

# Index

## A

Auditory novelty signal, 90–93

## B

Blue brain project, 160–162

Bottom-up, 44, 46, 54–55, 90, 136

Boundary vector cell (BVCs), 3

Brain and behavior, 30–31

## C

Clinical neuroscience, 157–169

Cognitive map, 2

Collective predictive belief, 54

Combinatorics in grid cells, 64–67

Computer science, 157–169

Computing through multiscale complexity,  
43–55

Consciousness, 92–95, 108–109, 111, 112,  
115–117, 139–141, 144–145, 148

Cortical evolution, 23–31

## D

Data mining, 161, 162, 165–166, 168

Data provenance, 163

Decision making, 81–83

Discretization of the entorhinal grid map,  
62–64

Disease signatures, 161, 163–166

Dopamine, 82, 83

Dynamics of conscious perception,  
85–95

## E

EEG. *See* Electro-encephalography (EEG)

Electro-encephalography (EEG), 108,  
133–135, 164

Embryonic development, 24

Emergence, 46, 52, 55

Entorhinal cortex, 5, 28, 59–76

## F

Federating what we know about the brain,  
157–169

Flow of information, 35–40

## G

Genome-wide association study (GWAS),  
158, 167

Gestalt, 46, 51–54

Gist extraction, 100–102

Global neuronal workspace (GNW), 93, 95

Grid cell, 3, 4, 7, 59–76

Grid spacing, 4, 62–63, 65, 69–71

## H

Head-fixed tactile decision, 36–37, 39

Hippocampus, 2, 4–8, 11–14, 24–25, 30–31,  
59–76, 102, 123, 127

Homeostasis, 24, 49, 54–55, 99–100,  
104–105

Horizontal connectivity, 27–29, 49,  
51, 53–54

Human brain project (HBP), 162, 164–167

**I**

Immersion, 45–51, 54  
 Integration of new with old memories, 101

**L**

Local field potential (LFP), 5, 7, 8, 12–13, 63, 81, 118, 123–125, 127, 130–135

**M**

Magneto-encephalography (MEG), 85–90, 92, 108–109, 135  
 Memory, 2, 6, 13–15, 30–31, 35, 40, 64, 68, 74, 100–105, 114  
     consolidation, 100–102, 104  
 Metastability, 93–95  
 Motor cortex, 35–36, 38  
 Motor planning, 35–40  
 Multivariate decoding method, 88–90, 95

**N**

Neural word, 10  
 Neuronal doctrine, 44

**O**

Oblique effect in grids, 74–76  
 Optogenetic, 36, 82, 83, 114  
 Oscillation, 5, 7, 28, 63, 127, 136

**P**

Parahippocampal system, 67–69  
 Physiological adaptation of the reptilian brain, 29–30  
 Place cell, 3, 4, 7–10, 12, 14, 59–62, 64–68, 74  
 Place field, 2–4, 6–14, 64–67, 131  
 Plasticity, 4, 9, 102, 104–105, 137  
 Prefrontal cortex, 81, 82, 90, 136  
 Premotor dynamics, 38–40

**R**

Receptive fields (RFs), 43–54, 117  
 REM sleep, 13, 99–102, 104  
 Reptilian cortex, 23–31

**S**

Segmentation of space by goals and boundaries, 1–15  
 Shearing-induced asymmetries in grid cells, 71–74  
 Simulating the brain, 161–162  
 Sleep, 6, 13, 92, 99–105, 108–109, 112, 115, 136  
     in sleep, 99–100, 102–105  
 Spatial  
     code, 5–8, 10–11, 14–15  
     map, 5, 59–76  
     navigation, 2  
     representation, 4, 67–68, 74  
 Striatum, 12, 81–83  
 Striosome, 82, 83  
 Synapse, 26, 100–105, 118, 122–126, 128, 129, 136–137, 139, 140  
 Synaptic  
     consolidation, 102  
     down-selection, 99–105  
 Synaptic homeostasis hypothesis (SHY), 104–105  
 Synaptic imprint of mesoscopic immersion, 46–51  
 Syndromic diagnosis, 159  
 System-level consolidation, 102

**T**

Tactile decision in mice, 35–40  
 Temporal decoding, 87, 88, 90–92, 94, 95  
 Temporal generalization method, 85–95  
 Theory of the brain, 159–160  
 Theta rhythm, 2, 5, 63  
 Top-down, 45–46, 52–55, 90, 92  
 Transcranial magnetic stimulation, 103–104

**V**

Vertical connectivity, 25–27  
 Visual brain, 43–55