Index

Page numbers in italics denote figures, those in bold denote tables.

abstinence 12, 15, 19, 162, 168–70, 170, 238, 275, 298
alcohol 191, 251
central effects
  amygdalar density 43
dopaminergic system 117
cocaine 247, 328, 330
cognitive performance effects 182–7 and craving 20, 22, 145
methamphetamine 43, 242, 248, 250
nicotine 143–4, 145, 188, 300
abuse see drug abuse
abuse potential 85–6
MDMA 239
neuronal systems related to 86–7, 86
acetaldehyde 303, 304
action-to-habit theory 13, 22
activation likelihood estimation 151
addiction 3, 211–12, 289
  behavioral see behavioral addictions
brain regions involved in 149
  see also individual regions
cognitive disruption 186–7
disequilibrium model 150
mesostratal system in 116–21
neural dysfunction in 218–24
neural mechanisms of 211–33
neuropharmacology 15–17
preclinical studies 9–14
and stress 218–21
  see also craving; and individual drugs
ADHD 19–20, 164, 334
alcohol
  abstinence 191, 251
  abuse 15, 92–5, 122, 251–2, 305
  cognitive disruption 183, 185
  DAT protein 288, 294–5
neuropharmacology 92
resting blood flow 94
central effects 301, 302
amygdala 134
corpus callosum 251
glutamatergic system 116, 301
hypothalamus 251
neural network function 94–5
nucleus accumbens 135
orbitofrontal cortex 301
prefrontal cortex 134, 135, 169
ventral striatum 67, 118, 135, 266, 305
ventral tegmental area 116
 craving 147
flushing response 304
metabolism 304
neuroimaging studies
  BOLD 134, 135, 146
  PET 92–4, 93
alcohol dehydrogenase 304, 304
Alcohol Use Disorders Identification Test 164
alleles 308
Asn398 307
asp40 305, 306
amphetamine 10, 15–16, 21, 117, 238–9
addiction 290–1
central effects 240, 241
blood flow 241
cortisol response 215
dopaminergic system 26, 265, 295
orbitofrontal cortex 195, 196, 324
and impulsivity 165
neuropathology 15
neuropharmacology 87
  see also psychostimulants
amygda 10, 11, 21, 108, 212, 213–14, 293
in addiction 11–12, 13, 54, 149, 219, 222
  alcohol 134
  nicotine 135
basolateral 11
in craving 137, 138, 142, 273
in cue-reactivity 116, 116
density 43
in emotional reactivity 295–8
in impulsive behavior 161
in motivation 86
in neurofeedback 334
neuropeptide Y affecting 296–7, 297
in reward processing 98
amygdalo-striatal system 12
anhedonia 146, 164
animal models 4, 24, 69, 117, 134, 150, 165, 238–9, 265, 269, 288
anisotropy 45–7, 45, 249
anterorr cingulate cortex 14, 21, 52, 54, 92, 97, 180, 212, 213, 326, 327
in addiction
  cannabis 168
  cocaine 222
disequilibrium model 150
  nicotine 135, 327
in craving 273
in cue-reactivity 116, 141
in stress 216
anxiety disorders 211, 221, 296
apparent diffusion coefficient 45, 250
appetitive motivational networks 86–7, 86
arterial spin labeling perfusion imaging see ASL perfusion imaging
ASL perfusion imaging 48–9
Asn398 allele 307
Asp40 allele 305, 306
associative learning deficit 16
attention 181, 182, 188–90
deficit see cognitive deficit
during drug administration 188–90, 190
without drug administration 181
attention deficit hyperactivity disorder see ADHD
autism 43
Barratt Impulsiveness Scale 18–19, 19, 159
behavioral addictions 3, 263–83
craving in 273–7, 274
diagnosis 264–5
mesostriatal dopaminergic system in 265–9, 266, 267
reward processing in 118, 269–72
see also individual addictions
behavioral impulsivity see impulsivity
benzoylmethylecgonine see cocaine
biofeedback see neurofeedback
blood oxygenation dependent imaging see BOLD studies
body mass index 264, 275
BOLD studies 48, 49, 115, 188, 290, 330
alcohol craving 134, 135, 146
  cannabis addiction 140
  in craving 275, 276
  in cue-reactivity 147, 148
  and emotional regulation 144–5
  in neurofeedback 334
  neurotransmitter studies 110
  nicotine addiction 52, 135, 137
psychostimulant addiction 91, 91, 92
  in reward processing 110–11, 115, 271, 274
  working memory task 192, 300
brain
  drug effects see individual drugs
  imaging see neuroimaging
  morphometric changes 301–2, 302
  symptom severity 325–6, 327
  see also individual regions
Brodmann areas 180–1, 180, 187
Cambridge Gamble Task see Cambridge Risk Task
Cambridge Risk Task 16, 194–5, 194
cannabis
  abuse 95–6
  cognitive disruption 183, 186
  neural network function 96
  neuropharmacology 95
  resting blood flow 95–6
  anterior cingulate cortex effects 168
  craving 139–40, 140, 274
  neuroimaging studies
    BOLD 140
    PET 95
catechol-O-methyltransferase see COMT gene
caudate-putamen 12
cerebellar clock 96
chemical shift imaging 55, 56, 246
CHRNA5 gene 305–6
chronic pain syndrome 217, 220
cocaine 239
abstinence 247, 328, 330
abuse 15, 20, 58
anatomic changes 240–1
cognitive deficit 182, 183, 186
executive dysfunction 323
inhibitory control in 166
neurochemical alterations 247–8
neuropathology 15–16
voxel-based morphometry 244
central effects 241–2, 333
anterior cingulate cortex 222
cerebellar neurotoxicity 244
corpus callosum 250
dorsal striatum 137
gray matter density/volume 242–4, 243
nucleus accumbens 137, 138
ventral tegmental area 54, 54
craving 137–9
cues 138
and impulsivity 165
neuroimaging studies
BOLD 91
MRI 239–40, 240
neuropharmacology 87
neurotransmitter effects
dopaminergic system 26
GABAergic system 248
glutamatergic system 248
see also psychostimulants
cognitive deficit 16, 179–207, 182–7, 241–4
abstinence effects 182–7
attention 181, 182, 188–90
decision-making 184–7, 193–7
evaluation of 300–1
frontolimbic and temporal abnormalities 241–2
pre-morbid vulnerabilities 198
study limitations 199–200
treatment implications 200
working memory 183–4, 190–3, 192
cognitive restraint 276, 277
compulsivity 13, 18, 20–5
assessment of 24–5
craving 20–2
drug-seeking behavior 12, 22–4, 23
see also craving; impulsivity
COMT gene 198, 294, 298–300, 299, 300, 337
conditioned stimulus 113, 113, 114, 118
corpus callosum 68
in addiction 47
alcohol 251
cocaine 250
methamphetamine 242, 244
section of 53
cortical surface-based analyses 42–3
cortical thickness 43
cortico-striatal-limbic circuit 212–14
in stress/addiction 223–4
see also amygdala; anterior cingulate cortex; nucleus accumbens; orbitofrontal cortex; prefrontal cortex
corticotropin-releasing hormone 214, 221
corticotropin-releasing hormone binding protein 296
Cramer-Rao lower bound 56
craving 20–2, 113, 114, 116, 133–56
abstinence effects 20, 22, 145
alcohol 134–5, 135
behavioral addictions 273–7, 274
BOLD studies 275, 276
brain regions involved in
amygdala 137, 138, 142, 273
dorsal striatum 276
hippocampus 275
orbitofrontal cortex 140
ventral striatum 142, 144, 147, 147
cannabis 139–40, 140
cocaine 137–9
and drug availability 144, 145
drug-seeking behavior 12, 22–4, 23
emotional regulation 144–5
genetic aspects 146
neural response 141–2
intervention effects 147–9, 149
modulators of 142–7
craving (Continued)

nicotine 135–7, 136
opioids 139
subjective response 141–2
see also addiction
cue-reactivity 113, 144, 195, 329
BOLD studies 147, 148
brain regions involved in 116, 135, 141, 142, 150
see also craving
cuneus 52, 139, 144, 327
DAT protein 288, 292, 294–5
decision-making 323–4

cognitive disruption 184–7, 193–7
during drug administration 197
without drug administration 194–7
see also cognitive deficit
impairment of 16
default-mode network 51, 270
defformation-based morphometry 42
delay discounting task 195–6, 196, 300, 309
depression 212, 328, 331
diffusion imaging 44–8
in addiction 46, 47–8
higher-order 46–7
tractography based on 47
diffusion tensor imaging 40, 45–6, 46
psychostimulant abuse 249–50, 249
diffusion-weighted imaging 45
diplotype 291, 296, 297, 301, 302, 308
disequilibrium model 150
disinhibition see impulsivity
dopamine dysregulation syndrome 268
dopaminergic system 15
in addiction 293
amphetamine 26, 265, 295
cocaine 26
gambling 268
psychostimulants 90
in craving 137
FMRI 25
G-protein coupled receptors 293
gene modulation 294–5
mesostriatal see mesostriatal dopamine system

in reward processing 111–15, 113–15, 294
striatal 305
dorsal striatum 266
in cocaine addiction 137
in craving 276
in cue-reactivity 116
in habit learning 12–14, 13, 272
in stress 221
dorsolateral prefrontal cortex 14, 122, 150, 180, 212–13
cortical thickness 243
in disequilibrium model 150
in nicotine addiction 298, 300
in stress 212–13
dorsomedial prefrontal cortex 137
drive see impulse drive
drug abuse 39–82, 85–104
impulsivity as risk factor 163–5
potential for 85–7, 86
psychostimulants see psychostimulant abuse
see also addiction; craving; and individual drugs
drug addiction see addiction
drug availability, and craving 144, 145
drug challenge studies 325
drug-seeking behavior 12, 22–4, 23
DSM-III-R 3
DSM-IV 4, 17
DSM-V 3
ecstasy see MDMA
EEG 5, 114, 296, 307, 334
effect size 288, 307, 308
electroencephalography see EEG
disruption computed tomography see PET; SPECT
emotional processing 296–300, 297, 299, 300
BOLD studies 144–5
brain regions involved in amygdala 295–8
hippocampus 296, 297, 299
emotional regulation 144–5
endophenotypes 223, 287
see also impulsivity
endorphins 112, 272, 305
ethanol see alcohol
event-related designs 50
event-related potentials 114–15
executive functioning 298, 323
expectancy 144, 336
and craving 145
Eysenck Impulsiveness Questionnaire 159
Fagerström Test of Nicotine Dependence 46, 47
fMRI 5, 39, 48–51
addiction studies 51, 52, 117
psychostimulant abuse 91
ASL perfusion imaging 48–9
BOLD studies see BOLD studies as diagnostic tool 321–2
methodological challenges 335–6
dopamine and brain function 25
experimental design 50
hemodynamic response function 49–50
mechanisms 50
motor response inhibition 162
phenotype studies 290–1
relapse potential 329–34
resting-state functional connectivity 51–4, 52
VASO imaging 49
food craving 273–5, 274
frontolimbic abnormalities 241–2
functional brain imaging see neuroimaging; and individual techniques
functional locus 288, 306, 308
functional magnetic resonance imaging see fMRI
G-protein coupled receptors 293
GABAergic system 5, 11
in addiction 120
cocaine 248
in reward processing 116, 119, 120
gambling, pathological 264, 271–2
 craving in 276–7
dopaminergic system in 268
gamma-aminobutyric acid see GABA genes 308
candidate 308
and disease 302
modulation of dopamine function 294–5
see also individual genes
genetic studies 287–317
addiction phenotypes 290–1
alcohol flushing response 304, 304
brain morphometric changes 301–2, 302
cognitive function 300–1
 craving 146
domains of vulnerability 289, 293–300
 reward sensitivity 289, 293–5
 stress resiliency 295–300
gene-environmental interaction 222–3
molecular-functional locus 288
pre-morbid vulnerabilities 198
protein expression 292
genetic variants 308
gene wide association studies 288, 309
genomics 288, 309
genotyping, high throughput 288, 309
glucocorticoids 215
glucocorticoid gene 223
glutamatergic system 5, 11, 12, 55, 245
in addiction 119–20, 120
alcohol 116, 301
cocaine 248
in reward processing 116
in stress 219
Go/No-Go task 17, 164, 167
g gray matter
density/volume changes 242–4, 243
prefrontal cortex 15–16
MRI 41
gyrification index 43
gyrus scale 43
habit learning 12–14, 13
haplotype 292, 294, 296, 298, 301, 305, 308
Heath, Robert 271
hedonic motivation 11, 17, 20, 87, 110, 112, 189, 220, 274
hemodynamic response function 49–50
heroin 10, 15, 18, 47, 53, 67, 96, 97, 115, 139, 167, 247, 294
central effects 301
craving 144, 146
dopamine receptor downregulation 265
high angular resolution diffusion imaging 47
Index

hippocampus 10, 11, 12, 43, 108, 118
  in addiction 54, 119, 149
  nicotine 136
  overeating 270
  in craving 142, 273, 275
  in emotional processing 296, 297, 299
  glutamatergic neurons in 119
  memory role 119, 119
  neuropeptide Y affecting 296–7, 297
  in reward processing 98, 120
  in stress 212
  5-HTT gene 297–8
hydromorphone 97
hypothalamic-pituitary-adrenal axis 242, 295–6
hypothalamus 213
  in alcohol addiction 251
  in impulsivity 161
  in motivation 86
  sexual cue reward 277
  in stress 214, 219
imaging genetics see genetic studies
  Impaired Response Inhibition and
    Salience Attribution 180
  impulse control 160, 160
  disorders of 122, 264
  impulse drive 160, 160, 164
  impulsivity 17–20, 159–76
  abstinence and relapse 168–70, 170
  and ADHD 19–20
  brain regions involved in
    hypothalamus 161
    orbitofrontal cortex 161, 163
    prefrontal cortex 17, 160, 161, 162
    ventral tegmental area 161
  in current drug users 165–8, 166, 167
  drugs affecting 165
  neurobiology 161–3, 162
  and reward processing 121–2
  as reward vs control 159–61, 160
  and risk of drug abuse 163–5
  see also impulsivity
  incentive salience 13, 110, 112–13, 113,
    134, 148, 150, 160
  incentive-sensitization theory 13
  independent component analysis 53
  inferior parietal lobe 138, 141, 147, 327
  insertion-deletion (indel) 293, 308
  intermediate phenotypes 287, 303
  interoceptive processing 324–5
  Iowa Gambling Task 16, 48, 193, 193,
    300, 309
  J-coupling 57, 58
  lateral prefrontal cortex 91, 212–13
  learning systems 293
  liking 121
  limbic-striatal circuit 212, 214–15, 215
    dysfunction 217, 219–23
    stimulation of 217, 218
  linkage disequilibrium 308
  linkage studies 308
  locus coeruleus 214
  magnetic resonance imaging see MRI
  magnetic resonance spectroscopy see MRS
  marijuana see cannabis
  Matching Familiar Figures task 168
  MDMA 48, 190, 192, 240
    abuse potential 239
    cognitive disruption 184
    neurotoxicity 239, 240, 244, 248, 294
  medial prefrontal cortex 51, 54, 108, 117,
    213, 298, 300, 333
  in cue-reactivity 116, 117, 147
  MEGA-PRESS 56–7
  Melbourne Decision-Making Questionnaire 16
  memory 137
    deficit 16, 239, 323
    drugs affecting 179
      opioids 139
      episodic 121, 270
      hippocampus in 119, 119
      working see working memory
  mesostriatal dopamine system 107–10,
    108, 109
  in addiction 116–21
    behavioral addictions 265–9, 266, 267
  in reward processing 111–15, 113–15
  methamphetamine 16, 58, 239
  abstinence 242, 248, 250
  abuse
    cognitive disruption 182, 184–5
dopaminergic system in 267
executive dysfunction 323
neurochemical alterations 248–9
central effects 242
corpus callosum 242, 244
nucleus accumbens 242
white matter changes 250
neuropharmacology 87
see also psychostimulants
3,4-methylenedioxymethamphetamine 239
methylphenidate 20, 66, 89, 165, 199
molecular-functional locus 288
monetary incentive delay task 92, 93
monoamine oxidase A gene 223
Montreal Neurological Institute (MNI) space 42
morphine 10, 97, 98
and impulsivity 165
motivation
neuroanatomical pathways 86
see also craving; reward processing
motor response inhibition 162
MRI 15, 39, 40–54
diffusion imaging 44–8
functional see fMRI
pharmacological 51
phenotype studies 290–1
principles of 40
psychostimulant abuse 239–40, 240, 244–7, 245, 246
structural see structural MRI
MRS 40, 55–9
in addiction 58–9
proton 55
spatial localization 55–6
spectral editing and 2-D imaging 56–8, 58
spectral quantification 56, 57
N-back task 300
naltrexone 147, 147, 305–6, 306
negative reinforcement 97, 221–2, 222
neural networks
alcohol abuse 94–5
methamphetamine 248–9
methamphetamine 248–9
neurocognitive impairment 16, 167, 179, 326, 331
see also cognitive deficit
neurofeedback 321, 334
neuroimaging
acute drug effects 85–104
craving 133–56
diagnostic/therapeutic potential 321–43
future of 336–8
genetic studies 287–317
methods 39–82
preclinical studies 9–35
reward processing 107–29
see also individual drugs and methods
neuropathology 10, 11, 15–17
amphetamine abuse 15
and clinical phenotype 17
cocaine abuse 15–16
see also cognitive deficit;
neurocognitive impairment
neuropeptide Y 223, 296–7, 297
neuropharmacology 15–20
neuroreceptors 61–4, 62, 63, 64, 65
binding potential 65
G-protein coupled 293
neurotoxic changes 237–59
neurotransmitter systems
dopaminergic system see dopaminergic system
GABAergic system see GABAergic system
glutamatergic system see glutamatergic system
in reward processing 107–16, 108, 109
serotonergic system 110, 239, 293, 297–8
see also individual neurotransmitters
nicotine
abstinence 143–4, 145, 170, 170, 188, 300
addiction 305–6
cognitive disruption 182, 184, 185
functional connectivity 54, 54
central effects
amygdala 135
anterior cingulate cortex 135, 327
nicotine (Continued)

dorsolateral prefrontal cortex 298, 300
hippocampus 136
prefrontal cortex 44, 46
ventral striatum 135, 137, 307
craving 135–7, 136, 143–4
abstinence/expectancy effects 145
gender-related 143
and intensity of use 143, 326
subjective 143
tactile cues 135, 136
and impulsivity 165
neuroimaging studies 44, 46
BOLD 52, 135, 137
replacement therapy 147–8
novelty 18, 86, 191
nucleus accumbens 10, 54, 86, 117, 162, 213–14, 265, 293
in addiction
alcohol 135
cocaine 137, 138
methamphetamine 242
opioids 98
in craving 92, 146
in cue-reactivity 116
dopamine in 15, 111–12
as limbic-motor interface 10–12, 11
in reward processing 108, 119
as sensory-motor gateway 112
in stress 215

obesity see overeating
obsessive-compulsive disorder 24, 25
Obsessive-Compulsive Drug Use Scale 24

opioids
abuse 15, 96–8, 251–2
neuropharmacology 96
PET imaging 96–7
resting blood flow 97–8
central effects 98
endogenous opioid system 295
nucleus accumbens 98
ventral striatum 96
ventral tegmental area 96
craving 139
orbitofrontal cortex 14, 98, 180, 241, 270
in addiction 61
alcohol 301

amphetamine 195, 196, 324
disequilibrium model 150
in craving 140
in cue-reactivity 116, 135
in impulsivity 161, 163
in stress 213, 216, 218
thickness 44
overeating 264, 269–71
dopaminergic system in 266–7, 267
food craving 273–5, 274

parahippocampus 273, 327
Parkinson’s disease 268
PET 5, 18, 39, 59–68
addiction studies 61, 61, 66–7, 66, 68, 116–17
alcohol 92–4, 93
cannabis 95
opioids 96–7
psychostimulants 87–91, 88, 90
brain activation 60–1
limitations 67, 68
neuroreceptors 61–4, 62, 63, 64, 65
output measures 64–6
principles of 59–60
reward processing 115

phenotype
clinical 17
and disease 302
imaging studies 290–1
intermediate 287, 303
planning, deficit in 16
point resolved spectroscopy 56
polymorphisms 308
functional 308
insertion-deletion 293, 308
missense 308
orthologous 308
serotonin transporter gene 223
single nucleotide (SNP) 288, 293, 308
positron emission tomography see PET
posttraumatic stress disorder 211, 217, 328
addiction in 219
pramipexole 25
pre-morbid vulnerabilities 198
preclinical studies 9–35
prefrontal cortex 12, 15, 22, 23, 57, 58, 119, 120, 120, 180
in addiction 10, 11, 43
alcohol 134, 135, 169
cognitive disruption 179–207
disequilibrium model 150
nicotine 44, 46
dorsolateral see dorsolateral prefrontal
cortex
dorsomedial 137
GABA levels 59
in impulsivity 17, 160, 161, 162
lateral 91, 212–13
medial see medial prefrontal cortex
in stress 216–17, 216
and top-down control 14
ventrolateral 118
ventromedial 121, 144
premotor cortex 137, 327
priming 269
process addictions see behavioral
addictions
promoters 308
proton MRS 55
psychostimulants 87–92, 238–9
abuse
cognitive deficit 241–6, 243
dopamine release 90
neural network function 92
neurochemical alterations 244–9
treatment 252–3
central effects
frontolimbic/temporal region
241–2
gray matter changes 242–4, 243
resting blood flow 91–2, 91
ventral striatum 91, 92, 93
white matter changes 249–50, 249
neuroimaging studies
BOLD 91, 91, 92
MRI 239–40, 240, 244–7, 245, 246
PET 87–91, 88, 90
neuropsychology 87
neurotoxicity 237–59
anatomic changes 237–8, 240–1
cerebellar 244
frontotemporal 237–8
see also individual drugs
PTSD see posttraumatic stress disorder
Q-ball imaging 47
radiotracers 63
regions of interest 41, 53
relapse 168–70, 170, 221–2, 222, 329–30
neurobiology 331–4, 332, 333
potential for 329–34
repetitive behavior disorders 268
response inhibition 16
response perseveration 24, 25
resting blood flow
alcohol abuse 94
psychostimulant abuse 91–2, 91
resting-state functional connectivity
51–4, 52
in addiction 53–4, 54
analysis 53
mechanism 51, 53
reward deficiency syndrome 294
reward processing 10, 107–29
behavioral addictions 118, 269–72
brain regions involved in
amygdala 98
hippocampus 98, 120
nucleus accumbens 108, 119
ventral striatum 108, 109, 111–12,
121, 271
ventral tegmental area 108, 119
neuroimaging studies 107–29
BOLD 110–11, 115, 271, 274
PET 115
SPECT 115
neurotransmitter systems in 107–10,
108, 109
dopaminergic system 111–15,
113–15, 294
GABAergic system 116
glutamatergic system 116
mesostriatal dopamine system
111–15, 113–15
serotoninergic system 110
sensitivity 289, 293–5
schizophrenia 43
seed-based correlation analysis 53
selective serotonin reuptake inhibitors
305
sensation-seeking 19
  see also impulsivity
sensitization hypothesis 21
serine protease tissue-plasminogen activator 214
serotonin transporter gene 223, 298 polymorphism 223
serotoninergic system 239
  G-protein coupled receptors 293
  5-HTT gene 297–8
  in reward processing 110
severity of use 325–6
Sexual Addiction Screening Test-Revised 265
sexual behaviors, compulsive 264–5
  craving in 277
sexual gratification, neural response to 271
shape analysis 244
short tandem repeats 293, 308
sign-trackers 110
signal-to-noise ratio 41
single nucleotide polymorphisms (SNPs) 288, 293
single photon emission tomography see SPECT
single volume spectroscopy 56
Snaith-Hamilton Pleasure Scale 146
South Oaks Gambling Screen 264
SPECT 59–68
  addiction studies 61, 61, 66–7, 66, 68
  psychostimulant abuse 241
  brain activation 60–1
  drug-related reward processing 115
  limitations 67
  neureceptors 61–4, 62, 63, 64, 65
  output measures 64–6
  principles of 59–60
startle response 114–15
statistical parameter mapping 42
stimulated echo acquisition mode 56
stimulus-outcome association 22
Stop Signal task 17, 122, 163, 168
  stress 211–12
  and addiction 218–20
  brain regions involved in
    amygdala 214–15, 216–17, 218, 221, 295, 296
    cortico-striatal-limbic circuit 212–14
dorsal striatum 221
dorsolateral prefrontal cortex 212–13
hippocampus 212
hypothalamus 214, 219
limbic-striatal circuit 214–15, 215
orbitofrontal cortex 213, 216, 218
prefrontal cortex 216–17, 216
ventral striatum 218, 219, 222
early life 223
genetic aspects 222–3
neural dysfunction 217–22, 218, 221–2, 222
neural mechanisms 212–18, 218
  dysfunction of 217–22, 218, 221–2, 222
  prefrontal regulation 216–17, 216
resiliency 295–300
  emotional processing 296–300, 297, 299, 300
  hypothalamic-pituitary-adrenal axis 295–6
sensitivity to 220–1
stress-related illness 217–18, 218
  and addiction 219–20
PTSD 211, 217, 218
stressors 211
striatum see individual areas
Stroop test 22–3, 23, 168, 250, 328
  brain activation in 330
structural MRI 40–4, 41
  in addiction 43–4, 44
  cortical surface-based analyses 42–3
  deformation-based morphometry 42
  region-of-interest based analysis 41
  voxel-based morphometry 42, 44
substance abuse see drug abuse
substance dependence see addiction
sulcus scale 43
supplementary motor area 184–7, 327
symptom severity 325–6
  brain activation 326, 327
Talairach space 42
tanning, excessive 264, 272
Temperament and Character Inventory-Revised 159
temporal region abnormalities 241–2
timeline follow-back latent trajectory class analysis 335–6
top-down control 14
Toronto Alexithymia Scale 43
tractography 40, 45, 47
trait-impulsivity 19
transcription 309
translation 309
treatment
cognitive deficit 200
monitoring of 326–9
neurofeedback 321, 334
outcome prediction 328–9, 329
psychostimulant abuse 252–3

unconditioned response 113
utility 324
VAPOR (VVariable Pulse power and
Optimized Relaxation Delays) 55
vascular space occupancy imaging see
VASO imaging
VASO imaging 49
ventral striatum 9, 12, 15, 18, 54, 54,
107, 196, 213, 265, 270
in addiction 43
alcohol 67, 118, 135, 266, 305
nicotine 135, 137, 307
opioids 96
psychostimulants 91, 92, 93
in craving 142, 144, 147, 147
in cue-reactivity 116, 150
in impulsivity 160, 161, 164–6, 167
in motivation 86
in reward processing 108, 109, 111–12,
121, 271
in stress 218, 219, 222
see also nucleus accumbens
ventral subiculum 113, 117
ventral tegmental area 15, 91, 108, 224,
265, 293, 29383
in addiction 10, 11, 119
alcohol 116
cope 54, 54
disequilibrium model 150
opioids 96
in impulsivity 161
in motivation 86
in reward processing 108, 119
ventrolateral prefrontal cortex 118
ventromedial prefrontal cortex 121, 144
voxel-based morphometry 42, 44, 243

cocaine abuse 244
wanting 121
Warrior/Worrier gene 298
Wernicke’s encephalopathy 251
white matter
changes in 249–50, 249
MRI 41
neuropsychological abnormalities 250
tract tracing 5
Wisconsin Card Sort task 250, 309
working memory 14, 16, 138, 141, 162,
183–4, 190–3, 192, 300
brain regions involved in 21
drugs affecting 191
nicotine 298

Yale Food Addiction Scale 264
Yale-Brown Obsessive Compulsive Scale 24