integration, 275</td>
<td></td>
</tr>
<tr>
<td>nonverbal vocalizations, 273–274, 275</td>
<td></td>
</tr>
<tr>
<td>Zygomaticus, 100, 172</td>
<td></td>
</tr>
</tbody>
</table>