THE THEUTH EFFECT- WHAT DOES CULTURE DO TO OUR BRAINS?

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Contents

Summary

The aim of this chapter is to present a new field of research, namely the Cultural Cognitive Valence studies. The topic is what in cultural matrices limits (cultural adversity) or extends (cultural felicity) the optimal development of human cognitive abilities – a phenomenon termed Theuth effect. Cognitive abilities are broadly defined as information processing, whatever the information processing mode: by sensation and perception, by emotions or by high-level mental abilities. In the first part, we provide several examples of the powerful effects of cultural matrices on brain structures and cognitive functions. We outline recent attempts of synthesizing them in terms of methodological approaches or theories, and point out some of the major limits of these approaches. In the second part, the objectives of the Cultural Cognitive Valence studies are defined, and a description of the methods to be developed in order to promote research on the Theuth effect is given. We conclude arguing that the evaluation of the cultural cognitive valence would enrich our knowledge of cultural diversity, and would be a valuable indicator of the overall wellbeing of human life forms.

> "*Consider the possibility that any man could, if he were so inclined, be the sculptor of his own brain, and that even the least gifted may, like the poorest land that has been well cultivated and fertilized, produce an abundant harvest*" (Ramón y Cajal 1999: xv-xvi).

1. Introduction

In 2004, the chairman of TF1, a major French television channel, declared: "What we sell to Coca-Cola is available human brain time." He thus highlighted that the vocation of his medium was to offer advertising to the receptive brains of spectators. This is only an anecdote that, beyond any intention to create a straw man, is a useful rhetorical way of introducing the main issue that underlies this chapter: *What does culture do to our brains?* More specifically, the main question is: what do cultural matrices do to our brains, a cultural matrix being defined as a socio-ecological configuration that generates a robust sharing of behaviors and of representations among individuals caught in this matrix.

This is an old question. In *Phaedrus* (274-275b), the famous god Theuth, inventor of many arts, presents the invention of writing to king Thamus as a means for giving Egyptians “better memories.” Thamus immediately warns Theuth: “for this discovery of yours will create forgetfulness in the learners’ souls, because they will not use their memories”. Human beings, Thamus added, will learn an abundance of information that will induce them to believe in their competence in many domains, but they will have “the show of wisdom without the reality”. In the words of Thamus, the old question becomes: what does culture do to the productions of our brains, i.e. to our cognitive abilities, broadly defined in this chapter as information processing, whatever the information processing mode: by sensation and perception (including sensorimotor aptitudes), by emotions or by high-level mental abilities?

This is a relevant and currently debated question. Because of its amazing plasticity, and because of the highly impressive power of human culture (Greenfeld 2013), our brain is culture-dependent. Consequently, cultural psychology, cultural and social neurosciences, and even human social genomics are booming disciplines, which are increasingly interested in the effects of culture on brain and cognition (Henrich 2016; Thompson *et al.* 2016). Yet, unlike in Plato (who, of course, was wrong about the invention of writing), the issue of the cognitive valence of cultural matrices – or cultural cognitive valence, from here “CCV” - considered as a whole is presently not addressed head-on and systematically.

We address this issue in this chapter. First, considering the huge power of human culture and the immense plasticity of our brain, we show that CCV influences our cognitive skills for better or for worse. We term this influence the Theuth effect, referring to Plato's aforementioned text. Positive influence is termed Theuth effect+ (from here on “T+”), and negative influence Theuth effect- (from here on “T-”). There will be T+, or cultural felicity, when CCV induces an added value compared to the cognitive potential of individuals at birth. There will be T-, or cultural adversity, when CCV induces a loss compared to this cognitive potential. Obviously, one can imagine all intermediate solutions on the T-/T+ axis. Secondly, we hypothesize that it is possible to outline a theoretical framework and a methodology to identify and assess this CCV in a comparative perspective. Finally, we argue that the evaluation of this CCV would enrich our knowledge of cultural diversity, and would be a valuable indicator of the overall wellbeing of human life forms. Put simply, this chapter aims to understand when, why and how we have the Theuth effect, what is the CCV inducing this effect, and to what extent it can be important for human societies to assess this CCV.

2. Culture is Human Nature

2.1. Human Beings are Immersed in Culture

Culture is a natural phenomenon not specific to humans. Even if it is difficult to sort the genetic from the cultural (Langergraber *et al.* 2010), cultural or protocultural forms have been documented among apes (Boesch and Tomasello 1998; Breuer *et al.* 2005; Hohmann and Fruth 2003; McGrew 2010; McGrew *et al.* 2001; Mercader *et al.* 2007; Morgan and Abwe 2006; Sapolsky and Share 2004; van Schaik *et al.* 2003; Whiten 2001; Whiten *et al.* 1999) and monkeys (Huffman 1984; McGrew 1998; Visalberghi *et al.* 2013), and exist among species which are much more distant from our species than non-human primates (Auersperg *et al.* 2014; Fehér *et al.* 2009; Laland and Reader 1999; Noad *et al.* 2000). However, human culture is really unique because of its prevalence, its diversity, its complexity, its cumulative evolution, its inclination towards innovation, its various means of transmission (vertical, horizontal, oblique, from one to several, from several to one etc.), its manifold forms of cooperation (Candau 2012; Henrich and Henrich 2007; Nowak and Highfield 2011; Tomasello 2009) including regular cooperation with nonrelatives (unlike other animals), the fact that it is massively embedded in the environment, notably in social institutions, and in a multitude of artifacts (Clark 2008) and of what we called “sociotransmitters” (Candau 2005). Human culture is unique because of *the range and intensity* of its power. On the one hand, cultural expectations invade more or less every aspect of daily life (*range*). On the other hand, they can impact more or less profoundly our everyday life (*intensity*). Let us take the example of religion. Cultural religious expectations potentially encompass every aspect of the life of people from birth to death. Thus, their range is almost limitless compared with, for example, aesthetic codes which only concern some specific aspects of our existence. Besides, in some societies these cultural expectations are more diffuse (weak intensity) than in others (strong intensity), where, in extreme cases, they are absolutely inescapable (maximal intensity). For example, in French society cultural religious expectations have a medium range and a weak intensity. In contrast, they have a wide range and a strong intensity in Iranian society. In a religious sect or during a spiritual possession rite (Halloy 2015), the intensity is maximal. Therefore, cultural expectations can be variable in range and intensity but, from a more general anthropological perspective, among human beings culture has a large range and acts in a very intense way, in the sense that it is everywhere, at every moment. Human nature is to be cultural. Our species is “wired for culture” (Pagel 2012). Thus, culture pervades human lives, from the genome and epigenome (for an overview, see Laland *et al.* 2010) to behavior. This includes the body (which the brain is part of) and its performances, including cognitive abilities.

2.1.1. The Natural Human Capacity to Culturally Modify Human Nature

A few years ago, the term ‘anthropocene’ was coined by Nobel Prize winning scientist Paul Crutzen (2000) to describe the epoch in the Earth’s history, which started in the late 18th century, when the activities of humans first began to have significant effects on nature. Crutzen thought mainly about Earth’s climate and ecosystems (Jones 2011), but, in our view, the term can also indicate the natural capacity of human culture to modify human nature. Indeed, human lifestyles can act on the genotype. We considered for a long time that the relationship between genes and culture was one-way, that it is to say that only genes could have an effect on culture; we know today that culture can keep genes on a leash! Both low levels of genetic diversity and genetic differentiation in modern humans are not only the effects of natural selection (Barreiro *et al.* 2008) but are also the effects of culture. On the one hand, by limiting their mate choices to individuals of a similar culture, our ancestors possibly reduced the spread of new mutations across many groups (Premo and Hublin 2009). On the other hand, a correlation between linguistic borders and alleles frequency, which does not always correspond to physical boundaries (such as a mountain or a channel), has been observed in Europe (Barbujani and Sokal 1990; Pagel and Mace 2004), in Indonesia (Lansing *et al.* 2007), in South Amerindian populations (Hünemeier *et al.* 2012), etc. In this case, it is the practice of different languages which induces or supports sharp changes in gene frequencies. Another astonishing example of the influence of human lifestyles on genome diversity is the comparison of mtDNA and Y-chromosome variation in matrilocal and patrilocal groups. It shows a correlation between genetic diversity and residence pattern, supporting the role of sex-specific migration in influencing human genetic variation. The result is that women are genetically less structured than men (Oota *et al.* 2001; Ségurel *et al.* 2008) because of the predominance of both patrilocality and social organization of patrilineal populations.

Thanks to the emerging field of social genomics (Cole 2009), and to research in gene-culture co-evolution (Feldman and Laland 1996; O'Brien and Laland 2012), we have many examples where culture can act on the genome, and thereby alter human gene expression. There is genome-wide evidence for positive selection due to changes in diet, and subsistence (Chiaroni *et al.* 2009; Hancock *et al.* 2010). For instance, among human beings, the ability to digest milk declines sharply after infancy - half of modern humans cannot digest it -, but for most European and Euro-American people, and for some populations in Africa (Tishkoff *et al.* 2007), lactose (the main carbohydrate present in milk) is well tolerated. For over 8.000 years, these lactose-tolerant human societies exploited dairy breeds (Beja-Pereira *et al.* 2003; Check 2006; Feldman and Cavalli-Sforza 1989; Flatz 1987; Gibbons 2006; Holden and Mace 1997). In opposition to the ‘‘reverse cause hypothesis,’’ whereby dairying would have been adopted in populations with preadaptive high lactase persistence allele frequencies (a trait conferring the ability to digest the milk sugar lactose in adults), findings provided mounting evidence for the “culture-historical hypothesis” (Burger 2007), whereby lactase persistence alleles were rare until the advent of dairying early in the Neolithic age, but then rose rapidly in frequency under a selective pressure resulting from the adoption of cultural traits—namely animal domestication and adult milk consumption. Another example is the tolerance to starchy food. Populations with high-starch diets have, on average, more salivary amylase gene (AMY1), the enzyme responsible for starch hydrolysis, than populations with traditionally low-starch diets (Perry *et al.* 2007). We consider two final related examples. The use of cereals as the staple diet by some populations is strongly correlated with higher frequencies of *PRLP2* gene variant than by populations who have other diets (Hancock *et al.* 2010). Amongst Japanese people, consumption of marine microorganisms that live on seaweed – which contribute strongly to the daily diet in Japan - have introduced useful genes into their intestinal microbiome, which are absent among North American individuals (Heheman *et al.* 2010).

Researchers scrutinizing the genome unveil dramatic evidence of socioenvironmental influences, some of them concluding that regular changes in human cultures and ecologies linked with human demographic growth are hastening human evolution (Cochran and Harpending 2009; Gibbons 2010; Hawks *et al.* 2007). For instance, to inhabit in hypoxic conditions is a cultural behavior which have effects on our genes. In just a few thousand years, Andean, Deedu (DU) Mongolians, Ethiopian Amhara, and Tibetan populations (in this last case, likely by introgression of Denisovan-like DNA: Huerta-Sanchez *et al.* 2014) living at high altitude have adapted to hypoxia differently, with convergent evolution affecting different genes from the same pathway (Alkorta-Aranburu *et al.* 2012; Huerta-Sánchez *et al.* 2013; Simonson *et al.* 2010; Xing et al. 2013; Yi *et al.* 2010). The sequenced ancient DNA from 230 people who lived 3000 to 8500 years ago in Eurasia is another example of gene-culture coevolution. According to this research, the transition to farming favored genes to digest fats, as well as immune genes that protected against infectious diseases, such as tuberculosis and leprosy (Mathieson *et al.* 2015).

Thanks to behavioral epigenetics, we also know that social factors might regulate gene expression and functional genomic responses (Cole *et al.* 2007). It has been found in mammals that social conditions can modulate the expression of neural genes such as the glucocorticoid receptor gene (Zhang *et al.* 2006), the nerve growth factor gene, and the key immune system genes (Sloan *et al.* 2007). Roth *et al.* (2009) showed that pups raised by stressed-out mother rats exhibited increased methylation of brain-derived neurotrophic factor (BDNF) gene in the central nervous system, and they observed a transgenerational perpetuation of changes in gene expression and behavior induced by early abuse and neglect. Weaver *et al.* (2004) showed that increased pup licking and grooming and arched-back nursing by mother rats altered the offspring epigenome, and Curley *et al.* (2009) showed that an enrichment of the postnatal environment may exert sustained effects on behavior through modification of oxytocin and vasopressin receptor densities. Among human beings, epigenetics processes are increasingly well documented, and they begin to be considered by social scientists (Thayer & Non 2015), especially because some of them could be transgenerational (Heard & Martienssen 2014; Nestler 2016). In our species, adverse environmental conditions during early-life can cause epigenetic changes in humans that persist throughout life, and have effects on behavior (Keverne, Plaff & Tabansky 2015). For instance, the strong sensitivity to diseases for individuals who had prenatal exposure to famine during the Dutch Hunger Winter in 1944-1945: according with the fetal origins hypothesis (Barker 1995), sixty years later they had less DNA methylation along the insulin-like growth factor II gene *(*IGF2, compared with same-sex siblings not exposed to the famine (Heijmans *et al.* 2008). Other persistent changes in epigenetic regulation have been observed among people who suffered the Great Chinese Famine (1958-1961) or the 1968-1970 Biafra famine (Ahmed 2010). Low levels of social support and high depressive symptoms can regulate tumor cell gene expression among women with ovarian cancer (Lutgendorf *et al.* 2009). Oberlander *et al.* (2008) reported epigenetic alterations in cells isolated from umbilical cord blood in 33 infants born to women who suffered symptoms of depression during their pregnancy, suggesting an increased susceptibility to stress among the newborns.

Another example of the action of cultural matrices on genes is resistance to some diseases. For instance, due to the diversity of environmental and social conditions, resistance to malaria was promoted, directly or indirectly, in West Africa by the practice of agriculture (yam cultivar) as the environment in which resistance through the sickle cell gene emerged (Livingstone 1958), in Coastal New Guinea by the use of sago palm (Ulijaszek 2007), and in the Mediterranean by fava bean consumption (Katz and Schall 1979). If we consider mental health, it is well known that adverse early-life experiences have a profound effect on the developing brain (Nemeroff 2004), but a lot of data shows that genes and culture interact. Here are just a few examples. In men who were abused as children, the expression in the hippocampus of a gene involved in stress control is affected even decades later (McGowan *et al.* 2009). On one hand, variation in specific genes (monoamine oxidase A (MAOA) and serotonin transporter (5-HTT) contributes to predict greater or lesser degrees of psychopathology in maltreated individuals (Kim-Cohen and Gold 2009), but on the other hand, social factors can promote resilience. According to the social buffering hypothesis, having a supportive relationship with an adult protects maltreated children from developing depression and reduces behavior problems, even among children who have an at-risk genetic makeup (Kaufman *et al.* 2006). Also, socioeconomic status early in life seems to alter gene expression. According to the research of Miller *et al.* (2009), the white blood cells of men who lived in lower socioeconomic environments before the age of 5 show disparities in the activity of more than 100 genes related to immune system function. As a result, they observed an increase of inflammatory immune responses, and infectious and cardiovascular diseases, all phenomena related to poverty. Strictly speaking, even if epigenetics does not always seem to be the cause – changes in gene expression can be the result of changes in the activity of transcription factors without the help of epigenetic mechanisms (Miller 2010) -, the important lesson for anthropologists and biologists is that social interactions can affect biology.

2.1.2. The Cultural Brain

Among human beings, the power of culture is often explained by the power of the brain, acquired at the price of substantial developmental and energy costs which, from an evolutionary point of view, can be justified by the extent of the behavioral palette or repertoire that brain power ensures to our species (Sol 2009). This standpoint is right but it eludes an essential fact: if our brain is so powerful, it is also because culture can act on it or, more exactly, because the nature of our brain makes it especially suited to being culture-dependent. Thus, the human brain is shaped by both evolution (phylogenesis) and culture (Richerson and Boyd 2005; Schaller *et al.* 2009).

In various ways, our brain differs from that of other primates. If we put aside the still debated discovery of “Hobbit” (*Homo floresiensis*) on Florès Island (Brown *et al.* 2004; Sutikna *et al.* 2016 ; Weston and Lister 2009), the established fact is that, throughout evolution, brain size in hominins has always increased. At birth, cranial capacities were on average 180 cc among *Australopithecus*, 225 cc among early *Homo*, 270 cc in *Homo erectus*, and approximately 370 cc among anatomically modern humans. The size of the skull of a newborn human being is about 2.5 times bigger than that of a chimpanzee. The price to pay for this – a long, risky and dangerous labor, in contrast to other primates (Ponce de León 2008) – has as compensation a strong encephalization quotient (EQ). In our species, EQ is about 6.9 times higher than that of an average mammal with the same weight, and it is 2.6 times higher again than that of a chimpanzee. The power of our brain results not only from its size and its volume, but also from the number of neurones (about 86 billion on average, compared with about 28 billion in chimpanzees), the complexity of their interconnectivity (about 10^{14} synapses), neotenic changes present at the gene expression level (Somel *et al.* 2009), its voracious appetite for energy (Pontzer *et al.* 2016), its constant vigilance, and equally from its structure. Encephalization translates into increasing and significant specializations of cortical and sub-cortical areas, notably in the increase in the size of the temporal and frontal cortices, which play an essential role in our aptitude for sociality and in cultural representations.

The idea that the advanced cognitive abilities of the human brain were evolutionary shaped (and are still being shaped) by social factors is central to three related hypotheses - Social Brain Hypothesis (H.), Cultural Brain H., Cultural Intelligence H. (Dunbar 1998, 2003 and 2007; Herrmann *et al.* 2007) -, according to which it is mainly the computational demands of living in large, complex societies that selected for large brains, and not the brain's role in sensory or technical competences such as foraging skills, innovations, and way-finding. In the same way, the Vygotskian Intelligence H., the Shared Intentionality H. and the Machiavellian Intelligence H. argue that both the adoption of cooperative behaviors and the existence of social competition, communication and teaching among early humans led to more conceptually complex forms of thinking (Byrne and Whiten 1988; Call 2009; Tomasello 2014). It has also been argued that the cultural invention of cooking increased caloric content and so freed more energy for the brain (Wrangham *et al.* 1999; Wrangham 2009), what allowed the increase of the number of neurones and consequently (Fonseca-Azevedo *et al.* 2012) of the brain. So, throughout its evolution, the human brain was largely shaped (and is still being shaped) by cultural matrices. Furthermore, beyond evolutionary shaping, it is also similarly shaped after birth and through the entire life span, thanks to its amazing plasticity. The human brain is a never-ending construction. From conception (Mampe *et al.* 2009; Partanen *et al.* 2013) to death, it is encultured (Lende and Downey 2012) i.e. open to cultural sculpting at multiple levels.

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Candau J., Bureau E., Durand K., Geffroy C., Gélard M.l., Ginouvès V., Halloy A., Hahn H. P., Khabbache H., Kibora L., Knödel K., Mazzucchi Ferreira M. L., Rosso T., Schaal B., Sim K. L., Verguet V., Verhasselt V., Zirotti J.-P. 2016. Une approche bioculturelle du premier aliment du nouveau-né : le colostrum, in Herrscher E., Séguy I.(éds.), *Pratiques d'allaitement et de sevrage : approches diachroniques et pluridisciplinaires*, Paris, INED (in press). [Article about the first international research program to be dedicated to the representations and practices related to the gift of colostrum by the mother and its consumption by neonates.]

Caparos S., Ahmed L., Bremner A. J. *et al.* (2012). Exposure to an urban environment alters the local bias of a remote culture. *Cognition* 122(1): 80-85. [This article proposes that exposure to an urban environment contributes to cultural differences in the processing of information in visual displays.]

Caracciolo B., Xu W., Collins S., Fratiglioni L. (2014). Cognitive decline, dietary factors and gut–brain interactions. *Mechanisms of Ageing and Development* 136-137: 59-69. [This article is a review of the most recent findings about plausible mechanisms underlying the relationship between diet and cognitive decline.]

Carr N**.** 2010. *The Shallows. What the Internet Is Doing to Our Brains*. New York, Norton, 304 pp. [This article discusses the effect of Internet on human cognitive abilities.]

Carreiras M., Seghie M. L. *et al*. J. (2009). An anatomical signature for literacy. *Nature* 461:983-986. [This article investigates how literacy changes the adult brain.]

Changeux J.-P. (éd.). (2003). *Gènes et Culture*. Paris: Odile Jacob. [This book is a dialogue about human nature between researchers of the life sciences and social scientists.]

Changeux J.-P., Danchin A. (1976). The selective stabilization of developing synapses: a plausible mechanism for the specification of neuronal networks. *Nature* 264: 705-712. [This article shows that connections between neurons are genetically specified between classes of cells, but the final wiring pattern depends on the refinement of those collections by selective stabilization during neural activity.]

Changeux J.-P. (2002). *L'Homme de vérité*. Paris, Odile Jacob, 448 pp. [This outstanding book documents the progress of knowledge of neuroscience regarding the development and organization of the brain, and its relationship with the human and cultural environment.]

Check E. (2006). How Africa learned to love the cow. *Nature* 444: 994-996. [This article shows that the development of lactose tolerance in sub-Saharan Africa is a fascinating tale of genetic convergence.]

Chen M.K. 2012. The Effect of Language on Economic Behavior: Evidence from Savings Rates, Health Behaviors, and Retirement Assets. (December 12, 2012). Cowles Foundation Discussion Paper No. 1820. Available at SSRN: http://ssrn.com/abstract=1914379 or http://dx.doi.org/10.2139/ssrn.1914379. [This article shows that languages that grammatically associate the future and the present, foster future-oriented behavior; see "Whorfian perspective" in the glossary.]

Chiaroni J., Underhill P. A., Cavalli-Sforza L.L. (2009). Y chromosome diversity, human expansion, drift, and cultural evolution. *Proceedings of the National Academy of Sciences* 106(48): 20174-20179. [This article suggests that cultural evolution has been subrogating biologic evolution in providing natural selection advantages and reducing our dependence on genetic mutations, especially in the last phase of transition from food collection to food production.]

Choi S., Bowerman M. (1991). Learning to express motion events in English and Korean: The influence of language-specific lexicalization patterns. *Cognition* 41(1-3): 83-121. [This article challenges the widespread view that children initially map spatial words directly to nonlinguistic spatial concepts, and suggests that they are influenced by the semantic organization of their language virtually from the beginning.]

Clark A. (2008). *Supersizing the Mind. Embodiment, Action, and Cognitive Extension*. New York, Oxford University Press, 318 pp. [Drawing upon recent work in psychology, linguistics, neuroscience, artificial intelligence, robotics, human-computer systems, and beyond, this book offers both a tour of the emerging cognitive landscape and a sustained argument in favor of a conception of mind that is extended rather than "brain-bound."]

Cochran G., Harpending H. (2009). *The 10,000 Year Explosion: How Civilization Accelerated Human Evolution*. New York, Basic Books, 304 pp. [This book reveals the ongoing interplay between culture and biology in the making of the human race.]

Cole S. W. (2009). Social Regulation of Human Gene Expression. *Current Directions in Psychological Science* 18(3): 132-137. [This article challenges the view that the relationship between genes and social behavior is a one-way street, with genes in control.]

Cole S. W., Hawkley L. C., Arevalo J. M., Sung C. Y., Rose R. M., Cacioppo. J. T. (2007). Social regulation of gene expression in human leukocytes. *Genome Biology* 8:R189 (doi:10.1186/gb-2007-8-9-r189). [This article provides the first indication that human genome-wide transcriptional activity is altered in association with a social epidemiological risk factor.]

Colzato L. S., van Beest I., van den Wildenberg W. P. M., Scorolli C., Dorchin S., Meiran N., Borghi A. M., Hommel B. (2010). God: Do I have your attention? *Cognition* 117: 87-94. [This article suggests that religious practice induces particular cognitive-control styles that induce chronic, directional biases in the control of visual attention.]

Coqueugniot H., Hublin J.-J., Veillon F., Houët F., Jacob T. (2004). Early brain growth in Homo erectus and implications for cognitive ability. *Nature* 431:299-302. [This article discusses the differences in the development of cognitive capabilities between *Homo erectus* and anatomically modern humans.]

Crutzen P. J., Stoermer E. F. (2000). The 'Anthropocene'. *Global Change Newsletter* 41: 17-18. [The first use in print of the term "Anthropocene" (see Glossary).]

Curley J. P., Davidson S., Bateson P., Champagne F. A. (2009). Social Enrichment during Postnatal Development Induces Transgenerational Effects on Emotional and Reproductive Behavior in Mice. *Frontiers in Behavioral Neuroscience* 3(25) doi: 10.3389/neuro.08.025.2009. [This article suggests that through enrichment of the postnatal environment, behavioral and neuroendocrine deficits may be attenuated both within and across generations.]

Davidoff J. (2001). Language and Perceptual Categorisation. *Trends in Cognitive Sciences* 5(9): 382-387. [This article supports a strong version of the Whorfian view (see glossary) that perceptual categories are organized by the linguistic systems of our mind.]

Davidoff J., Davies I., Roberson D. (1999). Colour Categories in a Stone-Age Tribe. *Nature* 398: 203-204. [Comparing the distribution of English and Berinmo (Papua New Guinea) color names, this article shows a considerable degree of linguistic influence on color categorization.]

de Rooij S.R., Wouters H., Yonker J. E., Painter R. C., Roseboom T.J. (2010). Prenatal undernutrition and cognitive function in late adulthood. *Proceedings of the National Academy of Sciences* 107(39): 16881-16886. [This article shows that cognitive function in later life seems affected by prenatal undernutrition.]

Deary I. J., Yang J., Davies G. *et al.* (2012). Genetic contributions to stability and change in intelligence from childhood to old age. *Nature* 482: 212-215. [This article provides an estimate of the genetic and environmental contributions to stability and change in intelligence across most of the human lifetime.]

Dehaene S., Cohen L. (2007). Cultural Recycling of Cortical Maps. *Neuron* 56(2): 384-398. [This article proposes a neuronal recycling hypothesis, according to which cultural inventions invade evolutionarily older brain circuits and inherit many of their structural constraints.]

Dehaene S., Pegado F., Braga L. W. *et al.* (2010). How Learning to Read Changes the Cortical Networks for Vision and Language. *Science* 330: 1359-1364. [This article shows that both childhood and adult education can profoundly refine cortical organization.]

Demeinex Barbara. 2014. *Losing our minds. How environmental pollution impairs human intelligence and mental health*. Oxford, Oxford University Press, 312 pp. [This book outlines the environmental causes underlying the increased incidence of various neurodevelopmental disorders and IQ loss.]

DeSilva J. M., Lesnik J.J. (2006). Chimpanzee neonatal brain size: Implications for brain growth in Homo erectus. *Journal of Human Evolution* 51: 207-212. [This article argues that *Homo erectus* may not have been characterized by a chimpanzee-like prenatal brain-growth pattern.]

DeSilva J. M., Lesnik J.J. (2008). Brain size at birth throughout human evolution: A new method for estimating neonatal brain size in hominins. *Journal of Human Evolution* 55: 1064-1074. [This article discusses the evolution of brain development and obstetric constraints in the human lineage.]

Deutscher G. (2010). *Through the Language Glass. Why the World Looks Different in Other Languages.* New York, Metropolitan (Henry Holt), 320 pp. [This book discusses the question of how - and whether - culture shapes language and language, culture.]

Diamond J. 1978. The Tasmanians: the longest isolation, the simplest technology. *Nature* 273: 185-186. [The author argues that in Tasmania cultural losses were concomitant of the "world's longest isolation".]

Diamond J. 2005. *Collapse: How Societies Choose to Fail or Succeed*. New York, Viking, 576 pp. [In this book, the author explores how climate change, the population explosion and political discord create the conditions for the collapse of civilization.]

Draganski B., Gaser C. *et al*. (2004). Changes in grey matter induced by training. *Nature* 427:311-312. [This article shows that transient and selective structural changes in brain areas respond to environmental demands.]

Draganski B., Gaser C., Kempermann G. *et al.* (2006). Temporal and Spatial Dynamics of Brain Structure Changes during Extensive Learning. *The Journal of Neuroscience* 26(23):6314-6317. [This article indicates that the acquisition of a great amount of highly abstract information may be related to a particular pattern of structural gray matter changes in particular brain areas.]

Duerden E. G., Laverdure-Dupont D. (2008). Practice Makes Cortex**.** *The Journal of Neuroscience* 28: 8655-8657. [This article gives examples of neuroplasticity.]

Dunbar R. (1998). The Social Brain Hypothesis. *Evolutionary Anthropology* 6(5): 178-190. [A comprehensive discussion of the social brain hypothesis: primates evolved large brains to manage their unusually complex social systems.]

Dunbar R. (2012). Social cognition on the Internet: testing constraints on social network size. *Philosophical Transactions of the Royal Society B* 367: 2192-2201. [Considering social networks, this article discusses the hypothesis that only relatively weak quality relationships can be maintained without face-to-face interaction.]

Dunbar R.I.M. (2003). Evolution of the Social Brain. *Science* 302: 1160-1161. [This article discusses the links between sociality and brain growth in primates.]

Dunbar R.I.M., Shultz S. (2007). Evolution in the Social Brain. *Science* 317: 1344-1347. [This article argues that primate sociality selected for large brains.]

Dutton E., Lynn R. 2015. A negative Flynn Effect in France, 1999 to 2008–9. *Intelligence* 51: 67-70. [The authors present data showing a decline in the average IQs in France.]

Ellemers Naomi. 2012. The Group Self. *Science* 336: 848-852. [This article shows that although people often tend to consider themselves and others as unique individuals, there are many situations in which they think, feel, and act primarily as group members, for the best, or the worst.]

Eriksson P. S., Perfilieva E., Björk E. T. *et al.* (1998). Neurogenesis in the adult human hippocampus. *Nature Medicine* 4(1): 1313-1317. [This article demonstrates the genesis of new cells, including neurons, in the adult human brain.]

Ernst A., Alkass K., Bernard S. *et al.* (2014). Neurogenesis in the Striatum of the Adult Human Brain. *Cell* 156(5): 1072-1083. [This article demonstrates a unique pattern of neurogenesis in the adult human brain: new neurons integration in the striatum.]

Fan S. P., Liberman Z., Keysar B., Kinzler K. D. (2015). The Exposure Advantage: Early Exposure to a Multilingual Environment Promotes Effective Communication. *Psychological Science* doi: 10.1177/0956797615574699. [This article shows that multilingual exposure may facilitate the development of perspective-taking tools that are critical for effective communication.]

Fehér O., Wang H., Saar S., Mitra P.P., Tchernichovski O. (2009). De novo establishment of wild-type song culture in the zebra finch. *Nature* 459: 564-568. [This article shows that species-typical song culture can appear de novo.]

Feldman M. W., Laland K. N. (1996). Gene-culture coevolutionary theory. *Trends in Ecology and Evolution* 11(11): 453-457. [This article presents a branch of theoretical population genetics that models the transmission of genes and cultural traits from one generation to the next, exploring how they interact.]

Feldman M., Cavalli-Sforza L. (1989). On the theory of evolution under genetic and cultural transmission with application to the lactose absorption problem in *Mathematical Evolutionary Theory*. Edited by Feldman M. W., pp. 145–173. Princeton, NJ, Princeton University Press. [The gene-culture theory applied to the lactose tolerance problem.]

Fisher L. (2009). *The Perfect Swarm: The Science of Complexity in Everyday Life*. Philadelphia, Basic Books, 288 pp. [The process of “self-organization” and of “swarm intelligence” in living organisms, from fish to ants to human beings.]

Fisher M., Goddu M. K., Keil F. C. (2015). Searching for Explanations: How the Internet Inflates Estimates of Internal Knowledge. *Journal of Experimental Psychology: General* doi : http://dx.doi.org/10.1037/xge0000070. [This article shows that searching for information online leads to an increase in self-assessed knowledge as people mistakenly think they have more knowledge “in the head,” even seeing their own brains as more active as depicted by functional MRI (fMRI) images.]

Flatz G. (1987). Genetics of Lactose Digestion in Humans. *Advances in Human Genetics* 16: 1-77. [This article is a review of the causes and distribution of the dimorphism of lactase activity in human adults.]

Flynn J. R. (1987). Massive IQ gains in 14 nations: what IQ tests really measure. *Psychological Bulletin* 101:171-191 doi:10.1037/0033-2909.101.2.171. [This article argues that IQ tests do not measure intelligence but rather a correlate with a weak causal link to intelligence.]

Fonseca-Azevedo K., Herculano-Houzel S. (2012). Metabolic constraint imposes tradeoff between body size and number of brain neurons in human evolution. *Proceedings of the National Academy of Sciences* 109(45): 18571-18576. [This article shows (i)that brain size is directly linked to the number of neurons in a brain; and (ii), that the number of neurons is directly correlated to the amount of energy (or calories) needed to feed a brain.]

Gaser C., Schlaug G. (2003). Brain Structures Differ between Musicians and Non-Musicians. *The Journal of Neuroscience* 23(27): 9240-9245. [This article shows structural adaptations in response to long-term skill acquisition in different brain regions when comparing professional musicians with a matched group of amateur musicians and non-musicians.]

Geangu Elena, Ichikawa Hiroko, Lao Junpeng, Kanazawa So, Yamaguchi Masami K., Caldara Roberto, Turati Chiara. 2016. Culture shapes 7-month-olds' perceptual strategies in discriminating facial expressions of emotion. *CurrentBiology* 26(14): R663-R664 [This article shows that, by 7 months, infants from both cultures visually discriminate facial expressions of emotion by relying on culturally distinct fixation strategies, resembling those used by the adults from the environment in which they develop.]

Gelfand M. J., Raver J. L., Nishii L. *et al.* 2015. Differences Between Tight and Loose Cultures: A 33-Nation Study. *Science* 332: 1100-1104. [This article illustrates the differences between cultures that are tight (have many strong norms and a low tolerance of deviant behavior) versus loose (have weak social norms and a high tolerance of deviant behavior).]

Gendron M., Lindquist K. A., Barsalou L., Barrett L. F. (2012). Emotion words shape emotion percepts. *Emotion* 12(2): 314-325. [According to the Whorfian view (see glossary), this article demonstrates that the exact same face was encoded differently when a word was accessible versus when it was not.]

Gibbons A. (2006). There's More Than One Way to Have Your Milk and Drink It, Too. *Science* 314: 1672. [A brief report on research on lactose tolerance.]

Gibbons A. (2010). Tracing Evolution's Recent Fingerprints. *Science* 329: 740-742. [An article about the genes that helped humans adapt to new climates, diseases, and diets, exposing how evolution works.]

Gold J., Gold I. 2015. *Suspicious Minds. How Culture Shapes Madness*. New York, Free Press (Simon and Schuster), 351 pp. [A theory for understanding psychosis through a social lens.]

Gordon P. (2004). Numerical Cognition without Words: Evidence from Amazonia. *Science* 306: 496-499. [According to the Whorfian view (see glossary), this article shows that numerical cognition is clearly affected by the lack of a counting system in the language.]

Goren C. C., Sarty M., Wu P.Y.K. (1975). Visual following and pattern discrimination of face-like stimuli by newborn infants. *Pediatrics* 56: 544-549. [The preference for the proper face stimulus by infants who had not seen a real face prior to testing suggests that an unlearned or "evolved" responsiveness to faces may be present in human neonates.]

Grandjean P. 2013. *Only one chance. How environmental pollution impairs brain development – and how to protect the brains of the next generation*. Oxford, Oxford University Press, 232 pp. [This book explains how industrial chemicals are causing a silent pandemic of chemical brain drain.]

Greenfeld L. (2013). *Mind, Modernity, Madness. The Impact of Culture on Human Experience*. Cambridge, MA, Harvard University Press, 688 pp. [In this book, the author argues that madness is a culturally constituted malady.]

Greenhill Stuart D., Juczewski Konrad, de Haan Annelies M., Seaton Gillian, Fox Kevin, Hardingham Neil R. 2015. Adult cortical plasticity depends on an early postnatal critical period. *Science* 349: 424-427. [This article shows that the development of the cerebral cortex is influenced by sensory experience during distinct phases of postnatal development known as critical periods.]

Grossmann I., Ellsworth P. C., Hong Y. -Y. (2011). Culture, attention and emotion. *Journal of Experimental Psychology*: *General* 141(1): 31-36. [This article provides experimental evidence for cultural influence on one of the most basic elements of emotional processing: attention to positive versus negative stimuli.]

Gutchess A. H. (2014). Plasticity of the aging brain: New directions in cognitive neuroscience. *Science* 346: 579-582. [This article shows that aging of the brain, amidst interrelated behavioral and biological changes, is as complex and idiosyncratic as the brain itself, qualitatively changing over the life span.]

Hair N.L., Hanson J.L., Wolfe B.L., Pollak S.D. (2015). Association of child poverty, brain development, and academic achievement. *JAMA Pediatrics* 169(9): 822-829. [This article discusses the effect of poverty and early childhood environments on brain development.]

Halloy A. (2015). *Divinités incarnées. L'apprentissage de la possession dans un culte afro-brésilien.* Paris, Petra, 412 pp. [This book suggests that a major part of possession comes from a form of emotional learning.]

Han S., Northoff G. (2008). Culture-sensitive neural substrates of human cognition: a transcultural neuroimaging approach. *Nature Reviews Neuroscience* 9: 646-654. [Recent transcultural neuroimaging studies have demonstrated that one's cultural background can influence the neural activity that underlies both high- and low-level cognitive functions.]

Han S., Northoff G., Vogeley K. *et al.* (2013). A Cultural Neuroscience Approach to the Biosocial Nature of the Human Brain. *Annual Review of Psychology* 64(1): 335-359. [This review describes the origin, aims, and methods of Cultural Neuroscience (see glossary) as well as its conceptual framework and major findings.]

Hancock A. M., Witonsky D. B., Ehler E., Alkorta-Aranburu G., Beall C. Gebremedhin A., Sukernik R., Utermann G., Pritchard J., Coop G., Di Rienzo A. (2010). Human adaptations to diet, subsistence, and ecoregion are due to subtle shifts in allele frequency. *Proceedings of the National Academy of Sciences* 107(suppl. 2): 8924-8930. [This article discusses the genetic basis of human subsistence strategies to exploit an exceptionally broad range of ecoregions and dietary components.]

Hanushek E.A., Woessmann L. 2015. *The Knowledge Capital of Nations: Education and the Economics of Growth*. Cambridge, MA, MIT Press, 280 pp. [The authors contend that the cognitive skills of the population—which they term the "knowledge capital" of a nation—are essential to long-run prosperity.]

Hawks J., Wang E. T., Cochran G. M., Harpending H. C., Moyzis R. K. (2007). Recent acceleration of human adaptive evolution. *Proceedings of the National Academy of Sciences* 104(52): 20753-20758. [This article discusses the extraordinarily rapid recent genetic evolution of our species.]

Heard E., Martienssen R.A. 2014. Transgenerational Epigenetic Inheritance: Myths and Mechanisms. *Cell* 157(1): 95-109. [This article discusses the issue of the inheritance of epigenetic characters.]

Hehemann J.-H., Correc G., Barbeyron T., Helbert W., Czjzek M., Michel G. (2010). Transfer of carbohydrate-active enzymes from marine bacteria to Japanese gut microbiota. *Nature* 464: 908-912. [This article shows how the diversity in gut microbiota evolved by acquiring new genes from microbes living outside the gut.]

Heijmans B.T., Tobi E.W., Stein A.D., Putter H., Blauw G.J., Susser E.S., Slagboom P.E., Lumey L.H. (2008). Persistent epigenetic differences associated with prenatal exposure to famine in humans. *Proceedings of the National Academy of Sciences* 105(44): 17046-17049. [This article shows that individuals who had prenatal exposure to famine during the Dutch Hunger Winter in 1944–45 had, 6 decades later, less DNA methylation (see glossary) of the imprinted IGF2 gene compared with their unexposed, same-sex siblings.]

Henrich J. 2004. Demography and Cultural Evolution: How Adaptive Cultural Processes Can Produce Maladaptive Losses-The Tasmanian Case. *American Antiquity* 69(2): 197-214. **[**This article discusses the general question of how human cognition and social interaction can generate both adaptive cultural evolution and maladaptive losses of culturally acquired skills.]

Henrich J. 2016. *The Secret of Our Success: How Culture Is Driving Human Evolution, Domesticating Our Species, and Making Us Smarter*. Princeton, Princeton University Press, 445 pp. [This book explains why culture is essential for understanding human evolution.]

Henrich J., Heine S. J., Norenzayan A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences* 1-75 doi:10.1017/S0140525X0999152X. [This review of the comparative database from across the behavioral sciences suggests both that there is substantial variability in experimental results across populations and that WEIRD (Western, Educated, Industrialized, Rich, and Democratic) subjects are particularly unusual compared with the rest of the species.]

Henrich J., Henrich N. (2007). *Why Humans Cooperate: A Cultural and Evolutionary Explanation*. Oxford-New York, Oxford University Press, 272 pp. [This book discusses cooperation among humans, one of the keys to our great evolutionary success.]

Herdener M., Esposito F., di Salle F. *et al*. (2010). Musical Training Induces Functional Plasticity in Human Hippocampus. *The Journal of Neuroscience* 30(4): 1377-1384. [This article provides direct evidence for functional changes of the adult hippocampus in humans related to musical training.]

Herrmann E., Call J., Hernàndez-Lloreda M. V., Hare B., Tomasello M. (2007). Humans Have Evolved Specialized Skills of Social Cognition: The Cultural Intelligence Hypothesis. *Science* 317: 1360-1366. [This article shows that the children and chimpanzees had very similar cognitive skills for dealing with the physical world but that the children had more sophisticated cognitive skills than either of the ape species for dealing with the social world.]

Heyes C. (2012). Grist and mills: on the cultural origins of cultural learning. *Philosophical Transactions of the Royal Society B: Biological Sciences* 367: 2181-2191. [This article shows that through social interaction in the course of development, we not only acquire facts about the world and how to deal with it (grist), we also build the cognitive processes that make 'fact inheritance' possible (mills).]

Heyes C. M., Frith C. D. 2014. The cultural evolution of mind reading. *Science* 344: 1357. [This article suggests that infants are equipped with neurocognitive mechanisms that yield accurate expectations about behavior ("implicit" mind reading), whereas "explicit" mind reading, like literacy, is a culturally inherited skill, passed from one generation to the next by verbal instruction.]

Hohmann G., Fruth B. (2003). Culture in Bonobos? Between-species and within-species variation in behavior. *Current Anthropology* 44(4): 563-571. [This article discusses the use of the term "culture" in non-humans primates.]

Holden C., Mace R. (1997). Phylogenetic analysis of the evolution of lactose digestion in adults. *Human Biology* 69(5): 605-628. [This article supports the hypothesis that high adult lactose digestion capacity is an adaptation to dairying but does not support the hypotheses that lactose digestion capacity is additionally selected for either at high latitudes or in highly arid environments.]

Hostinar C. E., Stellern S. A., Schaefer C., Carlson S. M., Gunnar M. R. 2012. Associations between early life adversity and executive function in children adopted internationally from orphanages. *Proceedings of the National Academy of Sciences* 109 (Sup. 2):17208-17212. [This article provides evidence that early life adversity is associated with significant reductions in executive function performance.]

Huerta-Sánchez E., DeGiorgio M., Pagani L. *et al.* (2013). Genetic Signatures Reveal High-Altitude Adaptation in a Set of Ethiopian Populations. *Molecular Biology and Evolution* 30(8): 1877-1888. [This article supports the view that Ethiopian, Andean, and Tibetan populations living at high altitude have adapted to hypoxia differently, with convergent evolution affecting different genes from the same pathway.]

Huerta-Sanchez E., Jin X., Asan *et al.* 2014. Altitude adaptation in Tibetans caused by introgression of Denisovan-like DNA. *Nature* 512: 194-197. [This article illustrates that admixture with other hominin species has provided genetic variation that helped humans to adapt to new environments.]

Huffman M.A. (1984). Stone play of Macaca fuscata in Arashuyama B troop: transmission of a non-adaptative behavior. *Journal of Human Evolution* 13: 725-735. [This article shows how a non-adaptive behavior initially diffused among younger individuals was then later transmitted in form of tradition from these individuals to their offspring or younger sibs and playmates.]

Hünemeier T., Gómez-Valdés J., Ballesteros-Romero M. *et al.* (2012). Cultural diversification promotes rapid phenotypic evolution in Xavánte Indians. *Proceedings of the National Academy of Sciences* 109(1): 73-77. [This article demonstrates how human groups deriving from a recent common ancestor can experience variable paces of phenotypic divergence, probably as a response to different cultural or social determinants.]

Hutchins E. (1995). *Cognition in the wild*. Cambridge, MA, MIT Press, 408 pp. [An account of how anthropological methods can be combined with cognitive theory to produce a new reading of cognitive science.]

Hyde K. L., Lerch J., Norton A**.** *et al.* **(**2009). Musical Training Shapes Structural Brain Development. *The Journal of Neuroscience* 29(10): 3019-3025. [These findings shed light on brain plasticity and suggest that structural brain differences in adult experts (whether musicians or experts in other areas) are likely due to training-induced brain plasticity.]

Ilg R., Wohlschläger A. M., Gaser C. *et al.* (2008). Gray Matter Increase Induced by Practice Correlates with Task-Specific Activation: A Combined Functional and Morphometric Magnetic Resonance Imaging

Study**.** *The Journal of Neuroscience* 28: 4210-4215. [This article confirms that short-term gray matter signal increase corresponds to task-specific processing.]

Jacquet P. O., Baumard N., Chevallier C. 2016. Does culture get embrained? *Proceedings of the National Academy of Sciences* 113(21): E2873. [This article discusses Mu *et al.*'s article (2015): see reference below).]

Johnson M., Dziurawiec S., Ellis H., Morton J. (1991). Newborns' preferential tracking of face-like stimuli and its subsequent decline. *Cognition* 4: 1-19. [This article confirms that newborn infants will follow a slowly moving schematic face stimulus with their head and eyes further than they will follow scrambled faces or blank stimuli.]

Jones N. (2011). Human influence comes of age. *Nature* 473: 133. [This article discusses the humanity's profound impact on this planet (see "Anthropocene" in the glossary).]

Juonala M., Pulkki-Råback L., Elovainio M. *et al.* 2016. Childhood psychosocial factors and coronary artery calcification in adulthood: The cardiovascular risk in young finns study. *JAMA Pediatrics* 170(5): 466-472. [In this article, the authors observe an independent association between childhood psychosocial well-being and reduced coronary artery calcification in adulthood.]

Kanai R., Bahrami B., Roylance R., Rees G. 2012. Online social network size is reflected in human brain structure. *Proceedings of the Royal Society B: Biological Sciences* 279(1732): 1327-1334. [This article demonstrates that the size of an individual's online social network is closely linked to focal brain structure implicated in social cognition.]

Kang D.-H., Jo H. J., Jung W. H. *et al.* (2013). The effect of meditation on brain structure: cortical thickness mapping and diffusion tensor imaging. *Social Cognitive and Affective Neuroscience* 8(1): 27-33. [This article suggests that long-term meditation induces structural differences in both gray and white matter.]

Katz S. H., Schall J. (1979). Fava Bean Consumption and Biocultural Evolution. *Medical Anthropology* 3(4): 459-476. [This biocultural evolutionary approach to dietary behavior provides a basis for examination of fava bean consumption in the circum-Mediterranean region.]

Kaufman J., Yang B.Z., Douglas-Palumberi H., Grasso D., Lipschitz D., Houshyar S., Krystal J. H., Gelernter J. (2006). Brain-derived neurotrophic factor- 5-HTTLPR gene interactions and environmental modifiers of depression in children. *Biological Psychiatry* 59: 673-680. [This is the first investigation to demonstrate a gene-by-gene interaction conveying vulnerability to depression. The article also shows a protective effect of social supports in ameliorating genetic and environmental risk for psychopathology.]

Kay P., Regier T. (2003). Resolving the Question of Color Naming Universals. *Proceedings of the National Academy of Sciences* 100(15): 9085-9089. [This article shows that strong universal tendencies in color naming exist across both sorts of language.]

Keverne E. B., Pfaff D. W., Tabansky I. 2015. Epigenetic changes in the developing brain: Effects on behavior. *Proceedings of the National Academy of Sciences* 112(22): 6789-6795. [This article discusses the topic of epigenetic chemistry and behavioral neuroscience.]

Kidd D. C., Castano E. (2013). Reading Literary Fiction Improves Theory of Mind. *Science*. 342: 377-380. [This article suggests that Theory of Mind (see glossary) may be influenced by engagement with works of art.]

Kim-Cohen J., Gold A.L. (2009). Measured Gene-Environment Interactions and Mechanisms Promoting Resilient Development. *Current Directions in Psychological Science* 18(3): 138-142. [This article summarizes advances toward greater specification of "gene–environment interactions" mechanisms, including genetic and environmental moderation of "gene–environment interactions" effects and imaging genomics that provide clues regarding resilience processes in development.]

Kimberly N. G., Houston S. M., Brito N. H. *et al.* (2015). Family income, parental education and brain structure in children and adolescents. *Nature Neuroscience* 18: 773-778. [This article shows that poverty may affect the growth of children's brains.]

Kitayama S., Uskul A. (2011). Culture, mind, and the brain: Current evidence and future directions. *Annual Review* of *Psychology* 62: 419-449. [This article proposes a new model of neuro-culture interaction by hypothesizing that the brain serves as a crucial site that accumulates effects of cultural experience, insofar as neural connectivity is likely modified through sustained engagement in cultural practices.]

Kolb B., Mychasiuk R., Muhammad A. *et al.* (2012). Experience and the developing prefrontal cortex. *Proceedings of the National Academy of Sciences* 109(S2): 17186-17193. [This article shows how early experiences influence prefrontal development and behavior.]

Kovács A. M., Mehler J. (2009a). Cognitive gains in 7-month-old bilingual infants. *Proceedings of the National Academy of Sciences* 106(16): 6556-6560. [This article shows that processing representations from 2 languages leads to a domain-general enhancement of the cognitive control system well before the onset of speech.]

Kovács A. M., Mehler J. (2009b). Flexible Learning of Multiple Speech Structures in Bilingual Infants. *Science* 325: 611-612. [This article shows show that preverbal 12-month-old bilingual infants have become more flexible at learning speech structures than monolinguals.]

Kraus N., Slater J., Thompson E. C. 2014. Music Enrichment Programs Improve the Neural Encoding of Speech in At-Risk Children. *The Journal of Neuroscience* 34(36): 11913-11918. [This article shows that music training aids speech processing.].

Kroeber A.L., Kluckhohn C. (1952). Culture: A critical review of concepts and definitions. *Papers of the Peabody Museum of American Archeology and Ethnology* 47(1), VIII + 223 pp. Cambridge, MA, Harvard University Press. [This text is a critical review of definitions and a general discussion of culture theory.]

Kundakovic M., Gudsnuk K., Herbstman J.B., Tang D., Perera F.P., Champagne F.A. (2015!. DNA methylation of BDNF as a biomarker of early-life adversity. *Proceedings of the National Academy of Sciences* 112(22): 6807-6813. [This article discusses the behavioral vulnerability induced by early-life environmental exposure.]

Kurvers R. H. J. M., Wolf M., Naguib M., Krause J. 2015. Self-organized flexible leadership promotes collective intelligence in human groups. *Royal Society Open Science* 2(12) doi 10.1098/rsos.150222. [This article shows show that groups can self-organize according to the information accuracy of their members, thereby promoting collective intelligence.]

Laland K. N., Odling-Smee J., Myles S. (2010). How culture shaped the human genome: bringing genetics and the human sciences together. *Nature Reviews Genetics* 11: 137-148. [This article collates data highlighting the considerable potential for cross-disciplinary exchange to provide novel insights into how culture has shaped the human genome.]

Laland K. N., Reader S. M. 1999. Foraging innovation in the guppy. *Animal Behaviour* 57(2): 331-340. [This article shows differences in foraging innovation in guppies.]

Langergraber K. E., Boesch C., Inoue E., Inoue-Murayama M., Mitani J. C., Nishida T., Pusey A., Reynolds V., Schubert G., Wrangham R. W., Wroblewski E., Vigilant L. (2010). Genetic and 'cultural' similarity in wild chimpanzees. *Proceedings of the Royal Society B* published online 18 August 2010 doi: 10.1098/rspb.2010.1112. [This article indicates that genetic dissimilarity cannot be eliminated as playing a major role in generating group differences in chimpanzee behavior.]

Lansing J. S., Cox M.P., Downey S.S., Gabler B.M., Hallmark B., Karafet T.M., Norquest P., Schoenfelder J.W., Sudoyo H., Watkins J.C., Hammer M.F. (2007). Coevolution of languages and genes on the island of Sumba, eastern Indonesia. *Proceedings of the National Academy of Sciences* 104(41): 16022-16026. [This article proposes a model to explain linguistic and demographic coevolution at fine spatial and temporal scales.]

Lawson D. W., James S., Ngadaya E., Ngowi B., Mfinanga S. G. M., Borgerhoff M. M. 2015. No evidence that polygynous marriage is a harmful cultural practice in northern Tanzania. *Proceedings of the National Academy of Sciences* 112(45): 13827-13832. [This article highlights the need for improved, culturally sensitive measurement tools and appropriate scales of analysis in studies of polygyny and other purportedly harmful practices.]

Lederbogen F., Kirsch P., Haddad L. *et al.* 2011. City living and urban upbringing affect neural social stress processing in humans. *Nature* 474: 498-501. [This article shows that urban upbringing and city living have dissociable impacts on social evaluative stress processing in humans.]

Lende D. H., Downey G. (eds). (2012). *The Encultured Brain. An Introduction to Neuroanthropology*. Cambridge MA, MIT Press, 448 pp. [This book provides a foundational text for neuroanthropology, offering basic concepts and case studies at the intersection of brain and culture.]

Lévi-Strauss C. (1973). *Anthropologie structurale deux*. Paris, Plon, 450 pp. [This book introduces readers to the methods of structural anthropology while affording a glimpse into the mind of one of the foremost anthropologists of our time.]

Lindenberger U. 2014. Human cognitive aging: Corriger la fortune? *Science* 346: 572-578. [This article suggests that leading an intellectually challenging, physically active, and socially engaged life may mitigate losses and consolidate gains.]

Livingstone F.B. (1958). Anthropological Implications of Sickle Cell Gene Distribution in West Africa. *American Anthropologist* 60: 533-562. [The purpose of this article is to show how the distribution of the sickle cell gene in West Africa is the result of the interaction of two factors, selection and gene flow.]

Livneh Y., Feinstein N., Klein M., Mizrahi A. (2009). Sensory Input Enhances Synaptogenesis of Adult-Born Neurons. *The Journal of Neuroscience* 29(1): 86-97. [This article provides evidence for an activity-based mechanism that enhances synaptogenesis of adult-born periglomerular neurons during their initial phases of development.]

Lledo P.M., Alonso M., Grubb M.S. (2006). Adult neurogenesis and functional plasticity in neuronal circuits. *Nature Reviews | Neuroscience* 7: 179-193. [This article discusses the plastic mechanism by which the brain’s performance can be optimized for a given environment.]

Luby J., Belden A., Botteron K. *et al.* 2013. The effects of poverty on childhood brain development: The mediating effect of caregiving and stressful life events. *JAMA Pediatrics* doi: 10.1001/jamapediatrics.2013.3139. [This article shows that exposure to poverty in early childhood materially impacts brain development at school age.]

Luby J. L., Belden A., Harms M. P., Tillman R., Barch D. M. 2016. Preschool is a sensitive period for the influence of maternal support on the trajectory of hippocampal development. *Proceedings of the National Academy of Sciences* 113(20): 5742-5747. [This article suggests that enhancing early childhood maternal support fosters healthy childhood brain development and emotion functioning.]

Lupyan G., Ward E. J. (2013). Language can boost otherwise unseen objects into visual awareness. *Proceedings of the National Academy of Sciences* 110(35): 14196-14201. [This article suggests that facilitated detection of invisible objects due to language occurs at a perceptual rather than semantic locus.]

Lutgendorf S.K., Degeest K., Sung C.Y., Arevalo J.M., Penedo F., Lucci J.III, *et al.* (2009). Depression, social support, and beta-adrenergic transcription control in human ovarian cancer. *Brain, Behavior, and Immunity* 23: 176-183. [This article shows that genome-wide transcriptional profiles are significantly altered in tumors from patients with high behavioral risk profiles, and it identifies beta-adrenergic signal transduction as a likely mediator of those effects.]

Maguire E. A., Gadian D. G., Johnsrude I. S. *et al.* (2000). Navigation-related structural change in the hippocampi of taxi drivers. *Proceedings of the National Academy of Sciences* 97(8): 4398-4403. [This article shows that the posterior hippocampus stores a spatial representation of the environment and can expand regionally to accommodate elaboration of this representation in people with a high dependence on navigational skills.]

Majid A., Bowerman M., Kita S., Haun D.B.M., Levinson S.C. (2004). Can language restructure cognition? The case for space. *Trends in Cognitive Sciences* 8(3): 108-114. [This article argues that language can play a significant role in structuring, or restructuring, a domain as fundamental as spatial cognition.]

Majid A., Burenhult N. (2014). Odors are expressible in language, as long as you speak the right language. *Cognition* 130(2): 266-270. [This article shows that the long-held assumption that people are bad at naming smells is not universally true.]

Mampe B., Friederici A. D., Christophe A., Wermke K. 2009. Newborns' Cry Melody Is Shaped by Their Native Language. *Current Biology* 19(23): 1994-1997. [This article shows an influence of the surrounding speech prosody on newborns’ cry melody.]

Mani A., Mullainathan S. *et al*. (2013). Poverty Impedes Cognitive Function. *Science* 341: 976-980. [This article shows that poverty reduces cognitive capacity, and it suggests that this is because poverty-related concerns consume mental resources, leaving less for other tasks.]

Manly J.J., Byrd D., Touradji P., Sanchez D., Stern Y. (2004). Literacy and cognitive change among ethnically diverse elders. *International Journal of Psychology* 39(1): 47-60. [This article suggests that literacy has a profound effect on neuropsychological measures across verbal and nonverbal domains, and that this effect is independent of other demographic and experiential factors such as age, years of education, sex, ethnicity, and language use.]

Mathieson I., Lazaridis I., Rohland N. *et al.* 2015. Genome-wide patterns of selection in 230 ancient Eurasians. *Nature* 528: 499-503. [Among Europe's first farmers, this article detects selection at loci associated with diet, pigmentation and immunity, and two independent episodes of selection on height.]

Mathew S., Perreault C. 2015. Behavioural variation in 172 small-scale societies indicates that social learning is the main mode of human adaptation. *Proceedings of the Royal Society of London B: Biological Sciences* 282(1810): 10.1098/rspb.2015.0061. [The authors measure the relative contribution of environment and cultural history in explaining the behavioral variation of 172 Native American tribes at the time of European contact. They find that the effect of cultural history is typically larger than that of environment.]

McGowan P. O., Sasaki A., D'Alessio A.C., Dymov S., Labonté B., Szyf M., Turecki G., Meaney M.J. (2009). Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse. *Nature Neuroscience* 12(3): 342-348. [This article translates previous results from rat to humans and suggests a common effect of parental care on the epigenetic regulation of hippocampal glucocorticoid receptor expression.]

McGrew W. C., Marchant L.F., Scott S.E., Tutin C.E.G. (2001). Intergroup Differences in a Social Custom of Wild Chimpanzees: The Grooming Hang-Clasp of the Mahale Mountains. *Current Anthropology* 42(1): 148-153. [This article reports the first case of a difference in social custom between neighboring groups of chimpanzees.]

McGrew W.C. (1998). Culture in Nonhuman Primates? *Annual Review of Anthropology* 27: 301-328. [This article discusses the topic of cultural primatology.]

McGrew W.C. (2010). Chimpanzee Technology. *Science* 328: 579-580. [This article argues that chimpanzees are the only nonhuman animal species known to make and use a wide range of complex tools.]

McLaughlin K. A., Sheridan M. A., Tibu F. *et al.* (2015). Causal effects of the early caregiving environment on development of stress response systems in children. *Proceedings of the National Academy of Sciences* 112(18): 5637-5642. [This article provides evidence for a causal link between the early caregiving environment and stress response system McLaughlin reactivity in humans with effects that differ markedly from those observed in rodent models.]

McNamara T. P., Shelton A.L. (2003). Cognitive maps and the hippocampus. *Trends in Cognitive Sciences* 7(8): 333-335. [This article discusses the neural basis of route following and wayfinding in humans.]

Mechelli A., Crinion J. T., Noppeney U. *et al.* (2004). Neurolinguistics: Structural plasticity in the bilingual brain. *Nature* 431: 757. [This article confirms that the human brain changes structurally in response to environmental demands.]

Mercader J., Barton H., Gillespie J., Harris J., Kuhn S., Tyler R., Boesch C. (2007). 4,300-Year-old chimpanzee sites and the origins of percussive stone technology. *Proceedings of the National Academy of Sciences* 104(9): 3043-3048. [This article suggests that percussive material culture could have been inherited from a common human–chimpanzee clade, rather than invented by hominins, or have arisen by imitation, or resulted from independent technological convergence.]

Mitchell C., Hobcraft J., McLanahan S. S. 2014. Social disadvantage, genetic sensitivity, and children's telomere length. *Proceedings of the National Academy of Sciences* 111(16): 5944-5949. [This article documents a gene–social environment interaction for telomere length, a biomarker of stress exposure.]

Miller G. (2010). The Seductive Allure of Behavioral Epigenetics. *Science* 329: 24-27. [This article presents the field of Behavioral Epigenetics (see glossary).]

Miller G. E., Chen E., Fok A. K., Walker H., Lim A., Nicholls E. F., Cole S., Kobor M.S. (2009). Low early-life social class leaves a biological residue manifested by decreased glucocorticoid and increased proinflammatory signaling *Proceedings of the National Academy of Sciences* 106(34): 14716-14721. [This article suggests that low early-life socioeconomic status programs a defensive phenotype characterized by resistance to glucocorticoid signaling, which in turn facilitates exaggerated adrenocortical and inflammatory responses.]

Milner G. 2016. *Pinpoint: How GPS is Changing Technology, Culture, and Our* Minds. W. W. New York – London, Norton & Company, 336 pp. **[**This book examines the different ways humans have understood physical space, delves into the neuroscience of cognitive maps, and questions GPS's effect on our culture and on human cognition.]

Morgan B. J., Abwe E.E. (2006). Chimpanzees use stone hammers in Cameroon. *Current Biology* 16(16): R632-R633. [This article reports the first observations of nut-cracking for *Pan troglodytes vellerosus*, a subspecies apparently restricted to western Cameroon and eastern and southern Nigeria.]

Mu Y., Kitayama S., Han S., Gelfand M. J. 2015. How culture gets embrained: Cultural differences in event-related potentials of social norm violations. *Proceedings of the National Academy of Sciences* 112(50): 15348-15353. [This article provides the evidence for the neurobiological foundations of social norm violation detection and its variation across cultures.]

Muggleton N. G., Banissy M. J. (2014). Culture and Cognition. *Cognitive Neuroscience* 5(1): 1-2. [This issue presents empirical papers investigating diverse categories of potential culturally related effects as well as a review article, all of which provide timely updates of the current state of knowledge in the area of Cognition and Culture.]

Mullen M. K., Yi S. (1995). The cultural context of talk about the past: Implications for the development of autobiographical memory. *Cognitive Development*, 10 (3): 407-419. [This article supports the theory that early linguistic experience may be related to the development of autobiographical memory.]

Muthukrishna M, Shulman B. W., Vasilescu V., Henrich J. (2014). Sociality influences cultural complexity. *Proceedings of the Royal Society B* 281: 20132511. [This article supports theoretical predictions linking sociality to cumulative cultural evolution.]

Muthukrishna M, Henrich J. 2016. Innovation in the collective brain. *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 371(1690): doi 10.1098/rstb.2015.0192. [In this article, the authors argue that rates of innovation are heavily influenced by (i) sociality, (ii) transmission fidelity, and (iii) cultural variance.]

Nemeroff C. B. (2004). Neurobiological consequences of childhood trauma. *Journal of Clinical Psychiatry* 65 [Suppl 1]: 18-28. [A review of the preclinical and clinical studies evaluating the consequences of early-life stress.]

Nestler E.J. 2016. Transgenerational Epigenetic Contributions to Stress Responses: Fact or Fiction? *PLoS Biology* 14(3): e1002426. [This article provides an overview of the multiple meanings of the term epigenetic, and discusses the challenges of studying epigenetic contributions to stress susceptibility.]

Nettle D. (2009). Beyond nature versus culture: cultural variation as an evolved characteristic. *Journal of the Royal Anthropological Institute* 15: 223-240. [This article suggests a high degree of mutual compatibility and potential gains from trade between the social and biological sciences.]

Neville H. J., Stevens C., Pakulak E. *et al.* 2013. Family-based training program improves brain function, cognition, and behavior in lower socioeconomic status preschoolers. *Proceedings of the National Academy of Sciences* 110(29): 12138-12143. [This article suggests that a training program in attention for 3- to 5-year-olds and their families could help boost brain activity and narrow the academic achievement gap between low- and high-income students.]

Nisbett R.E., Peng K., Choi I., Norenzayan A. (2001). Culture and systems of thought: holistic versus analytic cognition. *Psychological Review* 108: 291-310. [This article proposes a theory of how systems of thought arise on the basis of differing cultural practices and argues that the theory accounts for substantial differences in East Asian and Western thought processes.]

Noad M. J., Cato D.H., Bryden M.M., Jenner M.N., Jenner K.C.S. (2000). Cultural revolution in whale songs. *Nature* 408: 537. [This article shows that humpbacks have picked up a catchy tune sung by immigrants from a distant ocean.]

Nowak M. A., with Highfield R. (2011). *SuperCooperators: Altruism, Evolution, and Why We Need Each Other to Succeed.* New York, Free Press, 354 pp. [This book explains why cooperation, not competition, has always been the key to the evolution of complexity.]

Oatley K. 2016. Fiction: Simulation of Social Worlds. *Trends in Cognitive Sciences* 20(8): 618-628. [This article shows that people who read fiction improve their understanding of others.]

O'Brien M. J., Laland K. N. (2012). Genes, Culture, and Agriculture: An Example of Human Niche Construction. *Current Anthropology* 53(4): 434-470. [This article discusses niche construction theory and gene-culture coevolutionary theory (see glossary for these two terms).]

Oberlander T. F., Weinberg J., Papsdorf M., Grunau R., Misri S., Devlin A. M. (2008). Prenatal exposure to maternal depression, neonatal methylation of human glucocorticoid receptor gene (NR3C1) and infant cortisol stress responses. *Epigenetics* 3(2):97-106 doi: 10.4161/epi.3.2.6034. [This article shows that methylation (see glossary) status of the human NR3C1 gene in newborns is sensitive to prenatal maternal mood and may offer a potential epigenetic process (see "Epigenome" in the glossary) that links antenatal maternal mood and altered hypothalamicpituitary-adrenal stress reactivity during infancy.]

Olmstead M. C., Kuhlmei V. A. (2015). *Comparative Cognition.* Cambridge, Cambridge University Press. [Integrating developments from psychology, ethology and neuroscience, this book is an undergraduate introduction to cognitive processes across species.]

Oota H., Settheetham-Ishida W., Tiwawech D., Ishida T., Stoneking M. (2001). Human mtDNA and Y-chromosome variation is correlated with matrilocal versus patrilocal résidence. *Nature Genetics* 29(1): 20-21. [This article shows that genetic diversity in matrilocal and patrilocal groups (see glossary) has a striking correlation with residence pattern, supporting the role of sex-specific migration in influencing human genetic variation.]

Ophir E., Nass C. *et al.*(2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences* 106(37): 15583-15587. [This article shows that heavy media multitaskers are more susceptible to interference from irrelevant environmental stimuli and from irrelevant representations in memory.]

Özgen E., Davies I. R. L. (2002). Acquisition of categorical color perception: A perceptual Learning approach to the linguistic relativity hypothesis. *Journal of Experimental Psychology: General* 131: 477–493. [This article shows that language may shape color perception and suggests a plausible mechanism for the linguistic relativity hypothesis (see "Whorfian perspective" in the glossary).]

Pagel M. (2012). *Wired for Culture. Origins of the Human Social Mind*. New York, W.W. Norton and Company, 432 pp. [This book shows how an innate propensity to contribute and conform to the culture of our birth not only enabled human survival and progress in the past but also continues to influence our behavior today.]

Pagel M., Mace R. (2004). The cultural wealth of nations. *Nature* 428: 275-278. [This article discusses the following question: why, when the human race shows comparatively little genetic variation, are cultural differences so widespread and enduring?]

Park D.C., Reuter-Lorenz P. (2009). The Adaptive Brain: Aging and Neurocognitive Scaffolding. *Annual Review of Psychology* 60: 173-96. [This article provides an integrative view of the aging mind, suggesting that pervasive increased frontal activation with age is a marker of an adaptive brain that engages in compensatory scaffolding in response to the challenges posed by declining neural structures and function.]

Partanen E., Kujala T., Näätänen R., Liitola A., Sambeth A., Huotilainen M. 2013. Learning-induced neural plasticity of speech processing before birth. *Proceedings of the National Academy of Sciences* 110(37): 15145-15150. [This article shows that prenatal experiences have a remarkable influence on the brain's auditory discrimination accuracy, which may support, for example, language acquisition during infancy.]

Perry G. H., Dominy N.J., Claw K.G., Lee A.S., Fiegler H., Redon R., Werner J., Villanea F.A., Mountain J.L., Misra R., Carter N.P., Lee C., Stone A.C. (2007). Diet and the evolution of human amylase gene copy number variation. *Nature Genetics* 39(10): 1256-1260. [An example of positive selection on a copy number–variable geni, one of the first discovered in the human genome.]

Petanjek Z., Judas M., Simic G. *et al.* (2011). Extraordinary neoteny of synaptic spines in the human prefrontal cortex. *Proceedings of the National Academy of Sciences* 108(32): 13281-13286. [This article shows an extraordinarily long phase of developmental reorganization of cortical neuronal circuitry, which has implications for understanding the effect of environmental impact on the development of human cognitive and emotional capacities as well as the late onset of human-specific neuropsychiatric disorders.]

Petersson K. M., Silva C., Alexandre Castro-Caldas A., Ingvar M., Reis A. (2007). Literacy: A cultural influence on functional left-right differences in the inferior parietal cortex. *European Journal of Neuroscience* 26(3): 791-799. [This article provides evidence suggesting that a cultural factor, literacy, influences the functional hemispheric balance in reading and verbal working memory-related regions.]

Pica P., Lemer C., Izard V., Dehaene S. (2004). Exact and Approximate Arithmetic in an Amazonian Indigene Group. *Science* 306: 499-503. [This article discusses the following questions: is calculation possible without language? Or is the human ability for arithmetic dependent on the language faculty?]

Plailly J., Delon-Martin C., Royet J.P. (2012). Experience induces functional reorganization in brain regions involved in odor imagery in perfumers. *Human Brain Mapping* 33(1): 224-234. [This article shows that the perfumers' expertise is associated with a functional reorganization of key olfactory and memory brain regions, explaining their extraordinary ability to imagine odors and create fragrances.]

Ponce de León M.S., Golovanova L., Doronichev V. *et al.* (2008). Neanderthal brain size at birth provides insights into the evolution of human life history. *Proceedings of the National Academy of Sciences* 105(37): 13764-13768. [This article questions how the required extra amount of human brain growth is achieved and what its implications are for human life history and cognitive development.]

Pontzer H., Brown M. H., Raichlen D A. *et al.* 2016. Metabolic acceleration and the evolution of human brain size and life history. *Nature* 533 : 390-392. [This article shows that an increased metabolic rate, along with changes in energy allocation, was crucial in the evolution of human brain size and life history.]

Pratt G.A. 2015. Is a Cambrian Explosion Coming for Robotics? *Journal of Economic Perspectives* 29(3): 51-60. [This article analyzes the social effects of the explosion in the diversification and applicability of robotics.]

Premo L.S., Hublin J.J. (2009). Culture, population structure, and low genetic diversity in Pleistocene hominins. *Proceedings of the National Academy of Sciences* 106(1): 33-37. [This article discusses the effect of culturally mediated migration on neutral genetic diversity in structured populations.]

Quallo M.M., Price C.J., Ueno K., Asamizuya T., Cheng K., Lemon R.N., Iriki A. (2009). Gray and white matter changes associated with tool-use learning in macaque monkeys. *Proceedings of the National Academy of Sciences* 106(43): 18379-18384. [This article shows significant brain changes in individual trained monkeys exposed to tool-use training for the first time.]

Ramón y Cajal S. (1999). *Advice for a Young Investigator.* Cambridge, MA, London, MIT Press, 176 pp. [This book written by a mythic figure in science covers everything from valuable personality traits for an investigator to social factors conducive to scientific work.]

Rampon C., Tsien J.Z. (2000). Genetic analysis of learning behavior-induced structural plasticity. *Hippocampus* 10(5): 605-609. [This article discusses the experiments examining the relationship between structural plasticity and learning behaviors, using the environmental enrichment paradigm.]

Regier T., Kay P., Khetarpal N. (2007). Color Naming Reflects Optimal Partitions of Color Space. *Proceedings of the National Academy of Sciences* 104(4): 1436-1441. [This article argues that color naming across languages reflects optimal or near-optimal divisions of an irregularly shaped perceptual color space.]

Richerson P. J., Boyd R. (2005). *Not by Genes Alone: How Culture Transformed Human Evolution*. Chicago, Chicago U. Press, 342 pp. [This book offers a radical interpretation of human evolution, arguing that our ecological dominance and our singular social systems stem from a psychology uniquely adapted to create complex culture.]

Rieger M., Wagner N. 2016. Polygyny and child health revisited. *Proceedings of the National Academy of Sciences* 113(13): E1769-E1770. [This article discusses Lawson *et al.*'s article (2015, in this bibliography).]

Roberson D., Davidoff J., Davies I.R.L., Shapiro L.R. (2005). Color categories: Evidence for the cultural relativity hypothesis. *Cognitive Psychology* 50: 378-411. [This article provides further evidence of the tight relationship between language and cognition.]

Roth T. L., Lubin F. D., Funk A. J., Sweatt J. D. (2009). Lasting Epigenetic Influence of Early-Life Adversity on the *BDNF* Gene. *Biological Psychiatry* 65(9): 760-769. [This article highlights an epigenetic (see glossary) molecular mechanism potentially underlying lifelong and transgenerational perpetuation of changes in gene expression and behavior incited by early abuse and neglect.]

Rowe M. L., Goldin-Meadow S. (2009). Differences in Early Gesture Explain SES Disparities in Child Vocabulary Size at School Entry. *Science* 323: 951-953. [This article shows that differences in early gesture between children from low–socioeconomic status families and children from high–socioeconomic status families help to explain the disparities in vocabulary that children bring with them to school.]

Sapolsky R. M., Share L.J. (2004). A Pacific Culture among Wild Baboons: Its Emergence and Transmission. *PLOS Biology* 2(4): 534-541. [This article shows that a unique less-aggressive suite of behaviors that affects the overall structure and social atmosphere of a wild baboon troop potentially represents an intergenerational transfer of social culture.]

Sawyer K. (2008). *Group Genius: The Creative Power of Collaboration* New York, Basic Books, 288 pp. [This book tears down some of the most popular myths about creativity, revealing that creativity is always collaborative, even when we are alone.]

Schaller M., Norenzayan A., Heine S.J., Yamagishi T., Kameda T. (Eds). (2009). *Evolution, culture and the human mind*. New York, Psychology Press Taylor and Francis Group, 304 pp. [This book integrates evolutionary and cultural perspectives on human psychology.]

Schlaug G., Jäncke L., Huang Y., Staiger J.F. Steinmetz H. (1995). Increased corpus callosum size in musicians. *Neuropsychologia* 33: 1047-1055. [This article shows the effect of musical training before the age of 7 on the development of the corpus callosum.]

Segall M. H., Campbell D. T., Herskovits M. J. (1966). *The influence of culture on visual perception*. Indianapolis, Bobbs-Merrill Co, 268 pp. [This study in psychology and anthropology discusses the visual perception across the cultures.]

Ségurel L., Martínez-Cruz B., Quintana-Murci L., Balaresque P., Georges M., Hegay T., Aldashev A., Nasyrova F., Jobling M.A., Heyer E., Vitalis R. (2008). Sex-Specific Genetic Structure and Social Organization in Central Asia: Insights from a Multi-Locus Study. *PLoS Genetics* 4(9): e1000200. doi:10.1371/journal.pgen.1000200. [This article suggests that differences in sex-specific migration rates may not be the only cause of contrasting male and female differentiation in humans, and that differences in effective numbers do matter.]

Shafto M. A., Tyler L. K. (2014). Language in the aging brain: The network dynamics of cognitive decline and preservation. *Science* 346: 583-587. [This article reviews recent behavioral and neuroimaging evidence showing that language systems remain largely stable across the life span and that both younger and older adults depend on dynamic neural responses to linguistic demands.]

Shayer M., Ginsburg D. (2009). Thirty years on – a large anti-Flynn effect/ (II): 13- and 14-year-olds. Piagetian tests of formal operations norms 1976–2006/7. *British Journal of Educational Psychology* 79(3): 409-418. [This article discusses the Flynn effect (the increase in intelligence test scores measured in many parts of the world).]

Sheridan K. M., Konopasky A. W., Kirkwood S., Defeyter M. A. 2016. The effects of environment and ownership on children's innovation of tools and tool material selection. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*. 371(1690): doi 10.1098/rstb.2015.0191. [The authors argue that learning environments supporting tool exploration and invention and conveying ownership over materials may encourage successful tool innovation at earlier ages.]

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Zhao T. C., Kuhl P. K. 2016. Musical intervention enhances infants' neural processing of temporal structure in music and speech. *Proceedings of the National Academy of Sciences* 113(19): 5212-5217. [According to this research, individuals with music training in early childhood show enhanced processing of musical sounds, an effect that generalizes to speech processing.]

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Biographical Sketch

Joël Candau is Professor Exceptional class in the Department of Anthropology, and in the Laboratory of Cognitive and Social Anthropology and Psychology (LAPCOS, EA 7278), University of Nice Sophia Antipolis. He is member (elected) of the CNRS National Committee, Section 38; Member of the Scientific Council of the GDR 3713 - CNRS (https://gdro3.wordpress.com). After several years of research about various forms of shared memory (real or imaginary: collective memory, familial memory, etc.), his current research is focused on three topics: Sensorial and cognitive anthropology, Anthropology of cooperation, Naturalistic approaches in Social Sciences. J. Candau is currently Principal Investigator of the ANR COLOSTRUM (http://colostrum.hypotheses.org/). He is the author of over a hundred publications, including the following books: Candau J. 2013. *Antropologia da Memória*. Lisboa, Instituto Piaget; Candau J., Le Gonidec M.-B. (éds.). 2013. *"Paysages sensoriels". Essai d'anthropologie de la construction et de la perception de l'environnement sonore.* Paris, CTHS; Candau J., Barthélemy T. (eds). 2012. *Mémoire familiale, objets et économies affectives.* Paris, CTHS; Candau J. 2011. *Memória e Identidade*. São Paulo, Editora Contexto; Candau J. (ed.). 2009. *Temps en partage : ressources, représentations, processus*. Paris, CTHS; Candau J. 2005. *Anthropologie de la mémoire*. Paris, Armand Colin; Candau J. 2002. *La memoria e l'identità*. Napoli, *Iper*medium libri; Candau J. 2002. *Antropología de la memoria*. Buenos Aires, Ediciones Nueva Visión; Candau J. 2001. Антропология на паметта. Ed. Odri; Candau J. 2001. *Memoria e identidad*. Buenos Aires, Ediciones Del Sol; Candau J. 2000. *Mémoire et expériences olfactives. Anthropologie d'un savoir-faire sensoriel*. Paris, PUF; Candau J. 1998. *Mémoire et identité*. Paris, PUF; Candau J. 1996. *Anthropologie de la mémoire*. Paris, PUF.