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Homo Sapiens 1.0: human development and policy construction

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ABSTRACT Nearly a century of psychological research and recent advances in neuropsychology suggest that there is a 'learning to learn' stage in early childhood, during which children need to create the foundations of human cognition, which relies upon the ability to logically categorise incoming information. Mid-twentieth-century psychologists would refer to this process as 'schema building', while twenty-first-century cognitive scientists would refer to it as the development of 'embedded mental representation'. Whichever term we use, the implication for the early years teacher is the same: that children in the nursery stage of education, which is internationally recognised as the years between the third and seventh birthday, most effectively learn through self-chosen, play-based activities undertaken in the company of peers and facilitated by adults who engage in the process of 'sustained shared thinking' – that is, sensitively supporting the child to sequentially increase his/her understanding through 'real life' experience during this process. This article explains why the needs of young children have been increasingly poorly addressed in this respect within recent education policy in the United Kingdom, with reference to potential issues arising.

The 2014 (Gove) revision of the National Curriculum was based on the premise that goals set for a particular age group in Singapore or Alberta could simply be brought forward a year or two for England, and that teaching should be accelerated to reach these goals earlier. A century of knowledge about child development was discarded as irrelevant – and this despite clear government data showing much lower pass rates among summer-born children. This article aims to restore thinking about human development.

While human beings have been evolving for many millions of years, the latest species, *Homo sapiens*, appeared on earth approximately 200,000 years ago. One of its key traits is the immature condition in which it is born, taking a large percentage of its lifespan to become adult. The reason for this is presumed to be the complexity of the neuronal development that it needs to undertake; the

ability not only to think abstractly but also to communicate these highly abstract thoughts to other people in a richly symbolic language.

The construction of the human infant brain is in many ways quite different to that of a human adult, the key difference being its incomplete, malleable state. Babies' brains have far more neurons than adults', but far fewer connections. The early development of the brain involves an extensive neuronal connection program in response to environmental experiences. Those neurons that do not connect to others during this process shrivel and eventually die; such neural 'pruning' is an entirely natural process, the result of evolved human cognitive flexibility. This is essentially a 'nature via nurture' program: there is an in-built schedule for growth and development, but the direction in which the development occurs is directed by external stimuli; for example, there is a natural human ability to develop language, but the specific language spoken will depend upon the individual's environment.

A newborn baby can therefore be compared to a brand new personal computer – it comes equipped to run certain programs in certain ways, but these programs do not yet have any contents beyond the manufacturer 'freebies'. Nature provides the capacity, while nurture determines the content. Of course, a baby's brain is infinitely more complex than a personal computer, and goes on not only to *store* contents, but to *link* concepts together in infinite networks through the intricate neuronal pathways that are built through experience within and upon the environment.

Our current understanding of how the human brain constructs itself during the developmental period suggests that this happens via what is termed 'embedded mental representation'; that is, we incrementally memorise and co-ordinate our experiences. This generates an increasing ability to organise thought, gradually resulting in the ability to manage incoming information and locate it within memory in increasingly sophisticated neural networks.

As children grow, there is an exponential development in their ability to organise cognition, and in particular to focus attention without becoming distracted by the intrusion of non-relevant thoughts. This requires 'inhibitory behaviour', and the younger children are, the more difficult they find this; their thoughts are more susceptible to interference than those of adults due to the immature networks across which they travel. The more immature the network, the less capacity there is for incoming ideas to 'hang upon'; such capacity is gradually built as networks are constructed. A useful analogy is that it is far easier to find something in a wardrobe where there are enough hangers for all the clothes. If, regardless of lack of hangers on which to place them, we keep adding more and more clothes, they will end up in a tangled muddle at the bottom and become very difficult to retrieve when we next try to find them.

This fundamental adult/child difference is not sufficiently recognised in policy and practice. For example, in England, the current state education system expects children in the sixth year of life (between the fifth and sixth birthday) to demonstrate phonic competency in reading, for which a statutory assessment is imposed. While neurologists do not yet have a complete picture of how reading

develops, they have ascertained that it requires a considerable amount of inhibitory behaviour, and that it is gradually encoded at a very deep level in the brain. Magnetic resonance imaging (MRI) shows fundamental differences in neuronal activity between novice and expert readers decoding a text, and the act of reading requires the reader to simultaneously:

- control the eye so it moves in the direction of the relevant language. Some languages are written left to right (e.g. English), some right to left (e.g. Arabic) and some vertically (e.g. Chinese);
- convert a visual stimulus into sounds;
- make meaning from decoded words; and
- hold that meaning in memory sufficiently to make overall meaning from the text as a whole.

The isolation of phonics within the assessment process forces the learner to demonstrate partial competency in the operations utilised by fluent readers; understanding meaning is entirely removed from the process. However, the fundamental function of all human linguistic interaction is the understanding of meaning. It is not yet clear how a 'high-stakes' phonics assessment at this very early stage of literacy might impact upon the way that subsequent neuronal connections form in response to 'training to test', particularly given that the immature brain is still busily constructing and coordinating neural networks and ascertaining relationships between them in order to reduce irrelevant interference.

When we continue to contemplate the neuronal immaturity of young children, the quest that currently absorbs the English Department for Education – the formulation of a 'baseline' assessment of the literacy and numeracy skills of four-year-olds in order to predict future progress – seems quite ridiculous, and, indeed, such plans were pursued and dropped twice before, in 2002 and again in 2015. The reason for testing such young children is proposed (without supporting empirical evidence) to be to ensure that their teachers are 'accountable', as it is simply presumed that incremental progress can be accurately measured against this 'baseline'. However, literacy and numeracy are what are known as 'emergent' skills (human beings did not evolve to read or to count, but the abilities are emergent from other evolved competencies), and they are certainly not part of the core neuronal developmental program when a human being is less than 60 months into the lifespan. Such a test is the equivalent of judging a *Bake Off* cake while the ingredients are still being added to the bowl; as we all know, how a baked product eventually turns out is not simply the result of the amount of fat, sugar and eggs, but whether self-raising or plain flour is added, how it is sieved into the mixture, and how the mixture is then beaten and baked – all variables that act independently of one another; there can be no simple, predictable linear progression.

The way in which human beings naturally 'mix their ingredients', or, from the perspective of an alternative analogy, 'boot' their cognitive system in the first seven years of life, is through spontaneous, play-based interactions in which

they independently interact with peers and adults. What this stage of development most crucially creates is the ability not only to *acquire* information, but also to *use it flexibly* – the basis of independent cognition. And in building relationships with others and sharing ideas, children learn to socially and emotionally engage, a necessary stage in the development of communication skills, and thence, given that human beings are highly social creatures, the basis for ongoing social and emotional health. Moreover, all human adult communication involves complex combinations of collaboration, cooperation and competition, skills that are developed through these early interactions.

Young children whose social, emotional and cognitive needs are poorly addressed are likely to develop poor stress-coping mechanisms. At the biological level, stress coping is mediated in mammalian creatures by the hormone cortisol, which functions as a 'thermostat' which turns up the 'alert' system when a stressful situation is encountered. The human stress response, like that of all mammalian creatures, is attuned to the need to either escape or fight when threatened, and the release of cortisol begins a cascade of biological adjustments to make energy available for such response.

Human beings have a regular cortisol rhythm, where cortisol is highest in the mornings (to wake them from sleep), falling steadily as the day goes on, reaching its lowest point as they sleep. A stressful event will cause a sudden elevation in cortisol, which then falls once the situation is resolved. Children experiencing *ongoing* stress develop higher resting levels of cortisol, and the system takes longer to return to this base following a stressful event. Chronically heightened cortisol is not only linked with emotional disturbance but also impacts upon memory and learning. At the psychological level, ongoing stress runs a 'background program' in the mind, leaving less capacity to deal with incoming information. 'Too much too soon' approaches in early education that confuse and worry children therefore contribute to cycles of stress and underachievement.

Additionally, the way we deal with infants in our current society frequently disposes them to elevated cortisol before the school years even begin. Mammalian infants have evolved to bond with their principal carer, because an infant who stays close to his/her protector will be more likely to survive, and thence eventually pass on their genes to descendants. Insecurity of attachment therefore creates stress in infants, and correspondingly, recent research has shown that those with secure attachments to principal carers have a lower cortisol peak in response to stress, and a quicker return to baseline.

The way in which UK society currently functions, however, tends to strain the maintenance of such bonds between children and their principal carers once the maternity-leave period concludes. Many families are forced to rely upon income from two adults working full time, with the result that infants, sometimes under a year old, are routinely removed from their homes (and thence their bonded attachments) during the working week and placed in commercial care facilities. Such settings are most economically formatted as

mass day-care settings in which practitioner wages are low and staff turnover is consequently high.

A range of studies undertaken in the early 2000s discovered abnormally raised levels of cortisol in young children spending full days in collective day care, finding that when care at home was compared with care in collective settings, children showed less physiological signs of stress at home. While it would be naive to argue that all home environments are inevitably less stressful than all day-care environments, the indication seems to be that to be cared for within the average home is less stressful for an infant than to be cared for within the average day-care centre; in the typical home, children experience more continuity of care and develop more secure attachments, particularly where adults are themselves emotionally and economically secure and have the consequent capacity to be calmly attentive.

The results of contemporary care and education policies in the UK are illustrated in the deteriorating state of juvenile mental health. Statistics from the 'Young Minds' website indicate that approximately one in ten children have a diagnosed mental health disorder. Nearly 80,000 children and young people suffer from severe depression, including 8000 children aged under 10 years of age, while 20% of young people deliberately harm themselves. The New Economics Foundation found that the UK's 16-24-year-olds record the lowest levels of trust and belonging in Europe, and two studies by UNICEF in 2007 and 2013 found British children to have a low sense of well-being compared with children in economically similar nations. While it is clear that there are many disparate factors that may negatively impact upon children's mental health – for example, cyber-bullying and family breakdown – the 'too much too soon' approach to education and care is the element that we can most easily address, by adjusting social policy for families and schools to match the natural developmental needs of human beings.

In the first three years of life, human beings must most crucially develop and maintain relationships with a small circle of carers in order to acquire a healthy social and emotional base, and during the first seven years of life they require time and freedom of interaction to absorb the concepts of their physical and cultural environment and to apply these in many different ways, most crucially being given the latitude to do this in some ways that succeed and in some ways that don't. The younger the child, the more crucial this process becomes, due to the level of development of the underpinning knowledge base (bearing in mind that the younger the child, the fewer 'hangers' available). Once children reach the eighth year of life, they are ready for more formal instruction. This is the way that *Homo sapiens* 1.0 has evolved, and there is nothing that we can do to change this. We take great care to house young animals in ways that support their natural development. Why then are we so careless of our own species?

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