

## Science Enriches Faith... In Our Ancestors

The Evolution of Childhood: Relationships, Emotion, Mind. Melvin Konner.  
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Reviewed by:

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This is a big book, in all senses. It's big in length and requires some big thinking. Big ideas do. It's also big in the sense of great: "The greatest enterprise of the mind has always been and always will be the attempted linkage of the sciences and humanities" (Wilson 1998:8). For Konner, the link is information: organisms are matter and energy that have been organized by information. The book is long because it takes time to explain what this information is, where it comes from, what it's about, and how it organizes everything from our molecules, cells, tissues, and organs, up to our relationships, emotions, and minds. Great too is Konner's art. His prose is not just clear but engaging. He develops his information-organization argument like a mystery, and everyone likes a good mystery. It also develops like a musical score, and everyone likes a pleasing arrangement of ideas as themes and variations, rhythms, transitions, and interludes. It is also deeply empathic: anyone who is interested in children, who works for them or with them, from parents to policy makers, will identify with Konner's humanism. To wit, his volume is book-ended with two sentiments: on page one, "Nothing in nature is more marvellous than children's emotion and behavior... not even the seasons are more beautiful or interesting," and on page 751, "our ancestors deeply loved and wisely cared for their children. If they had not, we would not be here... We are here because our ancestors were able to meet the challenge, and because they could, we can." Konner uses our only scientific theory of life to show how and why our ancestors met this challenge. This is valuable information for anyone who considers "improving the human condition to be the aim of scientific activity" (p. 4).

His arguments are inevitably complex and tightly interwoven, but he unweaves them beautifully. It helps especially that the five parts of the book – evolution, maturation, socialization, enculturation, and conclusion – follow in order of their evolutionary emergence, just as his conclusion emerges from their common denominator. His conclusion is that the complex adaptive systems theory concept of self-organization is inherent in each of these natural processes and is another source of phenotypic (including personality and cultural) variation. This is an important insight, but because it is more in the realm of abstract evolutionary theory than childhood, and my space is limited, I'll not have much to say about it. Nor, really, does Konner who is less immediately concerned with theory than practical wisdom: "intervention on behalf of children" (p. 749). Instead I'll focus on Konner's concept of the role of information in organising organisms (including the superorganism of culture).

To intervene wisely we have to know how nature and culture go together. The only way to do that is to take them apart, which Konner does with skill at unavoidable length. He explores the mid-range theory and exhaustive empirical evidence from evolutionary biology, primatology, history of anthropological theory, developmental psychology, psychoneuroendocrinology, and ethnography, that he uses to take culture and nature apart and which make his take-apart so authoritative. Keep in mind that within each of the five main informational processes described below, there are too many sub-processes to mention them all.

Konner's stance in the nature-culture debate is that of a "philosophically committed environmental determinist" (p. 4) – someone one who believes that "many critical aspects of social and emotional development are due to known and unknown environmental causes" (p. 4). In fact if you want to intervene on behalf of children you *have* to be a committed environmental determinist: the better we know these environmental causes, the better our chance of intervening wisely. Yet his final take-home message is "Genetic determinism died long ago, and now environmental determinism is dead too" (p. 749). This is not contradictory. For Konner, the nature-culture dichotomy is Levi-Straussian dual-think, just another folk belief, and all the harder to avoid for that. But still we must. If we care enough to intervene, it is not helpful to think of the child as "one inextricably interwoven developing system" (p. 631), as some do. The only *useful* (practical, therapeutic) question for Konner is how the information represented in DNA comes to be expressed in the context of individual life span development in any given social-cultural (informational) environment. A philosophically committed environmental determinist is one with the moral commitment to intervene. To do so without committing harm we must first know how environments in general affect the expression of the information represented in the DNA of organisms in general. Only then can we learn how best to determine that our descendants grow up in the best possible environments. Konner's book is an argument in five parts for the role of information in resolving the nature-culture dichotomy.

Part I is about "how the laws of evolution produced the shape of human social and emotional development" (p. 34); Konner shows that evolution has the logic of a process for collecting and organizing information. All organisms store information about their environments in their DNA. This is "intentional" information in that it "points at" or is "about" these environments. The DNA of birds for example includes ordered strings of nucleic acid that "point at" the laws of aerodynamics (order in nature) that determine the range of all possible wing shapes. Konner describes in principle and considerable detail how this information is converted into strings of nucleic acid. The principle is the well-known algorithm of adaptation by natural selection, the "GTR heuristic" (Plotkin 1994; Konner uses slightly different terminology). Adaptation by natural selection will occur whenever a process (e.g., mutation, recombination) generates (G) genetic variability among individuals of a population; their environment tests (T) or selects those better able to survive and reproduce; and then, by virtue of reproducing, their DNA is replicated (R) in the next generation. Over time the effect is that more and more individuals carry genes that are "suited to" and thereby correlated with their environment. This natural process creates an informational or semiotic link between gene and environment; natural selection generates the ubiquitous good fit between genes (sign) and environment (signified).

In Part II Konner's theme is the essence of "evo-devo," the surprisingly recent consensus that evolution and development are two sides of the same information-coin: you can't have one without the other. Selection acts on phenotypes not DNA, and phenotypes take time to develop. It is development that evolves, not individuals: "Adult phenotypes do not evolve, life cycles do; life *is* development" (p. 741). Growth and development are evolution's way of preparing multi-celled organisms for reproduction; they are adaptation for reproduction. All sexually reproducing organisms begin life as a zygote, a single cell, but that single cell can't reproduce. Life cycles are evolved processes for "reading" zygotic DNA (which points at ancestral environments), adding matter and energy for growth, all the while mixing with new information for development. Nervous systems work with information; they are "networks of excitable cells that stably change with use" (p. 741). Among other things, they control behavior by interweaving the old information in their DNA (about ancestral

environments) with newer information (about their environment of development), and then with brand-new information (about their immediate environment). They are “excited” by this information and once excited, one part of the system can excite another part, which in turn can excite a third part, and so on. For better and worse some early environmental excitements can be permanent. Humans in particular were selected for developmental plasticity, the capacity of our developing nervous systems to be reliably affected by certain kinds of information, especially the social kind.

In Part III, Konner describes “the contributions of social life to developing relationships and emotions” (p. 347). He shows how as social systems evolved, nervous systems co-evolved to be increasingly excited by information about social relations, most impressively in nonhuman primates and ourselves. Information about social relations is processed in the limbic system, the primitive mammalian “emotional brain.” For any organism (or complex adaptive system) to behave adaptively, it must have a “value principle” – some basis for evaluating information, if only to “decide” which is better – say, approach or avoid. Emotions are the subjective experience of the nervous system evaluating information about the environment in order to behave as wisely as possible; they make us want to do the wise thing (as best we know it through our individual mixes of old, newer, and newest information). Because good social relations are the *sine qua non* of primate and human life, we have been selected to reliably experience emotion in – to value – our relations with others. But the nature of all our social-emotional relations, especially as children, has already been determined by a universal aspect of everyone’s developmental niche, the social structure into which we are born, which itself has already been determined by our ancestors’ behavior-genetic predispositions, local ecology, history, and so forth.

Konner therefore emphasizes that information about the social environment is represented or stored not only in developing social-emotional nervous systems but also in social relationships themselves. The infant-mother relationship is the best example because it is always the first. The evolutionarily wise thing for infants to want to do is be close to mother; the actual work (behavior) of being close to mother is motivated by the emotions of attachment (attachment theory being an evolutionary-developmental theory of love throughout the life cycle). Natural selection endowed all infants with nervous systems “factory-wired” to be excited by the kinds of information that normally emanates from mothers. Human infants are innately attracted to face-like objects, in a sense drawing themselves into their first relationship. But the relationship itself is a product of the natural mammalian social environment. Because mothers are naturally part of the environment of infancy, selection found that it could rely on mothers to emanate the kinds of stimuli (information) that naturally make infants want to learn how to be social. Information about social relations is thus stored in a social relationship given by nature. The same goes in spades for social relationships given by culture, the topic of Konner’s penultimate section, culture and mind.

Psychological anthropologists will be familiar with most of the theory and research in Part IV “wherein we come to understand what culture changes” (p. 593) – all the better to appreciate Konner’s evolutionary/developmental perspective on culture as an information storage/retrieval system, with enculturation its transmission sub-system. Put very simply, culture is a process of individual minds (nervous systems) being reliably affected by information (about facts *and* values) in other people’s minds. He makes the case that this evolutionary novelty emerged as a function of our capacity for intersubjectivity (involving mirror neurons, theory of mind, internal working models), of which symbols – shared mental

images or schema – are the best example. Of particular interest is his updating of the Whiting model of psychocultural development in light of more recent work on schema theory (e.g., D’Andrade, LeVine, Strauss, Quinn, Worthman), on one hand, and the universals of human nervous system development on the other.

Konner ties everything together at the end. In Parts I (evolution) and II (development) we learned how human life emerged from non-life as information about environments came to be represented in biological material; in Part III (socialization) we learn how social life and social emotions emerged through development; and in Part IV (culture and mind) one learns how intersubjectivity emerged from social-emotional cognition. Part V is about “the ultimate epigenetic enterprise” (p. 731) and Konner’s important insight that self-organization is the common denominator of these four processes. Self-organization is the process whereby the whole becomes greater than the sum of its parts. A standard example is the ever-changing shape of a flock of birds emerging unpredictably from the complex interactions of individual birds. No individual or single interaction determines the shape; it organizes itself. Self-organization is the way that complex adaptive systems emerge from less complex systems or chaos, as in life – which *is* development – emerging from non-life, social life from development, and culture from social life. The difference between the self-organization of the shape of a flock of birds and the self-organization of culture is that evolution/development, socialization, and enculturation are each complex adaptive information storage and retrieval systems. Changes in the shape of the flock are random, whereas changes in the shape of culture through historical processes. It’s difficult or impossible to predict what any complex adaptive system will look like in the future, but not as hard to trace causation backwards. Evolution/development, socialization, and enculturation are all complex adaptive systems for processing, storing, and transmitting information; each follows or embodies the GTR heuristic. Each however is also open to self-organization of the bird-flock type – the emergence of chance variations in the pathways from DNA to culture and mind. This is why Konner concludes that GTR is not enough; the algorithm needs a new term. Let’s call it O, for the order that can arise spontaneously through self-organization from simpler or even chaotic systems. The new algorithm would then be GOTR, for G – generate; O – order through self-organization; T – test; and R – replicate.

Konner’s insight about the self-organization of information is important for both theory and practice. First, it is consistent with overarching mathematical models and the laws of physics. For example, self-organization creates self-similarity or the “fractal” patterns characteristic of complex systems. This might explain why the “tree of life” shows the same (self-similar) pattern of branching at every taxonomic level – and therefore might explain as well why macroevolutionary changes are not closely associated with major environmental changes (Bennett 2010). Self-organization can moderate the expression of old (DNA) information in the organism’s phenotype, reducing variability when selection pressure is constant, or increasing it when selection pressure is low, as it typically is when populations enter a new ecological niche. Humans have been naturally selected for unusual developmental sensitivity to information, such that not only have we expanded into an extraordinary number of environmental niches, but invented an entirely new one, culture. Second, it underscores what I consider Konner’s main contributions: the role of information in organizing organisms, emotions as information for organizing value, and the value of this information for intervention on the behalf of children.

I recommend this book to anyone interested in how we evolved the life cycles that enable so many of us, in so many material and cultural (informational) environments, to mature

into “deeply loving” and “wisely caring” parents. This should include all parents and everyone else with a scientific, therapeutic, or emotional interest in “relationships, emotion, and mind” – i.e., humanists, people who believe that reason and science have something to say about how humans should live. In explaining how our relationships, emotions, and minds evolved and develop, Konner gives reason for hope – an authoritative “bio-logic” for believing that because all of our direct ancestors managed to have descendants, we can too.

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