INTERVIEW

The supreme infant

Jon Sutton talks to **Alison Gopnik** about the exploratory, bright butterflies that are children

You've described human development as more like reverse metamorphosis than simple growth, with babies as exploratory, bright butterflies and adults as caterpillars, inching along their narrower paths. Can you expand?
The central idea is that we should think of childhood as a separate evolutionary form, adaptive in its own right, and with its own special kinds of neurological and psychological structure. In particular, the evolutionary argument is that childhood – our uniquely protracted human period of immaturity and helplessness – is designed to give us a protected space in which we can learn and imagine. As adults we put what we have learned and imagined to productive work.

A recurring theme of your book is the idea that playful immersion in hypothetical worlds teaches us how to make sense of the real one. And you think this is actually what makes us human?
This is one of the most interesting ideas to come out of the new formal work on computational models of development, called causal Bayes nets or probabilistic models. The great advantage of these models is that they let us represent and construct counterfactuals – possible worlds as well as actual ones. I don't think I appreciated how important that ability is until recently. After all, the human advantage is not only that we can learn about more different environments than any other creature but that we can imagine and create new environments. If you look around the room you're in now everything in it – the right-angled table, the woven fabrics, the electric light – was once just a possibility in somebody's head. We live in an imaginary world. And that process of imagination begins in the protected pretend play of early childhood.

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You often seem genuinely aggrieved that the minds of babies have been underrated and misperceived. Is psychology as guilty of this as other disciplines and wider culture?
Well, as we parents say, 'I'm not hurt, just terribly, terribly disappointed'. Psychologists like Piaget have to get the credit for seeing, really for the first time in history, just how significant babies might be. Of course, even Piaget systematically underestimated children, but then every time I do a new study I discover that I've underestimated them myself. But there is still an impulse in much of psychology to see children as defective adults. For example, I often hear neuroscientists lump together children, patients and animals – an evolutionary absurdity that reflects an implicit assumption that adult humans are somehow the psychological pinnacle.

One of your explanations for this underestimation is that nearly all the great philosophers have been men! Given that psychology, here in the UK at least, is becoming a largely female discipline, perhaps children's minds will move to centre stage?
It's important to say that there is no idea here that somehow men and women do different kinds of science. But undoubtedly what you know and care about, and so what you look at, shapes the questions you ask – earthworms were around for aeons but nobody thought about actually paying attention to them till Darwin. This is particularly true for babies since there is such a large gulf between what you see when you look at babies cursorily and what you see when you know them well, although there is still more to learn from studying them scientifically. I think that as more women do psychology, and more male scientists spend time caring for babies, the significance of babies will become more widely accepted.

You come from 'a somewhat lunatic artistic intellectual family', and one of your sons is a hip-hop jazz fusion musician. Is there a danger this environment could lead you to overestimate the centrality of imagination and creativity in infants?
It might be a danger, if it weren't for the fact that the kids in my lab keep surprising me! Almost every time we do an experiment I start out thinking that the kids won't be able to hack it, and end up amazed at how much they can do. It's the science that is really convincing and the science just keeps coming up with more and more evidence for the power of young minds.

There seems little doubt that young minds are powerful, but some reviewers have questioned whether you are guilty of 'anthropomorphising'. For example, you write that 'even nine-month-olds understand some important statistical ideas'. Are you confident enough in the experimental techniques of psychology to disregard this possibility?
Of course, this raises interesting philosophical questions. What does it mean to 'understand'? Does it require the kind of self-conscious reflective articulation we see (sometimes) in adults? One of the greatest discoveries of cognitive science has been that the brain computes, infers, predicts and generalises and we can use psychological techniques to discover just what it is computing and inferring. And another great discovery is that the relation between that computation and our conscious adult experience of understanding and

reading

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inference is very complicated. Even as adults we often seem to understand, predict or compute even though we don't have a conscious 'understanding experience'. I actually think it's too easy to say that this sort of understanding in babies is just 'unconscious' or 'implicit' – I am fairly sure that it is associated with some vivid phenomenology and experience. But almost certainly that experience is not like adult experience.

You write that 'All the processes of change, imagination and learning, ultimately depend on love.' Clearly love is ideal, but don't a lot of unloved children turn into highly imaginative individuals?

Here is one of those interesting points about childhood that is easy to overlook. Even 'bad' parents already provide a degree of care to children that would count as profound devotion if it were offered to anyone else. They have to or the children literally wouldn't survive. I think I take pretty good care of my highly beloved partner – but it really comes to a half-hour of cooking and a couple of hours of company each evening, after leaving him alone to take care of himself all day. A caregiver who only took that much care of a baby would be an abusive monster! So even the minimum baseline of caregiver love is already a lot – and we know that children thrive with much more than that. Moreover, studies suggest that resilient children are those who do find love somewhere, even if it isn't the love of parents.

You have noted that parenting in today's middle-class America is unusual, because comparatively few people are involved in the care of each child and so parents are more intensely involved in it. What impact does this have?

It's not so much that parents are more intensely involved in care as that they are more self-conscious about it. For most of history we learned how to take care of children the way we learned most important skills: we watched other people do it and we practised when we were young. With the end of the extended family and fragmented and mobile societies there are now many people who hold a baby for the first time when they have a baby themselves. So there is a deep anxiety and a great hunger for some expert technological solution.

The writer Michael Pollan makes a similar point about food. It used to be that people simply ate what they saw their mothers cook and then cooked that way themselves. More choices and less experience turn eating into a self-conscious technology-driven goal-directed kind of work – a method to get healthier. And of course, the irony is that being less absorbed in trying to eat healthily is actually healthier! In the same way people feel that there is some parenting secret that will make their baby smarter. And yet the science suggests that simply letting children explore the world in a rich way with devoted, attentive caregivers is by far the best way to get them to thrive and learn. And, a further irony, for all the intense focus on 'parenting', in fact, many parents are less supported and more stressed and isolated than ever before.

Maybe they could learn a thing or two from children? You have said that 'To be infantile is to be supreme'.

I suspect I am so crazy about babies because I am also a capital R Romantic – I'm attracted to the sort of open-ended creativity that is so characteristic of babies and young children. Someone wrote that the title of Richard Holmes' new book on Romantic poetry and science in the early 19th century could have been the title of my book too – *The Age of Wonder*. Often adult art and science, and even more mundane activities like travel and certain kinds of meditation can reproduce some of that childlike wonder in children. But, of course, adult art and science and meditation also require just the sort of uniquely adult discipline and focus and executive control that you don't see in children. Real Romantic poets were rather a pain because they seem to have required about as much looking after as babies do.

There's only been about five minutes in your entire life you haven't been around babies and children. What's left to discover?

Oh, it would take many lifetimes just to get started. But right now what I'm working on is how caregivers play a role in implicitly teaching children what they need to know. The really enormous advance of the last 10 years has been that we're finally starting to understand how its possible for children to learn so much abstract, coherent, highly structured new knowledge from such fragmented evidence. I genuinely believe that the old battles between nativism and empiricism have been put to rest by the new computational work on probabilistic models and learning algorithms. But that work has also made it clear that the real problem is how children decide which pieces of evidence to attend to – which things to learn about – and caregivers may play a really crucial role there.

One nagging thing...

I've had three of my own children and spent my professional life thinking about children. And yet I still find my relation to my children deeply puzzling. Our love for children is so unlike any other human emotion. I fell in love with my babies so quickly and profoundly, almost completely independently of their particular qualities. And yet 20 years later I was (more or less) happy to see them go – I *had* to be happy to see them go. We are totally devoted to them when they are little and yet the most we can expect in return when they grow up is that they regard us with bemused and tolerant affection. We are ambitious for them, we want them to thrive so badly. And yet we know that we have to grant them the autonomy to make their own mistakes. In no other human relation do we work so hard to accomplish such an ill-defined goal, which is precisely to create a being who will have goals that are not like ours.

This is Professor Gopnik's contribution to last year's Research Digest special, on 'one nagging thing you still don't understand about yourself'. For more from some of the world's top psychologists, search for 'one nagging thing' at www.researchdigest.org.uk/blog