Research into brain functioning and the links with TA

"The old nature-nurture debate no longer makes sense"
James R Allen (2000)

The nature-nurture debate has long occupied human thinking and many pages of print have been produced on the subject. I have long held the personal belief that while genetics play a part by equipping us at birth with certain predilections; it is nurture that activates those predilections by pushing some "buttons" and not others.

There has been some very interesting research into neurophysiology published over the last decade and this paper draws attention to two Transactional Analysis writers (James R Allen and Jenni Hine) who have followed this research closely and discuss the connections with Transactional Analysis (TA) concepts and ideas.

James Allen (1989, 1997, 1999, 2000, 2003) has written extensively on TA and biology – his 2003 article links neurodevelopment with depression, anxiety, obsessive-compulsive disorder and attention deficit disorder, and discusses various TA treatment approaches. In his 1999 and 2000 articles he makes a number of interesting points which I will summarise below.

He calls the 1990s the "decade of the brain" due to the advances in research into neurophysiology and child development during that time. He identifies the brain as a "*system of subsystems that combine over time into patterns of increasing complexity*". This matches with the Structural Ego States model – a system of personality which gives us our sense of self and our script – our response to our environment. Allen says that the brain is an open system that engages with and is influenced by the environment and this relationship "*between experience and development*" is reciprocal". A child's developmental levels and cognitive ability influence his or her responses to experiences, but also, experiences *affect* that child's level of development. Allen cites the research of Perry et al whose research involving neglected children clearly identifies a smaller hippocampus in the brains of the abused children – ie the brain was adversely affected by the trauma showing that " '*nurture' can indeed become 'nature'* ". Allen highlights that experiences create new synaptic connections between the brain cells and therefore experiences (and especially early experiences) organise the brain.

I have an image in my mind of the brain "re-sculpting" itself in accordance with the society the child is in and the decisions taken in response to that environment – and all these messages being stored in the structural ego state system as described by Eric Berne and forming the basis of the individual's script.

So, underlying the ego states are patterns of neural networks, perhaps a set for Parent, a set for Adult and a set for Child which can be activated according to the needs of the moment. If the mind has experienced a pattern before and given it a larger informational meaning, then other neuronal groups will also be activated: for instance, if a child has never seen an apple before, his or her visual sensation of an

apple has nothing to "hook" itself on to. If, on the other hand, the child has experienced an apple before s/he will have created a category (or schema) for apples, and "*a conceptual symbol will be activated*" which can be used for a wider range of objects -
we would be surprised to find that this apple or that ball has no top to it. Jenni Hine (see below) refers to these perceptions from neuronal groupings as Generalised Representation (GR). Sensory experiences are related to the external environment, but conceptual schemas are created by the mind and they are not conscious. Here Allen is talking about representations of self and self with others which he links with existential life positions, and he purports that the I'm OK, You're OK position is not intrinsic to human nature. He says it is the result of our genetically programmed ability to form schemas with at least a "good enough" nurturing environment. He goes on to make a distinction between explicit and implicit memory. The decisions we can remember making (explicit memory) are grafted onto earlier non-conscious schemas embedded in implicit memory.

Implicit memory takes in sensations, behaviours and emotions, but "*there is no sense of self, time or that something is being re-called*". This explains why after acute trauma some people may re-experience some aspect of the event but not be aware of the connection between what they are experiencing, and the original incident.

Implicit memory involves how we feel and it develops earlier than explicit memory. We organise our perceptions of the world around us from very soon after birth – we are logging games of "peepo" and being thrown in the air and caught and the accompanying feelings we experienced which are not available in our explicit memory. Hine (see below) states that the neural-level general representations which underlay the Child ego state actually form well before birth. Implicit memory explains projective identification, or "hot potato" (English, 1998) scripts – behaviours passed down from one generation to another as part of an unconscious process. "*It accounts for much that we "know" but do not know that we know*". It also explains transferential transactions (Child to Parent, Parent to Child) that can happen while we appear to be having Adult to Adult transactional exchanges. Much is in the implicit memory and not easily accessible to consciousness.

So recognising the links between implicit memory and C1 (Somatic Child) the Little Professor and with decisions made around injunctions, my question is where does implicit memory "sit" in the brain? The answer is the limbic system, which is responsible for emotions and feelings, long-term memory, social bonding, biorhythms and immune system.

> *"Early relationships are of major importance in the development of the mind's organisation and integration."*

Referring back to the research of Perry et al, mentioned earlier, the hippocampus in neglected children was markedly smaller than in those children in the control group. (the hippocampus, amygdala, thalamus, hypothalamus and pineal gland all make up

the limbic system). If the "affective attunement" in the relationship between parent and child is lacking, the brain will not develop as it should which leaves the child underequipped to deal with its surroundings and so will affect it's responses to that environment – which lays down the neural pathways and patterns for ego state development.

Jenni Hine in her article "Brain Structures and Ego States" (2005) builds on her previous article published ten years before. She draws quite heavily on the work of neuroscientist Joseph LeDoux (2002) and is of the school of thought in neuroscience that proposes that "*the sense of self as an entity is not an abstract metaphysical state but a product of the complex systems, and systems of systems, of neurons*" and their synaptic connections. She says that based on recent research into brain structure and function we can now get a much clearer picture of the "*neural underpinnings*" of TA theory.

As previously mentioned, the ego states of Parent, Adult and Child (Hine prefers to label them PAC self-states), are underpinned by patterns and networks of generalised representations (GR) which are the different ways in which we experience our "self". The functioning of one of our PAC self-states is the response to our environment or to internal signals from within us which have been formed over time as complex systems of GR and would not show up on a brain scan, because they combine feeling, thought and behaviour from neural connections across the brain. So it is the *energy* created by the synaptic connections that fire off the ego state responses.

Child Ego State: GR potentials start forming well before birth and continue during the early years of a child's life and stored in the implicit memory and therefore out of awareness and before long-term memory and language developed in the cortex.

Adult Ego State: these GRs develop at times when the child's attention is not taken up with its own somatic emotional signals or messages from its parents. This is when the child is using its own senses to explore for him or herself. The attention is directed at the environment and the results of the exploration remain in the explicit memory.

Parent Ego State: the GRs that compile the Parent system are activated by transactions or covert messages from parental figures and Hine says that they are the most implicit in that we are not aware that we are absorbing the "ways of being" of the other person. This only becomes known to us at a later date when we can recognise traits in ourselves that came from the introjected parental figure. She points out that humans share this "hard wiring" with other species and it has survival advantages for both ourselves in our own Child system, and for our offspring and therefore for the human race.

Hine describes the convergence and connection of incoming stimuli which are retained in the synaptic changes which take place in the hippocampus and result in the GR which underpins the PAC self-state. The hippocampus plays a major role in

shaping and *selecting* the GRs that lodge in the working memory as explicit thoughts. She concludes that if the original stimulus is a stroke or injunction from parent to child all the signals converge in the child's hippocampus. If this event is repeated, a representation is formed that will be reactivated in the hippocampus every time a similar stimulus is received. With repetition, it becomes lodged in the cortex of the brain, separate to the hippocampus and in the child's implicit memory (unconscious). It may then become "impervious" to therapeutic intervention in adult life. The more lodged the injunction becomes, the more discounting takes place and the more the likelihood is that only a strong permission through a bulls-eye transaction (affecting and engaging all ego states) will have any affect.

Hine shows in a coherent manner TA concepts in relation to the latest research in neuroscience and her work appears to support Allen's ideas in this area. Both writers highlight the plasticity of the brain and how its development is affected by its environment. Allen describes genes as having two functions: to provide templates for what we inherit biologically from previous generations; and to determine which physiologic processes will be activated and when. Both processes are influenced by experience.

Therefore, it does not make sense to continue with the nature-nurture debate as two separate entities – they are intricately combined.

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