

SOCIAL STUDIES

Surges

A child is a finely enculturated, mostly moral, well-equipped being by the onset of adolescence. Then what?

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Melvin Konner

THE EVOLUTION OF CHILDHOOD

Relationships, emotion, mind

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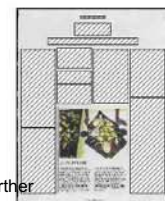
Bill Gates famously left Harvard because computers were more fun than classes. The founder of Facebook, Mark Zuckerberg, did much the same; his original Facemash was a socially marginalized college boy's prank. Napster, which made music downloadable, was co-founded by two high school chums during an idle summer. Silicon Valley emerged as the Mecca of these barely post-pubescent individuals, who have blithely revolutionized how their peers interact, how they share, how they befriend one another, how they self-advertise, how they use language. In a reversal of the conventional pattern of learning, adults perforce must follow, lest they be left behind like so many unevolved molluscs of a bygone era.

In some ways, though, the story is as old as the species. Adults consolidate power, and the young follow the rules for a time, and then they don't any more. For Melvin Konner, it is only natural that the young are trailblazers, and especially so in moments of change. At the very end of his book on the evolution of childhood, he whimsically imagines a more lyrical, primal scene: not children with computers, but their counterparts long ago gathering omega-rich clams and crabs as they played on the beaches of umpteen islands; "their idle wanderings", he muses, may well have "led the way", spurring our species to island-hop from the beaches of Africa all the way to Asia.

It is a conceit, of course, but the point is that children's play – and in particular its

more testosterone-driven adolescent variants – may well have led the way in the remote past of our species as it does now, drawing us into new ecological and indeed virtual niches, and making us what we have become. Since play is costly in terms of energy expenditure, and it is risky, it must have conferred survival and reproductive advantages. All mammals play, but none play anywhere near as intricately as humans, nor do any other animals have such complex emotional lives tied up with their playing, or such long childhoods in which to hone the art of play. And no other species continues to play into adulthood in the way that humans do, enabling us to suspend ourselves, as Clifford Geertz put it, "in webs of significance" that we ourselves have spun.

A professor of neurobiology and anthropology at Emory University, Konner has spent a lifetime studying the biological evolution of behaviour and its myriad cultural manifestations. This book – which has taken thirty years to complete – surveys human childhood from the vantage of several perspectives: from an evolutionary and cross-species perspective; from that of genes, hormones and brain development; and from social and cultural perspectives. Konner's aim is to understand how these interact in children's maturational march from birth to adulthood – or, as he might put it, to understand how children, carrying information encoded in a developmental "bio-gram" honed over hundreds of thousands of years, interact with their environments, are changed by and in



turn change those environments, readapt and re-tool themselves ad infinitum.

The book is breathtakingly ambitious, though, not surprisingly, its lengthy gestation has a downside as well as an upside. The upside is the scope and wealth of the material. The downside is that, because it is the product of years of accretion, its main lines of argument are sometimes obscured. Insights yielded by new studies (made possible, for instance, by new forms of brain imaging or by genomics) exist atop descriptions of older research in an ad hoc fashion. As a result, it can read as a patchwork compilation rather than a cohesive synthesis. Yet this book is undeniably a tour de force. Indeed, Konner is perhaps the only scholar who is as comfortable describing cultural change, or evolution in its broad quasi-philosophical outlines, as he is defining the complex biochemical and statistical correlates of behaviour.

One of his writerly charms is that he is ever seer and scientist. He marvels as he describes. He also renders the boundaries among disciplines porous. He scurries from one to another, insisting on their enmeshment, whether it be ethology, cognitive neuroscience, evolutionary or developmental psychology, endocrinology or cultural anthropology. He draws on all these fields to address the story of our inordinately long, and, compared to those of other species, "strangely-shaped" childhoods, and to discover how our childhood evolved to make us what we are.

If we start at the beginning, or nearly at the beginning, of the first stage, with birth, then one of the most striking evolutionarily significant features of human babies is their immaturity. According to normative ape development, they ought to be born at eleven months, or even later. But that would almost certainly break their mothers' hips, so nine months constitutes an evolutionary compromise – a stand-off between big brains and the narrow hips needed for bipedalism. The upshot is that foetal growth rates extend through the first year, and the first months are inordinately precarious. Some researchers speculate that the fact that babies are asocial during the first month makes it easier for the mother to postpone attachment; she is especially likely to do so if she has insufficient helpers, if her milieu values one sex over the other, or if the infant is sickly. Unlike ape mothers, who bond unconditionally, a young mother may, as the English nursery rhyme

puts it, deliberately let "the cradle . . . fall", in favour of later reproduction.

By three months, however, the situation has typically radically altered. Exquisitely honed by the evolutionary process, the baby's apparent helplessness is a front. Much like a sensory trap, or a bit like those carnivorous plants that expertly catch insects and glue them in place, the infant is increasingly in charge, or at least able expertly to manipulate the behaviour of its mother and of other potential care-givers via a kind of hormonal glue. Holding an infant has opiate-like effects. The infant is potent enough even to lower testosterone levels in some men. It could be said this stage marks the beginning of the dynamics of play: of a kind of reciprocity, a playful synchrony between adult and child. Konner makes much of the power of the human gaze, made possible apparently by the tripling in size of the whites of the eyes since our ape ancestors. We can deduce that those infants who, via a mixture of gaze, smiling and vocalization, are able coyly to engage the most helpers, are more likely to be better provisioned and to get their genes into the next generation.

While the infant is indiscriminate in its affections in the first half-year, this changes abruptly at some point in the second half, when it consolidates its attachments, further hones its play repertoire, and, thanks to growth in a part of the brain called the limbic circuitry, experiences "stranger anxiety" – that is, distinguishes between its personal entourage and the more fearful world "out there". Basically, during this period of rapid growth, new behaviours emerge as new circuitry comes online, albeit if, and only if, infants are raised in a social milieu. The point here is that infants need other minds to develop normally: if a child is deprived of social contact at this critical stage, it is quite likely that it will be unable to form emotional attachments later on. And, because emotional processing and cognition are so tightly bound up, the child may well have permanent cognitive deficits.

Radically earlier weaning than in the other Great Apes, increasing language proficiency, and of course more sophisticated forms of play are the next major events in the human child's maturational march. Konner thinks that all three are interconnected. Newly weaned children – typically aged two-and-a-half to three – were able to use language to get their provisioning needs satisfied. Language may not be as emotionally potent as

contact, or as binding as the gaze and smile, but the toddler's lilting lisp helped in cajoling a wider world. Language also must have been crucial in expanding children's play repertoire by way of, for instance, pretend play and symbolic play. And, needless to say, language is crucial for increasing cognitive and social complexity in general.

By far the most dramatic structural alteration to standard Ape maturation, however, is the stage between age six and eleven or so. Whereas chimps – our closest living relatives – plunge almost directly from weaning at the age of five or six to puberty, *Homo sapiens* maturation includes a long hormonally quiescent "middle" stage before adolescence. This "middle" essentially serves to keep sex hormones at bay for several years in order to allow learning. It is in fact an extraordinary interpolation; and its length must therefore be the result of strong "natural selection". In other words, those children with longer middle childhoods must have had an edge over those with shorter ones, at least initially. Konner surmises from fossil evidence that its emergence was correlated with a rapidly improving tool culture. Its primary purpose then is to enable enculturation.

It is interesting to note that the immune system during this period is fully complicit: it is more robust than at any other time in the human lifespan, so mortality rates are relatively low; children are also newly able to resist fatigue. Konner describes children of this age as remarkably pliant "vessels", able not only to learn to use tools but able seamlessly to absorb and internalize the codes, values and norms of their cultures, whether they be those of a pacific foraging tribe or of a polygynous warrior culture, or of an Amish farming community, or presumably of twenty-first-century inner cities or virtual space. From a parental point of view, this stage may well constitute the high point of parenting: children are not just assigned tasks but are also eager to carry them out – at least "on average". And in hunter-gatherer contexts, juveniles may even defray their costs by tending younger children and foraging.

Its start can be identified in several ways, including a precise and visible one: the eruption of the first molar. In cognitive terms, its start is sometimes referred to as "the 5 to 7 shift" – also known as the onset of "the age of reason", or more prosaically in industrialized nations as the moment of "school readiness".

Brain circuits do not visibly come online (as they do between birth and the age of five); instead, under the influence of a hormone called adrenarche, neural consolidation occurs. In addition to metacognition (the ability to think about thinking), this enables self-talk or interior speech, the ability to shift perspective as well as greater variability in play. Children may well engineer games (obstacle courses, sparring or boxing, capture the flag) that model aspects of the struggle for survival and so indirectly enhance adaptability. Adults should be advised that when children play, they are in a sense directing their own brain assembly. After all, play serves to control emotion; to test limits and measure oneself against others; to acquire spatial skills and indeed culturally valued competencies that will later attract mates. Woe betide the child who does not play!

Play at this age also tends to solidify a cultural group identity, an "us" in contradistinction to a "them". As Konner puts it in his genially neutral terms: at this stage, "it becomes rewarding not only to do, think, and feel as certain people do, but to avoid doing, thinking and feeling as others do". Whether "the others" actually do the negative things they are charged with is probably beside the point. More subtle variants are based on manufactured differences: the "in groups" and "out groups" that trouble just about every school or playground. As the ever-optimistic Konner reminds his readers, however, dispositions honed by evolution are not deterministic; they can be short-circuited via training, mingling, laws, etc. And, significantly, universal aspects of morality also arise out of social play at this age every bit as predictably as weak or strong forms of xenophobia.

The child is then a finely enculturated, mostly moral, well-equipped being by the onset of adolescence. Now sex hormones transform the brain and the body, complicating the stability of that very enculturation. Konner explains in minute molecular detail how testosterone, and in the case of girls estradiol as well, transform white and grey matter ratios, amplifying some brain regions, shrinking others, and so on, leading to sexual behaviour, aggression and risk-taking. After years of hormonal surges, further brain maturation in theory enables adult levels of inhibition and reasoning.

Konner provides a nuanced biological account of how testosterone levels in both

girls and boys interact with genes and environments to predict age of sexual activity. Susceptibility to peer influence is highly variable, but generally peaks at about fourteen, when most, if not all, adolescents are likely to behave like lemmings. Aggression has a remarkably strong genetic component – but it can be modulated by environment. Regular baby-sitting or baby-tending can lower levels of male aggression.

Aggression can also be channelled. For instance, in hunter-gatherer contexts, initiation rites often take advantage of this sensitive period of brain development, canalizing aggression, and so in principle averting rebellion and assuring initiates' cultural complicity. Among the !Kung, initiates have to tolerate six weeks of continuous dancing. Among the Baka of Cameroon, they must stoically endure excruciating teeth chiselling. Among the Australian aborigines, boys are laid on a rock and are publicly circumcised, and then a few years later they must endure a second more mutilating operation; in its painful aftermath, they are instructed in the ways of their culture. Such initiations are likely to precipitate a strong sense of gender identity, of adult identity and of cultural solidarity: of being incontrovertibly "in". In other contexts like our own, the transition to adulthood is messier.

Indeed, moments of rapid cultural change make the process more entropic. Genetic, sociological and endocrine variability translates into the fact that some children weather turbulence much better than others. Early bloomers are obviously different from later ones; and risk-takers or sensation-seekers from cautious types, and sensitive types from their resilient counterparts. All inhabit different if intersecting (reproductive) niches. Clearly, this very variability confers species-wide plasticity: the ability to adapt as a species, if not always as an individual, to different environments.

That said, the vast majority of children emerge relatively unscathed from this third stage of Konner's maturational programme, although one study estimates that roughly 11 per cent of adolescents have chronic difficulties. Most crime in any given country is committed by young males. It is now well established that an unstable environment, and having had few secure helpers at the nest, can cue a child early on for sexually promiscuous or delinquent behaviour. In evolutionary terms, early promiscuity would have maximized reproductive success in ancestral environments; it arguably still does according to a

"live fast die young" Darwinian logic. Early stress can lower the age of menarche in girls.

Idealism is also remarkably common at this age. Religious conversions are far more likely to occur at this age than at any other. Adolescents may choose self-imposed rigid rules of conduct and belief: a bulwark against entropy and anxiety. If average behaviour typically follows a set pattern between birth and five and between six and eleven, this is no longer the case in adolescence. Cultural context matters a lot, as does individual biology.

The fact is that the very hormonal surges that increase risk-taking enable new levels of cognition. Play itself thus takes on a new cast, to be sure one that is potentially more rebellious but also, as in the case of computer tinkers, for instance, one that has the potential to create new worlds for the rest of us. Adolescent play can, in its more innovative guises, even trigger behavioural mutations – as has certainly happened several times over in the twentieth century, and is happening at an accelerating rate in this century. New music, for instance, has repeatedly revamped collective sensibilities. One could argue that the internet in particular sets the stage for new selection pressures – especially if "tech skills" and entrepreneurial skills start to function like peacock feathers. As Konner reminds us in a refrain that runs through his book, this very range of adolescent behaviours – the world-altering and the seemingly destructive – is the result of ancestral adaptations without which we would not be here.

Konner is what might be termed a compassionate Darwinist. He insists on understanding rather than judgement – especially when it comes to adolescence – and always and above all, on the tangled web of evolutionary, developmental, and cultural or environmental causes for behaviour, whether it be species-altering innovation, or delinquency and aggression, or the many variants of xenophobia. The point is not that knowledge of this evolutionary legacy will set us free, but rather that knowledge leads to wisdom and might enable better interventions. If he has a bugbear at all, it is the figure of the univocal determinist, including perhaps his more narrowly focused colleagues who patrol the borders of their disciplines (the often warring biological versus cultural anthropologists, for instance). Of course, it should be said that toppling disciplinary boundaries can be a high-risk enterprise. In this sense, Konner is

himself like the adolescent Icarus in what he attempts. But the likely result of his work will be that disciplines will have to fraternize. Practitioners of developmental psychology will have to take note of the evolutionary legacy. And the rest of us may well look with renewed wonderment (and respect) at the playing of children small and large.



"Children Running in the Park, Derby", 2002, by Andrew Macara