
Joseph LeDoux

LUNGA STORIA DI NOI STESSI
COME IL CERVELLO È DIVENTATO COSCIENTE

BIBLIOGRAFIA

- Abdul Wahab MA, de Nys R, Webster N, Whalan S (2014) Larval behaviours and their contribution to the distribution of the intertidal coral reef sponge *Carteriospongia foliascens*. PLoS One 9:e98181. PMC4031186.*
- Adamska M, Degnan BM, Green K, Zwafink C (2011) What sponges can tell us about the evolution of developmental processes. *Zoology (Jena)* 114:1-10.
- Adler J (1966) Chemotaxis in Bacteria. *Science* 153:708-716.
- Adolphs R (2013) The biology of fear. *Curr Biol* 23:R79-93.
- Adolphs R, Anderson DJ (2018) *The Neuroscience of Emotion: A New Synthesis*. Princeton, NJ: Princeton University Press.
- Alexander PA (2016) Relational thinking and relational reasoning: harnessing the power of patterning. *Npj Science of Learning* 1:16004.
- Alexander WH, Brown JW (2018) Frontal cortex function as derived from hierarchical predictive coding. *Sci Rep* 8:3843. PMC5832795.
- Alie A, Manuel M (2010) The backbone of the post-synaptic density originated in a unicellular ancestor of choanoflagellates and metazoans. *BMC Evol Biol* 10:34. PMC2824662.
- Allbritton DW (1995) When metaphors function as schemas: some cognitive effects of conceptual metaphors. *Metaphor and Symbolic Activity* 10:33-46.
- Allman JM, Tetreault NA, Hakeem AY, Manaye KF, Semendeferi K, Erwin JM, Park S, Goubert V, Hof PR (2010) The von Economo neurons in fronto-insular and anterior cingulate cortex in great apes and humans. *Brain Struct Funct* 214:495-517.
- Allport FH (1955) *Theories of Perception and the Concept of Structure: A Review and Critical Analysis with an Introduction to a Dynamic-Structural Theory of Behavior*. New York: Wiley.
- Alpert B, Johnson A, Lewis J, Raff M, Roberts K, Walter P (2002) *Molecular Biology of the Cell*. New York: Garland Science.

* PubMed Central (PMC) è una banca dati digitale gratuita, realizzata e gestita dalla National Library of Medicine (NLM) statunitense, che raccoglie letteratura scientifica peer-reviewed nel campo della biomedicina e delle scienze della vita. Per ogni articolo sono disponibili sia l'abstract sia il full text. [NDR]

- Amano S, Hori I (1996) Transdifferentiation of larval flagellated cells to choanocytes in the metamorphosis of the demosponge *haliclona permollis*. *The Biological Bulletin* 190:161-172.
- Amaral DG (1987) Memory: anatomical organization of candidate brain regions. In: *Handbook of Physiology Section 1: The Nervous System*, vol. 5, Higher Functions of the Brain (Plum, F., ed), pp 211-294 Bethesda: American Physiological Society.
- Anderson AK, Phelps EA (2002) Is the human amygdala critical for the subjective experience of emotion? Evidence of intact dispositional affect in patients with amygdala lesions. *J Cogn Neurosci* 14:709-720.
- Anderson DJ (2016) Circuit modules linking internal states and social behaviour in flies and mice. *Nat Rev Neurosci* 17:692-704.
- Anderson DJ, Adolphs R (2014) A framework for studying emotions across species. *Cell* 157:187-200.
- Andriessen K (2006) On 'intention' in the definition of suicide. *Suicide Life Threat Behav* 36:533-538.
- Angier N (2011) So much more than plasma and poison. *The New York Times*, June 6. Retrieved on Dec 2, 2011 from <https://www.nytimes.com/2011/06/07/science/07jellyfish.html>.
- Annona G, Holland ND, D'Aniello S (2015) Evolution of the notochord. *Evodevo* 6:30. PMC4595329.
- Arendt D, Tosches MA, Marlow H (2016) From nerve net to nerve ring, nerve cord and brain—evolution of the nervous system. *Nat Rev Neurosci* 17:61-72.
- Ariens Kappers CU (1921) On structural laws in the nervous system: the principles of neurobiotaxis. *Brain* 44:125-149.
- Aristotle (350 BCE) *Historia Animalium*. [Tr. it. in *Opere biologiche*. UTET, Torino 1996.]
- Arthur W (1997) *The Origin of Animal Body Parts: A Study in Evolutionary Developmental Biology*. Cambridge: Cambridge University Press.
- Avargues-Weber A, Dyer AG, Combe M, Giurfa M (2012) Simultaneous mastering of two abstract concepts by the miniature brain of bees. *Proc Natl Acad Sci USA* 109:7481-7486. PMC3358847.
- Averbeck BB, Costa VD (2017) Motivational neural circuits underlying reinforcement learning. *Nat Neurosci* 20:505-512.
- Baars BJ (1988) *A Cognitive Theory of Consciousness*. New York: Cambridge University Press.
- Baars BJ, Franklin S (2007) An architectural model of conscious and unconscious brain functions: global workspace theory and IDA. *Neural Netw* 20:955-961.
- Bacon F (1620) *Instauratio Magna*. *Novum Organum*. London: John Brill, p 68. Cited in Mandler and Kessen, 1964, *The Language of Psychology*. New York: John Wiley. [Tr. it. *La grande instaurazione. Parte seconda: Nuovo organo*. Rusconi, Milano 1998.]
- Baddeley A (1986) *Working Memory*. Oxford: Oxford University Press. [Tr. it. *La memoria di lavoro*. Raffaello Cortina, Milano 1990.]
- Baddeley A (1992) Working memory. *Science* 255:556-559.

- Baddeley A (2000) The episodic buffer: a new component of working memory? *Trends Cogn Sci* 4:417-423.
- Baddeley A (2003) Working memory: looking back and looking forward. *Nat Rev Neurosci* 4:829-839.
- Baddeley A, Hitch GJ (1974) Working memory. In: *The Psychology of Learning and Motivation*, vol. 8 (Bower, G., ed), pp 47-89 New York: Academic Press.
- Badre D, D'Esposito M (2009) Is the rostro-caudal axis of the frontal lobe hierarchical? *Nat Rev Neurosci* 10:659-669. PMC3258028.
- Baguna J, Martinez P, Paps J, Riutort M (2008) Back in time: a new systematic proposal for the Bilateria. *Philos Trans R Soc Lond B Biol Sci* 363: 1481-1491. PMC2615819.
- Bailly X, Reichert H, Hartenstein V (2013) The urbilaterian brain revisited: novel insights into old questions from new flatworm clades. *Dev Genes Evol* 223:149-157. PMC3873165.
- Baker CL, Saxe R, Tenebaum JB (2011) Bayesian theory of mind: modeling joint belief-desire attribution, <https://pdfs.semanticscholar.org/5432/263c77a0c4f9fde9659b95ccc59976eec840.pdf>, retrieved Apr 2, 2018. *CogSci*.
- Baker LR (2000) *Persons and Bodies: A Constitution View*. Cambridge: Cambridge University Press.
- Baker LR (2013) *Naturalism and the First-Person Perspective*. Oxford: Oxford University Press.
- Balleine BW, Dickinson A (1998) Goal-directed instrumental action: contingency and incentive learning and their cortical substrates. *Neuropharmacology* 37:407-419.
- Balter M (2015) Human language may have evolved to help our ancestors make tools, <https://www.sciencemag.org/news/2015/01/human-language-may-have-evolved-help-our-ancestors-make-tools>, retrieved Jun 21, 2018. *Science*.
- Baluska F, Hlavacka A, Mancuso S, Barlow PW (2006) Neurobiological view of plants and their body plan. In: *Communication in Plants* (Baluska, F. et al., eds), pp 19-35 Heidelberg, Germany: Springer Verlag Berlin-Heidelberg.
- Baluska F, Mancuso S (2009) Deep evolutionary origins of neurobiology: turning the essence of 'neural' upside-down. *Commun Integr Biol* 2:60-65.
- Baluska F, Mancuso S, Volkmann D, Barlow PW (2009) The 'root-brain' hypothesis of Charles and Francis Darwin: revival after more than 125 years. *Plant Signal Behav* 4:1121-1127. PMC2819436.
- Banaji MR, Greenwald AG (2013) *Blind Spot: Hidden Biases of Good People*. New York: Bantam Books.
- Bar M (2003) A cortical mechanism for triggering top-down facilitation in visual object recognition. *J Cogn Neurosci* 15:600-609.
- Bar M, Kassam KS, Ghuman AS, Boshyan J, Schmid AM, Dale AM, Hamalainen MS, Marinkovic K, Schacter DL, Rosen BR, Halgren E (2006) Top-down facilitation of visual recognition. *Proc Natl Acad Sci USA* 103: 449-454. PMC1326160.

- Barbas H, Garcia-Cabezas MA (2016) How the prefrontal executive got its stripes. *Curr Opin Neurobiol* 40:125-134. PMC5056826.
- Barbas H, Ghashghaei H, Dombrowski SM, Rempel-Clower NL (1999) Medial prefrontal cortices are unified by common connections with superior temporal cortices and distinguished by input from memory-related areas in the rhesus monkey. *J Comp Neurol* 410:343-367.
- Barbas H, Pandya DN (1989) Architecture and intrinsic connections of the prefrontal cortex in the rhesus monkey. *J Comp Neurol* 286:353-375.
- Barford E (2013) Ancient fish face shows roots of modern jaw, <https://www.nature.com/news/ancient-fish-face-shows-roots-of-modern-jaw-1.13823>, retrieved Jul 12, 2017. *Nature*.
- Bargh JA (1997) The automaticity of everyday life. In: *Advances in Social Cognition*, vol. 10 (Wyer, R.S., ed) Mahwah, NJ: Erlbaum.
- Barrett LF (2017a) *How Emotions Are Made*. New York: Houghton Mifflin Harcourt.
- Barrett LF (2017b) The theory of constructed emotion: an active inference account of interoception and categorization. *Soc Cogn Affect Neurosci* 12:1-23. PMC5390700.
- Barrett LF, Bar M (2009) See it with feeling: affective predictions during object perception. *Philos Trans R Soc Lond B Biol Sci* 364:1325-1334. PMC2666711.
- Barrett LF, Lindquist KA, Bliss-Moreau E, Duncan S, Gendron M, Mize J, Brennan L (2007a) Of mice and men: natural kinds of emotions in the mammalian brain? A response to Panksepp and Izard. *Perspect Psychol Sci* 2:297-311.
- Barrett LF, Mesquita B, Ochsner KN, Gross JJ (2007b) The experience of emotion. *Annu Rev Psychol* 58:373-403. PMC1934613.
- Barrett LF, Niedenthal PM, Winkielman P (eds) (2007c) *Emotion and Consciousness*. New York: Guilford Press.
- Barrett LF, Russell JA (eds) (2015) *The Psychological Construction of Emotion*. New York: Guilford Press.
- Barrett LF, Simmons WK (2015) Interoceptive predictions in the brain. *Nat Rev Neurosci* 16:419-429. PMC4731102.
- Bartlett FC (1923) *Psychology and Primitive Culture*. Cambridge: Cambridge University Press.
- Bartlett FC (1932) *Remembering: A Study in Experimental and Social Psychology*. Cambridge: Cambridge University Press.
- Bastos AM, Loonis R, Kornblith S, Lundqvist M, Miller EK (2018) Laminar recordings in frontal cortex suggest distinct layers for maintenance and control of working memory. *Proc Natl Acad Sci USA* 115:1117-1122.
- Bateson P (2005) The return of the whole organism. *J Biosci* 30:31-39.
- Baum EB (2003) *What is Thought?* Cambridge, MA: The MIT Press.
- Baym M, Lieberman TD, Kelsic ED, Chait R, Gross R, Yelin I, Kishony R (2016) Spatiotemporal microbial evolution on antibiotic landscapes. *Science* 353:1147-1151.
- Beach FA (1950) The snark was a boojum. *Amer Psychol* 5:115-124.
- Bear MF, Connors BW, Paradiso MA (2007) *Neuroscience: Exploring the Brain*. Baltimore, MD: Lippincott Williams & Wilkins.

- Beccaloni G (2008) The Darwin-Wallace paper: Darwin, Charles and Wallace, Alfred R (1858) On the tendency of species to form varieties; and on the perpetuation of varieties and species by natural means of selection. *Journal of the Proceedings of the Linnean Society: Zoology*, August 20, 1858, <https://wallacefund.info/content/1858-darwin-wallace-paper>, retrieved Jun 19, 2018.
- Beck AT (1976) *Cognitive Therapy and the Emotional Disorders*. New York: International Universities Press. [Tr. it. *Principi di terapia cognitiva. Un approccio nuovo alla cura dei disturbi affettivi*. Astrolabio, Roma 1984.]
- Beck AT, Haigh EA (2014) Advances in cognitive theory and therapy: the generic cognitive model. *Annual review of clinical psychology* 10:1-24.
- Bekoff M (2000) Animal emotions: exploring passionate natures: current interdisciplinary research provides compelling evidence that many animals experience such emotions as joy, fear, love, despair, and grief—we are not alone. *BioScience* 50:861-870.
- Bendesky A, Bargmann CI (2011) Genetic contributions to behavioural diversity at the gene-environment interface. *Nat Rev Genet* 12:809-820.
- Bengtson S (2002) Origins and early evolution of predation. *Paleontological Society Papers* 8:289-318.
- Benney KS, Henkel LA (2006) The role of free choice in memory for past decisions. *Memory* 14:1001-1011.
- Benton M (2001) Four feet on the ground. In: *The Book of Life: An Illustrated History of the Evolution of Life on Earth* (Gould, S.J., ed), pp 79-168 New York: W.W. Norton & Company.
- Beran MJ (2017) personal communication about bird and primate prospective cognition, Sept 25, 2017.
- Beran MJ, Menzel CR, Parrish AE, Perdue BM, Sayers K, Smith JD, Washburn DA (2016) Primate cognition: attention, episodic memory, prospective memory, self-control, and metacognition as examples of cognitive control in nonhuman primates. *Wiley Interdiscip Rev Cogn Sci* 7:294-316. PMC5173379.
- Berg HC (2004) *E. coli in Motion*. New York: Springer Verlag.
- Bergstrom F, Eriksson J (2014) Maintenance of non-consciously presented information engages the prefrontal cortex. *Front Hum Neurosci* 8:938. PMC4240068.
- Berridge KC (2007) The debate over dopamine's role in reward: the case for incentive salience. *Psychopharmacology (Berl)* 191:391-431.
- Berridge KC, Kringelbach ML (2015) Pleasure systems in the brain. *Neuron* 86:646-664. PMC4425246.
- Berryhill ME, Chein J, Olson IR (2011) At the intersection of attention and memory: the mechanistic role of the posterior parietal lobe in working memory. *Neuropsychologia* 49:1306-1315. PMC3078173.
- Bertini C, Cecere R, Ladavas E (2013) I am blind, but I 'see' fear. *Cortex* 49:985-993.
- Bertossi E, Aleo F, Braghittoni D, Ciaramelli E (2016) Stuck in the here and now: construction of fictitious and future experiences following ventromedial prefrontal damage. *Neuropsychologia* 81:107-116.

- Bertrand S, Escriva H (2011) Evolutionary crossroads in developmental biology: amphioxus. *Development* 138:4819-4830.
- Bettcher BM, Mungas D, Patel N, Eloffson J, Dutt S, Wynn M, Watson CL, Stephens M, Walsh CM, Kramer JH (2016) Neuroanatomical substrates of executive functions: beyond prefrontal structures. *Neuropsychologia* 85:100-109. PMC4853308.
- Binder JR, Conant LL, Humphries CJ, Fernandino L, Simons SB, Aguilar M, Desai RH (2016) Toward a brain-based componential semantic representation. *Cogn Neuropsychol* 33:130-174.
- Binder JR, Desai RH (2011) The neurobiology of semantic memory. *Trends Cogn Sci* 15:527-536. PMC3350748.
- Block J (1995) A contrarian view of the five-factor approach to personality description. *Psychol Bull* 117:187-215.
- Block N (2007) Consciousness, accessibility, and the mesh between psychology and neuroscience. *Behav Brain Sci* 30:481-499; discussion 499-548.
- Block N (2011) Perceptual consciousness overflows cognitive access. *Trends Cogn Sci* 15:567-575.
- Block N (2014) Rich conscious perception outside focal attention. *Trends Cogn Sci* 18:445-447.
- Block N, Carmel D, Fleming SM, Kentridge RW, Koch C, Lamme VA, Lau H, Rosenthal D (2014) Consciousness science: real progress and lingering misconceptions. *Trends Cogn Sci* 18:556-557.
- Boakes R (1984) From Darwin to Behaviourism: Psychology and the Minds of Animals. Cambridge: Cambridge University Press. [Tr. it. *Da Darwin al comportamentismo*. FrancoAngeli, Milano 1986.]
- Boero F, Schierwater B, Piraino S (2007) Cnidarian milestones in metazoan evolution. *Integr Comp Biol* 47:693-700.
- Bonner JT (1998) The origins of multicellularity. *Integrative Biology* 1:27-36.
- Boorman ED, Behrens TE, Woolrich MW, Rushworth MF (2009) How green is the grass on the other side? Frontopolar cortex and the evidence in favor of alternative courses of action. *Neuron* 62:733-743.
- Boring EG (1950) A History of Experimental Psychology. New York: Appleton-Century-Crofts.
- Bornemann B, Winkielman P, van der Meer E (2012) Can you feel what you do not see? Using internal feedback to detect briefly presented emotional stimuli. *International Journal of Psychophysiology* 85:116-124.
- Botzung A, Denkova E, Ciuciu P, Scheiber C, Manning L (2008) The neural bases of the constructive nature of autobiographical memories studied with a self-paced fMRI design. *Memory* 16:351-363.
- Bourlat SJ, Nielsen C, Economou AD, Telford MJ (2008) Testing the new animal phylogeny: a phylum level molecular analysis of the animal kingdom. *Mol Phylogenet Evol* 49:23-31.
- Bowerman M, Levinson SC (eds) (2001) Language Acquisition and Conceptual Development. Cambridge: Cambridge University Press.
- Bowlby J (1969) Attachment and Loss, vol. 1, Attachment. New York: Basic Books. [Tr. it. *Attaccamento e perdita*, vol. 1: *Attaccamento alla madre*. Bolati Boringhieri, Torino 1999.]

- Brandl F, Mulej Bratec S, Xie X, Wohlschlagler AM, Riedl V, Meng C, Sorg C (2017) Increased global interaction across functional brain modules during cognitive emotion regulation. *Cereb Cortex* 1-13.
- Brandl JL (2016) The puzzle of mirror self-recognition. *Phenomenology and the Cognitive Sciences* 17(2): 279-304
- Breitmeyer BG, Ogmen H (2006) *Visual Masking: Time Slices Through Conscious and Unconscious Vision*. Oxford: Oxford University Press.
- Briggs DEG (2013) Marine mayhem. *Current Biology* 23:R506-R508.
- Brodal A (1982) *Neurological Anatomy*. New York: Oxford University Press.
- Brosch T, Scherer KR, Grandjean D, Sander D (2013) The impact of emotion on perception, attention, memory, and decision-making. *Swiss Med Wkly* 143:w13786.
- Brown R (2014) Consciousness doesn't overflow cognition. *Frontiers in psychology* 5:1399. PMC4255486.
- Brown R (2015) The HOROR theory of phenomenal consciousness. *Philosophical Studies* 172:1783-1794.
- Bruner JS, Goodman CC (1947) Value and need as organizing factors in perception. *J Abnorm Psychol* 42:33-44.
- Bruner JS, Minturn AL (1955) Perceptual identification and perceptual organization. *Journal of General Psychology* 53:21-28.
- Bruner JS, Postman L (1949) On the perception of incongruity; a paradigm. *J Pers* 18:206-223.
- Brunet T, Lauri A, Arendt D (2015) Did the notochord evolve from an ancient axial muscle? The axochord hypothesis. *Bioessays* 37:836-850.
- Bryant DA, Frigaard NU (2006) Prokaryotic photosynthesis and phototrophy illuminated. *Trends Microbiol* 14:488-496.
- Bryant PJ (2002) Biodiversity and Conservation. A Hypertext Book, Chapter 2: The age of mammals, <https://darwin.bio.uci.edu/sustain/bio65/lec02/b65lec02.htm>, retrieved May 10, 2018.
- Bucci W (1997) *Psychoanalysis and Cognitive Science: A Multiple Code Theory*. New York: Guilford Press.
- Bucher D, Anderson PAV (2015) Evolution of the first nervous systems—what can we surmise? *The Journal of Experimental Biology* 218:501-503.
- Buckner C (2011) Two approaches to the distinction between cognition and 'mere association'. *International Journal for Comparative Psychology* 24:1-35.
- Buckner RL, Carroll DC (2007) Self-projection and the brain. *Trends Cogn Sci* 11:49-57.
- Bulley A, Henry JD, Suddendorf T (2017) Thinking about threats: memory and prospection in human threat management. *Conscious Cogn* 49:53-69.
- Burgess N (2014) The 2014 Nobel prize in physiology or medicine: a spatial model for cognitive neuroscience. *Neuron* 84:1120-1125. PMC4276740.
- Burgess N, O'Keefe J (2011) Models of place and grid cell firing and theta rhythmicity. *Curr Opin Neurobiol* 21:734-744. PMC3223517.
- Burgess PW, Stuss DT (2017) Fifty years of prefrontal cortex research: impact on assessment. *J Int Neuropsychol Soc* 23:755-767.
- Burghardt G (1991) Cognitive ethology and critical anthropomorphism: a snake with two heads and hognose snakes that play dead. In: *Cognitive*

- Ethology: The Minds of Other Animals. Essays in Honor of Donald R Griffin (Ristau, C.A., ed), pp 53-90 Hillsdale, NJ: Lawrence Erlbaum Associates.
- Buss DM (1995) Evolutionary psychology: a new paradigm for psychological science. *Psychological Inquiry* 6:1-30.
- Buss DM, Greiling H (1999) Adaptive individual differences. *Journal of Personality* 67:209-243.
- Buss DM, Haselton MG, Shackelford TK, Bleske AL, Wakefield JC (1998) Adaptations, exaptations, and spandrels. *Am Psychol* 53:533-548.
- Buss LW (1987) *The Evolution of Individuality*. Princeton, NJ: Princeton University Press.
- Butler AB, Hodos W (2005) *Comparative Vertebrate Neuroanatomy: Evolution and Adaptation*. Hoboken: John Wiley & Sons, Inc.
- Butler MT, Wang Q, Harshey RM (2010) Cell density and mobility protect swarming Bacteria against antibiotics. *Proc Natl Acad Sci USA* 107:3776-3781. PMC2840483.
- Butler SM, Camilli A (2005) Going against the grain: chemotaxis and infection in *Vibrio cholerae*. *Nat Rev Microbiol* 3:611-620. PMC2799996.
- Butterfield NJ (2000) *Bangiomorpha pubescens* n. gen., n. sp.: implications for the evolution of sex, multicellularity, and the Mesoproterozoic/Neoproterozoic radiation of eukaryotes. *Paleobiology* 26:386-404.
- Butterfill SA, Apperly IA (2013) How to construct a minimal theory of mind. *Mind & Language* 28:606-637.
- Buzsaki G (2011) *Rhythms of the Brain*. Oxford: Oxford University Press.
- Byrne RW, Bates LA (2006) Why are animals cognitive? *Curr Biol* 16:R445-448.
- Cabeza R, Moscovitch M (2013) Memory systems, processing modes, and components: functional neuroimaging evidence. *Perspect Psychol Sci* 8:49-55. PMC3806137.
- Cabeza R, St Jacques P (2007) Functional neuroimaging of autobiographical memory. *Trends Cogn Sci* 11:219-227.
- Cain ML, Damman H, Lue R, Yoon CK (2007) *Discover Biology*. New York: W.W. Norton & Company.
- Cairns-Smith AG (1985) *Seven Clues to the Origin of Life*. Cambridge: Cambridge University Press.
- Caldwell RL (1979) A unique form of locomotion in a stomatopod-backward somersaulting. *Nature* 282:71-73.
- Cannon JT, Vellutini BC, Smith J, 3rd, Ronquist F, Jondelius U, Hejnol A (2016) Xenacoelomorpha is the sister group to Nephrozoa. *Nature* 530:89-93.
- Cannon WB (1929) *Bodily Changes in Pain, Hunger, Fear, and Rage*. New York: Appleton.
- Cardinal RN, Parkinson JA, Hall J, Everitt BJ (2002) Emotion and motivation: the role of the amygdala, ventral striatum, and prefrontal cortex. *Neurosci Biobehav Rev* 26:321-352.
- Carlen M (2017) What constitutes the prefrontal cortex? *Science* 358:478-482.
- Carrasco M (2011) Visual attention: the past 25 years. *Vision Res* 51: 1484-1525. PMC3390154.

- Carruthers P (2000) *Phenomenal Consciousness: A Naturalistic Theory*. Cambridge: Cambridge University Press.
- Carruthers P (2008) Meta-cognition in animals: a skeptical look. *Mind and Language* 23:58-89.
- Carruthers P, Ritchie JB (2012) The emergence of metacognition: affect and uncertainty in animals. In: *Foundations of Metacognition* (Beran, M.J. et al., eds), pp 76-93 Oxford: Oxford University Press.
- Carter CS, Braver TS, Barch DM, Botvinick MM, Noll D, Cohen JD (1998) Anterior cingulate cortex, error detection, and the online monitoring of performance. *Science* 280:747-749.
- Cartmill M (2000) The problem of animal consciousness: do horses gallop in their sleep?, <https://www.ee.columbia.edu/~shane/words/animalconsciousness.htm>, retrieved Sept 17, 2018.
- Catani M, Jones DK, ffytche DH (2005) Perisylvian language networks of the human brain. *Ann Neurol* 57:8-16.
- Cavalier-Smith T (2010) Kingdoms Protozoa and Chromista and the eozoan root of the eukaryotic tree. *Biol Lett* 6:342-345.
- Cavalier-Smith T (2017) Origin of animal multicellularity: precursors, causes, consequences-the choanoflagellate/sponge transition, neurogenesis and the Cambrian explosion. *Philos Trans R Soc Lond B Biol Sci* 372. PMC5182410.
- Cavanagh P (2011) Visual cognition. *Vision Res* 51:1538-1551. PMC3204942.
- Cerullo MA (2015) The problem with phi: a critique of integrated information theory. *PLoS Comput Biol* 11:e1004286. PMC4574706.
- Chalmers D (1996) *The Conscious Mind*. New York: Oxford University Press. [Tr. it. *La mente cosciente*. McGraw-Hill, Milano 1999.]
- Chamovitz D (2013) *What a Plant Knows: A Field Guide to the Senses*. New York: Scientific American. [Tr. it. *Quel che una pianta sa. Guida ai sensi nel mondo vegetale*. Raffaello Cortina, Milano 2013.]
- Chan AM, Baker JM, Eskandar E, Schomer D, Ulbert I, Marinkovic K, Cash SS, Halgren E (2011) First-pass selectivity for semantic categories in human anteroventral temporal lobe. *J Neurosci* 31:18119-18129. PMC3286838.
- Charrier C, Joshi K, Coutinho-Budd J, Kim JE, Lambert N, de Marchena J, Jin WL, Vanderhaeghen P, Ghosh A, Sassa T, Polleux F (2012) Inhibition of SRGAP2 function by its human-specific paralogs induces neoteny during spine maturation. *Cell* 149:923-935. PMC3357949.
- Cheeseman JF, Millar CD, Greggers U, Lehmann K, Pawley MD, Gallistel CR, Warman GR, Menzel R (2014) Way-finding in displaced clock-shifted bees proves bees use a cognitive map. *Proc Natl Acad Sci USA* 111:8949-8954. PMC4066533.
- Chen J-Y, Bottjer DJ, Oliveri P, Dornbos SQ, Gao F, Ruffins S, Chi H, Li CW, Davidson EH (2004) Small bilaterian fossils from 40 to 55 million years before the cambrian. *Science* 305:218-222.
- Chen J-Y, Huang D-Y, Li C-W (1999) An early Cambrian craniate-like chordate. *Nature* 402:518-522.
- Cheung A, Collett M, Collett TS, Dewar A, Dyer F, Graham P, Mangan M, Narendra A, Philippides A, Sturzl W, Webb B, Wystrach A, Zeil J (2014)

- Still no convincing evidence for cognitive map use by honeybees. *Proc Natl Acad Sci USA* 111:E4396-4397. PMC4210289.
- Chomsky N (1973) Introduction. In: *Language and Cognition* (Schaff, A., ed) New York: McGraw-Hill. [Tr. it. 'Introduzione'. In Schaff, A., *Linguaggio e conoscenza*. Editori Riuniti, Roma 1973.]
- Christophel TB, Klink PC, Spitzer B, Roelfsema PR, Haynes JD (2017) The distributed nature of working memory. *Trends Cogn Sci* 21:111-124.
- Chun MM, Jiang Y (2003) Implicit, long-term spatial contextual memory. *J Exp Psychol Learn Mem Cogn* 29:224-234.
- Chun MM, Phelps EA (1999) Memory deficits for implicit contextual information in amnesic subjects with hippocampal damage. *Nat Neurosci* 2:844-847.
- Churchland PM (1988a) Folk psychology and the explanation of human behavior. *Proceedings of the Aristotelian Society* 62:209-221.
- Churchland PM (1988b) *Matter and Consciousness: A Contemporary Introduction to the Philosophy of Mind*, revised edition. Cambridge, MA: The MIT Press.
- Clack JA (2005) Getting a leg up on land. *Sci Am* 293:100-107.
- Clark A (1998) *Being There*. Cambridge, MA: The MIT Press. [Tr. it. *Dare corpo alla mente*. McGraw-Hill, Milano 1999.]
- Clark A, Chalmers DJ (1998) The extended mind. *Analysis* 58:7-19.
- Clarke A, Taylor KI, Devereux B, Randall B, Tyler LK (2013) From perception to conception: how meaningful objects are processed over time. *Cereb Cortex* 23:187-197. PMC3619663.
- Clarke A, Tyler LK (2015) Understanding what we see: how we derive meaning from vision. *Trends Cogn Sci* 19:677-687. PMC4636429.
- Clayton NS, Dickinson A (1998) Episodic-like memory during cache recovery by scrub jays. *Nature* 395:272-274.
- Clayton NS, Dickinson A (2010) Mental time travel: can animals recall the past and plan for the future? A2 - Breed, Michael D. In: *Encyclopedia of Animal Behavior* (Moore, J., ed), pp 438-442 Oxford: Academic Press.
- Clayton NS, Griffiths DP, Emery NJ, Dickinson A (2001) Elements of episodic-like memory in animals. *Philos Trans R Soc Lond B Biol Sci* 356: 1483-1491. PMC1088530.
- Cleeremans A (2008) Consciousness: the radical plasticity thesis. *Prog Brain Res* 168:19-33.
- Cleeremans A (2011) The radical plasticity thesis: how the brain learns to be conscious. *Frontiers in psychology* 2:86. PMC3110382.
- Clore GL, Ortony A (2013) Psychological construction in the OCC model of emotion. *Emotion Review* 5:335-343.
- Coan JA (2010) Emergent ghosts of the emotion machine. *Emotion Review* 2:274-285.
- Coan JA, Gonzalez MZ (2015) Emotions as emergent variables. In: *The Psychological Construction of Emotion* (Barrett, L.F., Russell, J.A., eds), pp 209-228 New York: The Guilford Press.
- Cohen MA, Dennett DC, Kanwisher N (2016) What is the bandwidth of perceptual experience? *Trends Cogn Sci* 20:324-335. PMC4898652.

- Cohen NJ, Squire L (1980) Preserved learning and retention of pattern-analyzing skill in amnesia: dissociation of knowing how and knowing that. *Science* 210:207-209.
- Collins AG, Cartwright P, McFadden CS, Schierwater B (2005) Phylogenetic context and basal metazoan model systems. *Integr Comp Biol* 45:585-594.
- Colwill RM, Rescorla RA (1990) Effect of reinforcer devaluation on discriminative control of instrumental behavior. *J Exp Psychol Anim Behav Process* 16:40-47.
- Conaco C, Bassett DS, Zhou H, Arcila ML, Degnan SM, Degnan BM, Kosik KS (2012) Functionalization of a protosynaptic gene expression network. *Proc Natl Acad Sci USA* 109 Suppl 1:10612-10618. PMC3386881.
- Conway MA (2009) Episodic memories. *Neuropsychologia* 47:2305-2313.
- Conway MA, Pleydell-Pearce CW (2000) The construction of autobiographical memories in the self-memory system. *Psychological Review* 107:261-288.
- Conway Morris S (2006) Darwin's dilemma: the realities of the Cambrian 'explosion'. *Philosophical Transactions of the Royal Society, Series B, Biological Sciences* 361:1069-1083.
- Cooney JW, Gazzaniga MS (2003) Neurological disorders and the structure of human consciousness. *Trends Cogn Sci* 7:161-165.
- Corballis MC (2017) Language evolution: a changing perspective. *Trends Cogn Sci* 21:229-236.
- Corkin S (1968) Acquisition of motor skill after bilateral medial temporal lobe excision. *Neuropsychologia* 6:255-265.
- Correia SP, Dickinson A, Clayton NS (2007) Western scrub-jays anticipate future needs independently of their current motivational state. *Curr Biol* 17:856-861.
- Costandi M (2006) The role of Hox genes in development, <https://neurophilosophy.wordpress.com/2006/08/09/the-role-of-Hox-genes-in-development/>, retrieved Apr 15, 2017.
- Cowan N (1988) Evolving conceptions of memory storage, selective attention, and their mutual constraints within the human information-processing system. *Psychol Bull* 104:163-191.
- Cowan N (2001) The magical number 4 in short-term memory: a reconsideration of mental storage capacity. *Behav Brain Sci* 24:87-114; discussion 114-185.
- Craig AD (2003) Interoception: the sense of the physiological condition of the body. *Curr Opin Neurobiol* 13:500-505.
- Craig AD (2009) How do you feel—now? The anterior insula and human awareness. *Nat Rev Neurosci* 10:59-70.
- Crick F, Koch C (1995) Are we aware of neural activity in primary visual cortex? *Nature* 375:121-123.
- Crisp A, Boschetti C, Perry M, Tunnacliffe A, Micklem G (2015) Expression of multiple horizontally acquired genes is a hallmark of both vertebrate and invertebrate genomes. *Genome Biol* 16:50. PMC4358723.
- Critchley HD, Wiens S, Rotshtein P, Ohman A, Dolan RJ (2004) Neural systems supporting interoceptive awareness. *Nat Neurosci* 7:189-195.
- Cronin L, Walker SI (2016) Origin of life. Beyond prebiotic chemistry. *Science* 352:1174-1175.

- Curtis CE, Lee D (2010) Beyond working memory: the role of persistent activity in decision making. *Trends Cogn Sci* 14:216-222. PMC2883296.
- Custers R, Aarts H (2010) The unconscious will: how the pursuit of goals operates outside of conscious awareness. *Science* 329:47-50.
- Daeschler EB, Shubin NH, Jenkins FA, Jr. (2006) A Devonian tetrapod-like fish and the evolution of the tetrapod body plan. *Nature* 440:757-763.
- Damasio A (1989) The brain binds entities and events by multiregional activation from convergence zones. *Neural Computation* 1:123-132.
- Damasio A (1994) *Descartes' Error: Emotion, Reason, and the Human Brain*. New York: Gosset/Putnam. [Tr. it. *L'errore di Cartesio. Emozione, ragione e cervello umano*. Adelphi, Milano 1995.]
- Damasio A (1999) *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*. New York: Harcourt Brace. [Tr. it. *Emozione e coscienza*. Adelphi, Milano 2003.]
- Damasio A (2010) *Self Comes to Mind: Constructing the Conscious Brain*. New York: Pantheon Books. [Tr. it. *Il sé viene alla mente. La costruzione del cervello cosciente*. Adelphi, Milano 2012.]
- Damasio A (2018) *The Strange Order of Things*. New York: Pantheon Books. [Tr. it. *Lo strano ordine delle cose. La vita, i sentimenti e la creazione della cultura*. Adelphi, Milano 2018.]
- Damasio A, Carvalho GB (2013) The nature of feelings: evolutionary and neurobiological origins. *Nat Rev Neurosci* 14:143-152.
- Damasio H, Grabowski T, Frank R, Galaburda AM, Damasio AR (1994) The return of Phineas Gage: clues about the brain from the skull of a famous patient. *Science* 264:1102-1105.
- Damper PD, Epstein W (1981) Role of the membrane potential in bacterial resistance to aminoglycoside antibiotics. *Antimicrob Agents Chemother* 20:803-808. PMC181802.
- Damuth J, Heisler IL (1988) Alternative formulations of multilevel selection. *Biology and Philosophy* 3:407-430.
- Daneshmandi S, Izadikhah Z, Wilson L-A, Forooshani S (2018) Emotional schema therapy improves emotion regulation in individuals with a history of child abuse and neglect. *International Journal of Cognitive Therapy*.
- Danziger K (1997) *Naming the Mind: How Psychology Found Its Language*. London: Sage Publications, Ltd.
- Darwin C (1859) *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle of Life*. London: John Murray, Albemarle Street. [Tr. it. *L'origine delle specie*. Bollati Boringhieri, Torino 2011.]
- Darwin C (1871) *The Descent of Man, and Selection in Relation to Sex*. London: John Murray, Albemarle Street. [Tr. it. *L'origine dell'uomo e la selezione sessuale*. Newton Compton, Roma 2010.]
- Darwin C (1872) *The Expression of the Emotions in Man and Animals*. London: Fontana Press. [Tr. it. *L'espressione delle emozioni nell'uomo e negli animali*. Bollati Boringhieri, Torino 2012.]
- Darwin C (1880) *The Power of Movement in Plants*. London: John Murray. [Tr. it. *Il potere di movimento nelle piante*. Unione tipografico-editrice, To-

- rino 1884. Disponibile all'indirizzo web https://www.liberliber.it/mediateca/libri/d/darwin/il_potere_di_movimento_delle_piante/pdf/il_pot.pdf.]
- Darwin C (1887) Letter to Joseph Hooker. In: *The Life and Letters of Charles Darwin, including an autobiographical chapter*, vol. 3 (Darwin, F., ed), p 18 London: John Murray.
- Daw ND (2014) Advanced reinforcement learning. In: *Neuroeconomics: Decision Making and the Brain* (Glimcher, P., Fehr, E., eds), pp 299-320 San Diego: Elsevier.
- Daw ND (2015) Of goals and habits. *Proc Natl Acad Sci USA* 112:13749-13750. PMC4653153.
- Daw ND, Niv Y, Dayan P (2005) Uncertainty-based competition between prefrontal and dorsolateral striatal systems for behavioral control. *Nat Neurosci* 8:1704-1711.
- Daw ND, O'Doherty JP, Dayan P, Seymour B, Dolan RJ (2006) Cortical substrates for exploratory decisions in humans. *Nature* 441:876-879. PMC2635947.
- Dawkins MS (2012) *Why Animals Matter: Animal Consciousness, Animal Welfare, and Human Well-Being*. Oxford: Oxford University Press.
- Dawkins MS (2017) Animal welfare with and without consciousness. *Journal of Zoology* 301:1-10.
- Dawkins R (1976) *The Selfish Gene*. New York: Oxford University Press. [Tr. it. *Il gene egoista. La parte immortale di ogni essere vivente*. Mondadori, Milano 2017.]
- Dayan P (2008) Simple substrates for complex cognition. *Front Neurosci* 2:255-263. PMC2622746.
- Dayan P, Watkins CJCH (2006) Reinforcement learning: a computational perspective. In: *Encyclopedia of Cognitive Science*; John Wiley & Sons, Ltd.
- Dayel MJ, Alegado RA, Fairclough SR, Levin TC, Nichols SA, McDonald K, King N (2011) Cell differentiation and morphogenesis in the colony-forming choanoflagellate *Salpingoeca rosetta*. *Dev Biol* 357:73-82. PMC3156392.
- de Paula WB, Agip AN, Missirlis F, Ashworth R, Vizcay-Barrena G, Lucas CH, Allen JF (2013) Female and male gamete mitochondria are distinct and complementary in transcription, structure, and genome function. *Genome Biol Evol* 5:1969-1977. PMC3814205.
- de Paula WB, Lucas CH, Agip AN, Vizcay-Barrena G, Allen JF (2013) Energy, ageing, fidelity and sex: oocyte mitochondrial DNA as a protected genetic template. *Philos Trans R Soc Lond B Biol Sci* 368:20120263. PMC3685464.
- de Sousa R (2013) Emotion, <https://plato.stanford.edu/entries/emotion/>, retrieved July 9, 2018. Stanford Encyclopedia of Philosophy.
- de Waal F (1999) Anthropomorphism and anthropodenial: consistency in our thinking about humans and other animals. *Philosophical Topics* 27:255-280.
- de Waal F (2006) *Primates and Philosophers: How Morality Evolved*. Princeton: Princeton University Press. [Tr. it. *Primate e filosofi. Evoluzione e moralità*. Garzanti, Milano 2008.]

- de Waal F (2016) What I learned from tickling apes. The New York Times New York: The New York Times Company.
- Decker JH, Otto AR, Daw ND, Hartley CA (2016) From creatures of habit to goal-directed learners: tracking the developmental emergence of model-based reinforcement learning. *Psychological Science* 27:848-858. PMC4899156.
- Dehaene S (2014) *Consciousness and the Brain: Deciphering How the Brain Codes Our Thoughts*. New York: Penguin Books. [Tr. it. *Coscienza e cervello. Come i neuroni codificano il pensiero*. Raffaello Cortina, Milano 2014.]
- Dehaene S, Changeux JP (2011) Experimental and theoretical approaches to conscious processing. *Neuron* 70:200-227.
- Dehaene S, Changeux JP, Naccache L, Sackur J, Sergent C (2006) Conscious, preconscious, and subliminal processing: a testable taxonomy. *Trends Cogn Sci* 10:204-211.
- Dehaene S, Lau H, Kouider S (2017) What is consciousness, and could machines have it? *Science* 358:486-492.
- Delsuc F, Brinkmann H, Chourrout D, Philippe H (2006) Tunicates and not cephalochordates are the closest living relatives of vertebrates. *Nature* 439:965-968.
- Dennett DC (1991) *Consciousness Explained*. Boston: Little, Brown and Company. [Tr. it. *Coscienza. Che cosa è*. Laterza, Roma-Bari 2012.]
- Dennett DC (1992) The self as a center of narrative gravity. In: *Self and Consciousness: Multiple Perspectives* (Kessel, F. et al., eds) Hillsdale, NJ: Erlbaum.
- Dennett DC (1996a) *Kinds of Minds: Toward an Understanding of Consciousness*. New York: Basic Books. [Tr. it. *La mente e le menti. Verso una comprensione della coscienza*. Rizzoli, Milano 2006.]
- Dennett DC (1996b) *Darwin's Dangerous Idea*. New York: Touchstone. [Tr. it. *L'idea pericolosa di Darwin. L'evoluzione e i significati della vita*. Bollati Boringhieri, Torino 2015.]
- Dennett DC (2017) *From Bacteria to Bach and Back: The Evolution of Minds*. New York: W.W. Norton. [Tr. it. *Dai batteri a Bach. Come evolve la mente*. Raffaello Cortina, Milano 2018.]
- Dennis MY, Nuttle X, Sudmant PH, Antonacci F, Graves TA, Nefedov M, Rosenfeld JA, Sajjadian S, Malig M, Kotkiewicz H, Curry CJ, Shafer S, Shaffer LG, de Jong PJ, Wilson RK, Eichler EE (2012) Evolution of human-specific neural SRGAP2 genes by incomplete segmental duplication. *Cell* 149:912-922. PMC3365555.
- Denny BT, Kober H, Wager TD, Ochsner KN (2012) A meta-analysis of functional neuroimaging studies of self- and other judgments reveals a spatial gradient for mentalizing in medial prefrontal cortex. *J Cogn Neurosci* 24:1742-1752. PMC3806720.
- Descartes R (1637) *Discours de la Méthode. Pour bien conduire sa raison, et chercher la vérité dans les sciences*. Tr. ingl. *Discourse on the Method*. Indianapolis: Hackett. [Tr. it. *Discorso sul metodo*. Mondadori, Milano 2019.]
- D'Esposito M, Postle BR (2015) The cognitive neuroscience of working memory. *Annu Rev Psychol* 66:115-142. PMC4374359.

- Di Paolo EA, Thompson E (2014) The enactive approach. In: The Routledge Handbook of Embodied Cognition (Shapiro, L., ed), pp 68-78 New York: Routledge Press.
- di Primio F, Muller BS, Lengeler JW (2000) Minimal cognition in unicellular organisms. In: SAB2000 Proceedings Supplement: Sixth International Conference on Simulation of Adaptive Behavior (Meyer, J.A. et al., eds), pp 3-12 Honolulu: International Society for Adaptive Behavior.
- DiCarlo JJ, Zoccolan D, Rust NC (2012) How does the brain solve visual object recognition? *Neuron* 73:415-434. PMC3306444.
- Dickinson A (1985) Action and habits: the development of behavioural autonomy. *Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences* 308:67-78.
- Dickinson A (2012) Associative learning and animal cognition. *Philos Trans R Soc Lond B Biol Sci* 367:2733-2742. PMC3427555.
- Diemer GS, Stedman KM (2012) A novel virus genome discovered in an extreme environment suggests recombination between unrelated groups of RNA and DNA viruses. *Biol Direct* 7:13. PMC3372434.
- Ding SL, Van Hoesen GW, Cassell MD, Poremba A (2009) Parcellation of human temporal polar cortex: a combined analysis of multiple cytoarchitectonic, chemoarchitectonic, and pathological markers. *J Comp Neurol* 514:595-623. PMC3665344.
- Dobzhansky T (1937) *Genetics and the Origin of Species*. New York: Columbia University Press.
- Dobzhansky T (1973) Nothing in biology makes sense except in the light of evolution. *American Biology Teacher* 35:125-129.
- Dolan RJ, Dayan P (2013) Goals and habits in the brain. *Neuron* 80:312-325. PMC3807793.
- Doll BB, Duncan KD, Simon DA, Shohamy D, Daw ND (2015) Model-based choices involve prospective neural activity. *Nat Neurosci* 18:767-772. PMC4414826.
- Donahue CJ, Glasser MF, Preuss TM, Rilling JK, Van Essen DC (2018) Quantitative assessment of prefrontal cortex in humans relative to nonhuman primates. *Proc Natl Acad Sci USA*.
- Donoghue PCJ, Purnell MA (2009) The evolutionary emergence of vertebrates from among their spineless relatives. *Evolution: Education and Outreach* 2:204-212.
- Doolittle WF (1999) Phylogenetic classification and the universal tree. *Science* 284:2124-2129.
- Downs JP, Daeschler EB, Jenkins FA, Jr., Shubin NH (2008) The cranial endoskeleton of *Tiktaalik roseae*. *Nature* 455:925-929.
- Doyle JC, Csete M (2011) Architecture, constraints, and behavior. *Proc Natl Acad Sci USA* 108 Suppl 3:15624-15630. PMC3176601.
- Dudai Y, Morris RG (2013) Memorable trends. *Neuron* 80:742-750.
- Dugatkin LA, Trut L (2017) *How to Tame a Fox (and Build a Dog)*. Chicago: University of Chicago Press.
- Dunbar R (1998) *Grooming, Gossip, and the Evolution of Language*. Cambridge, MA: Harvard University Press. [Tr. it. *Dalla nascita del linguaggio alla Babele delle lingue*. CDE, Milano 1999.]

- Dunn CW, Hejnal A, Matus DQ, Pang K, Browne WE, Smith SA, Seaver E, Rouse GW, Obst M, Edgecombe GD, Sorensen MV, Haddock SH, Schmidt-Rhaesa A, Okusu A, Kristensen RM, Wheeler WC, Martindale MQ, Giribet G (2008) Broad phylogenomic sampling improves resolution of the animal tree of life. *Nature* 452:745-749.
- Durkheim E (1951) *Le suicide*. Tr. ingl. *Suicide: A Study in Sociology*. New York: The Free Press. [Tr. it. *Il suicidio. Studio di sociologia*. Rizzoli, Milano 2014.]
- Edelman GM (2004) *Wider Than the Sky: The Phenomenal Gift of Consciousness*. New Haven: Yale University Press. [Tr. it. *Più grande del cielo. Lo straordinario dono fenomenico della coscienza*. Einaudi, Torino 2004.]
- Edelman GM, Tononi G (2000) *A Universe of Consciousness*. New York: Basic Books. [Tr. it. *Un universo di coscienza. Come la materia diventa immaginazione*. Fabbri Centauria, Milano 2014.]
- Edinger L, Rand HW (1908) The relations of comparative anatomy to comparative psychology. *Journal of Comparative Neurology and Psychology* 18:437-457.
- Edmunds M (1974) *Defence in Animals: A Survey of Anti-Predator Defences*. New York: Longman.
- Eichenbaum H (2017a) Memory: organization and control. *Annu Rev Psychol* 68:19-45. PMC5499681.
- Eichenbaum H (2017b) On the integration of space, time, and memory. *Neuron* 95:1007-1018. PMC5662113.
- Eichenbaum H (2017c) Prefrontal-hippocampal interactions in episodic memory. *Nat Rev Neurosci* 18:547-558.
- Ekman P (1993) Facial expression and emotion. *American Psychologist* 48:384-392.
- Elliott GR, Leys SP (2007) Coordinated contractions effectively expel water from the aquiferous system of a freshwater sponge. *J Exp Biol* 210:3736-3748.
- Elliott GR, Leys SP (2010) Evidence for glutamate, GABA and NO in coordinating behaviour in the sponge, *Ephydatia muelleri* (Demospongiae, Spongillidae). *J Exp Biol* 213:2310-2321.
- el-Showk S (2014) The evolution of body plans: a TALE of two proteins, https://www.nature.com/scitable/blog/accumulating-gliches/the_evolution_of_body_plans, retrieved Apr 15, 2017.
- Emes RD, Grant SG (2011) The human postsynaptic density shares conserved elements with proteomes of unicellular eukaryotes and prokaryotes. *Front Neurosci* 5:44.
- Ericsson KA, Simon H (1993) *Protocol Analysis: Verbal Reports as Data*. Cambridge, MA: The MIT Press.
- Eriksson J, Vogel EK, Lansner A, Bergstrom F, Nyberg L (2015) Neurocognitive architecture of working memory. *Neuron* 88:33-46. PMC4605545.
- Erwin DH (1999) The origin of bodyplans. *Integrative and Comparative Biology* 39:617-629.
- Erwin DH (2015) Early metazoan life: divergence, environment and ecology. *Philos Trans R Soc Lond B Biol Sci* 370. PMC4650120.

- Erwin DH, Davidson EH (2002) The last common bilaterian ancestor. *Development* 129:3021-3032.
- Erwin DH, Valentine J (2013) *The Cambrian Explosion: The Construction of Animal Biodiversity*. New York: W.H. Freeman.
- Everett DL (2012) *Language: The Cultural Tool*. New York: Vintage Books.
- Everitt BJ, Robbins TW (2005) Neural systems of reinforcement for drug addiction: from actions to habits to compulsion. *Nat Neurosci* 8:1481-1489.
- Fairclough SR, Dayel MJ, King N (2010) Multicellular development in a choanoflagellate. *Curr Biol* 20:R875-876. PMC2978077.
- Fan J (2014) An information theory account of cognitive control. *Front Hum Neurosci* 8:680. PMC4151034.
- Fan L, Wang J, Zhang Y, Han W, Yu C, Jiang T (2014) Connectivity-based parcellation of the human temporal pole using diffusion tensor imaging. *Cereb Cortex* 24:3365-3378.
- Fanselow MS, Pennington ZT (2017) The danger of LeDoux and Pine's two-system framework for fear. *Am J Psychiatry* 174:1120-1121.
- Fanselow MS, Pennington ZT (2018) A return to the psychiatric dark ages with a two-system framework for fear. *Behav Res Ther* 100:24-29. PMC5794606.
- Fautin DG, Romano SL (1997) Cnidaria. Sea anemones, corals, jellyfish, sea pens, hydra. Version 24 April 1997, <https://tolweb.org/Cnidaria/2461/1997.04.24> in The Tree of Life Web Project, <https://tolweb.org/>, retrieved Jan 4, 2017.
- Fedonkin MA, Simonetta A, Ivantsov AY (2007) New data on Kimberella, the Vendian mollusc-like organism (White Sea region, Russia): palaeoecological and evolutionary implications. Geological Society, London, Special Publications 286:157-179.
- Fedonkin MA, Waggoner BM (1997) The Late Precambrian fossil Kimberella is a mollusc-like bilaterian organism. *Nature* 388:868.
- Feeney MC, Roberts WA, Sherry DF (2009) Memory for what, where, and when in the black-capped chickadee (*Poecile atricapillus*). *Anim Cogn* 12:767-777.
- Fehr FS, Russell JA (1984) Concept of emotion viewed from a prototype perspective. *Journal of Experimental Psychology: General* 113:464-486.
- Feinberg TE (2001) *Altered Egos: How the Brain Creates the Self*. New York: Oxford University Press.
- Feinstein JS, Buzza C, Hurlemann R, Follmer RL, Dahdaleh NS, Coryell WH, Welsh MJ, Tranel D, Wemmie JA (2013) Fear and panic in humans with bilateral amygdala damage. *Nat Neurosci* 16:270-272.
- Felleman DJ, Van Essen DC (1991) Distributed hierarchical processing in the primate cerebral cortex. *Cereb Cortex* 1:1-47.
- Fernando CT, Liekens AM, Bingle LE, Beck C, Lenser T, Stekel DJ, Rowe JE (2009) Molecular circuits for associative learning in single-celled organisms. *JR Soc Interface* 6:463-469.
- Festinger L (1957) *A Theory of Cognitive Dissonance*. Evanston: Row Peterson. [Tr. it. *Teoria della dissonanza cognitiva*. FrancoAngeli, Milano 2001.]
- Finlay BL, Hersman MN, Darlington RB (1998) Patterns of vertebrate neurogenesis and the paths of vertebrate evolution. *Brain Behav Evol* 52:232-242.

- Finnerty JR (2003) The origins of axial patterning in the metazoa: how old is bilateral symmetry? *Int J Dev Biol* 47:523-529.
- Finnerty JR (2005) Did internal transport, rather than directed locomotion, favor the evolution of bilateral symmetry in animals? *Bioessays* 27:1174-1180.
- Finnerty JR, Pang K, Burton P, Paulson D, Martindale MQ (2004) Origins of bilateral symmetry: Hox and Dpp expression in a sea anemone. *Science* 304:1335-1337.
- Fisher RA (1930) *The Genetical Theory of Natural Selection*. Oxford, United Kingdom: The Clarendon Press.
- Fleagle JG (1999) *Primate Adaptation and Evolution*. New York: Academic Press.
- Fleming SM, Lau HC (2014) How to measure metacognition. *Front Hum Neurosci* 8:443. PMC4097944.
- Fleming SM, Ryu J, Golfinos JG, Blackmon KE (2014) Domain-specific impairment in metacognitive accuracy following anterior prefrontal lesions. *Brain* 137:2811-2822. PMC4163038.
- Fleming SM, van der Putten EJ, Daw ND (2018) Neural mediators of changes of mind about perceptual decisions. *Nat Neurosci* 21:617-624. PMC5878683.
- Fleming SM, Weil RS, Nagy Z, Dolan RJ, Rees G (2010) Relating introspective accuracy to individual differences in brain structure. *Science* 329:1541-1543. PMC3173849.
- Fletcher GJO (1995) Two uses of folk psychology: implications for psychological science. *Philosophical Psychology* 8:221-238.
- Fletcher PC, Frith CD (2009) Perceiving is believing: a Bayesian approach to explaining the positive symptoms of schizophrenia. *Nat Rev Neurosci* 10:48-58.
- Fodor J (1975) *The Language of Thought*. Cambridge, MA: Harvard University Press.
- Folse HJ, 3rd, Roughgarden J (2010) What is an individual organism? A multilevel selection perspective. *Q Rev Biol* 85:447-472.
- Forgione L (2018) Descartes and Hume on I—Thoughts: Descartes y Hume acerca de los Pensamientos sobre el Yo. *Thémata Revista de Filosofía* 57:211-228.
- Fossati P (2013) Imaging autobiographical memory. *Dialogues Clin Neurosci* 15:487-490. PMC3898686.
- Fouke BW (2017) Lecture 36—4.8 Evolution of jaws and perfecting predation, <https://www.coursera.org/learn/emergence-of-life/lecture/uvA1s/4-8-evolution-of-jaws-and-perfecting-predation>, retrieved Jun 17, 2017. Coursera.
- Frank A (2018) Earth will survive. We may not, <https://www.nytimes.com/2018/06/12/opinion/earth-will-survive-we-may-not.html>, retrieved Aug 13, 2018. The New York Times New York: The New York Times Company.
- Freud S (1915) The unconscious. In: *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, vol. 14 (Strachey, J., ed), pp 161-215 London: The Hogarth Press. [Tr. it. *L'inconscio*. In *Opere di Sigmund Freud*, Boringhieri, Torino 1976, vol. 8.]

- Friederici AD (2017) Evolution of the neural language network. *Psychon Bull Rev* 24:41-47. PMC5325853.
- Frijda N (1986) *The Emotions*. Cambridge: Cambridge University Press. [Tr. it. *Emozioni*. il Mulino, Bologna 1986.]
- Friston K (2013) Consciousness and hierarchical inference. *Neuropsychoanalysis* 15:38-42.
- Friston KJ, Frith CD (2015) Active inference, communication and hermeneutics. *Cortex* 68:129-143. PMC4502445.
- Frith C (2007) *Making Up the Mind: How the Brain Creates Our Mental World*. Malden, MA: Blackwell Publishing. [Tr. it. *Inventare la mente. Come il cervello crea la nostra vita mentale*. Raffaello Cortina, Milano 2009.]
- Frith C (2008) The social functions of consciousness. In: *Frontiers of Consciousness: Chichele Lectures* (Weiskrantz, L., Davies, M., eds), pp 225-244 Oxford: Oxford University Press.
- Frith C, Dolan R (1996) The role of the prefrontal cortex in higher cognitive functions. *Brain Res Cogn Brain Res* 5:175-181.
- Frith C, Perry R, Lumer E (1999) The neural correlates of conscious experience: an experimental framework. *Trends in Cognitive Sciences* 3:105-114.
- Frith U, Happé F (1999) Theory of mind and self-consciousness: what is it like to be autistic? *Mind & Language* 14:82-89.
- Furl N, Henson RN, Friston KJ, Calder AJ (2013) Top-down control of visual responses to fear by the amygdala. *J Neurosci* 33:17435-17443.
- Furnham AF (1988) *Lay Theories: Everyday Understanding of Problems in the Social Sciences*. Oxford: Pergamon Press.
- Fuster J (2008) *The Prefrontal Cortex*. New York: Academic Press.
- Gallagher HL, Frith CD (2003) Functional imaging of 'theory of mind'. *Trends Cogn Sci* 7:77-83.
- Gallagher S (2000) Philosophical conceptions of the self: implications for cognitive science. *Trends Cogn Sci* 4:14-21.
- Gallagher S, Allen M (2018) Active inference, enactivism and the hermeneutics of social cognition. *Synthese* 195:2627-2648. PMC5972154.
- Gallagher S, Zahavi D (2012) *The Phenomenological Mind*, 2nd edition. New York: Routledge. [Tr. it. *La mente fenomenologica. Filosofia della mente e scienze cognitive*. Raffaello Cortina, Milano 2009.]
- Gallup GG (1982) Self-awareness and the emergence of mind in primates. *American Journal of Primatology* 2:237-248.
- Gallup GG, Jr., Platek SM, Spaulding KN (2014) The nature of visual self-recognition revisited. *Trends Cogn Sci* 18:57-58.
- Garcia J, Kimeldorf DJ, Koelling RA (1955) Conditioned aversion to saccharin resulting from exposure to gamma radiation. *Science* 122:157-158.
- Gardner H (1987) *The Mind's New Science: A History of the Cognitive Revolution*. New York: Basic Books, Inc. [Tr. it. *La nuova scienza della mente. Storia della rivoluzione cognitiva*. Feltrinelli, Milano 2016.]
- Garzon FC (2007) The quest for cognition in plant neurobiology. *Plant Signal Behav* 2:208-211. PMC2634130.

- Gauthier I, James TW, Curby KM, Tarr MJ (2003) The influence of conceptual knowledge on visual discrimination. *Cogn Neuropsychol* 20:507-523.
- Gazzaniga MS (1970) *The Bisected Brain*. New York: Appleton-Century-Crofts.
- Gazzaniga MS (1985) *The Social Brain*. New York: Basic Books. [Tr. it. *Il cervello sociale. Alla scoperta dei circuiti della mente*. Giunti, Firenze 1989.]
- Gazzaniga MS (2008) *Human: The Science Behind What Makes Us Unique*. New York: Ecco. [Tr. it. *Quel che ci rende unici*. Raffaello Cortina, Milano 2009.]
- Gazzaniga MS (2012) *Who's in Charge? Free Will and the Science of the Brain*. New York: Ecco.
- Gazzaniga MS (2015) *Tales from Both Sides of the Brain: A Life in Neuroscience*. New York: Ecco/Harper Collins.
- Gazzaniga MS (2018) *The Consciousness Instinct: Unraveling the Mystery of How the Brain Makes the Mind*. New York: Farrar, Straus and Giroux. [Tr. it. *La coscienza è un istinto. Il legame misterioso tra il cervello e la mente*. Raffaello Cortina, Milano 2019.]
- Gazzaniga MS, Bogen JE, Sperry RW (1962) Some functional effects of sectioning the cerebral commissures in man. *Proceedings of the National Academy of Sciences USA* 48:1765-1769.
- Gazzaniga MS, LeDoux JE (1978) *The Integrated Mind*. New York: Plenum.
- Gee H (1996) *Before the Backbone: Views on the Origin of the Vertebrates*. London: Chapman & Hall.
- Gennaro RJ (2011) *The Consciousness Paradox*. Cambridge, MA: The MIT Press.
- Gerhart J, Kirschner M (1997) *Cells, Embryos and Evolution: Toward a Cellular and Developmental Understanding of Phenotypic Variation and Evolutionary Adaptability*. Malden, MA: Wiley.
- Gershman SJ, Daw ND (2017) Reinforcement learning and episodic memory in humans and animals: an integrative framework. *Annu Rev Psychol* 68:101-128.
- Geschwind DH, Konopka G (2012) Neuroscience: genes and human brain evolution. *Nature* 486:481-482. PMC3636765.
- Ghaziri J, Tucholka A, Girard G, Houde JC, Boucher O, Gilbert G, Descoteaux M, Lippe S, Rainville P, Nguyen DK (2017) The corticocortical structural connectivity of the human insula. *Cereb Cortex* 27:1216-1228.
- Ghose T (2013) Origin of life: did a simple pump drive process?, <https://www.livescience.com/26173-hydrothermal-vent-life-origins.html>: Live Science.
- Gibson WT, Gonzalez CR, Fernandez C, Ramasamy L, Tabachnik T, Du RR, Felsen PD, Maire MR, Perona P, Anderson DJ (2015) Behavioral responses to a repetitive visual threat stimulus express a persistent state of defensive arousal in *Drosophila*. *Curr Biol* 25:1401-1415. PMC4452410.
- Gilbert SF (2013) The search for the urbilaterian ancestor. In: *Developmental Biology* (Gilbert, S.F., ed) Sunderland, MA: Sinauer Associates, Inc.
- Gilbert W (1986) Origin of life: The RNA world. *Nature* 319:618-618.
- Gilboa A (2004) Autobiographical and episodic memory—one and the same? Evidence from prefrontal activation in neuroimaging studies. *Neuropsychologia* 42:1336-1349.

- Gilboa A, Alain C, Stuss DT, Melo B, Miller S, Moscovitch M (2006) Mechanisms of spontaneous confabulations: a strategic retrieval account. *Brain* 129:1399-1414.
- Giles N, Lau H, Odegaard B (2016) What type of awareness does binocular rivalry assess? *Trends Cogn Sci* 20:719-720. PMC5108563.
- Gillan CM, Otto AR, Phelps EA, Daw ND (2015) Model-based learning protects against forming habits. *Cogn Affect Behav Neurosci* 15:523-536. PMC4526597.
- Gillis JA, Dahn RD, Shubin NH (2009) Shared developmental mechanisms pattern the vertebrate gill arch and paired fin skeletons. *Proc Natl Acad Sci USA* 106:5720-5724. PMC2667079.
- Ginsburg S, Jablonka E (2010) The evolution of associative learning: A factor in the Cambrian explosion. *J Theor Biol* 266:11-20.
- Giurfa M (2012) Social learning in insects: a higher-order capacity? *Front Behav Neurosci* 6:57. PMC3433704.
- Giurfa M, Zhang S, Jenett A, Menzel R, Srinivasan MV (2001) The concepts of 'sameness' and 'difference' in an insect. *Nature* 410:930-933.
- Glanzman DL (2010) Common mechanisms of synaptic plasticity in vertebrates and invertebrates. *Curr Biol* 20:R31-36.
- Glimcher PW (2011) Understanding dopamine and reinforcement learning: the dopamine reward prediction error hypothesis. *Proc Natl Acad Sci USA* 108 Suppl 3:15647-15654.
- Godfrey-Smith P (2016) *Other Minds: The Octopus, the Sea, and the Deep Origins of Consciousness*. New York: Farrar, Straus and Giroux.
- Gold DA, Grabenstatter J, de Mendoza A, Riesgo A, Ruiz-Trillo I, Summons RE (2016) Sterol and genomic analyses validate the sponge biomarker hypothesis. *Proc Natl Acad Sci USA* 113:2684-2689. PMC4790988.
- Goldman-Rakic PS (1987) Circuitry of primate prefrontal cortex and regulation of behavior by representational memory. In: *Handbook of Physiology Section 1: The Nervous System, vol. 5, Higher Functions of the Brain* (Plum, F., ed), pp 373-418 Bethesda: American Physiological Society.
- Goldman-Rakic PS (1996) The prefrontal landscape: implications of functional architecture for understanding human mentation and the central executive. *Philos Trans R Soc Lond B Biol Sci* 351:1445-1453.
- Gontier N (2011) Depicting the Tree of Life: the philosophical and historical roots of evolutionary tree diagrams. *History and Philosophy* 4:515-538.
- Goodall J (2009) Introduction. In: *The Inner World of Farm Animals* (Hatkoff, A., ed), p 13 New York: Stewart, Tabori, and Chang.
- Gottlieb J (2017) The collapse argument. *Philosophical Studies* 172(7):1783-1794.
- Gould JL (2004) Animal cognition. *Curr Biol* 14:R372-375.
- Gould SJ (1977) *Ontogeny and Phylogeny*. Cambridge, MA: Belknap Press. [Tr. it. *Ontogenesi e filogenesi*. Mimesis, Milano 2013.]
- Gould SJ (1980) *The Panda's Thumb: More Reflections in Natural History*. New York: W.W. Norton & Company. [Tr. it. *Il pollice del panda*. il Saggiatore, Milano 2016.]

- Gould SJ (1989) *Wonderful Life: The Burgess Shale and the Nature of History*. New York: WW Norton & Company, Inc. [Tr. it. *La vita meravigliosa. I fossili di Burgess e la natura della storia*. Feltrinelli, Milano 2018.]
- Gould SJ (1991) Exaptation: a crucial tool for evolutionary psychology. *Journal of Social Issues* 47:43-65.
- Gould SJ (1997) The exaptive excellence of spandrels as a term and prototype. *Proc Natl Acad Sci USA* 94:10750-10755. PMC23474.
- Gould SJ (2001) *The Book of Life: An Illustrated History of the Evolution of Life on Earth*. New York: W.W. Norton & Company.
- Gould SJ (2007) *Punctuated Equilibrium*. Cambridge, MA: Belknap Press. [Tr. it. *L'equilibrio punteggiato*. Codice, Torino 2008.]
- Gould SJ, Lewontin RC (1979) The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme. *Proceedings of the Royal Society B, Biological Sciences*, 205:581-598.
- Gould SJ, Vrba ES (1982) Exaptation—A missing term in the science of form. *Paleobiology* 8:4-15. [Tr. it. *Exaptation. Il bricolage dell'evoluzione*, a cura di T. Pievani. Bollati Boringhieri, Torino 2008.]
- Grabowsky GL (1994) Symmetry, locomotion, and the evolution of an anterior end: a lesson from sea urchins. *Evolution* 48:1130-1146.
- Graf P, Schacter DL (1985) Implicit and explicit memory for new associations in normal and amnesic subjects. *J Exp Psychol Learn Mem Cogn* 11:501-518.
- Graham KS, Barense MD, Lee AC (2010) Going beyond LTM in the MTL: a synthesis of neuropsychological and neuroimaging findings on the role of the medial temporal lobe in memory and perception. *Neuropsychologia* 48:831-853.
- Grant SG (2016) The molecular evolution of the vertebrate behavioural repertoire. *Philos Trans R Soc Lond B Biol Sci* 371:20150051. PMC4685586.
- Gray JA (2004) *Consciousness: Creeping up on the Hard Problem*. Oxford: Oxford University Press.
- Graziano MSA (2013) *Consciousness and the Social Brain*. Oxford: Oxford University Press.
- Greenspan RJ (2007) *An Introduction to Nervous Systems*. New York: Cold Spring Harbor Laboratory Press.
- Gregory RL (1974). *Concepts and Mechanisms of Perception*. London: Duckworth.
- Gregory RL (1997) Knowledge in perception and illusion. *Philos Trans R Soc Lond B Biol Sci* 352:1121-1127. PMC1692018.
- Gribaldo S, Brochier-Armanet C (2006) The origin and evolution of Archaea: a state of the art. *Philos Trans R Soc Lond B Biol Sci* 361:1007-1022.
- Griffin A (2015) Flies experience emotions like fear, and might offer insight into how the brain makes feelings, <https://www.independent.co.uk/news/science/flies-experience-emotions-like-fear-and-might-offer-insight-into-how-the-brain-makes-feelings-10253201.html>, retrieved May 11, 2018. Independent.
- Griffin DR (1976) *The Question of Animal Awareness: Evolutionary Continuity of Mental Experience*. New York: Rockefeller University Press. [Tr. it. *L'animale consapevole*. Boringhieri, Torino 1979.]

- Grillner S, Parker D, El Manira A (1998) Vertebrate locomotion—a lamprey perspective. *Ann NY Acad Sci* 860:1-18.
- Grillner S, Robertson B, Stephenson-Jones M (2013) The evolutionary origin of the vertebrate basal ganglia and its role in action selection. *J Physiol* 591:5425-5431. PMC3853485.
- Grimaldi D, Engel MS (2005) *Evolution of the Insects*. New York: Cambridge University Press.
- Grosberg RK, Strathmann RR (2007) The evolution of multicellularity: a minor major transition? *Annual Review of Ecology, Evolution, and Systematics* 38:621-654.
- Gross CG (1994) How inferior temporal cortex became a visual area. *Cereb Cortex* 4:455-469.
- Grossberg S (1980) How does a brain build a cognitive code? *Psychological Review* 87:1-51.
- Gu X, Hof PR, Friston KJ, Fan J (2013) Anterior insular cortex and emotional awareness. *J Comp Neurol* 521:3371-3388. PMC3999437.
- Gunturkun O, Bugnyar T (2016) Cognition without cortex. *Trends Cogn Sci* 20:291-303.
- Hagen JB (2012) Five kingdoms, more or less: Robert Whittaker and the broad classification of organisms. *BioScience* 62:67-74.
- Hagoort P (2014) Nodes and networks in the neural architecture for language: Broca's region and beyond. *Curr Opin Neurobiol* 28:136-141.
- Haldane JBS (1991) The origin of life (1929) in *The Rationalist Annual*. In: *On Being the Right Size and Other Essays* (Smith, J.M., ed) Oxford: Oxford University Press.
- Hameroff S, Penrose R (2014) Consciousness in the universe: a review of the 'Orch OR' theory. *Phys Life Rev* 11:39-78.
- Hamid AA, Pettibone JR, Mabrouk OS, Hetrick VL, Schmidt R, Vander Weele CM, Kennedy RT, Aragona BJ, Berke JD (2016) Mesolimbic dopamine signals the value of work. *Nat Neurosci* 19:117-126. PMC4696912.
- Harari YN (2015) *Sapiens: A Brief History of Humankind*. New York: HarperCollins. [Tr. it. *Da animali a dèi. Breve storia dell'umanità*. Bompiani, Milano 2017.]
- Hart G, Leung BK, Balleine BW (2014) Dorsal and ventral streams: the distinct role of striatal subregions in the acquisition and performance of goal-directed actions. *Neurobiol Learn Mem* 108:104-118. PMC4661143.
- Hassin RR, Bargh JA, Engell AD, McCulloch KC (2009) Implicit working memory. *Conscious Cogn* 18:665-678. PMC2760263.
- Hassin RR, Uleman JS, Bargh JA (eds) (2005) *The New Unconscious*. New York: Oxford University Press.
- Haun AM, Tononi G, Koch C, Tsuchiya N (2017) Are we underestimating the richness of visual experience? *Neuroscience of Consciousness* 2017:1-4.
- Hawkins RD, Byrne JH (2015) Associative learning in invertebrates. *Cold Spring Harb Perspect Biol* 7.
- Hayes SC (2019) The evolution of consciousness enables conscious evolution, <https://evolution-institute.org/the-evolution-of-consciousness-enables-conscious-evolution/>, retrieved Feb 2, 2019.

- Heisenberg M (2015) Outcome learning, outcome expectations, and intentionality in *Drosophila*. *Learn Mem* 22:294-298. PMC4436651.
- Hejnol A (2015) Acoelomorpha and Xenoturbellida. In: *Evolutionary Developmental Biology of Invertebrates 1* (Wanninger, A., ed), pp 203-214 Padova, Italy: Springer Verlag Wien.
- Hejnol A, Martín-Durán JM (2015) Getting to the bottom of anal evolution. *Zoologischer Anzeiger—A Journal of Comparative Zoology* 256:61-74.
- Helfman G, Collette B, Facey D (1997) *The Diversity of Fishes*. New York: Wiley.
- Hellingwerf KJ (2005) Bacterial observations: a rudimentary form of intelligence? *Trends Microbiol* 13:152-158.
- Henke K (2010) A model for memory systems based on processing modes rather than consciousness. *Nat Rev Neurosci* 11:523-532.
- Hennessey TM, Rucker WB, McDiarmid CG (1979) Classical conditioning in paramecia. *Animal Learning and Behavior* 7:417-423.
- Hennig W (1966) *Phylogenetic Systematics*. Chicago: University of Illinois Press.
- Hepburn L (2018) Species extinction rates skyrocket, <https://uk.blastingnews.com/science/2018/02/species-extinction-rates-skyrocket-002361487.html>, retrieved Aug 13, 2018. Blastingnews.
- Hering E (1870) Über das Gedächtnis als eine allgemeine Funktion der organisierten Materie. In: *Vortrag gehalten in der feierlichen Sitzung der Kaiserlichen Akademie der Wissenschaften in Wien am XXX. Mai 1870*. Leipzig: Akademische Verlagsgesellschaft. Tr. ingl. *Memory as a General Function of Organized Matter*. Chicago: Open Court 1895.
- Herrick CJ (1948) *The Brain of the Tiger Salamander*. Chicago: University of Chicago Press.
- Herrmann E, Call J, Hernandez-Lloreda MV, Hare B, Tomasello M (2007) Humans have evolved specialized skills of social cognition: the cultural intelligence hypothesis. *Science* 317:1360-1366.
- Hess WR (1962) *The Biology of Mind*. Chicago: University of Chicago.
- Heyes C (1995) Self-recognition in primates: further reflections create a hall of mirrors. *Animal Behaviour* 50:1533-1542.
- Heyes C (2008) Beast machines? Questions of animal consciousness. In: *Frontiers of Consciousness: Chichele Lectures* (Weiskrantz, L., Davies, M., eds), pp 259-274 Oxford: Oxford University Press.
- Heyes C (2015) Animal mindreading: what's the problem? *Psychon Bull Rev* 22:313-327.
- Heyes C (2016) Blackboxing: social learning strategies and cultural evolution. *Philos Trans R Soc Lond B Biol Sci* 371. PMC4843607.
- Heyes C (2017) Apes submentalise. *Trends Cogn Sci* 21:1-2.
- Heyes C (2018) *Cognitive Gadgets: The Cultural Evolution of Thinking*. Cambridge, MA: Belknap Press.
- Hinde RA (1970) *Animal Behaviour: A Synthesis of Ethology and Comparative Psychology*. New York: McGraw-Hill.
- Hirstein W (2011) The contribution of prefrontal executive processes to creating a sense of self. *Mens Sana Monogr* 9:150-158. PMC3115285.

- Hirth F, Kammermeier L, Frei E, Walldorf U, Noll M, Reichert H (2003) An urbilaterian origin of the tripartite brain: developmental genetic insights from *Drosophila*. *Development* 130:2365-2373.
- Hirth F, Reichert H (1999) Conserved genetic programs in insect and mammalian brain development. *Bioessays* 21:677-684.
- Hodos W, Campbell CBG (1969) *Scala naturae*: why there is no theory in comparative psychology. *Psychological Review* 76:337-350.
- Hoff WD, van der Horst MA, Nudel CB, Hellingwerf KJ (2009) Prokaryotic phototaxis. *Methods Mol Biol* 571:25-49.
- Hoffmann DL, Angelucci DE, Villaverde V, Zapata J, Zilhão J (2018a) Symbolic use of marine shells and mineral pigments by Iberian Neandertals 115,000 years ago. *Science Advances* 4.
- Hoffmann DL, Standish CD, Garcia-Diez M, Pettitt PB, Milton JA, Zilhão J, Alcolea-Gonzalez JJ, Cantalejo-Duarte P, Collado H, de Balbín R, Lorblanchet M, Ramos-Munoz J, Weniger GC, Pike AWG (2018b) U-Th dating of carbonate crusts reveals Neandertal origin of Iberian cave art. *Science* 359:912-915.
- Hofmann SG (2016) *Emotion in Therapy: From Science to Practice*. New York: Guilford Press.
- Hofmann SG, Doan SN (2018) *The Social Foundations of Emotion: Developmental, Cultural, and Clinical Dimensions*. Washington, DC: American Psychological Association.
- Holland LZ (2000) Body-plan evolution in the Bilateria: early antero-posterior patterning and the deuterostome-protostome dichotomy. *Curr Opin Genet Dev* 10:434-442.
- Holland LZ (2015a) Evolution of basal deuterostome nervous systems. *J Exp Biol* 218:637-645.
- Holland LZ (2015b) The origin and evolution of chordate nervous systems. *Philos Trans R Soc Lond B Biol Sci* 370. PMC4650125.
- Holland LZ, Carvalho JE, Escrava H, Laudet V, Schubert M, Shimeld SM, Yu JK (2013) Evolution of bilaterian central nervous systems: a single origin? *EvoDevo* 4:27. PMC3856589.
- Holland LZ, Onai T (2012) Early development of cephalochordates (amphioxus). *Wiley Interdiscip Rev Dev Biol* 1:167-183.
- Holland ND (2003) Early central nervous system evolution: an era of skin brains? *Nat Rev Neurosci* 4:617-627.
- Holland ND, Holland LZ, Holland PW (2015) Scenarios for the making of vertebrates. *Nature* 520:450-455.
- Holland P (2011) *The Animal Kingdom: A Very Short Introduction*. Oxford: Oxford University Press.
- Holland PC (1993) Cognitive aspects of classical conditioning. *Current Opinion in Neurobiology* 3:230-236.
- Holland PC, Rescorla RA (1975) The effect of two ways of devaluing the unconditioned stimulus after first- and second-order appetitive conditioning. *Journal of Experimental Psychology: Animal Behavior Processes* 1:355-363.
- Holland PW (2013) Evolution of Homeobox genes. *Wiley Interdiscip Rev Dev Biol* 2:31-45.

- Holland PW, Marletaz F, Maeso I, Dunwell TL, Paps J (2017) New genes from old: asymmetric divergence of gene duplicates and the evolution of development. *Philos Trans R Soc Lond B Biol Sci* 372. PMC5182412.
- Hollis JM, Lovas FJ, Jewell PR (2000) Interstellar glycolaldehyde: the first sugar. *The Astrophysical Journal Letters* 540:L107.
- Holmes B (2006) Meet your ancestor—the fish that crawled. *New Scientist*, Sept 9.
- Holmes B (2009) Sponge larvae: your unlikely ancestors. *New Scientist*, Apr 29.
- Holmes B (2012) First glimpse at the viral birth of DNA. *New Scientist*, Apr 18.
- Holyoak KJ (2005) Analogy. In: *The Cambridge Handbook of Thinking and Reasoning* (Holyoak, K.J., Morrison, R.G., eds), pp 117-142 Cambridge: Cambridge University Press.
- Hoppenbrouwers SS, Bulten BH, Brazil IA (2016) Parsing fear: a reassessment of the evidence for fear deficits in psychopathy. *Psychol Bull* 142:573-600.
- Horner AJ, Burgess N (2014) Pattern completion in multielement event engrams. *Curr Biol* 24:988-992. PMC4012134.
- Horowitz A (2016) *Being a Dog: Following the Dog into a World of Smell*. New York: Scribner.
- Hubel DH (1988) *Eye, Brain, and Vision*. New York: W.H. Freeman. [Tr. it. *Occhio, cervello e visione*. Zanichelli, Bologna 1998]
- Hudry B, Thomas-Chollier M, Volovik Y, Duffraisse M, Dard A, Frank D, Technau U, Merabet S (2014) Molecular insights into the origin of the Hox-TALE patterning system. *Elife* 3:e01939. PMC3957477.
- Humphrey NK (1977) Review of Griffin's 'The question of animal awareness'. *Animal Behaviour*, 25, 521-522.
- Huxley A (1954) *The Doors of Perception: Heaven and Hell*. New York: Harper & Row. [Tr. it. *Le porte della percezione. Paradiso e inferno*. Mondadori, Milano 2014.]
- Huxley J (1942) *Evolution: The Modern Synthesis*. New York: Harper & Bros. [Tr. it. *Evoluzione. La sintesi moderna*. Ubaldini, Roma 1966.]
- Ikuta T (2011) Evolution of invertebrate deuterostomes and Hox/ParaHox genes. *Genomics Proteomics Bioinformatics* 9:77-96. PMC5054439.
- Ivantsov AY (2013) Trace fossils of precambrian metazoans 'Vendobionta' and 'Mollusks'. *Stratigraphy and Geological Correlation* 21:252-264.
- Iwatsuki K, Naitoh Y (1988) Behavioural responses to light in *Paramecium Bursaria* in relation to its symbiotic green alga *Chlorella*. *Journal of Experimental Biology* 134:43-60.
- Izard CE (1971) *The Face of Emotion*. New York: Appleton-Century-Crofts.
- Izard CE (1990) Facial expressions and the regulation of emotions. *J Pers Soc Psychol* 58:487-498.
- Jack AI, Shallice T (2001) Introspective physicalism as an approach to the science of consciousness. *Cognition* 79:161-196.
- Jackendoff R (2007) *Language, Consciousness, Culture: Essays on Mental Structure*. Cambridge: The MIT Press.
- Jacob J, Jacobs C, Silvanto J (2015) Attention, working memory, and phenomenal experience of WM content: memory levels determined by dif-

- ferent types of top-down modulation. *Frontiers in Psychology* 6:1603. PMC4610135.
- Jacobs C, Silvanto J (2015) How is working memory content consciously experienced? The 'conscious copy' model of WM introspection. *Neurosci Biobehav Rev* 55:510-519.
- James W (1884) What is an emotion? *Mind* 9:188-205. [Tr. it. 'Che cos'è l'emozione?'. In Fonseca, G., Starace, G. (a cura di), *L'uomo come esperienza*. L'Ancora del Mediterraneo, Napoli 1999, pp. 167-186.]
- James W (1890) *Principles of Psychology*. New York: Holt. [Tr. it. *Principi di psicologia*. Principato, Milano 1950.]
- Janicke T, Haderer IK, Lajeunesse MJ, Anthes N (2016) Darwinian sex roles confirmed across the animal kingdom. *Sci Adv* 2:e1500983. PMC4758741.
- Janis C (2001) Victors by default. In: *The Book of Life: An Illustrated History of the Evolution of Life on Earth* (Gould, S.J., ed), pp 169-218 New York: W.W. Norton & Company.
- Jarcho JM, Berkman ET, Lieberman MD (2011) The neural basis of rationalization: cognitive dissonance reduction during decision-making. *Social Cognitive and Affective Neuroscience* 6:460-467.
- Javanbakht A (2011) A neural network model for schemas based on pattern completion. *J Am Acad Psychoanal Dyn Psychiatry* 39:243-261.
- Jekely G (2011) Origin and early evolution of neural circuits for the control of ciliary locomotion. *Proc Biol Sci* 278:914-922. PMC3049052.
- Jennings HS (1906) *Behavior of the Lower Organisms*. New York: Columbia University Press.
- Jerison H (1973) *Evolution of Brain and Intelligence*. New York: Academic Press.
- Joglekar MR, Mejias JF, Yang GR, Wang XJ (2018) Inter-areal balanced amplification enhances signal propagation in a large-scale circuit model of the primate cortex. *Neuron* 98:222-234 e228.
- Johnson MK (2006) Memory and reality. *Am Psychol* 61:760-771.
- Johnson MK, Raye CL, Mitchell KJ, Touryan SR, Greene EJ, Nolen-Hoeksema S (2006) Dissociating medial frontal and posterior cingulate activity during self-reflection. *Soc Cogn Affect Neurosci* 1:56-64. PMC2435374.
- Johnson-Laird PN (1983) *Mental Models: Towards a Cognitive Science of Language, Inference, and Consciousness*. Cambridge, MA: Harvard University Press. [Tr. it. *Modelli mentali*. il Mulino, Bologna 1993.]
- Johnson-Laird PN (1988) *The Computer and the Mind: An Introduction to Cognitive Science*. Cambridge, MA: Harvard University Press. [Tr. it. *La mente e il computer. Introduzione alla scienza cognitiva*. il Mulino, Bologna 1990.]
- Johnson-Laird PN (2006) *How We Reason*. Oxford: Oxford University Press. [Tr. it. *Pensiero e ragionamento*. il Mulino, Bologna 2008.]
- Johnson-Laird PN (2010) Mental models and human reasoning. *Proc Natl Acad Sci USA* 107:18243-18250. PMC2972923.
- Jonas H (1968) Biological foundations of individuality. *International Philosophical Quarterly* 8:231-251.
- Jones RA (1986) *Emile Durkheim: An Introduction to Four Major Works*. Beverly Hills, CA: Sage Publications.

- Joyce GF (1989) RNA evolution and the origins of life. *Nature* 338:217-224.
- Joyce GF (2002) The antiquity of RNA-based evolution. *Nature* 418:214-221.
- Joyce MKP, Barbas H (2018) Cortical connections position primate area 25 as a keystone for interoception, emotion, and memory. *J Neurosci* 38:1677-1698. PMC5815452.
- Kaas JH (1995) The evolution of isocortex. *Brain Behav Evol* 46:187-196.
- Kaas JH (2011) Neocortex in early mammals and its subsequent variations. *Ann NY Acad Sci* 1225:28-36. PMC3840914.
- Kahneman D (1999) Objective happiness. In: *Well Being* (Kahneman, D. et al., eds), pp 85-105 New York: Russell Sage Foundation.
- Kahneman D (2011) *Thinking, Fast and Slow*. New York: Farrar, Straus and Giroux. [Tr. it. *Pensieri lenti e veloci*. Mondadori, Milano 2017.]
- Kalenzaga S, Sperduti M, Anssens A, Martinelli P, Devauchelle AD, Gallarda T, Delhommeau M, Lion S, Amado I, Krebs MO, Oppenheim C, Piolino P (2014) Episodic memory and self-reference via semantic autobiographical memory: insights from an fMRI study in younger and older adults. *Front Behav Neurosci* 8:449. PMC4292587.
- Kandel ER (2001) The molecular biology of memory storage: a dialogue between genes and synapses. *Science* 294:1030-1038.
- Kandel ER, Schwartz JH, Jessell TM (2000) *Principles of Neural Science*. New York: Mc-Graw Hill. [Tr. it. *Principi di neuroscienze*. CEA, Rozzano (Mi) 2014.]
- Karten HJ (1991) Homology and evolutionary origins of the 'neocortex'. *Brain Behav Evol* 38:264-272.
- Karten HJ (2015) Vertebrate brains and evolutionary connectomics: on the origins of the mammalian 'neocortex'. *Philos Trans R Soc Lond B Biol Sci* 370. PMC4650131.
- Karten HJ, Shimizu T (1989) The origins of neocortex: connections and lamination as distinct events in evolution. *J Cogn Neurosci* 1:291-301.
- Katsuki T, Greenspan RJ (2013) Jellyfish nervous systems. *Curr Biol* 23:R592-594.
- Kelava I, Rentzsch F, Technau U (2015) Evolution of eumetazoan nervous systems: insights from cnidarians. *Philos Trans R Soc Lond B Biol Sci* 370. PMC4650132.
- Keller FS (1973) *The Definition of Psychology*. New York: Appleton-Century-Crofts.
- Kelley HH (1992) Common-sense psychology and scientific psychology. *Annual Review of Psychology* 43:1-24.
- Kemp TS (2005) *The Origins & Evolution of Mammals*. Oxford: Oxford University Press.
- Kennedy JS (1992) *The New Anthropomorphism*. New York: Cambridge University Press.
- Kermack DM, Kermack KA (1984) *The Evolution of Mammalian Characters*. Sydney: Croom Helm.
- Keverne EB (2015) Genomic imprinting, action, and interaction of maternal and fetal genomes. *Proc Natl Acad Sci USA* 112:6834-6840. PMC4460494.
- Kiefer M (2012) Executive control over unconscious cognition: attentional sensitization of unconscious information processing. *Front Hum Neurosci* 6:61. PMC3311241.

- Kihlstrom JF (1987) The cognitive unconscious. *Science* 237:1445-1452.
- Kim H (2012) A dual-subsystem model of the brain's default network: self-referential processing, memory retrieval processes, and autobiographical memory retrieval. *Neuroimage* 61:966-977.
- Kim H (2016) Default network activation during episodic and semantic memory retrieval: a selective meta-analytic comparison. *Neuropsychologia* 80:35-46.
- Kirk DL (2005) A twelve-step program for evolving multicellularity and a division of labor. *Bioessays* 27:299-310.
- Kitayama S, Markus HR (eds) (1994) *Emotion and culture: empirical studies of mutual influence*. Washington, DC: American Psychological Association.
- Klein SB (2004) The cognitive neuroscience of knowing one's self. In: *The Cognitive Neurosciences*, 3rd edition (Gazzaniga, M.S., ed), pp 1077-1089 Cambridge, MA: The MIT Press.
- Kluver H, Bucy PC (1937) 'Psychic blindness' and other symptoms following bilateral temporal lobectomy in rhesus monkeys. *American Journal of Physiology* 119:352-353.
- Knoll AH (2003) *Life on a Young Planet: The first Three Billion Years of Evolution on Earth*. Princeton: Princeton University Press.
- Knoll E (1997) Dogs, darwinism, and English sensibilities. In: *Anthropomorphism, Anecdotes, and Animals* (Mitchell, R.W. et al., eds), pp 12-21 Albany: State University of New York Press.
- Koch C (2018) What is consciousness? *Nature* 557:S8-S12. [Tr. it. 'Che cos'è la coscienza?'. In *Le Scienze*, 601, ottobre 2018, pp. 68-71.]
- Koechlin E (2011) Frontal pole function: what is specifically human? *Trends Cogn Sci* 15:241; author reply 243.
- Koechlin E, Basso G, Pietrini P, Panzer S, Grafman J (1999) The role of the anterior prefrontal cortex in human cognition. *Nature* 399:148-151.
- Koechlin E, Hyafil A (2007) Anterior prefrontal function and the limits of human decision-making. *Science* 318:594-598.
- Koechlin E, Ody C, Kouneiher F (2003) The architecture of cognitive control in the human prefrontal cortex. *Science* 302:1181-1185.
- Koechlin E, Summerfield C (2007) An information theoretical approach to prefrontal executive function. *Trends Cogn Sci* 11:229-235.
- Koerner EFK (2000) Towards a 'full pedigree' of the 'Sapir-Whorf hypothesis': from Locke to Lucy. In: *Explorations in Linguistic Relativity* (Putz, M., Verspoor, M., eds), pp 1-24 Amsterdam: John Benjamins.
- Koizumi O, Mizumoto H, Sugiyama T, Bode HR (1990) Nerve net formation in the primitive nervous system of Hydra—an overview. *Neurosci Res Suppl* 13:S165-170.
- Kolodny O, Edelman S (2018) The evolution of the capacity for language: the ecological context and adaptive value of a process of cognitive hijacking. *Philos Trans R Soc Lond B Biol Sci* 373. PMC5812965.
- Kondo H, Saleem KS, Price JL (2003) Differential connections of the temporal pole with the orbital and medial prefrontal networks in macaque monkeys. *J Comp Neurol* 465:499-523.
- Kondo H, Saleem KS, Price JL (2005) Differential connections of the perirhinal and parahippocampal cortex with the orbital and medial prefrontal networks in macaque monkeys. *J Comp Neurol* 493:479-509.

- Konopka G, Friedrich T, Davis-Turak J, Winden K, Oldham MC, Gao F, Chen L, Wang GZ, Luo R, Preuss TM, Geschwind DH (2012) Human-specific transcriptional networks in the brain. *Neuron* 75:601-617. PMC3645834.
- Koonin EV (2003) Comparative genomics, minimal gene-sets and the last universal common ancestor. *Nat Rev Microbiol* 1:127-136.
- Koshino H, Minamoto T, Yaei K, Osaka M, Osaka N (2014) Coactivation of the default mode network regions and working memory network regions during task preparation. *Sci Rep* 4:5954. PMC4121601.
- Koshland DE, Jr. (1977) A response regulator model in a simple sensory system. *Science* 196:1055-1063.
- Kotter R, Meyer N (1992) The limbic system: a review of its empirical foundation. *Behavioural Brain Research* 52:105-127.
- Kovecses Z (2000) *Metaphor and Emotion: Language, Culture, and Body in Human Feeling*. Cambridge: Cambridge University Press.
- Krawczyk DC (2012) The cognition and neuroscience of relational reasoning. *Brain Res* 1428:13-23.
- Kriegel U (2009) *Subjective Consciousness: A Self-Representational Theory*. Oxford: Oxford University Press.
- Kringelbach ML (2005) The human orbitofrontal cortex: linking reward to hedonic experience. *Nat Rev Neurosci* 6:691-702.
- Kristan WB, Jr. (2016) Early evolution of neurons. *Curr Biol* 26:R949-R954.
- Kron A, Schul Y, Cohen A, Hassin RR (2010) Feelings don't come easy: studies on the effortful nature of feelings. *J Exp Psychol Gen* 139:520-534.
- Krubitzer L, Kaas J (2005) The evolution of the neocortex in mammals: how is phenotypic diversity generated? *Curr Opin Neurobiol* 15:444-453.
- Kuijper B, Lane N, Pomiankowski A (2015) Can paternal leakage maintain sexually antagonistic polymorphism in the cytoplasm? *J Evol Biol* 28:468-480. PMC4413368.
- Kumar S, Hedges SB (1998) A molecular timescale for vertebrate evolution. *Nature* 392:917-920.
- Kupfermann I, Teyke T, Rosen SC, Weiss KR (1991) Studies of behavioral state in *Aplysia*. *The Biological Bulletin* 180:262-268.
- Kurzweil R (1999) *The Age of Spiritual Machines: When Computers Exceed Human Intelligence*. New York: Viking Penguin.
- Lacalli TC (1994) Apical organs, epithelial domains, and the origin of the chordate central nervous system. *American Zoologist* 34:533-541.
- Lacalli TC (1996) Landmarks and subdomains in the larval brain of branchiostoma: Vertebrate homologs and invertebrate antecedents. *Israel Journal of Zoology* 42:S131-S146.
- Lacalli TC (2001) New perspectives on the evolution of protochordate sensory and locomotory systems, and the origin of brains and heads. *Philos Trans R Soc Lond B Biol Sci* 356:1565-1572. PMC1088536.
- Lake JA (1990) Origin of the metazoa. *Proc Natl Acad Sci USA* 87:763-766. PMC53346.
- Lakoff G (1987) *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind*. Chicago: The University of Chicago Press.

-
- Lalande M (1996) Parental imprinting and human disease. *Annu Rev Genet* 30:173-195.
- Lambon Ralph MA (2014) Neurocognitive insights on conceptual knowledge and its breakdown. *Philos Trans R Soc Lond B Biol Sci* 369:20120392. PMC3866422.
- Lamme V (2015a) Predictive coding is unconscious, so that consciousness happens now: a reply to Lucia Melloni. In: *Open MIND* (Metzinger, T., Windt, J.M., eds), pp 895-898 Cambridge, MA: The MIT Press.
- Lamme V (2015b) The crack of dawn: perceptual functions and neural mechanisms that mark the transition from unconscious processing to conscious vision. In: *Open MIND* (Metzinger, T., Windt, J.M., eds), pp 847-880 Cambridge, MA: The MIT Press.
- Lane N (2009) Was our oldest ancestor a proton-powered rock?, <https://www.newscientist.com/article/mg20427306-20427200-was-our-oldest-ancestor-a-proton-powered-rock/>, retrieved Jun 20427325, 20422018. *New Scientist*.
- Lane N (2014) Bioenergetic constraints on the evolution of complex life. *Cold Spring Harb Perspect Biol* 6:a015982. PMC3996473.
- Lane N (2015) *The Vital Question: Energy, Evolution, and the Origins of Complex Life*. New York: W.W. Norton & Company.
- Lane N, Le Page M (2009) How life evolved: 10 steps to the first cell, <https://www.newscientist.com/article/dn17987-how-life-evolved-17910-steps-to-the-first-cells/>. *New Scientist*.
- Lane N, Martin WF, Raven JA, Allen JF (2013) Energy, genes and evolution: introduction to an evolutionary synthesis. *Philos Trans R Soc Lond B Biol Sci* 368:20120253. PMC3685456.
- Lang PJ (1968) Fear reduction and fear behavior: problems in treating a construct. In: *Research in Psychotherapy*, vol. 3 (Schlien, J.M., ed), pp 90-103 Washington, DC: American Psychological Association.
- Lanuza E, Belekhovala M, Martinez-Marcos A, Font C, Martinez-Garcia F (1998) Identification of the reptilian basolateral amygdala: an anatomical investigation of the afferents to the posterior dorsal ventricular ridge of the lizard *Podarcis hispanica*. *European Journal of Neuroscience* 10:3517-3534.
- Lapage G (1925) Memoirs: notes on the choanoflagellate, *Codosiga botrytis*, Ehrbg. *Quarterly Journal of Microscopical Science* s2-69:471-508.
- Lara AH, Wallis JD (2015) The role of prefrontal cortex in working memory: a mini review. *Frontiers in Systems Neuroscience* 9:173. PMC4683174.
- Larsen WJ (1993) *Human Embryology*. London: Churchill Livingstone. [Tr. it. *Embriologia umana*. Idelson-Gnocchi, Napoli 2002.]
- Larson EL (1997) *Summer for the Gods: The Scopes Trial and America's Continuing Debate Over Science and Religion*. New York: Basic Books.
- Lashley KS (1958) Cerebral organization and behavior. *Res Publ Assoc Res Nerv Ment Dis* 36:1-4; discussion 14-18.
- Lattal K (1998) A century of effect: legacies of E.L. Thorndike's animal intelligence monograph. *J Exp Anal Behav* 70:325-336. PMC1284688.
- Lau H (2017) In consciousness we trust, <https://inconsciousnesswetrust.blogspot.com/>, retrieved Aug 13, 2018.

- Lau H, Brown R (2019) The emperor's new phenomenology? The empirical case for conscious experience without first-order representations. In: Blockheads (Pautz, A., Stoljar, D., eds) Cambridge, MA: The MIT Press.
- Lau HC, Passingham RE (2006) Relative blindsight in normal observers and the neural correlate of visual consciousness. *Proc Natl Acad Sci USA* 103:18763-18768. PMC1693736.
- Lau HC, Passingham RE (2007) Unconscious activation of the cognitive control system in the human prefrontal cortex. *J Neurosci* 27:5805-5811.
- Lau HC, Rosenthal D (2011a) Empirical support for higher-order theories of conscious awareness. *Trends Cogn Sci* 15:365-373.
- Lau HC, Rosenthal D (2011b) The higher-order view does not require consciously self-directed introspection: response to Malach. *Trends Cogn Sci* 15:508-509.
- Lauri A, Brunet T, Handberg-Thorsager M, Fischer AH, Simakov O, Steinmetz PR, Tomer R, Keller PJ, Arendt D (2014) Development of the annelid axochord: insights into notochord evolution. *Science* 345:1365-1368.
- Lawrence JG (2002) Shared strategies in gene organization among prokaryotes and eukaryotes. *Cell* 110:407-413.
- Lazarus RS, McCleary R (1951) Autonomic discrimination without awareness: a study of subception. *Psychological Review* 58:113-122.
- Lazarus RS (1991) *Emotion and Adaptation*. New York: Oxford University Press.
- Leahy RL (2015) *Emotional Schema Therapy*. New York: Guilford Press. [Tr. it. *Emotional schema therapy. Credenze sulle emozioni e strategie di regolazione emozionale in terapia metacognitiva*. Eclipsi, Firenze 2016.]
- Lechner HA, Byrne JH (1998) New perspectives on classical conditioning: a synthesis of Hebbian and non-Hebbian mechanisms. *Neuron* 20:355-358.
- LeDoux JE (1984) Cognition and emotion: processing functions and brain systems. In: *Handbook of Cognitive Neuroscience* (Gazzaniga, M.S., ed), pp 357-368 New York: Plenum Publishing Corp.
- LeDoux JE (1987) Emotion. In: *Handbook of Physiology 1: The Nervous System, vol. 5, Higher Functions of the Brain* (Plum, F., ed), pp 419-459 Bethesda: American Physiological Society.
- LeDoux JE (1991) Emotion and the limbic system concept. *Concepts in Neuroscience* 2:169-199.
- LeDoux JE (1994) Emotion, memory and the brain. *Sci Am* 270:50-57.
- LeDoux JE (1996) *The Emotional Brain*. New York: Simon and Schuster. [Tr. it. *Il cervello emotivo. Alle origini delle emozioni*. Baldini&Castoldi, Milano 2014.]
- LeDoux JE (2002) *Synaptic Self: How Our Brains Become Who We Are*. New York: Viking. [Tr. it. *Il Sé sinaptico. Come il nostro cervello ci fa diventare quelli che siamo*. Raffaello Cortina, Milano 2002.]
- LeDoux JE (2008) Emotional colouration of consciousness: how feelings come about. In: *Frontiers of Consciousness: Chichele Lectures* (Weiskrantz, L., Davies, M., eds), pp 69-130 Oxford: Oxford University Press.
- LeDoux JE (2012) Rethinking the emotional brain. *Neuron* 73:653-676.
- LeDoux JE (2013) The slippery slope of fear. *Trends Cogn Sci* 17:155-156.

- LeDoux JE (2014) Coming to terms with fear. *Proc Natl Acad Sci USA* 111:2871-2878.
- LeDoux JE (2015) *Anxious: Using the Brain to Understand and Treat Fear and Anxiety*. New York: Viking. [Tr. it. *Ansia. Come il cervello ci aiuta a capirla*. Raffaello Cortina, Milano 2016.]
- LeDoux JE (2017) Introductory essay: consciousness in light of the non-conscious brain. In: *Before Consciousness: In Search of the Fundamentals of Mind* (Radman, Z., ed) Exeter, United Kingdom: Imprint Academic.
- LeDoux JE (2017) Semantics, surplus meaning, and the science of fear. *Trends Cogn Sci* 21:303-306.
- LeDoux JE, Brown R (2017) A higher-order theory of emotional consciousness. *Proc Natl Acad Sci USA* 114:E2016-E2025.
- LeDoux JE, Brown R, Pine DS, Hofmann SG (2018) Know thyself: well-being and subjective experience. In: *Cerebrum* New York: The Dana Foundation.
- LeDoux J, Daw ND (2018) Surviving threats: neural circuit and computational implications of a new taxonomy of defensive behaviour. *Nat Rev Neurosci* 19:269-282.
- LeDoux JE, Daw N (submitted) Surviving threats: brain circuits underlying defense when in harm's way. *Nat Rev Neurosci*.
- LeDoux JE, Hofmann SG (2018) The subjective experience of emotion: a fearful view. *Current Opinion in Behavioral Sciences* 19:67-72.
- LeDoux JE, Mobbs D (2018) Survival behaviors and circuits. *Current Opinion in Behavioral Sciences* 24:14-20.
- LeDoux JE, Pine DS (2016) Using neuroscience to help understand fear and anxiety: a two-system framework. *Am J Psychiatry* 173:1083-1093.
- Lee DD, Prindle A, Liu J, Suel GM (2017) Snapshot: electrochemical communication in biofilms. *Cell* 170:214-214 e211.
- Lee MS, Soubrier J, Edgecombe GD (2013) Rates of phenotypic and genomic evolution during the Cambrian explosion. *Curr Biol* 23:1889-1895.
- Lehrman DS (1953) A critique of Konrad Lorenz's theory of instinctive behavior. *Q Rev Biol* 28:337-363.
- Lettvin JY, Maturana HR, McCulloch WS, Pitts WH (1959) What the frog's eye tells the frog's brain. *Proceedings of the Institution of Radiological Engineers* 41:1940-1951.
- Levin TC, King N (2013) Evidence for sex and recombination in the choanoflagellate *Salpingoeca rosetta*. *Curr Biol* 23:2176-2180. PMC3909816.
- Levine B (2004) Autobiographical memory and the self in time: brain lesion effects, functional neuroanatomy, and lifespan development. *Brain Cogn* 55:54-68.
- Levine B, Turner GR, Tisserand D, Hevenor SJ, Graham SJ, McIntosh AR (2004) The functional neuroanatomy of episodic and semantic autobiographical remembering: a prospective functional MRI study. *J Cogn Neurosci* 16:1633-1646.
- Levinton JS (2013) *Marine Biology: Function, Biodiversity, Ecology*. Oxford: Oxford University Press.
- Levitin DJ (2015) *The Organized Mind: Thinking Straight in the Age of Information Overload*. New York: Plume.

- Lewis DA, Melchitzky DS, Burgos GG (2002) Specificity in the functional architecture of primate prefrontal cortex. *J Neurocytol* 31:265-276.
- Lewis M (2011) The origins and uses of self-awareness or the mental representation of me. *Conscious Cogn* 20:120-129.
- Lewis M (2013) *The Rise of Consciousness and the Development of Emotional Life*. New York: The Guilford Press.
- Lewis-Peacock JA, Postle BR (2008) Temporary activation of long-term memory supports working memory. *J Neurosci* 28:8765-8771. PMC2699183.
- Lewontin RC (1983) The organism as the subject and object of evolution. *Scientia* 118:65-82.
- Leys SP (2015) Elements of a 'nervous system' in sponges. *J Exp Biol* 218:581-591.
- Leys SP, Degnan BM (2001) Cytological basis of photoresponsive behavior in a sponge larva. *Biol Bull* 201:323-338.
- Leys SP, Hill A (2012) The physiology and molecular biology of sponge tissues. *Adv Mar Biol* 62:1-56.
- Leys SP, Meech RW (2006) Physiology of coordination in sponges. *Canadian Journal of Zoology* 84:288-306.
- Libby E, Ratcliff WC (2014) Evolution. Ratcheting the evolution of multicellularity. *Science* 346:426-427.
- Libby LA, Hannula DE, Ranganath C (2014) Medial temporal lobe coding of item and spatial information during relational binding in working memory. *J Neurosci* 34:14233-14242. PMC4205549.
- Liebesskind BJ (2011) Evolution of sodium channels and the new view of early nervous system evolution. *Commun Integr Biol* 4:679-683. PMC3306330.
- Lindquist KA, Barrett LF (2008) Constructing emotion: the experience of fear as a conceptual act. *Psychological Science* 19:898-903. PMC2758776.
- Lindquist KA, Barrett LF, Bliss-Moreau E, Russell JA (2006) Language and the perception of emotion. *Emotion* 6:125-138.
- Lindquist KA, Satpute AB, Gendron M (2015) Does language do more than communicate emotion? *Curr Dir Psychol Sci* 24:99-108. PMC4428906.
- Liu H, Qin W, Li W, Fan L, Wang J, Jiang T, Yu C (2013) Connectivity-based parcellation of the human frontal pole with diffusion tensor imaging. *J Neurosci* 33:6782-6790.
- Livingstone M (2008) *Vision and Art: The Biology of Seeing*. New York: Abrams.
- Loaiza VM, Borovanska BM (2018) Covert retrieval in working memory impacts the phenomenological characteristics remembered during episodic memory. *Conscious Cogn* 57:20-32.
- Loeb J (1918) *Forced Movements, Tropisms, and Animal Conduct*. Philadelphia: Lippincott.
- Long J, Xie Q, Ma Q, Urbin MA, Liu L, Weng L, Huang X, Yu R, Li Y, Huang R (2016) Distinct Interactions between fronto-parietal and default mode networks in impaired consciousness. *Sci Rep* 6:38866. PMC5153635.
- Long JA (1996) *The Rise of Fishes: 500 Million Years of Evolution*. Baltimore: The Johns Hopkins University Press.
- Lorenz KZ (1950) The comparative method in studying innate behavior patterns. *Symp Soc Exp Biol* 4:221-268.

- Lorenz KZ (1965) *Evolution and Modification of Behavior*. Chicago: University of Chicago Press. [Tr. it. *Evoluzione e modificazione del comportamento*. Boringhieri, Torino 1971.]
- Lovejoy AO (1936) *The Great Chain of Being: A Study of the History of an Idea*. Cambridge, MA: Harvard University Press. [Tr. it. *La grande catena dell'essere*. Feltrinelli, Milano 1981.]
- Lowe CJ, Clarke DN, Medeiros DM, Rokhsar DS, Gerhart J (2015) The deuterostome context of chordate origins. *Nature* 520:456-465.
- Luck SJ, Vogel EK (1997) The capacity of visual working memory for features and conjunctions. *Nature* 390:279-281.
- Luo ZX (2007) Transformation and diversification in early mammal evolution. *Nature* 450:1011-1019.
- Lurija AR (1973) *The Working Brain*. New York: Basic Books. [Tr. it. *Come lavora il cervello. Introduzione alla neuropsicologia*. il Mulino, Bologna 1990.]
- Lyon P (2015) The cognitive cell: bacterial behavior reconsidered. *Front Microbiol* 6:264. PMC4396460.
- Ma WJ, Husain M, Bays PM (2014) Changing concepts of working memory. *Nat Neurosci* 17:347-356. PMC4159388.
- MacLean EL (2016) Unraveling the evolution of uniquely human cognition. *Proc Natl Acad Sci USA* 113:6348-6354. PMC4988573.
- MacLean PD (1949) Psychosomatic disease and the 'visceral brain': recent developments bearing on the Papez theory of emotion. *Psychosomatic Medicine* 11:338-353.
- MacLean PD (1952) Some psychiatric implications of physiological studies on frontotemporal portion of limbic system (visceral brain). *Electroencephalography and Clinical Neurophysiology* 4:407-418.
- MacLean PD (1970) The triune brain, emotion and scientific bias. In: *The Neurosciences: Second Study Program* (Schmitt, F.O., ed), pp 336-349 New York: Rockefeller University Press.
- MacLean PD (1990) *The Triune Brain in Evolution: Role in Paleocerebral Functions*. New York: Plenum Press.
- Macnab RM, Koshland DE, Jr. (1972) The gradient-sensing mechanism in bacterial chemotaxis. *Proc Natl Acad Sci USA* 69:2509-2512.
- Maier NRF (1931) Reasoning in humans. II. The solution of a problem and its appearance in consciousness. *Journal of Comparative Psychology* 12:181-194.
- Maier NRF, Schneirla TC (1965) *Principles of Animal Psychology*. New York: Dover.
- Mallatt J, Chen JY (2003) Fossil sister group of craniates: predicted and found. *J Morphol* 258:1-31.
- Mancuso S, Viola A (2015) *Brilliant Green: The Surprising History and Science of Plant Intelligence*. Washington, DC: Island Press. [Tr. it. *Verde brillante. Sensibilità e intelligenza del mondo vegetale*. Giunti Editore, Milano 2015.]
- Mandler G, Kessen W (1964) *The Language of Psychology*. New York: John Wiley & Sons, Inc. [Tr. it. *Il linguaggio della psicologia*. il Mulino, Bologna 1977.]
- Mandler JM (1984) *Stories, Scripts, and Scenes: Aspects of Schema Theory*. Hillsdale, NJ: Lawrence Erlbaum Associates.

-
- Maniscalco B, Lau H (2016) The signal processing architecture underlying subjective reports of sensory awareness. *Neurosci Conscious* 2016. PMC4972343.
- Manning A (1967) *An Introduction to Animal Behavior*. Reading, MA, Addison-Wesley. [Tr. it. *Il comportamento animale*. Boringhieri, Torino 1985.]
- Margulis L (1970) *Origin of Eukaryotic Cells*. New Haven: Yale University Press.
- Margulis L, Chapman MJ (2009) *Kingdoms and Domains: An Illustrated Guide to the Phyla of Life on Earth*. Amsterdam: Academic Press.
- Markowitsch HJ, Staniloiu A (2011) Memory, autozoetic consciousness, and the self. *Conscious Cogn* 20:16-39.
- Markus HR, Kitayama S (1991) Culture and the self: implications for cognition, emotion, and motivation. *Psychological Review* 98:224-253.
- Marr D (1971) Simple memory: a theory for archicortex. *Philos Trans R Soc Lond B Biol Sci* 262:23-81.
- Marshall M (2009) Timeline: the evolution of life, <https://www.newscientist.com/article/dn17453-timeline-the-evolution-of-life/>, retrieved Mar 17 2017. *New Scientist*.
- Marshall M (2011) Your brain chemistry existed before animals did. *New Scientist* 211(2828):11.
- Marshall M (2016) The secret of how life on Earth began, <https://www.bbc.com/earth/story/20161026-the-secret-of-how-life-on-earth-began>, retrieved Feb 20 2016 10:25, 2016 2017.
- Martin A, Haxby JV, Lalonde FM, Wiggs CL, Ungerleider LG (1995) Discrete cortical regions associated with knowledge of color and knowledge of action. *Science* 270:102-105.
- Martin R (1990) *Primate Origins and Evolution*. Princeton: Princeton University Press.
- Martin W, Muller M (1998) The hydrogen hypothesis for the first eukaryote. *Nature* 392:37-41.
- Martin W, Russell MJ (2003) On the origins of cells: a hypothesis for the evolutionary transitions from abiotic geochemistry to chemoautotrophic prokaryotes, and from prokaryotes to nucleated cells. *Philos Trans R Soc Lond B Biol Sci* 358:59-83; discussion 83-55. PMC1693102.
- Martindale MQ (2005) The evolution of metazoan axial properties. *Nat Rev Genet* 6:917-927.
- Martindale MQ, Pang K, Finnerty JR (2004) Investigating the origins of triploblasty: 'mesodermal' gene expression in a diploblastic animal, the sea anemone *Nematostella vectensis* (phylum, Cnidaria; class, Anthozoa). *Development* 131:2463-2474.
- Martinelli P, Sperduti M, Piolino P (2013) Neural substrates of the self-memory system: new insights from a meta-analysis. *Hum Brain Mapp* 34:1515-1529.
- Martinez-Garcia F, Martinez-Marcos A, Lanuza E (2002) The pallial amygdala of amniote vertebrates: evolution of the concept, evolution of the structure. *Brain Res Bull* 57:463-469.
- Marx MH (1951) Intervening variable or hypothetical construct? *Psychol Rev* 58:235-247.

- Mashour GA (2018) The controversial correlates of consciousness. *Science* 360:493-494.
- Mastin L (2009) The physics of the universe: the beginnings of life—the early earth and the building blocks of life, https://www.physicsoftheuniverse.com/topics_life_early.html, retrieved Feb 20, 2017.
- Mattson MP (2014) Superior pattern processing is the essence of the evolved human brain. *Front Neurosci* 8:265. PMC4141622.
- Maturana HR (1975) The organization of the living: a theory of the living organization. *International Journal of Man-Machine Studies* 7:313-332.
- Maturana HR, Varela FJ (1980) *Autopoiesis and Cognition: The Realization of the Living*. Dordrecht, Holland: D. Reidel Publishing Company. [Tr. it. *Autopoiesi e cognizione. La realizzazione del vivente*. Marsilio, Venezia 1985.]
- Maturana HR, Varela FJ (1987) *The Tree of Knowledge: The Biological Roots of Human Understanding*. Boston: New Science Library. [Tr. it. *L'albero della conoscenza*. Garzanti, Milano 1999.]
- Matus DQ, Pang K, Marlow H, Dunn CW, Thomsen GH, Martindale MQ (2006) Molecular evidence for deep evolutionary roots of bilaterality in animal development. *Proc Natl Acad Sci USA* 103:11195-11200. PMC1544064.
- May T (2018) Would human extinction be a tragedy? *The New York Times* New York: New York Times Company.
- Mayr E (1963) *Animal Species and Evolution*. Cambridge, MA: Belknap Press. [Tr. it. *L'evoluzione delle specie animali*. Einaudi, Torino 1970.]
- Mayr E (1974) Cladistic analysis or cladistic classification? *Journal of Zoological Systematics and Evolutionary Research* 12:94-128.
- Mayr E (1982) *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*. Cambridge, MA: Belknap Press. [Tr. it. *Storia del pensiero biologico. Diversità, evoluzione, eredità*. Bollati Boringhieri, Torino 2011.]
- Mayr E (2001) *What Evolution Is*. New York: Basic Books.
- McClelland JL, McNaughton BL, O'Reilly RC (1995) Why there are complementary learning systems in the hippocampus and neocortex: insights from the successes and failures of connectionist models of learning and memory. *Psychological Review* 102:419-457.
- McCormick C, Ciarraelli E, De Luca F, Maguire EA (2017) Comparing and contrasting the cognitive effects of hippocampal and ventromedial prefrontal cortex damage: a review of human lesion studies. *Neuroscience* 374:295-318.
- McCurdy LY, Maniscalco B, Metcalfe J, Liu KY, de Lange FP, Lau H (2013) Anatomical coupling between distinct metacognitive systems for memory and visual perception. *J Neurosci* 33:1897-1906. PMC4696871.
- McGovern K, Baars BJ (2007) Cognitive theories of consciousness. In: *The Cambridge Handbook of Consciousness* (Zelazo, P.D. et al., eds), pp 177-205 New York: Cambridge University Press.
- McGowan PO, Sasaki A, D'Alessio AC, Dymov S, Labonte B, Szyf M, Turecki G, Meaney MJ (2009) Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse. *Nat Neurosci* 12:342-348. PMC2944040.

- McGregor S, Vasas V, Husbands P, Fernando C (2012) Evolution of associative learning in chemical networks. *PLoS Comput Biol* 8:e1002739.
- McNally R (2009) Anxiety. In: *Oxford Companion to Emotion and the Affective Sciences* (Sander, D., Scherer, K., eds) Oxford: Oxford University Press.
- Meinhardt H (2002) The radial-symmetric hydra and the evolution of the bilateral body plan: an old body became a young brain. *Bioessays* 24:185-191.
- Melloni L (2015) Consciousness as interference in time: a commentary on Victor Lamme. In: *Open MIND* (Metzinger, T., Windt, J.M., eds), pp 881-893 Cambridge, MA: The MIT Press.
- Menant C (2006) Evolution of representations. From basic life to self-representation and self-consciousness, <https://cogprints.org/4843/>.
- Menant C (2011) Computation on information, meaning and representations: an evolutionary approach. in: *information and computation: essays on scientific and philosophical understanding of foundations of information and computation* (Dodig-Crnkovic, G., Burgin, M., eds), pp 255-286 Hackensack, NJ: World Scientific Publishing.
- Menant C (2018) Self-consciousness and human evil. Proposal for an evolutionary approach. In: *Association for the Scientific Study of Consciousness Krakow, Poland*, https://www.researchgate.net/publication/324113733_Self-Consciousness_and_Human_Evil_Proposal_for_an_Evolutionary_Approach_abstract.
- Mesulam MM (1998) From sensation to cognition. *Brain* 121 (Pt 6):1013-1052.
- Metcalfe J, Son LK (2012) Anoetic, noetic and auto-noetic metacognition. In: *The Foundations of Metacognition* (Beran, M. et al., eds) Oxford: Oxford University Press.
- Metzinger T (2003) *Being No One*. Cambridge, MA: The MIT Press.
- Meyer A (1998) Hox gene variation and evolution. *Nature* 391:225, 227-228.
- Meyer K (2011) Primary sensory cortices, top-down projections and conscious experience. *Progress in neurobiology* 94:408-417.
- Michod RE (2005) On the transfer of fitness from the cell to the multicellular organism. *Biology & Philosophy* 20:967-987.
- Michod RE, Roze D (2001) Cooperation and conflict in the evolution of multicellularity. *Heredity* (Edinb) 86:1-7.
- Miller EK (2013) The 'working' of working memory. *Dialogues in clinical neuroscience* 15:411-418. PMC3898679.
- Miller EK, Cohen JD (2001) An integrative theory of prefrontal cortex function. *Annu Rev Neurosci* 24:167-202.
- Miller G (1956) The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review* 63:81-97.
- Miller SL (1953) A production of amino acids under possible primitive earth conditions. *Science* 117:528-529.
- Milner B (1959) The memory defect in bilateral hippocampal lesions. *Psychiatr Res Rep Am Psychiatr Assoc* 11:43-58.
- Milner B (1962) Les troubles de la memoire accompagnant des lesions hippocampiques bilaterales. In: *Physiologie de l'hippocampe* (Plassouant, P., ed), pp 257-272 Paris: Centre de la Recherche Scientifique.

- Milner B, Corkin S, Teuber HL (1968) Further analysis of the hippocampal amnesic syndrome: 14-year follow-up study of H.M. *Neuropsychologia* 6:215-234.
- Milner D, Goodale M (2006) *The Visual Brain in Action*. Oxford: Oxford University Press.
- Miloyan B, Suddendorf T (2015) Feelings of the future. *Trends Cogn Sci* 19:196-200.
- Minors D (2016) How a honey bee solves an abstract conceptual problem, DOI: 10.13140/RG.2.2.23590.63044.
- Minsky M (1975) A framework for representing knowledge. In: *The Psychology of Computer Vision* (Winston, P., ed), pp 211-277 New York: McGraw-Hill.
- Mishkin M (1982) A memory system in the monkey. *Philos Trans R Soc Lond B Biol Sci* 298:85-95.
- Mishkin M, Ungerleider LG, Macko KA (1983) Object vision and spatial vision: two cortical pathways. *Eye (Lond)* 6:414-417.
- Mitchell RW, Thompson NS, Miles HL (eds) (1996) *Anthropomorphism, Anecdotes, and Animals*. New York: SUNY Press.
- Miyashita Y (1993) Inferior temporal cortex: where visual perception meets memory. *Annu Rev Neurosci* 16:245-263.
- Moayeddi M, Salomons TV, Dunlop KA, Downar J, Davis KD (2015) Connectivity-based parcellation of the human frontal polar cortex. *Brain Struct Funct* 220:2603-2616. PMC4549383.
- Mobbs D (2018) The ethological deconstruction of fear(s). *Current Opinion in Behavioral Sciences* 24:32-37.
- Mobbs D, Hagan CC, Dalgleish T, Silston B, Prevost C (2015) The ecology of human fear: survival optimization and the nervous system. *Front Neurosci* 9:55. PMC4364301.
- Moore TE (1988) The case against subliminal manipulation. *Psychology and Marketing* 5:297-316.
- Morales J, Lau H, Fleming SM (2018) Domain-general and domain-specific patterns of activity supporting metacognition in human prefrontal cortex. *J Neurosci* 38:3534-3546. PMC5895040.
- Moreno A, Etxebarria A (2005) Agency in natural and artificial systems. *Artif Life* 11:161-175.
- Morgan CL (1890-1891) *Animal Life and Intelligence*. Boston: Ginn & Company.
- Morgan CL (1930) Autobiography of C. Lloyd Morgan. In: *History of Psychology in Autobiography*, vol. 2 (Murchison, C., ed), pp 237-264 Worcester, MA: Clark University Press.
- Moroz LL, Kocot KM, Citarella MR, Dosung S, Norekian TP, Povolotskaya IS, Grigorenko AP, Dailey C, Berezikov E, Buckley KM, Pritsyn A, Reshetov D, Mukherjee K, Moroz TP, Bobkova Y, Yu F, Kapitonov VV, Jurka J, Bobkov YV, Swore JJ, Girardo DO, Fodor A, Gusev F, Sanford R, Bruders R, Kittler E, Mills CE, Rast JP, Derelle R, Solovyev VV, Kondrashov FA, Swalla BJ, Sweedler JV, Rogaev EI, Halanych KM, Kohn AB (2014) The ctenophore genome and the evolutionary origins of neural systems. *Nature* 510:109-114. PMC4337882.

- Moroz LL, Kohn AB (2016) Independent origins of neurons and synapses: insights from ctenophores. *Philos Trans R Soc Lond B Biol Sci* 371:20150041. PMC4685580.
- Morris D (1967) *The Naked Ape: The Controversial Classic of Man's Origins*. New York: Random House, Inc. [Tr. it. *La scimmia nuda*. Bompiani, Milano 2018.]
- Moscovitch M (1992) Memory and working-with-memory: a component process model based on modules and central systems. *J Cogn Neurosci* 4:257-267.
- Moscovitch M (1995) Recovered consciousness: a hypothesis concerning modularity and episodic memory. *J Clin Exp Neuropsychol* 17:276-290.
- Moscovitch M, Rosenbaum RS, Gilboa A, Addis DR, Westmacott R, Grady C, McAndrews MP, Levine B, Black S, Winocur G, Nadel L (2005) Functional neuroanatomy of remote episodic, semantic and spatial memory: a unified account based on multiple trace theory. *Journal of anatomy* 207: 35-66. PMC1571502.
- Moscovitch M, Winocur G (2002) The frontal cortex and working with memory. In: *Principles of Frontal Lobe Function* (Stuss, D.T., Knight, R.T., eds), pp 188-209 New York: Oxford University Press.
- Mukhina YI, Kumeiko VV, Podgornaya OI, Efremova SM (2006) The fate of larval flagellated cells during metamorphosis of the sponge *Halisarca dujardini*. *Int J Dev Biol* 50:533-541.
- Murray EA (1992) Medial temporal lobe structures contributing to recognition memory: the amygdaloid complex versus the rhinal cortex. In: *The Amygdala: Neurobiological Aspects of Emotion, Memory, and Mental Dysfunction* (Aggleton, J.P., ed), pp 453-470 New York: Wiley-Liss, Inc.
- Murray EA, Wise SP, Graham KS (2017a) Representational specializations of the hippocampus in phylogenetic perspective. *Neurosci Lett*. PMC5665731.
- Murray EA, Wise SP, Graham KS (2017b) *The Evolution of Memory Systems: Ancestors, Anatomy, and Adaptations*. Oxford: Oxford University Press.
- Muzio RN, Pistone Creydt V, Iurman M, Rinaldi MA, Sirani B, Papini MR (2011) Incentive or habit learning in amphibians? *PLoS One* 6:e25798. PMC3210735.
- Naccache L (2018) Why and how access consciousness can account for phenomenal consciousness. *Philos Trans R Soc Lond B Biol Sci* 373. PMC6074081.
- Naccache L, Dehaene S (2007) Reportability and illusions of phenomenality in the light of the global neuronal workspace model. *Behav Brain Sci* 30:518-520.
- Nagel T (1974) What is it like to be a bat? *Philosophical Review* 83:4435-4450. [Tr. it. *Cosa si prova a essere un pipistrello?* Castelvecchi, Roma 2013.]
- Nahmias EA (2002) Verbal reports on the contents of consciousness: reconsidering introspectionist methodology. *Psyche* 8.
- Nauta WJH, Karten HJ (1970) A general profile of the vertebrate brain, with sidelights on the ancestry of cerebral cortex. In: *The Neurosciences: Second Study Program* (Schmitt, F.O., ed), pp 7-26 New York: The Rockefeller University Press.

- Neisser U (1967) *Cognitive Psychology*. Englewood Cliffs, NJ: Prentice Hall. [Tr. it. *Psicologia cognitivista*. A. Martello-Giunti, Firenze 1976.]
- Neisser U (ed) (1993) *The Perceived Self: Ecological and Interpersonal Sources of Self Knowledge*. Cambridge: Cambridge University Press. [Tr. it. *La percezione del Sé. Le fonti ecologiche e interpersonali della conoscenza di sé*. Bollati Boringhieri, Torino 1999.]
- Neri P (2014) Semantic control of feature extraction from natural scenes. *J Neurosci* 34:2374-2388. PMC3913878.
- Nestler EJ (2013) Epigenetic inheritance: fact or fiction?, https://www.dana.org/Publications/ReportOnProgress/Epigenetic_Inheritance_Fact_or_Fiction/. The Dana Foundation.
- Nestler EJ, Pena CJ, Kundakovic M, Mitchell A, Akbarian S (2016) Epigenetic basis of mental illness. *Neuroscientist* 22:447-463. PMC4826318.
- Neubert FX, Mars RB, Thomas AG, Sallet J, Rushworth MF (2014) Comparison of human ventral frontal cortex areas for cognitive control and language with areas in monkey frontal cortex. *Neuron* 81:700-713.
- Nickel M (2010) Evolutionary emergence of synaptic nervous systems: what can we learn from the non-synaptic, nerveless Porifera? *Invertebrate Biology* 129:1-16.
- Nielsen C (2008) Six major steps in animal evolution: are we derived sponge larvae? *Evol Dev* 10:241-257.
- Nieuwenhuys R (2002) Deuterostome brains: synopsis and commentary. *Brain Res Bull* 57:257-270.
- Niklas KJ (2014) The evolutionary-developmental origins of multicellularity. *Am J Bot* 101:6-25.
- Niklas KJ, Newman SA (2013) The origins of multicellular organisms. *Evol Dev* 15:41-52.
- Niklas KJ, Newman SA (eds) (2016) *Multicellularity: Origins and Evolution*. Cambridge, MA: The MIT Press.
- Nilsson DE (1996) Eye ancestry: old genes for new eyes. *Curr Biol* 6:39-42.
- Nimchinsky EA, Gilissen E, Allman JM, Perl DP, Erwin JM, Hof PR (1999) A neuronal morphologic type unique to humans and great apes. *Proc Natl Acad Sci USA* 96:5268-5273. PMC21853.
- Nisbett RE, Wilson TD (1977) Telling more than we can know: verbal reports on mental processes. *Psychological Review* 84:231-259.
- Niv Y (2007) The effects of motivation on habitual instrumental behavior. In: *Computational Neuroscience*, PhD thesis, Interdisciplinary Center for Neural Computation, The Hebrew University of Jerusalem.
- Niv Y, Daw ND, Dayan P (2005) How fast to work: response vigor, motivation and tonic dopamine. *Advances in Neural Information Processing Systems* 18:1019.
- Noë A (2012) *Varieties of Presence*. Cambridge, MA: Harvard University Press.
- Norman DA, Shallice T (1986) Attention to action: willed and automatic control of behavior. In: *Consciousness and Self-Regulation* (Davidson, R.J. et al., eds), pp 1-18 New York: Plenum.
- Northcutt RG (1981) Evolution of the telencephalon in nonmammals. *Annu Rev Neurosci* 4:301-350.

- Northcutt RG (2002) Understanding vertebrate brain evolution. *Integr Comp Biol* 42:743-756.
- Northcutt RG (2012) Evolution of centralized nervous systems: two schools of evolutionary thought. *Proc Natl Acad Sci USA* 109 Suppl 1:10626-10633. PMC3386872.
- Northcutt RG, Kaas JH (1995) The emergence and evolution of mammalian neocortex. *Eye (Lond)* 18:373-379.
- Oatley K, Johnson-Laird PN (2014) Cognitive approaches to emotions. *Trends Cogn Sci* 18:134-140.
- Ochsner KN, Gross JJ (2005) The cognitive control of emotion. *Trends Cogn Sci* 9:242-249.
- Odegaard B, Knight RT, Lau H (2017) Should a few null findings falsify prefrontal theories of conscious perception? *J Neurosci* 37:9593-9602. PMC5628405.
- Odegaard B, So TY, Taschereau-Dumouchel V, Kawato M, Lau H (2018) Can perceptual content be read-out from prefrontal cortex? In: 22nd Meeting of the Association for the Scientific Study of Consciousness Krakow, Poland.
- Ohman A (2002) Automaticity and the amygdala: non-conscious responses to emotional faces. *Curr Dir Psychol Sci* 11:62-66.
- Ohman A (2005) The role of the amygdala in human fear: automatic detection of threat. *Psychoneuroendocrinology* 30:953-958.
- O'Keefe J, Dostrovsky J (1971) The hippocampus as a spatial map. Preliminary evidence from unit activity in the freely-moving rat. *Brain Res* 34:171-175.
- O'Keefe J, Nadel L (1978) *The Hippocampus As a Cognitive Map*. Oxford: Clarendon Press.
- Okuda J, Fujii T, Ohtake H, Tsukiura T, Tanji K, Suzuki K, Kawashima R, Fukuda H, Itoh M, Yamadori A (2003) Thinking of the future and past: the roles of the frontal pole and the medial temporal lobes. *Neuroimage* 19:1369-1380.
- Olds J (1956) Pleasure centers in the brain. *Sci Am* 195:105-116.
- Olds J, Milner P (1954) Positive reinforcement produced by electrical stimulation of septal and other regions of the brain. *J Comp Physiol Psychol* 47:419-427.
- Olsson A, Phelps EA (2004) Learned fear of 'unseen' faces after Pavlovian, observational, and instructed fear. *Psychological Science* 15:822-828.
- Ongur D, Ferry AT, Price JL (2003) Architectonic subdivision of the human orbital and medial prefrontal cortex. *J Comp Neurol* 460:425-449.
- Oosterwijk S, Touroutoglou A, Lindquist KA (2015) The neuroscience of construction: what neuroimaging approaches can tell us about how the brain creates the mind. In: *The Psychological Construction of Emotion* (Barrett, L.F., Russell, J.A., eds), pp 111-143 New York: The Guilford Press.
- O'Reilly RC, McClelland JL (1994) Hippocampal conjunctive encoding, storage, and recall: avoiding a trade-off. *Hippocampus* 4:661-682.
- Ortony A, Turner TJ (1990) What's basic about basic emotions? *Psychological Review* 97:315-331.
- Ota KG, Kuratani S (2007) Cyclostome embryology and early evolutionary history of vertebrates. *Integr Comp Biol* 47:329-337.

- Otto AR, Gershman SJ, Markman AB, Daw ND (2013) The curse of planning: dissecting multiple reinforcement-learning systems by taxing the central executive. *Psychological Science* 24:751-761. PMC3843765.
- Otto AR, Raio CM, Chiang A, Phelps EA, Daw ND (2013) Working-memory capacity protects model-based learning from stress. *Proc Natl Acad Sci USA* 110:20941-20946. PMC3876216.
- Otto AR, Skatova A, Madlon-Kay S, Daw ND (2015) Cognitive control predicts use of model-based reinforcement learning. *J Cogn Neurosci* 27: 319-333. PMC4387848.
- Otto S (2008) Sexual reproduction and the evolution of sex. *Nature Education* 1:182.
- Overgaard M, Sandberg K (2014) Kinds of access: different methods for report reveal different kinds of metacognitive access. In: *The Cognitive Neuroscience of Metacognition* (Fleming, S.M., Frith, C.D., eds), pp 67-86 Berlin-Heidelberg: Springer Verlag.
- Pabba M (2013) Evolutionary development of the amygdaloid complex. *Front Neuroanat* 7:27. PMC3755265.
- Packard V (1957) *The Hidden Persuaders*. New York: D.M. McKay. [Tr. it. *I persuasori occulti*. Einaudi, Torino 2005.]
- Panagiotaropoulos TI, Deco G, Kapoor V, Logothetis NK (2012) Neuronal discharges and gamma oscillations explicitly reflect visual consciousness in the lateral prefrontal cortex. *Neuron* 74:924-935.
- Pandey UB, Nichols CD (2011) Human disease models in *Drosophila melanogaster* and the role of the fly in therapeutic drug discovery. *Pharmacol Rev* 63:411-436. PMC3082451.
- Panichello MF, Cheung OS, Bar M (2012) Predictive feedback and conscious visual experience. *Front Psychol* 3:620. PMC3549576.
- Panksepp J (1980) Hypothalamic integration of behavior: rewards, punishments, and related psychological processes. In: *Handbook of the Hypothalamus*, vol. 3, Behavioral Studies of the Hypothalamus (Morgane, P.J., Panksepp, J., eds), pp 289-431 New York: Marcel Dekker.
- Panksepp J (1998) *Affective Neuroscience*. New York: Oxford University Press.
- Panksepp J (2005) Affective consciousness: core emotional feelings in animals and humans. *Conscious Cogn* 14:30-80.
- Panksepp J (2011) The basic emotional circuits of mammalian brains: do animals have affective lives? *Neurosci Biobehav Rev* 35:1791-1804.
- Panksepp J (2016) The cross-mammalian neurophenomenology of primal emotional affects: from animal feelings to human therapeutics. *J Comp Neurol* 524:1624-1635.
- Panksepp J, Biven L (2012) *The Archaeology of Mind: Neuroevolutionary Origins of Human Emotions*. New York: W.W. Norton & Co. [Tr. it. *Archeologia della mente. Origini neuroevolutive delle emozioni umane*. Raffaello Cortina, Milano 2014.]
- Papez JW (1937) A proposed mechanism of emotion. *Archives of Neurology and Psychiatry* 79:217-224.
- Papini MR (2010) *Comparative Psychology: Evolution and Development of Behavior*. New York: Psychology Press.

- Pascal R, Pross A (2016) The logic of life. *Orig Life Evol Biosph* 46:507-513.
- Pasquali A, Timmermans B, Cleeremans A (2010) Know thyself: metacognitive networks and measures of consciousness. *Cognition* 117:182-190.
- Passingham R (1995) *The Frontal Lobes and Voluntary Action*. Oxford: Oxford University Press.
- Passingham RE, Wise SP (2012) *The Neurobiology of the Prefrontal Cortex*. Oxford: Oxford University Press.
- Pavlov IP (1927) *Conditioned Reflexes*. New York: Dover. [Tr. it. *I riflessi condizionati*. Bollati Boringhieri, Torino 2011.]
- Pavlov IP (1936) Pavlov and the spirit of science. *Nature* 137:572.
- Pechère J-C (2007) *The Intelligent Microbe*. Paris, France: Frison Roche.
- Pena-Guzman DM (2017) Can nonhuman animals commit suicide? *Animal Sentience* 20(1).
- Penn DC, Holyoak KJ, Povinelli DJ (2008) Darwin's mistake: explaining the discontinuity between human and nonhuman minds. *Behav Brain Sci* 31:109-130; discussion 130-178.
- Penn DC, Povinelli DJ (2007) Causal cognition in human and nonhuman animals: a comparative, critical review. *Annu Rev Psychol* 58:97-118.
- Pennisi E, Roush W (1997) Developing a new view of evolution. *Science* 277:34-37.
- Penrose R (1994) *Shadows of the Mind: A Search for the Missing Science of Consciousness*. Oxford: Oxford University Press. [Tr. it. *Ombre della mente*. Rizzoli, Milano 1996.]
- Pepperberg I (2009) *Alex & Me: How a Scientist and a Parrot Discovered a Hidden World of Animal Intelligence—and Formed a Deep Bond in the Process*. New York: Harper. [Tr. it. *Parla con Alex. Una storia di scienza e di amicizia*. Rizzoli, Milano 2008.]
- Perez-Cerezales S, Boryshpolets S, Eisenbach M (2015) Behavioral mechanisms of mammalian sperm guidance. *Asian J Androl* 17:628-632.
- Perry CJ, Barron AB, Cheng K (2013) *Invertebrate learning and cognition: relating phenomena to neural substrate*. Wiley Interdiscip Rev Cogn Sci 4:561-582.
- Perusini JN, Fanselow MS (2015) Neurobehavioral perspectives on the distinction between fear and anxiety. *Learn Mem* 22:417-425. PMC4561408.
- Pessoa L (2013) *The Cognitive-Emotional Brain: From Interactions to Integration*. Cambridge, MA: The MIT Press.
- Peters MAK, Fesi J, Amendi N, Knotts JD, Lau H, Ro T (2017a) Transcranial magnetic stimulation to visual cortex induces suboptimal introspection. *Cortex* 93:119-132. PMC5541901.
- Peters MAK, Thesen T, Ko YD, Maniscalco B, Carlson C, Davidson M, Doyle W, Kuzniecky R, Devinsky O, Halgren E, Lau H (2017b) Perceptual confidence neglects decision-incongruent evidence in the brain. *Nat Hum Behav* 1. PMC5675133.
- Petrides M, Pandya DN (1988) Association fiber pathways to the frontal cortex from the superior temporal region in the rhesus monkey. *J Comp Neurol* 273:52-66.

- Petrides M, Tomaiuolo F, Yeterian EH, Pandya DN (2012) The prefrontal cortex: comparative architectonic organization in the human and the macaque monkey brains. *Cortex* 48:46-57.
- Petrovich GD, Canteras NS, Swanson LW (2001) Combinatorial amygdalar inputs to hippocampal domains and hypothalamic behavior systems. *Brain Res Brain Res Rev* 38:247-289.
- Pettitt ME, Orme BAA, Blake JR, Leadbeater BSC (2002) The hydrodynamics of filter feeding in choanoflagellates. *European Journal of Protistology* 38:313-332.
- Pezzulo G, Barca L, Friston KJ (2015) Active inference and cognitive-emotional interactions in the brain. *Behav Brain Sci* 38:e85.
- Pezzulo G, Rigoli F, Friston KJ (2018) Hierarchical active inference: a theory of motivated control. *Trends Cogn Sci* 22:294-306. PMC5870049.
- Phelps EA (2006) Emotion and cognition: insights from studies of the human amygdala. *Annu Rev Psychol* 57:27-53.
- Piaget J (1929) *The Child's Conception of the World*. London: Routledge & Kegan Paul Ltd. [Tr. it. *La rappresentazione del mondo nel fanciullo*. Boringhieri, Torino 2013.]
- Pickens CL, Holland PC (2004) Conditioning and cognition. *Neurosci Biobehav Rev* 28:651-661.
- Pidgeon LM, Morcom AM (2016) Cortical pattern separation and item-specific memory encoding. *Neuropsychologia* 85:256-271.
- Pinker S (1994) *The Language Instinct: How the Mind Creates Language*. New York: William Morrow and Co., Inc. [Tr. it. *L'istinto del linguaggio*. Mondadori, Milano 1998.]
- Pinker S (1997) *How the Mind Works*. New York: Norton. [Tr. it. *Come funziona la mente*. Castelvechi, Roma 2017.]
- Pinto Y, Neville DA, Otten M, Corballis PM, Lamme VAF, de Haan EHF, Foschi N, Fabri M (2017) Split brain: divided perception but undivided consciousness. *Brain* 140:1231-1237.
- Pisani D, Pett W, Dohrmann M, Feuda R, Rota-Stabelli O, Philippe H, Larillot N, Worheide G (2015) Genomic data do not support comb jellies as the sister group to all other animals. *Proc Natl Acad Sci USA* 112:15402-15407. PMC4687580.
- Plachetzki DC, Serb JM, Oakley TH (2005) New insights into the evolutionary history of photoreceptor cells. *Trends Ecol Evol* 20:465-467.
- Plutchik R (1980) *Emotion: A Psychoevolutionary Synthesis*. New York: Harper & Row.
- Pollan M (2002) *The Botany of Desire: A Plant's-Eye View of the World*: Random House. [Tr. it. *La botanica del desiderio. Il mondo visto dalle piante*. il Saggiatore, Milano 2013.]
- Popkin G (2017) Bacteria use brainlike bursts of electricity to communicate. In: *Quanta Magazine*: Simons Foundation.
- Posner MI (1994) Attention: the mechanisms of consciousness. *Proc Natl Acad Sci USA* 91:7398-7403.
- Posner MI, DiGiralomo GJ (1998) Executive attention: conflict, target detection, and cognitive control. In: *The Attentive Brain* (Parasuraman, R., ed), pp 401-423 Cambridge, MA: The MIT Press.

- Postle BR (2006) Working memory as an emergent property of the mind and brain. *Neuroscience* 139:23-38. PMC1428794.
- Postle BR (2016) How does the brain keep information 'in mind'? *Curr Dir Psychol Sci* 25:151-156. PMC5115785.
- Povinelli DJ (2008) Darwin's mistake: explaining the discontinuity between human and nonhuman minds. *Behav Brain Sci* 31:109-130; discussion 130-178.
- Povinelli DJ, Preuss TM (1995) Theory of mind: evolutionary history of a cognitive specialization. *Eye (Lond)* 18:418-424.
- Povinelli DJ, Prince CG (1998) When self met other. In: *Self-Awareness: Its Nature and Development* (Ferrari, M., Sternberg, R.J., eds), pp 37-107 New York: Guilford Press.
- Pradeu T (2010) What is an organism? An immunological answer. *Hist Philos Life Sci* 32:247-267.
- Premack D, Woodruff G (1978) Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences* 4:515-629.
- Preuss TM (1995) Do rats have prefrontal cortex? The Rose-Woolsey-Akert program reconsidered. *Journal of Cognitive Neuroscience* 7:1-24.
- Preuss TM (2011) The human brain: rewired and running hot. *Ann NY Acad Sci* 1225 Suppl 1:E182-191. PMC3103088.
- Preuss TM (2012) Human brain evolution: from gene discovery to phenotype discovery. *Proc Natl Acad Sci USA* 109 Suppl 1:10709-10716. PMC3386880.
- Preuss TM, Caceres M, Oldham MC, Geschwind DH (2004) Human brain evolution: insights from microarrays. *Nat Rev Genet* 5:850-860.
- Price AR, Bonner MF, Grossman M (2015) Semantic memory: cognitive and neuroanatomical perspectives. In: *Brain Mapping: An Encyclopedic Reference*, vol. 3 (Toga, A.W., ed), pp 529-536 London: Academic Press.
- Prince VE, Joly L, Ekker M, Ho RK (1998) Zebrafish Hox genes: genomic organization and modified colinear expression patterns in the trunk. *Development* 125:407-420.
- Prinz JJ (2012) *The Conscious Brain: How Attention Engenders Experience*. New York: Oxford University Press.
- Pross A (2016) *What is Life? How Chemistry Becomes Biology*. Oxford: Oxford University Press.
- Putnam NH, Butts T, Ferrier DE, Furlong RF, Hellsten U, Kawashima T, Robinson-Rechavi M, Shoguchi E, Terry A, Yu JK, Benito-Gutierrez EL, Dubchak I, Garcia-Fernandez J, Gibson-Brown JJ, Grigoriev IV, Horton AC, de Jong PJ, Jurka J, Kapitonov VV, Kohara Y, Kuroki Y, Lindquist E, Lucas S, Osoegawa K, Pennacchio LA, Salamov AA, Satou Y, Sauka-Spengler T, Schmutz J, Shin IT, Toyoda A, Bronner-Fraser M, Fujiyama A, Holland LZ, Holland PW, Satoh N, Rokhsar DS (2008) The amphioxus genome and the evolution of the chordate karyotype. *Nature* 453:1064-1071.
- Queller DC, Strassmann JE (2009) Beyond society: the evolution of organismality. *Philos Trans R Soc Lond B Biol Sci* 364:3143-3155.
- Raby CR, Clayton NS (2009) Prospective cognition in animals. *Behav Processes* 80:314-324.

- Rachman S, Hodgson R (1974) I. Synchrony and desynchrony in fear and avoidance. *Behaviour Research and Therapy* 12:311-318.
- Rademaker RL, Chunharas C, Serences JT (2018) Simultaneous representation of sensory and mnemonic information in human visual cortex. DOI: <https://doi.org/10.1101/339200>.
- Radman Z (ed) (2017) *Before Consciousness: In Search of the Fundamentals of Mind*. Exeter, United Kingdom: Imprint Academic.
- Radtke KM, Ruf M, Gunter HM, Dohrmann K, Schauer M, Meyer A, Elbert T (2011) Transgenerational impact of intimate partner violence on methylation in the promoter of the glucocorticoid receptor. *Transl Psychiatry* 1:e21. PMC3309516.
- Radzvilavicius AL, Hadjivasilou Z, Pomiankowski A, Lane N (2016) Selection for mitochondrial quality drives evolution of the germline. *PLoS Biol* 14:e2000410. PMC5172535.
- Raff RA (2008) Origins of the other metazoan body plans: the evolution of larval forms. *Philos Trans R Soc Lond B Biol Sci* 363:1473-1479. PMC2614227.
- Rahnev D (2017) Top-down control of perceptual decision making by the prefrontal cortex. *Current Directions in Psychological Science* 26:464-469.
- Ramnani N, Owen AM (2004) Anterior prefrontal cortex: insights into function from anatomy and neuroimaging. *Nat Rev Neurosci* 5:184-194.
- Rao RP, Ballard DH (1999) Predictive coding in the visual cortex: a functional interpretation of some extra-classical receptive-field effects. *Nat Neurosci* 2:79-87.
- Raven PH, Johnson GB (2002) *Vertebrates*. In: *Biology*, pp 945-980 Boston: McGraw-Hill.
- Ravosa MJ, Dagosto M (eds) (2007) *Primate Origins: Adaptations and Evolution*. New York: Springer.
- Reber AS (2018) *The first minds: caterpillars, karyotes, and consciousness*. Oxford: Oxford University Press.
- Redshaw J, Taylor AH, Suddendorf T (2017) Flexible planning in ravens? *Trends Cogn Sci* 21:821-822.
- Rehm P, Borner J, Meusemann K, von Reumont BM, Simon S, Hadrys H, Misof B, Burmester T (2011) Dating the arthropod tree based on large-scale transcriptome data. *Mol Phylogenet Evol* 61:880-887.
- Reiner A (1990) An explanation of behavior. *Science* 250:303-305.
- Reiner A (2009) You cannot have a vertebrate brain without a basal ganglia. In: *The Basal Ganglia IX* (Groenewegen, H.J. et al., eds), pp 3-24 New York: Springer.
- Reiner A, Medina L, Veenman CL (1998) Structural and functional evolution of the basal ganglia in vertebrates. *Brain Res Brain Res Rev* 28:235-285.
- Reiss D, Marino L (2001) Mirror self-recognition in the bottlenose dolphin: a case of cognitive convergence. *Proc Natl Acad Sci USA* 98:5937-5942.
- Renard E, Vacelet J, Gazave E, Lapebie P, Borchiellini C, Ereskovsky AV (2009) Origin of the neuro-sensory system: new and expected insights from sponges. *Integr Zool* 4:294-308.
- Rensink RA, O'Regan JK (1997) TO SEE OR NOT TO SEE: the need for attention to perceive changes in scenes. *Psychological Science* 8:368-373.

- Rentzsch F, Anton R, Saina M, Hammerschmidt M, Holstein TW, Technau U (2006) Asymmetric expression of the BMP antagonists chordin and gremlin in the sea anemone *Nematostella vectensis*: implications for the evolution of axial patterning. *Dev Biol* 296:375-387.
- Reynolds A, Hulsmann N (2008) Ernst Haeckel's discovery of *Magosphaera planula*: a vestige of metazoan origins? *Hist Philos Life Sci* 30:339-386.
- Reynolds JN, Wickens JR (2002) Dopamine-dependent plasticity of corticostriatal synapses. *Neural Netw* 15:507-521.
- Richards J (ed) (2001) *Are We Spiritual Machines?: Ray Kurzweil vs. the Critics of Strong A.I.* Seattle: Discovery Institute Press.
- Richter DJ, King N (2013) The genomic and cellular foundations of animal origins. *Annu Rev Genet* 47:509-537.
- Richter FR, Cooper RA, Bays PM, Simons JS (2016) Distinct neural mechanisms underlie the success, precision, and vividness of episodic memory. *Elife* 5. PMC5079745.
- Rilling JK, Glasser MF, Jbabdi S, Andersson J, Preuss TM (2011) Continuity, divergence, and the evolution of brain language pathways. *Front Evol Neurosci* 3:11. PMC3249609.
- Rilling JK, Glasser MF, Preuss TM, Ma X, Zhao T, Hu X, Behrens TE (2008) The evolution of the arcuate fasciculus revealed with comparative DTI. *Nat Neurosci* 11:426-428.
- Ritchey M, Libby LA, Ranganath C (2015) Cortico-hippocampal systems involved in memory and cognition: the PMAT framework. *Prog Brain Res* 219:45-64.
- Rittschof CC, Bukhari SA, Sloofman LG, Troy JM, Caetano-Anolles D, Cash-Ahmed A, Kent M, Lu X, Sanogo YO, Weisner PA, Zhang H, Bell AM, Ma J, Sinha S, Robinson GE, Stubbs L (2014) Neuromolecular responses to social challenge: common mechanisms across mouse, stickleback fish, and honey bee. *Proc Natl Acad Sci USA* 111:17929-17934.
- Rivas J, Burghardt G (2002) Crotalomorphism: a metaphor to understand anthropomorphism by omission. In: *The Cognitive Animal: Empirical and Theoretical Perspectives on Animal Cognition* (Bekoff, M. et al., eds), pp 9-18 Cambridge, MA: The MIT Press.
- Roberts AC, Glanzman DL (2003) Learning in *Aplysia*: looking at synaptic plasticity from both sides. *Trends Neurosci* 26:662-670.
- Roberts MF, Kruchten AE (2016) *Receptor Biology*: Wiley.
- Roberts WA, Feeney MC (2009) The comparative study of mental time travel. *Trends Cogn Sci* 13:271-277.
- Robertson B, Kardamakis A, Capantini L, Perez-Fernandez J, Suryanarayana SM, Wallen P, Stephenson-Jones M, Grillner S (2014) The lamprey blueprint of the mammalian nervous system. *Prog Brain Res* 212:337-349.
- Robinson MD, Clore GL (2002) Belief and feeling: evidence for an accessibility model of emotional self-report. *Psychol Bull* 128:934-960.
- Robson D (2011) A brief history of the brain. *New Scientist*.
- Rohde S, Nietzer S, Schupp PJ (2015) Prevalence and mechanisms of dynamic chemical defenses in tropical sponges. *PLoS One* 10:e0132236. PMC4496075.

- Rokas A (2008) The origins of multicellularity and the early history of the genetic toolkit for animal development. *Annu Rev Genet* 42:235-251.
- Rolls ET (2000) Functions of the primate temporal lobe cortical visual areas in invariant visual object and face recognition. *Neuron* 27:205-218.
- Rolls ET (2008) Emotion, higher-order syntactic thoughts, and consciousness. In: *Frontiers of Consciousness: Chichele Lectures* (Weiskrantz, L., Davies, M., eds), pp 131-167 Oxford: Oxford University Press.
- Rolls ET (2013) The mechanisms for pattern completion and pattern separation in the hippocampus. *Front Syst Neurosci* 7:74. PMC3812781.
- Rolls ET (2014) *Emotion and Decision-Making Explained*. Oxford: Oxford University Press.
- Romanes GJ (1882) *Animal Intelligence*. London: Kegan Paul, Trench & Co.
- Romanski LM (2004) Domain specificity in the primate prefrontal cortex. *Cogn Affect Behav Neurosci* 4:421-429.
- Romer AS (1977) *Vertebrate Body*. Philadelphia: W.B. Saunders Company.
- Rosen JB, Schulkin J (1998) From normal fear to pathological anxiety. *Psychol Rev* 105:325-350.
- Rosenthal D (2004) Varieties of higher-order theory. In: *Higher-Order Theories of Consciousness: An Anthology* (Gennaro, R.J., ed) Amsterdam: John Benjamins.
- Rosenthal D (2005) *Consciousness and Mind*. Oxford: Oxford University Press.
- Rosenthal D (2012a) Awareness and identification of self. In: *Consciousness and the Self: New Essays* (Liu, J., Perry, J., eds), pp 22-50 New York: Cambridge University Press.
- Rosenthal D (2012b) Higher-order awareness, misrepresentation and function. *Philos Trans R Soc Lond B Biol Sci* 367:1424-1438.
- Rosenthal D (2019) Consciousness and confidence. *Neuropsychologia*. 2019 May; 128:255-265.
- Rosenthal D, Weisberg J (2008) Higher-order theories of consciousness. *Scholarpedia* 3:4407.
- Rowe T (1988) Definition, diagnosis, and origin of mammalia. *Journal of Vertebrate Paleontology* 8:241-264.
- Ruby E, Maniscalco B, Peters MAK (2018) On a 'failed' attempt to manipulate visual metacognition with transcranial magnetic stimulation to prefrontal cortex. *Conscious Cogn* 62:34-41. PMC5964034.
- Ruggiero MA, Gordon DP, Orrell TM, Bailly N, Bourgoin T, Brusca RC, Cavalier-Smith T, Guiry MD, Kirk PM (2015) A higher level classification of all living organisms. *PLoS One* 10:e0119248. PMC4418965.
- Ruiz-Trillo I, Riutort M, Fourcade HM, Baguna J, Boore JL (2004) Mitochondrial genome data support the basal position of Acoelomorpha and the polyphyly of the Platyhelminthes. *Mol Phylogenet Evol* 33:321-332.
- Ruiz-Trillo I, Riutort M, Littlewood DT, Herniou EA, Baguna J (1999) Acoel flatworms: earliest extant bilaterian metazoans, not members of Platyhelminthes. *Science* 283:1919-1923.
- Ruiz-Trillo I, Roger AJ, Burger G, Gray MW, Lang BF (2008) A phylogenomic investigation into the origin of metazoa. *Mol Biol Evol* 25:664-672.

- Rumelhart DE (1980) Schemata: the building blocks of cognition. In: Theoretical Issues in Reading Comprehension (Spiro, R.J. et al., eds) Hillsdale, NJ: Lawrence Erlbaum.
- Ruppert EE, Fox RS, Barnes RD (2003) Invertebrate Zoology. Belmont, CA: Brooks Cole.
- Rushworth MF, Behrens TE, Rudebeck PH, Walton ME (2007) Contrasting roles for cingulate and orbitofrontal cortex in decisions and social behaviour. *Trends Cogn Sci* 11:168-176.
- Russell B (1921) Lecture II: instinct and habit. In: *The Analysis of Mind* (Russell, B., ed) Auckland, New Zealand: Floating Press. [Tr. it. 'Lezione II. Istinto e abitudine'. In *L'analisi della mente*. Newton Compton, Roma 1970.]
- Russell B (1927) *An Outline of Philosophy*. London: George Allen & Unwin Ltd.
- Russell JA (2003) Core affect and the psychological construction of emotion. *Psychol Rev* 110:145-172.
- Russell JA (2014) The greater constructionist project for emotion. In: *The Psychological Construction of Emotion* (Barrett, L.F., Russell, J.A., eds) New York: Guilford Press.
- Ryan TJ, Grant SG (2009) The origin and evolution of synapses. *Nat Rev Neurosci* 10:701-712.
- Ryle G (1949) *The Concept of Mind*. New York: Barnes and Noble. [Tr. it. *Il concetto di mente*. Laterza, Roma 2007.]
- Sacks O (1989) *Seeing Voices: A Journey into the World of the Deaf*. Berkeley: University of California Press. [Tr. it. *Vedere voci. Un viaggio nel mondo dei sordi*. Adelphi, Milano 1989.]
- Sagan C (1977) *The Dragons of Eden: Speculations on the Evolution of Human Intelligence*. New York: Random House. [Tr. it. *I draghi dell'Eden. Considerazioni sull'evoluzione dell'intelligenza umana*. Club degli Editori, Milano 1980.]
- Salwiczek LH, Watanabe A, Clayton NS (2010) Ten years of research into avian models of episodic-like memory and its implications for developmental and comparative cognition. *Behav Brain Res* 215:221-234.
- Sample I (2006) Monster fish crushed opposition with strongest bite ever, <https://www.smh.com.au/news/science/jaws-of-steel-on-this-fish-tank/2006/11/29/1164777657728.html>, retrieved Jul 12, 2017. The Sydney Morning Herald.
- Sarafian AR, Nielsen SG, Marschall HR, Gaetani GA, Hauri EH, Righter K, Sarafian E (2017) Angrite meteorites record the onset and flux of water to the inner solar system. *Geochimica et Cosmochimica Acta* 212:156-166.
- Satoh N, Rokhsar D, Nishikawa T (2014) Chordate evolution and the three-phylum system. *Proc Biol Sci* 281:20141729. PMC4211455.
- Satpute AB, Nook EC, Narayanan S, Shu J, Weber J, Ochsner KN (2016) Emotions in 'black and white' or shades of gray? How we think about emotion shapes our perception and neural representation of emotion. *Psychol Sci* 27:1428-1442. PMC5111864.
- Satpute AB, Shu J, Weber J, Roy M, Ochsner KN (2013) The functional neural architecture of self-reports of affective experience. *Biol Psychiatry* 73:631-638.

- Satterlie RA (2011) Do jellyfish have central nervous systems? *J Exp Biol* 214:1215-1223.
- Saxe R, Houlihan SD (2017) Formalizing emotion concepts within a Bayesian model of theory of mind. *Curr Opin Psychol* 17:15-21. PMC5637274.
- Scamardella JM (1999) Not plants or animals: a brief history of the origin of kingdoms Protozoa, Protista and Protoctista. *Int Microbiol* 2:207-216.
- Scarantino A (2018) Are LeDoux's survival circuits basic emotions under a different name? *Current Opinion in Behavioral Sciences* 24:75-82.
- Schachter S, Singer JE (1962) Cognitive, social, and physiological determinants of emotional state. *Psychol Rev* 69:379-399.
- Schacter DL (1987) Implicit memory: history and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 13:501-518.
- Schacter DL (1990) Toward a cognitive neuropsychology of awareness: implicit knowledge and anosognosia. *Journal of Clinical and Experimental Neuropsychology* 12:155-178.
- Schacter DL, Tulving E (1982) Memory, amnesia, and the episodic/semantic distinction. In: *The Expression of Knowledge: Neurobehavioral Transformations of Information into Action* (Isaacson, R.L., Spear, N.E., eds), pp 33-65 Boston: Springer US.
- Schenker NM, Buxhoeveden DP, Blackmon WL, Amunts K, Zilles K, Semendeferi K (2008) A comparative quantitative analysis of cytoarchitecture and minicolumnar organization in Broca's area in humans and great apes. *J Comp Neurol* 510:117-128.
- Scherer K (2000) Emotions as episodes of subsystem synchronization driven by nonlinear appraisal processes. In: *Emotion, Development, and Self-Organization: Dynamic Systems Approaches to Emotional Development* (Lewis, M., Granic, I., eds), pp 70-99 New York: Cambridge University Press.
- Scherer KR (1984) Emotion as a multicomponent process: a model and some cross-cultural data. *Review of Personality and Social Psychology* 5:37-63.
- Schierwater B, Eitel M, Jakob W, Osigus HJ, Hadrys H, Dellaporta SL, Kolokotronis SO, Desalle R (2009) Concatenated analysis sheds light on early metazoan evolution and fuels a modern 'urmetazoon' hypothesis. *PLoS Biol* 7:e20. PMC2631068.
- Schiller PH, Tehovnik EJ (2015) *Vision and the Visual System*. Oxford: Oxford University Press.
- Schmack K, Gomez-Carrillo de Castro A, Rothkirch M, Sekutowicz M, Rossler H, Haynes JD, Heinz A, Petrovic P, Sterzer P (2013) Delusions and the role of beliefs in perceptual inference. *J Neurosci* 33:13701-13712.
- Schneider D, Slaughter VP, Dux PE (2017) Current evidence for automatic theory of mind processing in adults. *Cognition* 162:27-31.
- Schneider W, Shiffrin RM (1977) Controlled and automatic human information processing: I. Detection, search, and attention. *Psychological Review* 84:1-66.
- Schneirla TC (1959) An evolutionary theory of biphasic processes underlying approach and withdrawal. In: *Nebraska Symposium on Motivation* (Jones, M.R., ed), pp 1-42 Lincoln: University of Nebraska Press.

- Schultz W, Dayan P, Montague PR (1997) A neural substrate of prediction and reward. *Science* 275:1593-1599.
- Scott-Phillips TC, Dickins TE, West SA (2011) Evolutionary theory and the ultimate-proximate distinction in the human behavioral sciences. *Perspect Psychol Sci* 6:38-47.
- Seidner SS (1982) Ethnicity, Language, and Power from a Psycholinguistic Perspective. Brussels: Centre de Recherche sur le Plurilinguisme.
- Seipel K, Schmid V (2005) Evolution of striated muscle: jellyfish and the origin of triploblasty. *Dev Biol* 282:14-26.
- Seligman MEP, Hager JL (eds) (1972) *Biological Boundaries of Learning*. New York: Appleton-Century-Crofts.
- Seltzer B, Pandya DN (1978) Afferent cortical connections and architectonics of the superior temporal sulcus and surrounding cortex in the rhesus monkey. *Brain Res* 149:1-24.
- Semendeferi K, Teffer K, Buxhoeveden DP, Park MS, Bludau S, Amunts K, Travis K, Buckwalter J (2011) Spatial organization of neurons in the frontal pole sets humans apart from great apes. *Cereb Cortex* 21:1485-1497.
- Senatore A, Raiss H, Le P (2016) Physiology and evolution of voltage-gated calcium channels in early diverging animal phyla: Cnidaria, Placozoa, Porifera and Ctenophora. *Front Physiol* 7:481. PMC5095125.
- Seth AK (2016) The real problem, <https://aeon.co/essays/the-hard-problem-of-consciousness-is-a-distraction-from-the-real-one>, retrieved May 10, 2018.
- Seth AK (2019) From unconscious inference to the beholder's share: predictive perception and human experience. *European Review* 27, 3:378-410.
- Seth AK, Dienes Z, Cleeremans A, Overgaard M, Pessoa L (2008) Measuring consciousness: relating behavioural and neurophysiological approaches. *Trends Cogn Sci* 12:314-321. PMC2767381.
- Seth AK, Friston KJ (2016) Active interoceptive inference and the emotional brain. *Philos Trans R Soc Lond B Biol Sci* 371. PMC5062097.
- Seymour B, Dolan R (2008) Emotion, decision making, and the amygdala. *Neuron* 58:662-671.
- Shallice T (1988) Information processing models of consciousness. In: *Consciousness in Contemporary Science* (Marcel, A., Bisiach, E., eds), pp 305-333 Oxford: Oxford University Press.
- Shapiro JA (1998) Thinking about bacterial populations as multicellular organisms. *Annu Rev Microbiol* 52:81-104.
- Shapiro JA (2007) Bacteria are small but not stupid: cognition, natural genetic engineering and socio-bacteriology. *Stud Hist Philos Biol Biomed Sci* 38:807-819.
- Shatz M (2008) Language as a consequence and an enabler of the exercise of higher-order relational capabilities: evidence from toddlers. *Behavioral and Brain Sciences* 31:145-146.
- Shea N, Boldt A, Bang D, Yeung N, Heyes C, Frith CD (2014) Supra-personal cognitive control and metacognition. *Trends Cogn Sci* 18:186-193. PMC3989995.
- Shekhar M, Rahnev D (2018) Distinguishing the roles of dorsolateral and anterior PFC in visual metacognition. *J Neurosci* 38:5078-5087.

- Shepherd G (1983) *Neurobiology*. New York: Oxford.
- Sherrington CS (1906) *The Integrative Action of the Nervous System*. New Haven: Yale University Press.
- Sherrington CS (1933) *The Brain and Its Mechanism*. Cambridge: Cambridge University Press.
- Shettleworth SJ (2009) The evolution of comparative cognition: is the snark still a boojum? *Behav Processes* 80:210-217.
- Shettleworth SJ (2010) Clever animals and killjoy explanations in comparative psychology. *Trends Cogn Sci* 14:477-481.
- Shiflett MW, Balleine BW (2010) At the limbic-motor interface: disconnection of basolateral amygdala from nucleus accumbens core and shell reveals dissociable components of incentive motivation. *Eur J Neurosci* 32: 1735-1743. PMC2994582.
- Shih YL, Rothfield L (2006) The bacterial cytoskeleton. *Microbiol Mol Biol Rev* 70:729-754. PMC1594594.
- Shu D, Morris SC, Zhang ZF, Liu JN, Han J, Chen L, Zhang XL, Yasui K, Li Y (2003) A new species of yunnanozoan with implications for deuterostome evolution. *Science* 299:1380-1384.
- Shubin N (2008) *Your Inner Fish: A Journey into the 3.5-Billion-Year History of the Human Body*. New York: Pantheon Books. [Tr. it. *Il pesce che è in noi. La scoperta del fossile che ha cambiato la storia dell'evoluzione*. Rizzoli, Milano 2008.]
- Simon DA, Daw ND (2011) Neural correlates of forward planning in a spatial decision task in humans. *J Neurosci* 31:5526-5539. PMC3108440.
- Simons DJ, Chabris CF (1999) Gorillas in our midst: sustained inattentive blindness for dynamic events. *Perception* 28:1059-1074.
- Simons DJ, Levin DT (1997) Change blindness. *Trends Cogn Sci* 1:261-267.
- Singer P (2009) *Animal Liberation: The Definitive Classic of the Animal Movement*. New York: Harper Collins. [Tr. it. *Liberazione animale. Il manifesto di un movimento diffuso in tutto il mondo*. il Saggiatore, Milano 2015.]
- Skinner BF (1938) *The Behavior of Organisms: An Experimental Analysis*. New York: Appleton-Century-Crofts.
- Skov-Rickett SI, Miller NY, Shettleworth SJ (2006) What-where-when memory in pigeons. *J Exp Psychol Anim Behav Process* 32:345-358.
- Sloan DM, Marx BP, Lee DJ, Resick PA (2018) A brief exposure-based treatment vs cognitive processing therapy for posttraumatic stress disorder: a randomized noninferiority clinical trial. *JAMA Psychiatry* 75:233-239. PMC5843538.
- Smallwood WM, Reveley IL, Bailey GA, Dodge RA (1948) *Elements of Biology*. Boston: Allyn & Bacon.
- Smith JD, Couchman JJ, Beran MJ (2012) The highs and lows of theoretical interpretation in animal-metacognition research. *Philos Trans R Soc Lond B Biol Sci* 367:1297-1309. PMC3318761.
- Smith JD, Couchman JJ, Beran MJ (2014) Animal metacognition: a tale of two comparative psychologies. *Journal of Comparative Psychology* 128: 115-131. PMC3929533.

- Smith JM (1993) *The Theory of Evolution*. Cambridge: Cambridge University Press. [Tr. it. *La teoria dell'evoluzione*. Newton Compton, Roma 2005.]
- Smith JM, Szathmary E (1995) *The Major Transitions in Evolution*. Oxford: Oxford University Press.
- Smith R (2017) A neuro-cognitive defense of the unified self. *Conscious Cogn* 48:21-39.
- Smulders TV (2009) Darwin 200: special feature on brain evolution. *Biol Lett* 5:105-107. PMC2657770.
- Snell EA, Furlong RF, Holland PW (2001) Hsp70 sequences indicate that choanoflagellates are closely related to animals. *Curr Biol* 11:967-970.
- Sontheimer A, Vassal F, Jean B, Feschet F, Lubrano V, Lemaire JJ (2017) fMRI study of graduated emotional charge for detection of covert activity using passive listening to narratives. *Neuroscience* 349:291-302.
- Soon CS, Brass M, Heinze HJ, Haynes JD (2008) Unconscious determinants of free decisions in the human brain. *Nat Neurosci* 11:543-545.
- Sorabji R (1993) *Animal Minds & Human Morals: The Origins of the Western Debate*. Ithaca: Cornell University Press.
- Soto D, Mantyla T, Silvanto J (2011) Working memory without consciousness. *Curr Biol* 21:R912-913.
- Soto D, Silvanto J (2014) Reappraising the relationship between working memory and conscious awareness. *Trends Cogn Sci* 18:520-525.
- Speijer D, Lukes J, Elias M (2015) Sex is a ubiquitous, ancient, and inherent attribute of eukaryotic life. *Proc Natl Acad Sci USA* 112:8827-8834. PMC4517231.
- Sperling G (1960) The information available in brief visual presentations. *Psychological Monographs* 74:1-29.
- Sprecher SG, Reichert H (2003) The urbilaterian brain: developmental insights into the evolutionary origin of the brain in insects and vertebrates. *Arthropod Struct Dev* 32:141-156.
- Spudich JL, Yang CS, Jung KH, Spudich EN (2000) Retinylidene proteins: structures and functions from Archaea to humans. *Annu Rev Cell Dev Biol* 16:365-392.
- Squire LR (1986) Mechanisms of memory. *Science* 232:1612-1619.
- Squire LR (1987) *Memory and Brain*. New York: Oxford.
- Squire LR, Zola SM (1998) Episodic memory, semantic memory, and amnesia. *Hippocampus* 8:205-211.
- Sreenivasan KK, Curtis CE, D'Esposito M (2014) Revisiting the role of persistent neural activity during working memory. *Trends Cogn Sci* 18:82-89. PMC3964018.
- Srivastava M, Simakov O, Chapman J, Fahey B, Gauthier ME, Mitros T, Richards GS, Conaco C, Dacre M, Hellsten U, Larroux C, Putnam NH, Stanke M, Adamska M, Darling A, Degnan SM, Oakley TH, Plachetzki DC, Zhai Y, Adamski M, Calcino A, Cummins SF, Goodstein DM, Harris C, Jackson DJ, Leys SP, Shu S, Woodcroft BJ, Vervoort M, Kosik KS, Manning G, Degnan BM, Rokhsar DS (2010) The Amphimedon queenslandica genome and the evolution of animal complexity. *Nature* 466:720-726. PMC3130542.

- St Jacques PL, Carpenter AC, Szpunar KK, Schacter DL (2018) Remembering and imagining alternative versions of the personal past. *Neuropsychologia* 110:170-179. PMC5733718.
- Staddon JER (1983) *Adaptive Behavior and Learning*. Cambridge: Cambridge University Press.
- Stearns BP, Stearns SC (2000) *Watching, from the Edge of Extinction*. New Haven: Yale University Press.
- Steenkamp ET, Wright J, Baldauf SL (2006) The protistan origins of animals and fungi. *Mol Biol Evol* 23:93-106.
- Stefanics G, Kremlacek J, Czigler I (2014) Visual mismatch negativity: a predictive coding view. *Front Hum Neurosci* 8:666. PMC4165279.
- Steinmetz PRH, Aman A, Kraus JEM, Technau U (2017) Gut-like ectodermal tissue in a sea anemone challenges germ layer homology. *Nat Ecol Evol* 1:1535-1542.
- Sternson SM (2013) Hypothalamic survival circuits: blueprints for purposive behaviors. *Neuron* 77:810-824.
- Sternson SM, Nicholas Betley J, Cao ZF (2013) Neural circuits and motivational processes for hunger. *Curr Opin Neurobiol* 23:353-360. PMC3948161.
- Stich S (1983) *From Folk Psychology to Cognitive Science: The Case Against Belief*. Cambridge, MA: The MIT Press. [Tr. it. *Dalla psicologia del senso comune alla scienza cognitiva*. il Mulino, Bologna 1994.]
- Stone AC, Starrs JE, Stoneking M (2001) Mitochondrial DNA analysis of the presumptive remains of Jesse James. *J Forensic Sci* 46:173-176.
- Strahl H, Hamoen LW (2010) Membrane potential is important for bacterial cell division. *Proc Natl Acad Sci USA* 107:12281-12286. PMC2901462.
- Striedter GF (2005) *Principles of Brain Evolution*. Sunderland: Sinauer Associates.
- Suddendorf T, Butler DL (2014) Response to Gallup et al.: are rich interpretations of visual self-recognition a bit too rich? *Trends Cogn Sci* 18:58-59.
- Suddendorf T, Corballis MC (2007) The evolution of foresight: what is mental time travel, and is it unique to humans? *Behav Brain Sci* 30:299-313; discussion 313-251.
- Suddendorf T, Corballis MC (2010) Behavioural evidence for mental time travel in nonhuman animals. *Behav Brain Res* 215:292-298.
- Suddendorf T, Redshaw J (2017) Anticipation of future events. In: *Encyclopedia of Animal Cognition and Behavior* (Vonk, J., Shackelford, T., eds), pp 1-9: Springer, <https://link.springer.com/article/10.1007/s10539-020-09746-2>.
- Sui J, Humphreys GW (2015) The integrative self: how self-reference integrates perception and memory. *Trends Cogn Sci* 19:719-728.
- Suzuki WA, Amaral DG (2003) Perirhinal and parahippocampal cortices of the macaque monkey: cytoarchitectonic and chemoarchitectonic organization. *J Comp Neurol* 463:67-91.
- Swanson LW (1983) The hippocampus and the concept of the limbic system. In: *Neurobiology of the Hippocampus* (Seifert, W., ed), pp 3-19 London: Academic Press.
- Tagkopoulos I, Liu YC, Tavazoie S (2008) Predictive behavior within microbial genetic networks. *Science* 320:1313-1317. PMC2931280.

- Takahashi T, McDougall C, Trosianko J, Chen WC, Jayaraman-Nagarajan A, Shimeld SM, Ferrier DE (2009) An EST screen from the annelid *Pomatoceros lamarckii* reveals patterns of gene loss and gain in animals. *BMC Evol Biol* 9:240. PMC2762978.
- Tamietto M, Castelli L, Vighetti S, Perozzo P, Geminiani G, Weiskrantz L, de Gelder B (2009) Unseen facial and bodily expressions trigger fast emotional reactions. *Proc Natl Acad Sci USA* 106:17661-17666.
- Tamietto M, de Gelder B (2010) Neural bases of the non-conscious perception of emotional signals. *Nat Rev Neurosci* 11:697-709.
- Tamietto M, Pullens P, de Gelder B, Weiskrantz L, Goebel R (2012) Subcortical connections to human amygdala and changes following destruction of the visual cortex. *Curr Biol* 22:1449-1455.
- Tavolga WN (1969) *Principles of Animal Behavior*. New York: Harper & Row.
- Taylor JR, Stoker R (2012) Trade-offs of chemotactic foraging in turbulent water. *Science* 338:675-679.
- Technau U, Scholz CB (2003) Origin and evolution of endoderm and mesoderm. *Int J Dev Biol* 47:531-539.
- Teffer K, Semendeferi K (2012) Human prefrontal cortex: evolution, development, and pathology. *Prog Brain Res* 195:191-218.
- Terrace H, Metcalfe J (2004) *The Missing Link in Cognition: Origins of Self-Reflective Consciousness*. New York: Oxford University Press.
- Teyler TJ, DiScenna P (1986) The hippocampal memory indexing theory. *Behav Neurosci* 100:147-154.
- Theobald DL (2010) A formal test of the theory of universal common ancestry. *Nature* 465:219-222.
- Thompson HE, Robson H, Lambon Ralph MA, Jefferies E (2015) Varieties of semantic 'access' deficit in Wernicke's aphasia and semantic aphasia. *Brain* 138:3776-3792. PMC4655340.
- Thompson RF, Madigan SA (2005) *Memory: The Key to Consciousness*. Washington, DC: Joseph Henry Press.
- Thorndike EL (1898) Animal intelligence: an experimental study of the associative processes in animals. *Psychological Monographs* 2:109.
- Thorndike EL (1905) *The Elements of Psychology*. Syracuse, NY: The Mason-Henry Press.
- Timberlake W (1999) Biological behaviorism. In: *Handbook of Behaviorism* (O'Donohue, W., Kitchener, R., eds), pp 243-284 San Diego, CA: Academic Press.
- Tinbergen N (1951) *The Study of Instinct*. New York: Oxford University Press. [Tr. it. *Lo studio dell'istinto*. Adelphi, Milano 1994.]
- Tinbergen N (1963) On aims and methods of ethology. *Zeitschrift für Tierpsychologie* 20:410-433.
- Tolman EC (1932) *Purposive Behavior in Animals and Men*. New York: Century. [Tr. it. *Il comportamento intenzionale. Negli animali e negli uomini*. Armando, Roma 1983.]
- Tolman EC (1948) Cognitive maps in rats and men. *Psychol Rev* 55:189-208.
- Tomasello M, Rakoczy H (2003) What makes human cognition unique? From individual to shared to collective intentionality. *Mind & Language* 18:121-147.

- Tomkins SS (1962) *Affect, Imagery, Consciousness*, vol. 1, *The Positive Affects*. New York: Springer.
- Tomkins SS (1963) *Affect, Imagery, Consciousness*, vol. 2, *The Negative Affects*. New York: Springer.
- Tononi G, Boly M, Massimini M, Koch C (2016) Integrated information theory: from consciousness to its physical substrate. *Nat Rev Neurosci* 17:450-461.
- Tononi G, Koch C (2015) Consciousness: here, there and everywhere? *Philos Trans R Soc Lond B Biol Sci* 370. PMC4387509.
- Tooby J, Cosmides L (1992) The psychological foundations of culture. In: *The Adapted Mind: Evolutionary Psychology and the Generation of Culture* (Barkow, J.H. et al., eds), pp 19-136 New York: Oxford University Press.
- Torruella G, de Mendoza A, Grau-Bové X, Antó M, Chaplin MA, del Campo J, Eme L, Perez-Cordon G, Whipps CM, Nichols KM, Paley R, Roger AJ, Sitja-Bobadilla A, Donachie S, Ruiz-Trillo I (2015) Phylogenomics reveals convergent evolution of lifestyles in close relatives of animals and fungi. *Curr Biol* 25:2404-2410.
- Trubutschek D, Marti S, Ojeda A, King JR, Mi Y, Tsodyks M, Dehaene S (2017) A theory of working memory without consciousness or sustained activity. *Elife* 6.
- Tsuchiya N, Wilke M, Frassle S, Lamme VA (2015) No-report paradigms: extracting the true neural correlates of consciousness. *Trends Cogn Sci* 19:757-770.
- Tulving E (1972) Episodic and semantic memory. In: *Organization of Memory* (Tulving, E., Donaldson, W., eds), pp 382-403 New York: Academic Press.
- Tulving E (1983a) *Elements of Episodic Memory*. New York: Oxford.
- Tulving E (1983b) *Memory and Consciousness*. Oxford: Clarendon Press.
- Tulving E (2001) The origin of auto-noesis in episodic memory. In: *The Nature of Remembering: Essays in Honor of Robert G Crowder* (Roediger, H.L. et al., eds), pp 17-34 Washington, D.C.: Am Psychol Assoc.
- Tulving E (2005) Episodic memory and auto-noesis: uniquely human? In: *The Missing Link in Cognition* (Terrace, H.S., Metcalfe, J., eds), pp 4-56 New York: Oxford University Press.
- Tweedy J (2018) *Let's Go (So We Can Get Back): A Memoir of Recording and Discording with Wilco, Etc.* New York: Dutton.
- Uddin LQ (2011) The self in autism: an emerging view from neuroimaging. *Neurocase* 17:201-208. PMC3117464.
- Umen J, Heitman J (2013) Evolution of sex: mating rituals of a pre-metazoan. *Curr Biol* 23:R1006-1008.
- Ungerleider LG, Mishkin M (1982) Two cortical visual systems. In: *Analysis of Visual Behavior* (Ingle, D.J. et al., eds), pp 549-586 Cambridge, MA: The MIT Press.
- Uylings HB, Groenewegen HJ, Kolb B (2003) Do rats have a prefrontal cortex? *Behav Brain Res* 146:3-17.
- Valadao DF, Anderson B, Danckert J (2015) Examining the influence of working memory on updating mental models. *QJ Exp Psychol (Hove)* 68:1442-1456.
- Valentine JW (2004) *On the Origin of Phyla*. Chicago: University of Chicago Press.

- van der Meer L, Costafreda S, Aleman A, David AS (2010) Self-reflection and the brain: a theoretical review and meta-analysis of neuroimaging studies with implications for schizophrenia. *Neurosci Biobehav Rev* 34:935-946.
- van Duijn M, Keijzer F, Franken D (2006) Principles of minimal cognition: casting cognition as sensorimotor coordination. *Adaptive Behavior* 14:157-170.
- van Vugt B, Dagnino B, Vartak D, Safaai H, Panzeri S, Dehaene S, Roelfsema PR (2018) The threshold for conscious report: signal loss and response bias in visual and frontal cortex. *Science* 360:537-542.
- Varela FJ (1996) Neurophenomenology: methodological remedy for the hard problem. *Journal of Consciousness Studies* 3:330-349.
- Varela FJ (1997) Patterns of life: intertwining identity and cognition. *Brain Cogn* 34:72-87.
- Varela FJ, Thompson E, Rosch E (1993) *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, MA: The MIT Press.
- Vermeij GJ (1996) Animal origins. *Science* 274:525-526.
- Viegas J (2015) Flies have feelings: fear and maybe more, <https://www.abc.net.au/science/articles/2015/05/15/4236373.htm>, retrieved May 11, 2018.
- Vladimirov N, Soujik V (2009) Chemotaxis: how Bacteria use memory. *Biol Chem* 390:1097-1104.
- Volk T (2008) *CO₂ Rising: The World's Greatest Environmental Challenge*. Cambridge, MA: The MIT Press.
- Volk T (2017) *Quarks to Culture: How We Came to Be*. New York: Columbia University Press.
- von Foerster H (1984) On constructing a reality. In: *The Invented Reality: How Do We Know What We Believe We Know* (Watzlawick, P., ed), pp 41-62 New York: W.W. Norton & Co.
- von Helmholtz H (1866) Concerning the perceptions in general. In: *Treatise on Psychological Optics*, vol. 3, 3rd edition (translated by JPC Southall 1925 Opt Soc Am Section 26, reprinted 1962). New York: Dover.
- von Helmholtz H (2005) *Treatise on Physiological Optics*, vol. 3. Mineola, NY: Dover.
- Vygotskij L (1934) *Thought and Language*. Cambridge, MA: The MIT Press. [Tr. it. *Pensiero e linguaggio. Ricerche psicologiche*. Laterza, Roma-Bari 2008.]
- Wachtershauser G (1990) Evolution of the first metabolic cycles. *Proc Natl Acad Sci USA* 87:200-204. PMC53229.
- Wachtershauser G (2006) From volcanic origins of chemoautotrophic life to Bacteria, Archaea and Eucarya. *Philos Trans R Soc Lond B Biol Sci* 361:1787-1806; discussion 1806-1788. PMC1664677.
- Wada H, Satoh N (1994) Details of the evolutionary history from invertebrates to vertebrates, as deduced from the sequences of 18S rDNA. *Proc Natl Acad Sci USA* 91:1801-1804. PMC43251.
- Wadhams GH, Armitage JP (2004) Making sense of it all: bacterial chemotaxis. *Nat Rev Mol Cell Biol* 5:1024-1037.
- Waidergoren S, Segalowicz J, Gilboa A (2012) Semantic memory recognition is supported by intrinsic recollection-like processes: 'The butcher on the bus' revisited. *Neuropsychologia* 50:3573-3587.

- Waite AJ, Cannistra C, Shou W (2015) Defectors can create conditions that rescue cooperation. *PLoS Comput Biol* 11:e1004645. PMC4687000.
- Wallace AR (1855) On the law which has regulated the introduction of new species. *Annals and Magazine of Natural History* 16.
- Wang SH, Morris RG (2010) Hippocampal-neocortical interactions in memory formation, consolidation, and reconsolidation. *Annu Rev Psychol* 61: 49-79, C41-44.
- Ward-Fear G, Pearson DJ, Brown GP, Rangers B, Shine R (2016) Ecological immunization: in situ training of free-ranging predatory lizards reduces their vulnerability to invasive toxic prey. *Biol Lett* 12:20150863. PMC4785923.
- Warrington EK, Shallice T (1984) Category specific semantic impairments. *Brain* 107 (Pt 3):829-854.
- Waters CM, Bassler BL (2005) Quorum sensing: cell-to-cell communication in Bacteria. *Annu Rev Cell Dev Biol* 21:319-346.
- Watson JB (1925) *Behaviorism*. New York: W.W. Norton. [Tr. it. *Il comportamentismo*. Centauria, Milano 2018.]
- Weisberg J (2011) Misrepresenting consciousness. *Philosophical Studies* 154:409-433.
- Weiskrantz L (1997) *Consciousness Lost and Found: A Neuropsychological Exploration*. New York: Oxford University Press. [Tr. it. *Coscienza perduta e trovata. Un approccio neuropsicologico*. McGraw-Hill, Milano 2002.]
- Wellik DM (2009) Hox genes and vertebrate axial pattern. *Curr Top Dev Biol* 88:257-278.
- West SA, Kiers ET (2009) Evolution: what is an organism? *Curr Biol* 19:R1080-1082.
- Wheeler MA, Stuss DT, Tulving E (1997) Toward a theory of episodic memory: the frontal lobes and auto-noetic consciousness. *Psychol Bull* 121:331-354.
- Whelan NV, Kocot KM, Moroz LL, Halanych KM (2015) Error, signal, and the placement of Ctenophora sister to all other animals. *Proc Natl Acad Sci USA* 112:5773-5778. PMC4426464.
- Whittaker RH (1957) The kingdoms of the living world. *Ecology* 38:536-538.
- Whorf BL (1956) *Language, Thought, and Reality*. Cambridge, MA: Technology Press of MIT. [Tr. it. *Linguaggio, pensiero e realtà*. Bollati Boringhieri, Torino 2018.]
- Wickramasinghe J, Wickramasinghe NC, Napier W (2010) *Comets and the Origin of Life*. Hackensack, NJ: World Scientific.
- Wierzbicka A (1994) Emotion, language, and cultural scripts. In: *Emotion and Culture: Empirical Studies of Mutual Influence* (Kitayama, S., Markus, H.R., eds), pp 133-196 Washington, DC: American Psychological Association.
- Wikipedians (2017) *Organism*. Limburg, Germany: PediaPress, <https://pediapress.com>.
- Wilkinson A, Huber L (2012) Cold-blooded cognition: reptilian cognitive abilities. In: *The Oxford Handbook of Comparative Evolutionary Psychology* (Shackelford, T.K., Vonk, J., eds) Oxford: Oxford University Press.
- Williams DL (2016) Light and the evolution of vision. *Eye (Lond)* 30: 173-178. PMC4763119.

- Williams GC (1975) *Sex and Evolution*. Princeton, NJ: Princeton University Press.
- Williams SCP (2015) Humans may harbor more than 100 genes from other organisms. In: *Science: American Association for the Advancement of Science*.
- Wilson EO (2014) *The Meaning of Human Existence*. New York: Liveright. [Tr. it. *Il significato dell'esistenza umana*. Codice, Torino 2015.]
- Wilson TD (1994) The proper protocol: validity and completeness of verbal reports. *Psychological Science* 5:249-252.
- Wilson TD (2002) *Strangers to ourselves: self-insight and the adaptive unconscious*. Cambridge, MA: Harvard University Press.
- Wilson-Mendenhall CD, Barrett LF, Simmons WK, Barsalou LW (2011) Grounding emotion in situated conceptualization. *Neuropsychologia* 49:1105-1127.
- Wise RA (1980) The dopamine synapse and the notion of 'pleasure centers' in the brain. *Eye (Lond)* 3:91-95.
- Wise SP (2008) Forward frontal fields: phylogeny and fundamental function. *Trends Neurosci* 31:599-608.
- Wittgenstein L (1958) *Philosophical Investigations*. Oxford: Basil Blackwell. [Tr. it. *Ricerche filosofiche*. Einaudi, Torino 2009.]
- Woese C (1998) The universal ancestor. *Proc Natl Acad Sci USA* 95:6854-6859. PMC22660.
- Woese CR, Fox GE (1977) Phylogenetic structure of the prokaryotic domain: the primary kingdoms. *Proc Natl Acad Sci USA* 74:5088-5090. PMC432104.
- Woese CR, Kandler O, Wheelis ML (1990) Towards a natural system of organisms: proposal for the domains Archaea, Bacteria, and Eucarya. *Proc Natl Acad Sci USA* 87:4576-4579. PMC54159.
- Wolff P, Holmes KJ (2011) Linguistic relativity. *Wiley Interdiscip Rev Cogn Sci* 2:253-265.
- Wright S (1931) Evolution in mendelian populations. *Genetics* 16:97-159. PMC1201091.
- Wynne CDL (2004) The perils of anthropomorphism. *Nature* 428:606.
- Wynne CDL (2007) What are animals? Why anthropomorphism is still not a scientific approach to behavior. *Comparative Cognition & Behavior Reviews* 2:125-135.
- Wynne CDL, Bolhuis JJ (2008) Minding the gap: why there is still no theory in comparative psychology. *Behavioral and Brain Sciences* 31:152-153.
- Wynne CDL, Udell MAR (2013) *Animal Cognition: Evolution, Behavior and Cognition*. London: Palgrave Macmillan.
- Yang E, Brascamp J, Kang MS, Blake R (2014) On the use of continuous flash suppression for the study of visual processing outside of awareness. *Frontiers in Psychology* 5:724. PMC4093749.
- Ye Q, Zou F, Lau H, Hu Y, Kwok SC (2018) Causal evidence for mnemonic metacognition in human precuneus. *J Neurosci* 38(28):6479-6387.
- Yeterian EH, Pandya DN, Tomaiuolo F, Petrides M (2012) The cortical connectivity of the prefrontal cortex in the monkey brain. *Cortex* 48:58-81. PMC3161133.

- Yin JC, Tully T (1996) CREB and the formation of long-term memory. *Curr Opin Neurobiol* 6:264-268.
- Yin Z, Zhu M, Davidson EH, Bottjer DJ, Zhao F, Tafforeau P (2015) Sponge grade body fossil with cellular resolution dating 60 Myr before the Cambrian. *Proc Natl Acad Sci USA* 112:E1453-1460. PMC4378401.
- Yong E (2016) Stunning videos of evolution in action: the MEGA-plate allows scientists to watch Bacteria adapting to antibiotics before their eyes, <https://www.theatlantic.com/science/archive/2016/2009/stunning-videos-of-evolution-in-action/499136/>. The Atlantic.
- Young JE, Klosko JS, Weishaar ME (2003) *Schema Therapy: A Practitioner's Guide*. New York: The Guilford Press. [Tr. it. *Schema therapy. La terapia cognitivo-comportamentale integrata per i disturbi della personalità*. Eclipsi, Firenze 2007.]
- Young MP (1992) Objective analysis of the topological organization of the primate cortical visual system. *Nature* 358:152-155.
- Zanto TP, Rubens MT, Thangavel A, Gazzaley A (2011) Causal role of the prefrontal cortex in top-down modulation of visual processing and working memory. *Nat Neurosci* 14:656-661. PMC3083493.
- Zapata F, Goetz FE, Smith SA, Howison M, Siebert S, Church SH, Sanders SM, Ames CL, McFadden CS, France SC, Daly M, Collins AG, Haddock SH, Dunn CW, Cartwright P (2015) Phylogenomic analyses support traditional relationships within Cnidaria. *PLoS One* 10:e0139068. PMC4605497.
- Zentall TR, Clement TS, Bhatt RS, Allen J (2001) Episodic-like memory in pigeons. *Psychon Bull Rev* 8:685-690.
- Zhu M, Yu X, Choo B, Wang J, Jia L (2012) An antiarch placoderm shows that pelvic girdles arose at the root of jawed vertebrates. *Biol Lett* 8: 453-456. PMC3367742.
- Zinkivskay A, Nazir F, Smulders TV (2009) What-where-when memory in magpies (*Pica pica*). *Anim Cogn* 12:119-125.

*Siti internet**

- Animal cognition: <https://plato.stanford.edu/entries/cognition-animal/>
- Animal diversity: <https://oer2go.org/mods/en-boundless/www.boundless.com/biology/textbooks/boundless-biology-textbook/introduction-to-animal-diversity-27/index.html>
- Choanoflagellates and the origin of animals: <https://www.hhmi.org/research/choanoflagellates-and-origin-animals>
- Cilia and flagella: https://www.diffen.com/difference/Cilia_vs_Flagella.
- Cnidaria: <https://www.encyclopedia.com/plants-and-animals/animals/zooology-invertebrates/cnidaria#3400500071>
- Cognitive science: <https://plato.stanford.edu/entries/cognitive-science/>
- Earliest known fossil fish: <https://news.bbc.co.uk/1/hi/sci/tech/504776.stm>
- Evolutionary history of life: https://en.wikipedia.org/wiki/Timeline_of_evolutionary_history_of_life

* Gli indirizzi web citati in questo elenco sono aggiornati al 23 marzo 2020. [NdR]

Kimberella: https://en.wikipedia.org/wiki/Kimberella#cite_ref-Fedonkin_2007_3-8

Kingdom (biology): [https://en.wikipedia.org/wiki/Kingdom_\(biology\)](https://en.wikipedia.org/wiki/Kingdom_(biology))

Largest mammal: <https://www.guinnessworldrecords.com/world-records/largest-mammal>

Placodermi: <https://en.wikipedia.org/wiki/Placodermi>; <https://palaeos.com/vertebrates/placodermi/placodermi.html>

Smallest mammals: <https://www.mnn.com/earth-matters/animals/photos/11-of-the-smallest-mammals-in-the-world/etruscan-shrew>