

Index

Locators in **bold type** refer to figures and tables

- acausality 106
- action-guiding legal rules 255–6
- actions, in mental disorders 126, 132
 - acting for reasons 136–9
 - being able to act otherwise 138–9
 - originating 138–9
 - primary/secondary disturbances of will 194–5
- actions, neuroscientific determinism 54–5, 58–63 *see also* freedom in action; self-attributions of actions
- active change, neuromodulation 221–2
- activity, stimulus-induced 34–5, 39–40
- actual condition of autonomy 207
- addiction 146–7, 162–3
 - animal models 149–50
 - as brain disease *see* brain disease model of addiction
 - coerced treatment 157–8
 - compulsory treatment 159–62
 - criminal responsibility 154–7, 279–81
 - impaired control of behavior 154–7
 - medication-induced 151–2
 - moral views 155–6
 - nature of 147–8
 - psychiatric treatment 159–60
 - severity of addiction 153–4
 - weak reactivity account 109–10
 - work of Hughlings Jackson 52
- ADHD (attention-deficit hyperactivity disorder) 217, 245
- adolescents, criminal responsibility 269
- afferent projections, prefrontal cortex 194–5
- agency
 - feeling of 67–8
 - self-attributions of 16–17 *see also* free will; illusion of agency
- agent-causal libertarianism 4
- Agich, G. J. 209
- akrasia* 48–9
- altruistic punishment 239–40
- Alzheimer's disease 128–9
 - deep-brain stimulation 198
 - neural circuits 192, 194–5
- American Psychiatric Association 265
- amygdala
 - impulse-control disorders 135–6
 - mood disorder 129–31
 - psychopathy 112–13
- anatomy of decision-making *see* neural circuits
- animal models, addiction 149–50
- anorexia nervosa, deep-brain stimulation 198
- antisocial personality disorder (ASPD) 51–2
- anxiety disorder 13–14, 132–4, 199, 201
- apathy, in depressive disorder 125–8
- aphasia 47
- Arendt, H. 83–4, 87–8, 90
- Aristotle 16, 44–5, 48–9, 52, 62–3, 242
- artifacts, neuroscientific 267
- Atmanspacher, H. 7
- attention, inward directed 92
- attention deficits
 - dementia and delirium 129
 - MRI studies 245
 - neuromodulation 217
 - psychopathy 113–15
- auditory hallucinations 130–1, 137
- Augustine of Hippo 232
- Australia, addiction treatment 157, 159
- autism spectrum disorders 234
- autocausation 106
- automatic behavior 14
- autonomy
 - addiction treatment 159, 161, 163
 - mental disorders 141–3
 - and neuromodulation 19, 206–10, 213–19

288 Index

- autonomy (cont.)
 and neuroscience 209–10
see also free will
- averaging, neurodata 266
- avoidance behavior
 mental disorders 133
 obsessive-compulsive disorder 94
- avolition 126, 132, 141
- back pain analogy, limitations of
 neuroscience 268
- badness vs. madness 127, 176–8 *see also*
 character flaws; mental disorders
- ball sculpture example, neuroscientific
 determinism 55
- basal ganglia 10, 195–7 *see also* subthalamic
 nucleus
- BDMA *see* brain disease model of addiction
- behavioral control, addiction 154–7
- behavioral evidence 268–9
- being-in-the-world 89 *see also*
 phenomenological perspective
- beliefs, false 129–30
- biomarkers for mental disorders 265, 274
- biopsychosocial model 12
- bipolar disorder 131–2 *see also* hypomania;
 mania
- blame 75 *see also* responsibility
- blood-oxygenation-level-dependent
 (BOLD) signal 6
- brain-based conception *see* observer vs.
 brain-based conception of free will
- brain circuits *see* neural circuits
- brain-damaged mobster example,
 neuroscientific determinism 61
- brain disease model of addiction (BDMA)
 18, 134, 142, 148–9
 animal models 149–50
 critique 152–3
 evidence for 149–52
 genetics 150–1
 neuroimaging studies 150
see also disease models
- brain–mind relation 5–6, 13–16
 folk-psychological framework 259
 mental disorders 126
 role of neuroscience in criminal
 responsibility 264
- brain–mind–action relation 264–5, 270–2
- Brain Overclaim Syndrome 252, 283–4
- brainwashing 220
- Burgess, Anthony 179
- Burns, J. M. 177
- Buszaki, G. 37–8
- butterfly effect, neuroscientific determinism
 55–7
- capacity *see* mental capacity
- Caplan, A. 161
- Cashmore, A. R. 11, 169
- causal determinism 3, 54–5, 106, 237–8
 criminal responsibility 258–62, 282–3
see also continuous reciprocal causation
- causal exclusion thesis 8
- causal mechanisms 234
- causation and correlation 6, 266
- CBT *see* cognitive behavioral therapy
- cerebellum 10
- chance, stochastic effects 236
- character flaws 18, 175–81
- character traits, neuromodulation 214–16
- Charland, L. C. 154
- childhood abuse, as mitigating factor 263
- children, mental capacity 257
- Christman, J. 208
- chronic relapsing brain disease model of
 addiction 153–4
- A Clockwork Orange* (Anthony Burgess)
 179
- closed causal nexus account of brain
 function 56–7
- coding, neural 39
- coercion 4, 14
 addiction treatment 157–8
- cognitive behavioral therapy (CBT) 11, 139
 anxiety disorder 133–4
 Tourette’s syndrome 135
- cognitive deficits 171
 addiction 134
 psychopathy 113–18
- Cohen, J. 168, 240–7, 264, 271–2
- colour phi phenomenon 59
- command hallucinations 130–1, 137, 278
- comparator model 68–9, 71–3
- compatibilism 4, 237–8, 281
 criminal responsibility 17–18, 261
 mental capacity 170–1
 psychopathy 105–11
see also incompatibilism
- compulsion 4, 14
 addiction 134, 151–2
 and criminal responsibility 263
 mitigating factors 257–8
 psychopathy 118
see also obsessive-compulsive disorder
- compulsory treatment
 addiction 159–62
 and autonomy 207
see also mental capacity
- concentration, mood disorders 131
- concept–fact iterativity 37
- concepts, observer vs. brain-based 29–31
- connectivity *see* neural circuits

- conscious deliberation *see* deliberation, conscious
- conscious mental states 15
- dementia and delirium 129
- emergence 13
- Libet experiments 9
- neuroscientific mechanism 11–12
- obsessive-compulsive disorder 83–5
- paradoxical role of conscious control 86–7, 91–6
- work of Hughlings Jackson 45–9
- consequentialism 239
- folk-psychological framework 252, 258
- moral responsibility 107–8
- see also* punishment
- constraint 4, 13–14, 40, 42–3
- continuity hypothesis, observer vs. brain-based conception of free will 34–5
- Continuous Reciprocal Causation (CRC) 53, 59
- contra-causal freedom 236, 242
- correlation and causation 6, 266
- cosmetic neurology 218–19
- counter-productive conscious control 88–9, 91–6
- crime prevention, psychopathy 117–18
- criminal law 5, 17–20
- addiction 157–8
- neuroscientific determinism 7–8
- neuroscientific mechanism 12–13
- see also* neurolaw
- criminal responsibility 20
- addiction 154–7
- doctrinal criteria for 256–9
- incompatibilist perspectives 240–7
- mental disorders 126–7
- psychopathy 118
- see also* mental capacity; neuroscience (role in criminal responsibility)
- cue integration 69–73
- cultural perspectives, responsibility and punishment 240
- daily life, effect of mental disorders 140–1
- Damasio, A. 15
- dancing, conscious control 92
- data
- averaging 266
- observer vs. brain-based conception of free will 29–31
- decision-making
- and mental disorders 127–8, 137
- modulating pathology 197–8 *see also* neurosurgery
- neural circuitry 192–7
- neuroscientific research 141–2
- deep-brain stimulation (DBS) 19, 201, 210
- modulating decision-making pathology 197–8
- mood and anxiety conditions 199
- motor circuit dysfunction 198–9
- obsessive-compulsive disorder 96–7, 216–17
- Parkinson's disease/essential tremor 196
- side effects 213–15
- definitions
- acausality 106
- autocausation 106
- autonomy 206–10
- avolition 126
- causal determinism 106
- free will 105, 138–9, 193
- substance dependence 147
- will 127
- deliberation, conscious 14
- counter-productive 91–6
- phenomenological perspective 88–91
- and unreflective action 96–9
- delirium 128–9
- delusions 129–30, 137
- of influence 71–3
- of reference (megalomania) 72
- dementia 128–9, 194–5 *see also* Alzheimer's disease
- Dennett, D. 107
- depressive disorder 13–14
- cognitive behavioral therapy 11
- deep-brain stimulation 198–9, 201
- effect on will 125–8, 131–2, 139, 141
- neural circuits 192, 195
- neurofeedback 12
- Descartes, René 11, 69, 232 *see also* dualism
- design features, brain 39–40
- desire, distinction from will 127
- determinism
- folk-psychological framework 258
- vs. indeterminism 28–9, 41–3
- moral and criminal responsibility 232–3, 254, 261–2
- observer vs. brain-based conception of free will 41–3
- see also* causal determinism; neuroscientific determinism
- Diagnostic and Statistical Manual of Mental Disorders* 265
- A different existence* (Van den Berg) 92
- direct brain modulation 220–1
- directedness *see* intentionality
- disease models
- criminal responsibility 276–7
- psychopathy 176–8, 182–3

290 Index

- disease models (cont.)
 schizophrenia 71
see also brain disease model of addiction
- distal intentions 9–10
- DNA sequencing 233–4 *see also* genetics
- doctrinal criteria *see* legal criteria
- dopamine
 addiction 149–52
 psychopathy 114
- dopamine replacement therapy (DRT)
 151–2
- double vision 238, 281
- Dreyfus, H. L. 88
- driving, and conscious control 88–9
- drug courts 158
- drug-induced addiction/impulsivity 151–2,
 198
- drug-related disorders 134 *see also* addiction
- dualism 11, 69, 232, 264, 283 *see also*
 brain–mind relation; Descartes
- Dworkin, G. 205, 208, 219
- ecological validity 266
- education (indirect brain modulation)
 220–1
- electroencephalography (EEG) 9
- embodiment *see* phenomenological
 perspective
- emergence, consciousness 13, 264
- emotional processing
 prefrontal cortex 194
 psychopathy 111–14, 116–18
- empathy 111–13, 276–7
- enabling domain, freedom in action 90
- enhancement (neuro-enhancement)
 218–19
- environmental conditions
 evolutionary perspectives 45
 vs. genetic factors in behavior 169
 socio-cultural environment 90
- epidemiological surveys, addiction
 152–4
- epiphenomenalism 10–11, 272
- epistemic factors
 double vision 238, 281
 mental disorders 138, 140
- Esquirol, E. 86
- essential tremor (ET) 196, 198–9
- European Group on Ethics and New
 Technologies 206, 213
- event-causal libertarianism 4, 7
- evolutionary perspectives, moral and
 criminal responsibility 235 *see also*
 Hughlings Jackson
- executive autonomy 209
- experience of free will/agency 66, 76–7
 comparator model 68–9
 social phenomenon 66–7
see also self-attributions of actions
- external relevance, neuroscience 258–60
- externalizing strategies, limitations of
 neuroscience 254
- exteroceptive stimuli 33–4
- extrinsic observer-related intrusions 30, 33,
 35–7
- eye movements, visual distortion paradigm
 71
- facial expressions, fear 111–13
- facts, observer vs. brain-based conception
 29–31
- false beliefs, mental disorders 129–30
- fear
 facial expressions 111–13
 neurofeedback conditioning 119
 psychopathy 113
- feeling in control 68
- feeling of agency 67–8
- Feinberg, T. 13
- Feldman, R. 254
- Felthous, A. R. 127
- Fingarette, H. 134, 141–2, 279
- first-person perspective, observer vs.
 brain-based conception of free will 42
- Fischer, J. M. 105, 108–11, 171
- fMRI (functional magnetic resonance
 imaging)
 BOLD signal 6
 brain disease model of addiction 150
 neurofeedback 119
 signal-to-noise ratio 6
- folk-psychological framework 20, 253,
 255–6, 273
 addiction 279–81
 mental disorders 277–9
 obsessive-compulsive disorder 275–6
 psychopathy 276–7
- force matching paradigm, schizophrenia 71
- forensic psychiatry 15, 17–18 *see also*
 criminal law
- forking paths metaphor 4
- Frankfurt, H. 108, 117
- free will 5
 compatibilism/incompatibilism 105–8
 definition 105
 folk-psychological framework 260–2
 and freedom in action 87–8
 mental disorders 126–7, 137–40
 primary and secondary disturbances of
 194–5

- and responsibility 16–17
- self-attributions of actions 73–6
- see also* observer vs. brain-based
 - conception of free will
- freedom in action 84, 99
- conscious deliberation 89–91
- counter-productive conscious control
 - 91–6
 - and free will 87–8
 - obsessive-compulsive disorder 96–9
 - phenomenological perspective 88–9
- fronto-temporal dementia (FTD) 194–5
- functional magnetic resonance imaging *see* fMRI
- functional neurosurgery *see* neurosurgery
- fundamental psycholegal error 258–62

- GABA (gamma-aminobutyric acid) 31–3
- Gage, Phineas 193
- gene chips (microarrays) 233–4
- gene sequencing 233–4
- genetics
 - addiction 150–1
 - vs. environmental conditions in behavior 169
 - moral and criminal responsibility 233–4, 236–7
- genome-wide association studies (GWAS), addiction 150–1
- glutamate 31–3
- Greene, J. 168, 240–7, 264, 271–2
- group data, limitations of neuroscience 267
- guidance control
 - moral responsibility 107–8
 - reasons-responsive compatibilism 109

- Haggard, P. 11
- hallucinations 130–1, 137
- hand movements, visual distortion
 - paradigm 71
- hard determinism 4, 168–70, 233
- hard incompatibilism 4, 105–8
- Heavy drinking: The myth of alcoholism as a disease* (Fingarette) 134
- Heidegger, Martin 84, 88–9
- heroin
 - brain disease model 152–3
 - compulsory treatment 161
- Heyman, G. 134, 141–2, 279
- hierarchical mesh theory account of free will 117
- hijacking of will-formation 130–1, 137, 139
- HIV/AIDS 158
- homeostasis, brain circuits 13–14

- Homer's *Odyssey* and *Iliad* 231–2
- Hughlings Jackson, John 16, 44–5, 62–3
 - akrasia 48–9
 - conscious mental states 45–9
 - impulse disorders/addiction 52
 - obsessive-compulsive disorder 51–63
 - psychopathy 51–2
 - social and moral thought 49
 - speech 47–8
- human rights-based framework, psychopathy 118
- hyper-reflectivity, counter-productive conscious control 17, 95–6
- hypnosis 220
- hypomania 131–2, 139
 - causal perspectives 262–3
 - neuroscience, role in criminal responsibility 278–9
 - see also* bipolar disorder; mania

- identity, and neuromodulation 214–16
- Iliad* (Homer) 232
- illusion of agency 9–11, 15, 169, 234
 - criminal responsibility 242, 256, 281–3
 - neuroscientific account 44
 - observer-based concept of free will 42
 - and psychopathy 104, 106
- imagination 53
- imitation learning 53 *see also* memory/learning
- impulsivity
 - deep-brain stimulation 96–7, 198–9
 - impulse disorders 52, 135–6
 - medication-induced 151–2, 198
 - and neuromodulation 214
 - psychopathy 114
- incompatibilism 4, 105–8, 232–5
 - criminal justice system 240–7
 - introspection 235–8
 - moral responsibility and punishment 238–40
 - see also* compatibilism
- independent existence (IE) requirement, brain function 57–8
- individual differences 240
- inner freedom 87–8, 90, 96
- insanity defense 140, 259–74
- insecurity, and hyper-reflectivity 95–6
- insight lack, in dementia 194–5
- instincts 89
- integration of agency cues 69–73
- intentional binding paradigm, schizophrenia 71
- intentionality
 - brain-level account 58–61
 - brain–mind relation 13

292 Index

- intentionality (cont.)
 effect of mental disorders 127–8
 inter-individual differences 240
 internal relevance, neuroscience 258–60
 internal sensory predictions, comparator model 69
 internalizing strategy, over-belief in neuroscience 254
 interoceptive stimuli, observer vs. brain-based conceptions of free will 33–4
 interpersonal factors 16
 interventions *see* treatment interventions
 intoxication 134 *see also* addiction
 intrinsic observer-related intrusions 30, 35, 37–41
 introspection 235–8
 invasive neurostimulation 210 *see also* deep-brain stimulation
 involuntary nature, addiction 154–7
 inward directed attention 92
- James, W. 4, 89
 judgment of agency 67–8
 justice, retributive. *see* retributive justice
- Kant, Immanuel 53, 57, 62–3
 kleptomania 135–6, 140, 183
- language, work of Hughlings Jackson 47–8
 Laplace, Pierre-Simon 236
 learning *see* memory/learning
 legal criteria, criminal responsibility 256–9, 268, 273
 legal implications of neuroscience 20, 258–60 *see also* criminal law; neurology
 legal rules, action-guiding 255–6
 legally coerced addiction treatment 157–8
 Leshner, A. I. 154
 lesion studies, prefrontal cortex 194
 libertarian incompatibilism 4
 libertarianism 252
 compulsory addiction treatment 159–60
 event-causal 4, 7
 free will 260
 moral models of addiction 155–6
 neuroscience, role in criminal responsibility 279
 Libet, B. 9–10, 58–61, 68, 97–8, 137
 likelihood bias 93–4
 local autonomy 208
 London taxi drivers, hippocampus 220
 Looney Tunes 60
 Lorenz, E. 55
 Luria, A. R. 16, 46
- madness vs. badness 127, 176–8 *see also* character flaws; mental disorders; psychopathy
 magnetic resonance imaging *see* fMRI; MRI
 Maibom, H. L. 176
 mania 131–2
 following deep-brain stimulation 213–15 *see also* bipolar disorder; hypomania
 McSherry, B. 178
 mechanism, neuroscientific *see* neuroscientific mechanism
 medial prefrontal cortex 195
 medical models *see* disease models
 medication-induced addiction/impulsivity 151–2, 198
 megalomania 72
 Mele, A. 9–10
 memory/learning
 evolutionary perspectives 45
 imitation 53
 prefrontal cortex 194
 work of Hughlings Jackson 46–7
mens rea (intending mind) 238, 244–5, 260
 mental capacity 18, 170–5, 181–4
 and autonomy 207–8
 character flaws 175–81
 compatibilism 170–1
 criminal justice system 241, 243
 deficit, conceptualizations 172–5
 folk-psychological framework 257
 hard determinism 168–70
 mental disorders 17–18, 125–8, 142–3, 171
 anxiety disorder 13–14, 132–4, 199, 201
 and criminal responsibility 277–9
 dementia and delirium 128–9, 194–5 *see also* Alzheimer's disease
 drug-related disorders 134 *see also* addiction
 free will 126–7, 137–40
 implications 140–1
 impulse-control disorders 135–6
 mental capacity 257
 mood disorder 131–2
 neural circuits 192–7 *see also* neurosurgery
 neuroscientific research 141–2
 psychosis 129–31, 235
 Tourette's syndrome 135–8, 140
 types of influences on will 137
see also depressive disorder; personality disorders
 Merleau-Ponty, M. 84, 88–90
 mesh theory account of free will 117
 mesolimbic brain reward system
 animal models of addiction 150

- genetics of addiction 150–1
- neuroimaging studies of human addiction 150
- methadone maintenance treatment (MMT) 158
- microarrays (gene chips) 233–4
- mind and brain *see* brain–mind relation
- mind-altering techniques 221–3 *see also* neuromodulation
- mitigating factors
 - causal perspectives 258–62
 - folk-psychological framework 257–8
 - limitations of neuroscience 264–70
- MMT (methadone maintenance treatment) 158
- M’Naghten Rule, insanity defense 140
- moderately reasons-responsive mechanism 109, 172–4
- mood changes, deep-brain stimulation 198–9
- mood disorder
 - deep-brain stimulation 199
 - effect on will 131–2
 - see also* bipolar disorder; depressive disorder
- moral bias 93–4
- moral emotion 239–40, 243–4 *see also* retributive justice
- moral model of addiction 18, 147–8, 155–6
- moral responsibility
 - and causal determinism 3
 - compatibilist and incompatibilist accounts 105–8
 - legal implications of neuroscience 20
 - mental disorders, effect on will 138
 - neuroscientific determinism 7–8
 - neuroscientific mechanism 12–13
 - psychopathy 104–5, 108–11, 115–19
 - and punishment 238–40, 244
 - self-attributions of actions 73–6
 - work of Hughlings Jackson 49
- More-or-Less distinction, observer vs. brain-based conception of free will 30
- Morse, S. J. 4–5, 111, 240–7
- motivation
 - freedom in action 91
 - mental disorders, effect on will 127–8
- motor circuit dysfunction, deep-brain stimulation 198–9
- motor cortex 10
- MRI (magnetic resonance imaging), ADHD 245 *see also* fMRI
- naltrexone, compulsory addiction treatment 161
- NAP (non-a priori requirement), brain function 57–8
- nature versus nurture 169
- nested hierarchies, brain–mind relation 13
- Netherlands, psychopathy 118–19
- neural circuits 10
 - addiction 134, 149–50
 - dementia and delirium 128–9
 - homeostasis 13–14
 - impulse-control disorders 135–6
 - mental disorders 192–7
 - mood disorder 129–31
 - neurosurgery 192–7, 199–200
 - obsessive-compulsive disorder 51–63, 97
 - psychopathy 111–15, 119
 - work of Hughlings Jackson 46
 - see also* neurosurgery
- neural mechanisms
 - folk-psychological framework 259
 - observer-based conception of free will 16
- neurodevelopmental disorder, psychopathy 117–18
- neuro-enhancement 218–19
- neurofeedback 12, 19
 - and autonomy 212–13
 - as mind-induced brain modulation 220
 - psychopathy 119
- neurolaw
 - issue of translation 258–60
 - limitations of 253–5
 - see also* criminal law; mental capacity
- neuromodulation 171, 183–4, 205–6, 223–4
 - and autonomy 19, 206–10, 213–19
 - difference between techniques 219–23
 - invasive neurostimulation 210 *see also* deep-brain stimulation
 - non-invasive brain stimulation 211–12
 - see also* neurofeedback
- neuronal stimuli, observer vs. brain-based conception of free will 33–4
- neuroscience/neuroimaging studies
 - and autonomy 209–10
 - brain disease model of addiction 150
 - limitations of 240–1, 253–5, 264–70
 - obsessive-compulsive disorder 97–9
 - see also* fMRI; MRI; PET
- neuroscience, role in criminal responsibility
 - 251–3, 283–4
 - addiction 279–81
 - agency as an illusion 281–3
 - causal perspectives 258–62
 - compulsion 263
 - dualism 264
 - folk-psychological framework 255–6, 273
 - free will 260–2
 - legal doctrinal criteria 256–9, 273

294 Index

- neuroscience, role in criminal responsibility (cont.)
 mental disorders, effect on will 277–9
 obsessive-compulsive disorder 275–6
 over-belief in neuroscience 253–5
 positive contribution of neuroscience 272–4
 predictability 263–4
 psychopathy 276–7
 radical arguments 270–2
 translation, issue of 258–60
 neuroscientific determinism 5–8, 52–4, 62–3, 254, 261–2
 actions, brain-level account 58–61
 acts and intentions syllogism 54–5
 ball sculpture example 55
 butterfly effect 55–7
 closed causal nexus account of brain function 56–7
 independent existence (IE) account of brain function 57–8
 reason 54–8
see also causal determinism; determinism
 neuroscientific mechanism 8–13, 264
 criminal responsibility 259, 270–2
 moderately reasons-responsive 109, 172–4
 observer vs. brain-based conception of free will 42–3
 neurosurgery 19, 191–2, 201–2
 modulating decision-making pathology 197–8
 neural circuits 192–7, 199–200
see also deep-brain stimulation
 neurotransmitters
 addiction 149–50
 mitigating factors 263
 observer vs. brain-based conception of free will 31–3
 psychopathy 114
 neutralizing compulsions *see* obsessive-compulsive disorder
 Nietzsche, Friedrich 53, 62
 non-a priori requirement (NAP), brain function 57–8
 non-invasive brain stimulation (NIBS) 211–12
 nucleus accumbens 199
 observer vs. brain-based conception of free will 16, 27–9, 41–3
 continuum 30–1, 32
 data/facts and concepts 29–31
 examples 31–6
 extrinsic observer-related intrusions 33, 36–7
 intrinsic observer-related intrusions 37–41
 obsessive-compulsive disorder (OCD) 14, 16–17, 83–5, 99
 basal ganglia 196–7
 conscious deliberation 89–91
 counter-productive conscious control 91–6
 deep-brain stimulation 96–7, 198–9, 201, 216–17
 deliberation vs. unreflective action 95–6
 freedom in action 87–8
 lack of freedom 85–6
 mental disorders, effect on will 132–4
 neural circuits 192
 neuroscience, role in criminal responsibility 275–6
 neuroscientific debate on free will 97–9
 paradoxical role of conscious control 86–7
 phenomenological perspective 88–9
 prefrontal cortex 195
 work of Hughlings Jackson 51–63
 O'Connor, T. 138
Odyssey (Homer) 231–2
 optimal integration of agency cues 69–73
 optogenetics 234
 orbitofrontal cortex
 addiction 150
 decision-making 193–5
 dementia and delirium 129
 mood disorder 129–31
 psychopathy 112–15
 oscillations, psychological processes 38–40
 paedophilia *see* pedophilia
 pain, neurofeedback 12
 panic disorder 13–14, 132–4, 136–9
 Parkinson's disease 12
 deep-brain stimulation 198–9, 201
 medication-induced addiction 151–2
 neural circuits 192, 196
 passive change, neuromodulation 221–2
 paternalistic compulsory treatments 148, 159, 161–3
 pathology
 and normal brain function 192
 schizophrenia 71
see also disease models
 pedophilia 177
 disease model 177
 mind-altering techniques 223
 and neuromodulation 214–15
 Penfield, W. 201–2
 person, folk-psychological concept of 257
 personal identity, and neuromodulation 214–16

- personality changes
 deep-brain stimulation 198
 and neuromodulation 214–16
- personality disorders 183
 mental disorders, effect on will 136–7
 work of Hughlings Jackson 51–2
- PET (positron emission tomography) 198
- phenomenological perspective 99
 conscious deliberation 89–91
 obsessive-compulsive disorder 84–5,
 88–9
 psychopathy 92
- pink-elephant-effect 92–4
- placebo studies, Parkinson's disease 12
- plasticity, behavioral 45, 243
- policy implementation, neuroscience-based
 274
- population sampling, limitations of
 neuroscience 266
- possible worlds analysis, mental capacity
 174
- pragmatic value 17
- praise 75
- predictability, role of neuroscience in
 criminal responsibility 263–4
- prefrontal cortex 10
 decision-making 193–5
 dementia and delirium 129
 psychopathy 113–15
see also neurosurgery; orbitofrontal cortex
- premotor cortex 10
- primary disorders of will 19, 194–5
- prison sentences 118–19, 246 *see also*
 punishment
- probabilistic gene actions 233
- probability, stochastic effects 236
- procedural independence 208
- projections, prefrontal cortex 194–5
- property dualism 10–11
- propositionising 45, 48–9
- prosthesis analogy, deep-brain stimulation
 217
- proximal intentions 9–10
- psychiatric addiction treatment 159–60
- psychiatric disorders *see* mental disorders
- psychological stress, homeostasis 13–14
- psychopathy 103–5, 115–19, 181–4
 character flaw account 175–81
 cognitive deficits 113–15
 compatibilism/incompatibilism 105–8,
 170–1
 criminal responsibility 276–7
 hyper-reflectivity 95–6
 inward directed attention 92
 lack of empathy 111–13
- lack of fear of punishment 113
- post-prison mental health treatment
 118–19
- reasons-responsiveness theory 108–11
 treatment interventions 179–80
 work of Hughlings Jackson 51–2
see also mental capacity
- psychosis 13–14, 16–17, 234
 limitations of neuroscience 270
 mental disorders, effect on will 129–31
 moral and criminal responsibility 235
 self-attributions of actions 71–3
- psychotherapy, as indirect brain modulation
 220–1 *see also* cognitive behavioral
 therapy
- punishment 20, 282
 and addiction 157
 hard determinism 168–9
 and mental capacity 174
 and moral responsibility 238–40, 244
 psychopathy 113
 role of neuroscience in criminal
 responsibility 271–2
- quantum mechanics 236
- quantum stochasticity 7
- rationality *see* reason
- Ravizza, M. 105, 108–11, 171
- reactivity to reasons, reasons-
 responsiveness theory 109–10, 117
- readiness potential 137
- reality, loss of contact with 267–9
- reason
 bypassing 222–3
 folk-psychological framework 256–7
 neuroscientific determinism 54–8
 role in mind-altering techniques 222–3
- reasons as rationalisations of behaviour 98
- reasons-responsiveness theory
 mental capacity 170–4
 and neuromodulation 222–3
 psychopathy 105, 108–11, 115–19
 role of neuroscience in criminal
 responsibility 276–7
- receptivity to reasons, reasons-
 responsiveness theory 109–10, 117
- reductive mechanism 8–13, 264 *see also*
 neuroscientific mechanism
- reference delusions (megalomania) 72
- reflexes 89
- regulative control
 moral responsibility 107–8
 reasons-responsive compatibilism 109
- rehabilitation, psychopaths 118–19

296 Index

- relevance, legal 258–60
 remission, addictive disorders 152
 repetitive rituals *see* obsessive-compulsive disorder
 replicated studies, limitations of neuroscience 266
 repression of conscious thought 92–4
 responsibility 232–5
 and free will 16–17
 introspection 235–8
 self-attributions of 67
 see also criminal responsibility; moral responsibility
 resting state, observer vs. brain-based conception of free will 34–5, 39–40
 retributive justice 239, 241–2, 246, 282
 folk-psychological framework 254, 257–8
 see also punishment
 retrospective evaluation, limitations of neuroscience 265–6
 reward sensitivity
 medial prefrontal cortex 195
 psychopathy 114
 see also mesolimbic brain reward system
Rhythms of the brain (Buszaki) 37–8
 rights-based framework, psychopathy 118
Roper v. Simmons (2005) 269
 Roskies, A. 5
 Rotter, S. 7
 rules, action-guiding 255–6
- sampling, population 266
 Sapolsky, R. M. 178
 scale conditions 138
 SCC (subcallosal cingulate) 199
 schizophrenia *see* psychosis
 secondary disorders of will 19, 194–5
 self-attributions of actions 67–8, 76–7
 comparator model 68–9
 free will 73–6
 optimal integration of agency cues 69–71
 schizophrenia 71–3
 self-attributions of free will 66–7
 self-attributions of responsibility 67
 self-sustaining prophecies, counter-productive conscious control 94
 semi-compatibilist account, reasons-responsiveness theory 109
 serving role, conscious deliberation 92
 sexual desire
 mind-altering techniques 223
 and neuromodulation 214–15
 see also pedophilia
 Shafraan, R. D. S. 93
 signal-to-noise ratio, fMRI 6
- situational factors 16
 skills 54, 88–9
 sleepiness example, free will 138
 SMA (supplementary motor area) 192–7
 social cognition, work of Hughlings Jackson 49
 social control 75
 social norms, moral responsibility 75–6
 social phenomenon, experience of free will 66–7
 socio-cultural environment *see* environmental conditions
 spatial structure, intrinsic observer-related intrusions 39
 speech, work of Hughlings Jackson 47–8
 Spence, Sean 9
 startle response, and psychopathy 113
 statistical significance, limitations of neuroscience 267
 stealing, impulse-control disorders *see* kleptomania
 stimuli, interoceptive/exteroceptive 33–4
 stimulus-induced activity 34–5, 39–40
 STN *see* subthalamic nucleus
 stochastic effects 236
 Strawson, P. F. 237–8
 stress, psychological 13–14
 striatum 114
 subcallosal cingulate (SCC) 199
 substance dependence, definition 147 *see also* addiction
 substance dualism *see* Descartes; dualism
 subthalamic nucleus (STN)
 decision-making 196–7
 deep-brain stimulation 198–9
 supplementary motor area (SMA) 192–7
 suppression of conscious thought, pink-elephant effect 92–4
 Sweden, compulsory addiction treatment 159
 Swerdlow, R. H. 177
 Swinburne, R. 11
 Switzerland, compulsory addiction treatment 159
- taxi drivers, hippocampus 220
 temporal binding, integration of agency cues 70
 temporal structure, observer-related intrusions 39
 third-person perspective, observer vs. brain-based conception of free will 42
 thought-action fusion 93–4
 thought disorders 131 *see also* mental disorders
 thought suppression, pink-elephant effect 92–4

Index

297

- threshold conditions
 - free will 138
 - limitations of neuroscience 267
- Tourette's syndrome 135–8, 140, 196
- training, as indirect brain modulation
 - 220–1 *see also* skills
- transcranial direct current stimulation (tDCS) 211
- transcranial magnetic stimulation (TMS) 211–12
- translation, issue of 253, 258–60
- trauma studies, prefrontal cortex 194 *see also* Gage (Phineas)
- treatment interventions
 - addiction treatment 157–62
 - mental disorders 126, 131–2, 140–1
 - psychopathy 179–80, 183–4
 - see also* neuromodulation; neurosurgery; psychotherapy
- trial and error learning 53
- trustfulness 91–2
- ultimatum game 239–40
- unconscious processes 9, 15, 96–9
- unconscious registration 68
- United States
 - addictive disorders in servicemen 152–3
 - legally coerced addiction treatment 157–8
 - psychopathy 118
 - United States v. Hinckley* (1981) 273
 - urge to move 68
 - utilitarianism 243
- Van den Berg, J. H. 92
- Vargas, M. 253
- ventromedial prefrontal cortex (vmPFC) 112
- virtuosity 90
- visual distortion paradigm 71
- Volkow, N. 134, 141–2, 278
- Walter, H. 126–7, 138–9
- weak reactivity, addiction 109–10
- weakness of will 132
- Wegner, D. M. 93
- will 5
 - definition 127
 - neuroscientific determinism 52–4
 - see also* free will; mental disorders (effect on will)
- wineglass at the party example 61
- wishes, distinction from will 127
- withdrawal, drug-related disorders 134
- Wittgenstein, Ludwig 47, 258, 265