

Index

A

acoustic paradigm, 305
action potential, 7, 89, 140
activation function, 129, 140–41, 144–45, 150, 152, 154–56, 159–60, 165, 173, 189–90, 193–94, 348
affordance(s), 12, 205, 209, 219–21, 230, 245, 255–56, 261, 306, 319, 322–23, 392
algorithm, 19, 39, 41, 43–52, 56, 63, 73, 77, 98, 100, 106, 120, 161, 179–80, 182–83
all-or-none law, 140–42, 152, 348
aperture problem, 365–66
arbitrary pattern classifier, 150
Aristotle, 24, 56, 134–35, 226
artifacts, 7, 12, 20, 42–44, 76, 89, 98, 104, 236, 320, 419
artificial intelligence, 3, 6, 10, 93, 96–97, 128, 187, 250, 261, 284, 311, 318, 335, 343, 364
artificial neural networks, 8–9, 125–26, 128–30, 132, 140–41, 148–52, 177–78, 184, 186–90, 201, 203, 207–8, 282, 286–87, 289–91
Ashby, W. Ross, 217–18, 236, 260–61, 401, 421
 on Homeostat, 218, 236–37, 260, 421
associationism, 72, 130, 133–36, 139, 148, 150, 187
 association, 130, 133, 135–36, 139, 148
automata, 20–21, 60, 65, 72–73, 89, 243–44, 337

B

behavioural objects, 305, 308
behaviourism, 2, 68, 72, 107, 132, 148, 407–10
being-in-the-world, 220, 319, 403
binary logic, 23, 25–26, 28
biologically plausible, 8, 125, 128, 137, 184, 199, 202–3, 282, 286, 333–34, 342, 403, 416
blocking, 191
Boole, G., 21, 23–26
brain imaging, 117–18, 246
Braitenberg, Valentino, 43
Braitenberg vehicle, 216–17, 242
bricolage, 228–29, 236, 422
Brooks, Rodney, 12, 222, 237, 244, 253, 321, 323, 325, 331, 338

C

Cage, John, 269–70, 294–95
Cartesian dualism, 59, 77, 122, 206–7, 255, 260–61, 354, 419
Cartesian philosophy, 20, 58–60, 89, 113, 122, 126, 133, 135, 199, 206, 243, 254, 270, 281–82
central control, 266, 271, 294, 325–26, 331–34, 337, 356
 central controller, 8, 200, 329, 331
 central executive, 121, 256, 333–34
change blindness, 221, 366
Chinese room argument, 49
Chomsky, Noam, 65, 74, 350–51, 363, 408
Chomsky hierarchy, 73
Clark, Andy, 13, 209, 226, 231, 344–45
classical conditioning, 190–93, 195
classical music, 195, 265–75, 277, 279–81, 283, 285, 287, 289, 291–95, 299, 301, 305, 307–9, 311–13, 315
classical sandwich, 11, 91–92, 147, 201, 207, 215–16, 222–25, 231, 235, 260–62, 285, 329–30, 343
coarse code, 162, 171, 184, 186, 340
 coarse coding, 184–86, 340, 356
cognitive dialectic, 399–401, 403, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423
cognitive penetrability, 110–13, 115, 119
cognitive scaffolding, 12, 205, 209, 226–27, 230, 245, 248, 262, 270, 383, 395–96, 411
cognitive vocabulary, 85, 268, 315, 323, 348, 351–56, 359, 398, 411
computer, 4–8, 21–22, 29–30, 33, 36–38, 76–78, 89–90, 93–95, 106, 199–200, 227, 327–31, 334–36, 383, 410–13
 analog computer, 30
 computable functions, 81–82
 computation, 12, 22, 77, 89, 122, 229, 260, 329–30, 335, 359, 371, 375–81, 385, 414–17, 419–20
 computer simulation, 4, 37, 55, 93–94, 97, 100, 106, 109, 119, 129, 193, 215–16, 354, 383
 digital computer, 1, 4, 6, 8, 21, 26, 29, 76–77, 89–90, 122–23, 199–200, 202, 334–35, 403, 410
conceptualization, 209–10, 226, 261–62, 303

conduit metaphor, 299–303, 308
constitution, 209–10, 262
constraint propagation, 371, 375
context-free grammar, 66–67, 69, 71
contingency, 149, 153–58
contingency theory, 149, 154–55, 157–58
credit assignment problem, 159–61
cybernetics, 4, 12, 40–41, 129, 205–6, 217, 236, 259, 261, 299, 405–7, 410

D

decision tree, 179–83
definite features, 175–77
delta rule, 131, 139, 155–56, 158, 160–61, 165, 291
 generalized delta rule, 131, 158, 160–61, 165, 291
Dennett, Daniel, 5, 47
depictive theory, 108–10, 112, 394
Descartes, R., 55, 57–61, 69, 78, 95, 113, 126, 133, 199, 206, 219–20, 235, 254, 259, 282
designation, 81, 83, 322–23, 352
dialectic, 357, 399–401, 403, 405, 407, 409, 411, 413, 415, 417–19, 421, 423
digital musical instruments, 304–6
direct perception, 12, 322–23, 353, 360
distributed memory, 136, 138, 333, 337
distributed representations, 162, 178, 285, 339, 343, 346–47, 356
dodecaphony, 293
double dissociation, 117, 223–24, 341–42
dynamical systems theory, 259–60, 350, 403

E

EDVAC, 76, 329, 331, 336–37
ELIZA, 95–97
embodiment, 12, 130, 205–6, 208, 210, 216–17, 221–22, 230, 248, 256, 258, 266, 270–71, 282, 383
emergence, 135, 139, 254, 292, 301
empiricism, 126–27, 130, 133, 148, 158–59, 162, 190, 202, 235, 403
enactive perception, 205, 209, 219, 221, 230, 392, 394
equilibrium, 155–58
error evidence, 44–45, 56, 98, 104, 106, 188, 257
evolutionary psychology, 116

extended mind, 12–13, 209, 230–32, 235, 256, 262, 321, 325
extended mind hypothesis, 12, 231–32, 235, 262

F

feature cues, 104–5, 193–94, 239, 241, 243
feature integration theory, 102–3, 380–82, 385, 388
feedback, 4, 12, 74, 131, 161, 205, 211, 216–18, 236, 244–45, 259–61, 291, 393, 405–7, 409
finite state automaton, 70–71, 73, 338
FINST, 385–87, 389–93
Flores, Fernando, 317–20, 323–24, 344
Fodor, Jerry, 47, 71–72, 114–16, 118, 150
folk psychology, 84, 398
formalist's motto, 81–83, 269, 354–55
forward engineering, 188, 206, 210, 218, 235–37, 248, 258, 262–63, 400, 420–22, 424
frame of reference problem, 235, 420
frame problem, 392
functional analysis, 56, 119–22, 235, 262, 420
functional architecture, 48–49, 256–57
function approximation, 149, 151, 348

G

generalized delta rule, 131, 158, 160–61, 165, 291
geometric cues, 104–5, 118, 193–94, 243
Gibson, James J., 12, 220–21, 258, 353, 392, 407, 415
Gold's paradox, 72, 74

H

Heidegger, Martin, 220, 317, 319
hidden unit space, 147, 158, 165–66, 171–72, 182
hierarchical, 46, 64–65, 115, 213, 222, 267, 274–78, 289
 hierarchical organization, 46, 267, 274, 276, 278
Hobbes, Thomas, 20, 59, 134
Hopfield network, 287, 341
Hume, David, 135

I

identification assumption, 410–11
identified in the limit, 73–75
illusory conjunctions, 380–81
incommensurable, 14–15
index projection hypothesis, 395–97
individuation, 385, 388–89
informant learning, 72–74
information processing, 1, 4–10, 12–13, 15–17,
19, 41, 51–56, 69–73, 122–23, 125, 127–28,
199–202, 231–32, 259, 330–32
information processing devices, 51–54, 69–70
information processing hypothesis, 7, 15–16
information processing problem, 5, 19, 41, 51,
56, 71, 77, 113, 257, 259
input-output, 8, 31–32, 34, 39–46, 48, 50, 81–82,
86, 95, 97, 106, 120, 130–32, 160, 190
input-output function, 32, 34, 82, 95, 97, 106
input-output mapping, 32, 40–46, 48, 50, 130–
32, 151, 160, 162, 190
input-output relationship, 8, 97, 188
input unit, 129–30, 138–39, 144–47, 151, 158,
160–61, 164–67, 176, 180, 189–90, 194, 207,
333, 337, 343
intentionality, 83
intentional stance, 82–85, 251, 268, 323, 352
intermediate state evidence, 44–45, 98–99, 106,
257, 424
intertheoretic reduction, 159, 178, 183
isotropic processes, 114–16

J

Jackendoff, Ray, 267, 276–79, 351
Jacquard loom, 76, 78–80, 328
James, William, 135–38
jittered density plot, 175–77

K

Kuhn, Thomas, 14–15, 417, 424

L

law of contiguity, 134–36, 190–91

law of habit, 134, 136–38
law of similarity, 134–35, 138
law of uphill analysis and downhill synthesis, 218
learning rule, 8, 131–32, 138, 141, 146, 149, 159–60,
190–91, 291, 333, 421
Leibniz, Gottfried, 50–51
and monads, 51
leverage, 206, 248, 262–63
limited order constraint, 365–66
linearly nonseparable problem, 143, 145–46
linearly separable problem, 143
linguistic competence, 351, 357
linguistic performance, 350
locality assumption, 342
local representations, 339, 341–43, 415
Locke, John, 126, 130, 135, 199, 235
logicism, 19, 21–23, 68, 81, 84–85, 133, 199, 203,
255, 266, 270, 272, 281, 334

M

machine table, 42, 45, 50, 70, 330–32
machine head, 42–43, 45, 69–71, 80, 85, 152,
330–31, 347
machine state, 42–43, 330, 332
mark of the classical, 325–26, 334–35, 337–39, 343,
345–48, 352, 354–55
mark of the cognitive, 231, 325, 346
Marr, David, 5, 51, 53, 349–52, 355, 391, 415–16
and the tri-level hypothesis, 349–52, 355
massive modularity hypothesis, 116
matching law, 153
materialism, 59, 84, 113, 122, 255–56, 354
Merleau-Ponty, Maurice, 258, 361
methodological solipsism, 11, 206–8, 255, 261,
272–73, 317
metrical structure, 276, 278, 288
Mill, John Stuart, 135, 139
Miller, George, 4, 7, 406–8, 411
mind in action, 224, 227, 229–30, 234
Mind reading, 250
minimalism, 83–84, 296–97
minimalist music, 84, 296–97, 301
modularity, 113–19, 121, 194, 288, 342
packing problem, 113–14
modules, 56, 114–16, 194, 222–24, 288, 342, 379,
381–82, 390, 393
motion correspondence, 375–78, 384, 388, 416

motion correspondence problem, 375–78, 388
multiple realization, 36–37, 86, 94, 123, 127, 199,
270
musical pitch, 288

N

natural constraint, 375, 377, 414
navigation, 104, 229, 232, 234, 240, 242
nearest neighbour principle, 376–77
neurons, 8, 89, 114, 127, 136–37, 139–40, 152, 172–
73, 202, 246–47, 253–55, 287, 312, 339, 388–89
mirror neurons, 246–47, 253–54, 312
neuronally inspired, 8, 125, 128, 199, 282
neuron doctrine, 173
Newell, Alan, 78, 82, 86, 89, 94, 98–100, 110, 151,
226, 408, 420–21
nonlinearity, 139, 142, 217, 233

O

object file, 381, 389–92
operators, 33, 75, 85, 222, 328, 336, 420

P

parallel distributed processing (PDP), 128, 342
parallel processing, 127, 129, 334–38, 418
pattern completion, 286
pattern space, 143, 145–47, 150, 165–66, 172
perceptron, 141–42, 144–47, 150–51, 154–57, 160,
162, 165–66, 189–98, 240, 284, 337, 403
perceptron paradox, 192–93
phrase marker, 66–69, 79, 276
physical symbol system, 59, 61, 72, 75, 77–85,
88–89, 93–94, 110, 113, 119, 122, 151, 323,
354–55, 405
Piaget, Jean, 225–26
and concrete operations, 225
and formal operations, 225
piano-roll representation, 278
Pinker, Steven, 74, 288
pitch, 164–65, 167, 196, 277–78, 280, 286–88, 298
pitch class representation, 164–65, 167, 278
pop out, 101–3, 380–81
pop-out effect, 101, 380

posthumanism, 206, 250
poverty of the stimulus, 362–64, 368, 384
primary memory, 120–21
primitive, 15, 27–29, 33–34, 48–49, 51–53, 61, 77,
82, 102, 106, 108–10, 112, 256, 326–27, 385–86
primitive functions, 27–28, 152, 235
principle of modular design, 331–32
probability matching, 153–55, 348
problem behaviour graph, 99–100
problem of underdetermination, 74, 273, 364, 367,
390
problem solving, 7, 10, 98–100, 123, 201, 226–28,
370–71, 375, 397, 403–4, 407, 410, 412, 414,
421
production system, 89–92, 94, 100, 118, 177–78,
180–81, 183, 202, 320–22, 324, 332, 344, 403,
419, 421
prolongational reduction, 276–77
propositional attitudes, 83–85
propositional theory, 110, 394
protocol analysis, 98, 100, 201
protocols, 98–99, 420–21
punched card installation, 327–28
Pylyshyn, Zenon, 10, 48, 51, 94, 112, 268, 323, 353–
54, 358–60, 362, 366, 368, 371, 375, 382–98
on multiple object tracking, 386–87
on seeing and visualizing, 273, 354, 358, 360,
385, 397–98, 406, 417
on subitizing, 387
and the theory of visual cognition, 360, 368,
371, 375, 382–83, 385, 387–95, 397–98

R

random access memory (RAM), 76
rationality, 84–85, 104, 122, 251, 255, 268, 270, 280,
354, 371, 398
readiness-to-hand, 319–20
recency effect, 121
recursion, 61, 63–65, 68, 133, 148, 201
Reich, Steve, 293, 296–98, 301
relative complexity evidence, 44–45, 88, 98, 100,
103, 106–8, 257, 394
relative velocity principle, 377–78
relaxation labelling, 372, 374, 413–14
relays, 30–33, 35–37, 140
reorientation, 104–6, 118, 189, 193–95, 239–43, 422
reorientation task, 104–5, 118, 189, 193–95,

239–43
 replacement, 48, 209–10, 219, 253, 262
 replacement hypothesis, 209, 219
 Rescorla-Wagner model, 155, 157–58, 191–93
 reverse engineering, 43–44, 56, 119, 121–22, 188,
 206, 210, 218, 235, 257, 262–63, 420, 422
 frame of reference problem, 235, 420
 functional analysis, 56, 119–22, 235, 262, 420
 robotics, 70, 206, 208, 222, 225, 232, 237, 239–40,
 244, 248, 254, 258, 262, 321, 325
 behaviour-based robotics, 70, 106, 206, 208,
 222, 225, 240, 244, 253–54, 256, 258, 262, 321,
 323, 338
 evolutionary robotics, 240
 new wave robotics, 240
 robotic moment, 250, 257
 robots, 4, 21, 106, 210, 216–17, 220, 233–34, 236–
 38, 240–45, 248, 250, 256–58, 321, 338, 421
 Shakey, 224–25
 sociable robotics, 248
 romanticism, 265, 280–86, 288, 290–91, 307–8, 310
 rotational error, 105–6, 118, 241–42, 422
 rule-governed symbol manipulation, 77, 93,
 132–33, 199, 259
 Ryle's regress, 46–47, 120

S

scaffolding, 12, 205, 209, 226–27, 229–32, 234, 245,
 248, 262, 270, 331, 383, 394–97, 411
 Schoenberg, Arnold, 272, 293–94
 Scribner, Sylvia, 207, 226–30, 234
 Searle, John, 5–6, 10, 17, 50, 202
 self-organizing network, 131, 288
 sense-act, 11–12, 91–92, 206, 216, 222–24, 228, 233,
 240, 242–43, 250, 254, 256, 321–23, 330–31,
 343–44
 sense-act cycle, 12, 91, 330
 sense-think-act cycle, 11–12, 58, 91, 123, 216, 222,
 225, 260–61, 269
 sense-think-act processing, 92, 228, 240, 256,
 261, 318, 323, 330, 343, 403, 410, 415
 serialism, 202, 293–94, 300
 serial processing, 76, 89, 315, 325, 335–38, 356, 381
 Sierpinski triangle, 64–65, 67
 Simon, Herbert, 5–6, 22, 86, 89, 98–100, 178, 183,
 208, 215, 218, 234–35, 318–24, 355, 408–9,
 419–21

simulation theory, 112, 251–54
 simultaneous localization and mapping (SLAM),
 242
 situatedness, 12, 205, 216, 219
 situation, 1, 13–14, 46, 72, 74, 91, 116, 128, 145–46,
 154–55, 192, 208, 252, 366, 370
 Skinner, B.F., 68, 408
 social cognitive neuroscience, 247–48, 253
 sonata-allegro form, 267–69, 291
 standard pattern associator, 137–41, 189, 333–34,
 337
 stigmergy, 90, 212, 215–16, 233, 256, 292, 297–99,
 301
 stopping rule, 182
 stored program computer, 329–31, 335, 343
 strong equivalence, 56, 97–98, 100, 106, 113, 121,
 123, 138, 188, 260, 360
 structure/process distinction, 85, 123, 130, 184,
 199–200, 347
 subsumption architecture, 222–23, 225, 233–34,
 237, 242–43, 256, 321
 subsymbolic, 8, 129, 178, 183, 285, 311
 Sudoku, 371–75, 413
 superorganism, 212–13, 232, 245
 superposition, 340–41
 supervised learning, 131, 160, 190, 291
 swarm intelligence, 232–33, 338
 swarm music, 298
 switches, 19, 30–34, 36, 48–49, 140, 199, 328–29,
 375
 synthetic psychology, 188, 210, 216, 235–36, 262,
 295, 298, 419–20

T

tabula rasa, 75, 130
 text learning, 72–74, 363
 theory of mind, 72, 84, 122, 203, 207, 229, 250–51,
 253
 theory-theory, 84, 112, 251, 323
 timbre, 275, 287
 tonality, 195–96, 286, 291–92
 Tower of Hanoi problem, 62
 training set, 131, 164–65, 176
 trigger feature, 159, 173–74
 truth tables, 23, 27–29, 32, 142
 truth value, 7, 27–28, 142–43, 153, 370
 Turing, Alan, 22, 76, 95, 330, 335

Turing equivalence, 95, 152
Turing machine, 41–43, 45, 50, 66, 69–70, 72–73,
76–77, 80, 82, 85, 90, 151–52, 330–32, 335, 344
Turing test, 60, 93, 95–98
two-valued algebra, 27
two-valued logic, 30–31, 127, 142, 152

U

Ullman, Shimon, 381–82
umwelten, 209, 219, 262
unconscious inference, 368, 377–79
universal function approximator, 151
universal machine, 22, 55, 72, 76, 81–82, 85–86, 93,
114, 127, 132, 151–52, 187, 348
unsupervised learning, 131

V

value units, 141, 165, 174–77, 180, 183, 185
verbal behaviour, 68, 79, 107
Vico, Giambattista, 235–36
visual cognition, 100–102, 358, 360, 368, 371, 375,
379–83, 385, 387–95, 397–98, 416, 419
visual routines, 101, 381–82, 389
von Neumann, John, 89, 329, 331–32, 336–37
Vygotsky, Lev, 226

W

Wiener, Norbert, 217, 407
winner-take-all network, 387–88
Winograd, Terry, 317, 323
wiretapping, 158, 173, 175
word cloud, 400–402

X

x-bar syntax, 66

Y

Yates, Frances, 396
on the art of memory, 52, 396
and the method of loci, 396–97