

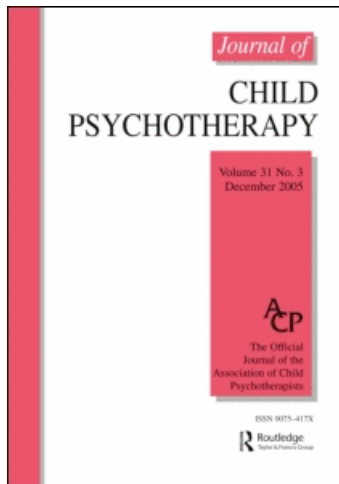
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Affective association: an effective intervention in countering fragmentation and dissociation

CAROLYN HART

Sheffield

Abstract *This paper is concerned with the processes, both psychoanalytic and neuroscientific, involved in the undoing of dissociation in a 3-year-old, who was seen weekly over a nine month period. A neuroscientific and psychoanalytic developmental framework is used to follow a sequence of phenomena that emerged over the duration of relatively brief once weekly psychotherapy. Splintered aspects of the personality are shown to co-exist using different but related primitive defences, namely: dissociation, projective identification and somatic tremor. Clinical material of this traumatised child is used to illustrate the struggle to regulate changing affective states and their manifestations and to suggest a developmental progression occurring during the psychotherapy. Speculatively it is suggested that whilst mirror neurons would have been present from birth, the process of dissociation inhibited their functioning. One of the outcomes of therapy was to recruit mirror neurons in the service of developing processes of identification and empathy. Only then could a transference relationship begin.*

Keywords Affect attunement; dissociation; mentalisation; mirror neurons; neuroscience; projective identification; tremor.

Introduction

This paper is concerned with trying to understand the relevance of neuroscience findings in working towards the ‘undoing’ of dissociation in a traumatised and developmentally delayed 3-year-old boy Zack. The paper developed from my attempt to understand the neuroscience and physiology involved in the manifest behavioural changes that I observed in Zack during nine months of once weekly psychotherapy.

My clinical understanding is Kleinian, with the additional understanding of working with traumatised and looked after children as described by Alvarez (1992), Kenrick (2005) and Sinason (2002). My work with Zack was also informed by an understanding of personality development, from both psychoanalytic and brain development perspectives. In particular, I was mindful of the functional specialisation and variation in timing of growth spurts in hemispheric development (Thatcher *et al.*, 1987) and the

role of intersubjectivity. In order to communicate, infants need to adapt their subjective control of objects – seen in their handling and exploring of objects, for example – to the subjectivity of others. That is, they must demonstrate intersubjectivity: the ability to adapt one's actions in accordance with the intentionality of the other. In this way, both participants come to share control of the communication (Trevarthen, 1993). My technique, whilst trying to identify my (sometimes absent) countertransference, used what Kenrick (2005) refers to as 'process interpretation'. That is, my interpretations did not make overt use of the transference, but captured the essence of the process that evolved in the session.

My technique was underpinned by my belief that Zack's brain would be plastic enough to make use of my interventions to work towards better affect regulation, in the sense described by Stern (1985). My therapeutic aims were to provide Zack with an opportunity to increase integration between left and right brain hemispheres. I needed to carefully attune to Zack and provide a 'sensory reciprocity' (Urwin, 2006). Intuition leads me to believe that such work would be either re-activating or recruiting new mirror neurons.¹ My interventions would have to be carefully matched to observations informing me of Zack's moment-by-moment state of mind and developmental phase.

In this paper, I hope to illustrate how an understanding of neuroscience can be integrated with psychoanalytic skills. In particular, I wish to illustrate and explore the significance of a developmental sequence in which the role of countertransference and, eventually, intersubjective and symbolic processes gradually became implicated in relation to neuroscience findings. I believe that such an understanding serves to enhance observational skills and clinical sensitivity.

A selective theoretical overview

An interest in dissociative disorders can be traced back to the 1880s when Charcot studied unexplained physical symptoms, including paralysis, in his patients. He reached the conclusion that his patients were suffering from hysteria as a result of an emotional response to a traumatic incident in their past. Whilst studying under Charcot, Freud became interested in Breuer's patient Anna O. He brought together aspects of Breuer's talking cure with Charcot's views on traumatic hysteria to develop his own technique of free association and interpretation to reconstruct repressed memories.

It was Melanie Klein in her paper 'Notes on some schizoid mechanisms' (1946) who first gave a detailed account of projective processes and linked these processes to what she termed at that time 'schizophrenic dissociation'.

Today, drawing on attachment theory, neuroscience and the implications of affect dysregulation, we are able to integrate psychoanalytic understanding of dissociation with our understanding of the workings of chemical processes in the brain and memory systems. Much of our understanding of dissociation is derived from research into the processing of experience – namely, relational trauma.

Broadly speaking, evidence can be split into three different categories: 1) that derived directly from brain imaging; 2) where links to brain chemistry are surmised but not directly known and 3) from animal physiology. Much of the evidence comes from animal studies, but evolutionary biology provides DNA evidence of common roots

across the animal kingdom. At a cellular level, many metabolic processes are the same across the mammalian phyla and this knowledge forms the bedrock for biological findings in neuroscience. Such findings are readily applicable to considering syndromes and phylogeny (the evolutionary relationships between organisms, cells, proteins) and can also offer an additional dimension to thinking about ontology.

A biological approach which takes as a given that the brain is a substrate of mind (while not reducing mind to brain) and can demonstrate its mechanisms and workings, offers us another way of thinking about and understanding what is occurring [in the consulting room].

(Green, 2003: 4)

Objections to evidence gained from brain scans include the observation that these scans show activity at precise milliseconds in time, whereas the psychoanalytic process spans months and sometimes years. Psychoanalytic neuroscience is a fast developing area of research, and it is becoming more and more possible to link specific emotions (fear, love and loss) with specific neural activity. No doubt, in the future it will become possible to record brain activity over 'real time'.

Developments in neuroscience and attachment theory, as reported by Fonagy (2001), Panksepp (1988), Schore (2003a, 2003b), Siegel (2003) and many more, encourage us to think of the developing infant personality as an experience dependent embodied 'body-mind'. By this, they refer to the fact that at birth whilst the cortex has a nearly full complement of neurons, the dendrite to dendrite connections are incomplete. Each new experience fires a new neural pathway for the infant. Over time those pathways that are frequently used become myelinated,² increasing the efficiency of their conductivity. Pathways that are infrequently used atrophy and disappear. Siegel (2003) suggested that our first relationships are responsible for shaping the circuits that allow for self-regulation and memory to be processed.

At a very basic level, the patterns of firing serve as codes or symbols that carry information and cause events to happen in the brain. These events themselves are patterns of neuronal activation, which in turn carry further information. The processing of the codes or symbols – the essence of information processing – is based on both the representational and causal properties of the symbols themselves.

(Siegel, 1999: 162) (italics in original)

Schore (2003a, 2003b) brought together a body of research that points to the importance of the dyadic relationship between mother and infant in establishing non-conscious internal working models in the first two years of life.

In these transactions the attuned caregiver is 'downloading programs' into the infant's brain... In particular as a result of attachment experiences the infant develops a representation of the mother... We know that the infant's memory representation includes not only details of the learning cues of events in the

external environment (especially those from the face), but also reactions in his internal arousal state to changes in the external environment.

(Schoore, 2003b: 79)

Schoore (2003b) concluded that our first relationships influence the hormonal environment of the infant and that these hormones in turn influence the way that genetic material manifests itself. It is now known that the *in utero* environment can have an impact on the epigenetics of the developing foetus. Epigenetics is the process that determines the way in which our inherited DNA is interpreted, i.e. what is expressed and what is not. As Hanson (2006) put it, 'I don't see how we draw the line between nature and nurture anymore – epigenetics is the link between the systems.'

This being the case we may understand the process by which early relational trauma gives rise to dissociative disorders. Cozolino (2006: 81) argues that:

... the mind arises from the brain, and that all psychiatric illnesses involve organic processes. Nature and nurture become one during development, and the line between organic and functional has dissolved into what is now called *experience dependant plasticity*. This term means that our brains are structured and restructured by interactions with our social and natural environments.

(Cozolino, 2006: 81)

It is important to try to understand how that experience may be processed within the developing memory systems available at this early stage of development. The mature brain has two distinct memory systems each with different functions. One system involves conscious memory and is called the explicit (or declarative) memory. It enables one to describe and give specific meaning to events in life. By taking brain scans (positron emission tomography and magnetic resonance imaging) of patients with brain injuries, it has been shown that this memory system requires a functioning hippocampus. The hippocampus develops towards the end of the second year of life.

The other system involves non-conscious memory and is known as implicit (or non-declarative) memory. Experiences processed by the implicit memory system cannot be remembered or verbalised. Whilst the actual circuitry of the implicit memory system is not yet known, it is known that the hippocampus is not involved. Implicit memory is active at birth and is the only available memory system for processing infantile experiences. If the experience is sufficiently traumatic, this may lead to dissociation.

Wilkinson (2005) quotes the following summary from Terr (1994)

Children old enough to remember their traumas may defend themselves from prolonged or repeated trauma by putting their traumas out of mind, deliberately 'suppressing' or unconsciously and undeliberately 'repressing' them.

Traumatised children may also dissociate, teaching themselves to self-hypnotize and to enter other planes of consciousness in which they fail to take in and register full memories of their traumas. Children may split, creating good sides to

themselves that know nothing about the awful experiences their cut off bad selves know. They may displace, concentrating deliberately on something similar but less cathected than trauma, and, thus making their memories slip away.

(Terr, 1994: 74)

However, children who experience trauma during a pre-verbal, pre-oedipal and pre-symbolic stage of development, can neither 'remember' nor repress their experiences as the structures concerned with explicit memory are not yet mature. These early sensory experiences form 'an early unrepresed unconscious nucleus of the self' (Mancia, 2006: 88).

The idea that pre-verbal children are also pre-symbolic is questioned by Ryle (2003), who suggests that infants are capable of 'non-linguistic symbolic-like transformations, abstract thinking and pre-thinking. Bauer (2005) and Gaensbauer (1995) found that pre-verbal children were able to remember events from the second half of the first year of life, memory increasing with age. This raises the question as to when declarative memory does in fact become available.

Clinically, it is important to distinguish between dissociation and repression. The dissociative disorders of Zack, my 3-year-old patient, fall into the category of 'early unrepresed unconscious' experiences (Mancia, 2006) These 'unremembered' experiences found symbolic expression and through the psychoanalytic process we were able to think about them, but unlike repressed experience, they will never be available for recollection. It may be that such experiences could be re-enacted and/or elements of them made available as somatic symptoms. In this way, they may become available for work in therapy.

Zack's referral and our first meeting

Zack was 3 years old when he was removed from his birth family because of neglect, domestic violence and suspected sexual abuse. Zack was referred following his pre-adoption medical. At the time of referral, he had been with foster carers for four months. He was small for his age and had been diagnosed with pervasive developmental delay. He was not yet talking or walking. This raised concerns during his statutory medical and he was referred to the 'Looked after' specialist Child and Adolescent Mental Health Service (CAMHS).

I first heard about Zack in the course of an initial consultation with Zack's carer and social worker. At this time, he was 3 years 7 months old. Zack's social worker described how Zack would sometimes curl up in a foetal position and cry without tears. His carer informed me how Zack would go into what she called a 'robotic-frozen state' when he was anxious. I was told that he frequently responded in this way when approached by unknown people. Zack's carer went on to describe how Zack would freeze at meal times. He could only be fed whilst strapped into a buggy facing the wall. His carer then had to spoon-feed him from behind.

A deluge of other problems followed, including chronic constipation, pervasive developmental delay to the extent that Zack's speech was limited to echolalia and he had only just learnt to walk.

The tone of this meeting fluctuated between an almost manic optimism that things were so much better now, since Zack had been with the foster carers, followed by a rapid deflation into despondency and despair. During further such meetings, I came to recognise this swing from mania to despondency shown by both Zack's carer and social worker as paralleling Zack's attempts at affective self-regulation, although I am unsure who was mirroring whom.

The following week I met with the foster carer and Zack. It was decided that we should have a five-week assessment period to explore how available Zack would be to a psychotherapeutic approach. In the event I began to see him regularly from our first meeting, on a once-a-week basis.

When I first met Zack, his carer brought him in a buggy, in which he was reclining. She wheeled the buggy into the centre of the therapy room. Zack was un-strapped and passively lifted onto his carer's lap, where he stayed, with his head cradled, for the entire session. He reminded me of an overgrown infant, sucking at a dummy instead of the breast. I remember wondering if he was actually able to support his own head. I also remember feeling that Zack had a presence like a vortex; he consumed our attention, but with no focus or direction. I wondered whether Zack had contributed to his lack of integration via a greedy attack on his mother's internal world.

We agreed that it might be better if, in future, the buggy was left in the reception area and Zack walked to the room. We also agreed that his carer would remain in the room during our sessions, but should behave predominantly as an observer, rather than initiate activities. As I was the only worker involved in the case, we arranged that I would regularly have telephone consultations with his carer, both to provide psycho-education and to offer support in the placement.

Clinical illustration of dissociation in which there was no countertransference experience

Throughout the first weeks of work with Zack (in the presence of his carer), I found Zack would frequently dissociate. I soon learnt that his dissociation occurred as a response to two separate situations: a lack of affective containment in the form of face-to-face contact with his carer, or due to over-stimulation from me. If Zack's carer and I momentarily engaged in conversation, Zack would engage in dissociative defences. Typically his eyes glazed over and, if he was sitting, his head would flop to one side. In this state, he reminded me of a distressed newborn unable to support his own head, protecting himself with a 'second skin' (Bick, 1968). If, on the other hand, I tried to engage Zack in face-to-face contact (over-stimulation at this point in time), he would turn away and disengage from the stimulus. If standing he tended to sway, and if kneeling rocked back and forth gently.

As Zack began to know and tentatively start to trust me, I was allowed more facial contact and we progressed to playing variations on peek-a-boo and ball rolling. I was always conscious of the need to keep the level of stimulation low.

During a session in our second month of work, Zack had taken a while to separate enough from his carer to interact with me. Our first interaction took the form of a peek-a-boo game with soft toys. After a few minutes of engaging with me in this way, Zack

turned his attention to the plasticine, a material he had only recently discovered. He pinched, prodded and tore off a few separate pieces, which he then squashed together again. He handed this to me and I rolled it into a ball. The layout of the room meant that we were sitting on the floor opposite each other with a long low coffee table between us. I rolled the plasticine ball to Zack on the floor under the table. He passed the ball back to me. I rolled it to him again. The game continued in this way for several more rolls of the ball. I punctuated the game with non-verbal, but emotive sounds. In retrospect, though this was not deliberate on my part, I think I may have been contributing to laying down the emotional grammar thought to be a pre-requisite for the development of language. As Alvarez (2006) says:

If we assume that some babies are born more, and some less, integrated than others, and that every baby has fluctuations in the course of the day, then we can still understand there may be some priorities of needs – i.e. that there are certain preconditions that need to be met for good introjections and internalisations to take place.

(Alvarez, 2006: 167–8)

I commented on the ball moving between the two of us. I could give something to him and he could also give something to me. Shortly after this comment, Zack varied the game slightly by passing the ball back to me over the top of the table. This developed into a peek-a-boo game over and under the table, with facial contact being made and lost in turn. Zack became quite excited, he smiled and squealed with delight, but this was immediately followed by a bearing of his teeth, indicating how easily stimulation prompted an aggressive response. I tried to lower the level of stimulation by rolling the ball only along the ground. In this way, I disengaged from the making and breaking of facial contact involved in the over/under table peek-a-boo. Zack calmed down and our game resumed with us rolling the ball on the floor, but soon Zack again returned it to me over the table. After several minutes of this play, I decided to return the ball to Zack by rolling it across the table to him. Zack ‘caught’ the ball at the edge of the table as it was about to drop. He looked at me and immediately turned away. The blood drained from his face, he went white and then collapsed on the floor.

This reaction was quite different to the dissociative defences of disengagement described earlier. I regard it as a ‘dissociative collapse’. It was as if a heightened emotional state was too much. Not only did he need to turn away from me, but he also needed to avoid contact with the external environment and momentarily with himself.

During these first sessions, I found myself with very few countertransference feelings, and I was not experiencing in parallel process a dissociated countertransference of my own. I had not dissociated in the sense of thinking about my own shopping list, but I was engaged in left hemispheric activity. I found myself thinking back to what I had been told about how Zack had been fed when he first came into care. I wondered what the early face-to-face contact for Zack might have been like and what he may have been forced to introject along with food.

What was happening when Zack dissociated and why was I struggling with a lack of countertransference experience? How could I help Zack differentiate between his bodily and psychic experience?

Thoughts on the process of dissociation

Within contemporary neuroscience, dissociation is now thought of as reflecting the inability of the right brain to recognise and co-process or integrate external stimuli (i.e. exteroceptive information from the environment) and internal stimuli (i.e. interoceptive information from the body, the corporeal self). This way of thinking fits well with observations of Zack's response to what was for him over-stimulation. His response would have involved implicit memory systems shaped by relational trauma during infancy. Implicit memory is associated with emotional, perceptual and body memory. It does not require conscious thought for encoding, is associated with the brain's right hemisphere and does not involve the hippocampus. Zack would have only been able to process his early emotions as a body-mind experience. His collapse was a strong indication of a poor differentiation between psyche and soma.

His body came under the control of his autonomic nervous system (ANS). Perry *et al.* (1995) and many others since have concluded that the ANS response to trauma involves two separate patterns: hyperarousal and hypoarousal/dissociation. Initially the sympathetic component of the ANS would have been aroused (fight/flight response). This would have caused a massive increase in heart rate, blood pressure and respiration accompanied by an increase in the production of excitatory neurotransmitters (noradrenalin, adrenaline, dopamine, glutamate and catecholamine) within the brain. As a result, the brain itself would have reached a hypermetabolic state.

In order to prevent consequential cell death and damage within the brain, there was a metabolic shut down, a dissociative response. In this state, the heart rate decreases, pupils constrict, blood supply to and stimulation to the digestive system is increased. The mitochondria (intra-cellular structures for producing energy) stop functioning. The immediate effect is that there is not enough energy to generate neurotransmitters across synaptic gaps, so that in effect only the survival functions remain fully operative.

Zack became cut off from both his internal and the external world. This response was determined by the parasympathetic component of the ANS.

In this state, there is no possibility for either introjection or projection. This could explain my lack of countertransference during the sessions.

Clinical illustration: projective identification and the appearance of a countertransference experience

Over the ensuing weeks, Zack's carer and I had several discussions around toilet training and Zack's chronic constipation. We had thought about constipation as Zack's unconscious attempt to gain some control of what went in and out of his life. I had also tried to encourage Zack's carer not to get too anxious about toilet training, as he was likely to achieve this developmental milestone when he felt he was ready to give up being babied. We thought together about what Zack's early experiences might have been and how a lack of affect regulation and consequential opportunity to develop self-regulation might have long-term consequences for Zack.

During a session that came five days after Zack had had contact with his biological father, I was forcefully made aware that Zack was able to use projective identification in

the service of communication. (In retrospect I realise I had no information about Zack's biological father, and whether he had ever been available to facilitate Zack making a bridge to the outside world.)

Earlier in the session, we had been sitting on the floor either side of the sand tray. Zack had been occupied with filling, emptying and refilling containers with sand. My presence and verbal comments had been concerned with attunement, as opposed to interpreting the play. As Alvarez (1992) reminds us:

There are moments when a Winnicottian respect for play itself is important and when a too premature transference interpretation would interfere with the very process of formulation the child is trying to achieve.

(Alvarez, 1992: 125)

We had made several 'comfortable' face-to-face contacts. After Zack had been playing in this way for about 15 minutes, he started to become twitchy and he squirmed on his buttocks several times. It became clear that Zack needed to defecate. He started to lose interest in the sand as he became overwhelmed by his body sensations. He took to rocking on his knees on the floor. He moaned to himself gently and moved so that he had his back to me. He placed himself so that he almost, but not quite, made contact with me. I talked quietly, almost whispering to the back of his neck. Momentarily it felt as if there was affect attunement between the two of us and that Zack had not slipped entirely into a world of self-soothing.

Zack's carer then interrupted to let me know that Zack had not been to the toilet since before seeing his father. His carer explained that (under medical supervision) she had been gradually increasing Zack's dose of laxative, so that now he probably had no control over his bowels.

The attunement between Zack and I was suddenly (and what felt to me catastrophically) disrupted. Zack had stopped rocking, but was now clutching himself in obvious pain. I too experienced a sharp pain in my abdomen, my mind went blank, and I felt shocked and unable to think.

Zack bent over himself hugging his knees. He was no longer moaning, but the cheek I was able to see was wet with tears. He was now silently crying as opposed to crying without tears. He changed his position from one of kneeling on his calves to kneeling with his legs splayed so that his buttocks were on the floor. Shortly after this change in position, I imagine that Zack had a sudden cramp, as he rocked on his buttocks and yelped.

I felt my body go tense. I saw images of daggers and imagined that Zack may have experienced anal abuse. When able to verbalise again, I suggested to his carer that Zack needed her physical comforting and not me at this moment in time. The session finished early. I would like to think that this decision was not driven by a personal wish to avoid this painful transference, but because Zack needed actual physical containment and soothing. I would have been unable to provide this without stepping outside of my analytic role.

In supervision, we pondered on the different states of my countertransference. At first I had a somatic experience similar to Zack, but this was followed by an image. Where

the somatic feeling had been one of expulsion, the image that came to me was one of penetration. Perhaps this adds some substance to my imaginings of anal abuse.

Thoughts on the process of projective identification

What might have been happening during this experience? On the one hand, it could be argued that Zack had fallen into an autistic mode. He had been self-soothing and then held his body as if trying to hold himself together with the formation of a 'second skin' (Bick, 1968). However, I believe that this autistic response can be regarded in a similar way to projective identification as a mind-body, non-verbal primitive defence used to auto-regulate against overwhelming affective states. This would involve right-brain-to-right-brain communication and regulation by the ANS. Schore (2003a) said the following about projective identification in the clinical setting:

...Although it appears to be an invisible, instantaneous, endogenous unidirectional phenomenon, the bidirectional process of projective identification is actually a very rapid sequence of reciprocal affective transactions within the intersubjective field that is constructed by the patient and therapist.

(Schore, 2003a: 73)

My observations were that, by this time, Zack was able to introject my efforts to be a containing object. In order for me to experience his projective identification so forcefully, Zack must have already introjected some aspect of me as being able to contain his projections.

This was not dissociation, for there had not been a total metabolic shutdown and energy had been available to communicate with me. Zack had been thrown back to an earlier persecutory experience where he had had to self-parent. He was no longer able to make use of my attempts at containment. The physical pain caused by the laxatives had propelled Zack back to a place in time when painful body experience just happened to him. However, neither he nor I were able to process this experience, we were both numbed by his use of projective processes.

Clinical illustration of a tremor, where previously dissociation would have been observed

Over time, Zack's use of dissociation lessened, but was replaced by a physical tremor. During this phase of psychotherapy, Zack would need me to break the crustiness that developed between sessions. At the start of each session, we needed to establish the safety of face-to-face contact. This developed into a ritual peek-a-boo dance with soft toy animals.

The normal pattern of the sessions would be for Zack to settle down to the sand tray. He would repeatedly try to use his hand to scoop sand into containers. Whether the sand was wet or dry, he managed to let it slip through his fingers. The task he had set himself of filling the container seemed insurmountable. The onset of Zack's tremor

would coincide with his inability to 'contain' the sand and his upper body would go into an involuntary tremor.

Zack would often roll a truck back and forth on a table. At this stage, he did not use bricks or figures alongside the truck. Whilst there was a rhythm, a come-and-go resonant with the peek-a-boo games, the motion seemed aimless with no place to go. When I made an interpretation about his need for a safe place to stay, Zack's tremor started.

My experience was that of being in an empty space where Zack was not yet able to use me as a maternal object. Zack had become overwhelmed both physically and emotionally by the experience of lack of containment. It was as if in a 'symbolic equation' the sand slipping through Zack's fingers was equated with his personality slipping away.

Zack's early relationship with his mother would not have afforded him the opportunity to introject an object into which he could project. Psyche and soma were unconsciously fused (Driver, 2005), which for Zack, during this particular developmental phase, resulted in a physical tremor.

My struggle was to avoid becoming a neglectful therapist unable to process experience. I would find myself in my own internal flight from Zack's pain. I preferred to engage in left hemispheric activity, thinking about Zack's early experience in terms of affect attunement and what the consequences might be. I had a constant struggle to engage my right hemisphere and 'be' with Zack in an attuned way.

As the therapy progressed over time, I noticed that Zack's tremor would occur where he previously might have dissociated. Thus, if his carer mentioned contact with his family or her own anxieties about long-term care plans, Zack's tremor would be triggered. Likewise, during face-to-face, eye-to-eye, contact rather than turning away (a dissociative behaviour), Zack would maintain eye contact but his hands would tremble.

Thoughts on the process of tremor

By the time that Zack's tremor developed, he was more able to tolerate face-to-face contact. He no longer needed to turn away from me frequently. Moreover, neither his carer nor I observed any further episodes of dissociative collapse. Zack's tremor appeared to be triggered by an increase in anxiety and perhaps as demonstrated by the bearing of teeth, the experience of the 'raw affect' of rage.

My hypothesis, and therefore starting point in trying to understand the occurrence of Zack's tremor, is that it was a physical manifestation of the body's attempt to regulate differing affective states many times within a second.

The body's response to anxiety comes under the control of hypothalamus, which maintains homeostasis via two systems: 1) neural signals which activate both the sympathetic and parasympathetic systems; 2) chemical endocrine signals which travel through the blood eventually reaching every endocrine gland in the body. The sympathetic nervous system evokes a fight/flight response, whereas the parasympathetic system is associated with a freeze response. The sympathetic and parasympathetic systems work together and in opposition.

Research carried out by Rosen and Schulkin (1988) led them to suggest that the memory of a fearful event becomes more intensive over time. They found that the thresholds for activation of the fear circuits become sensitised through a 'kindling-like process'.

The neurotransmitter GABA is involved in maintaining homeostasis at the synaptic cleft (see Figure 1). Experiments on mice indicate that if GABA clearance from the synaptic cleft is inhibited, a tremor is induced (Chiu *et al.*, 2005).

Speculatively I would hypothesise that attempting to regulate differing affective states, in a system sensitised through 'kindling' many times within a second, could have 'overloaded' the GABA system; this would have the effect of disrupting its clearance from the synaptic cleft and could thus be the cause of Zack's tremor.

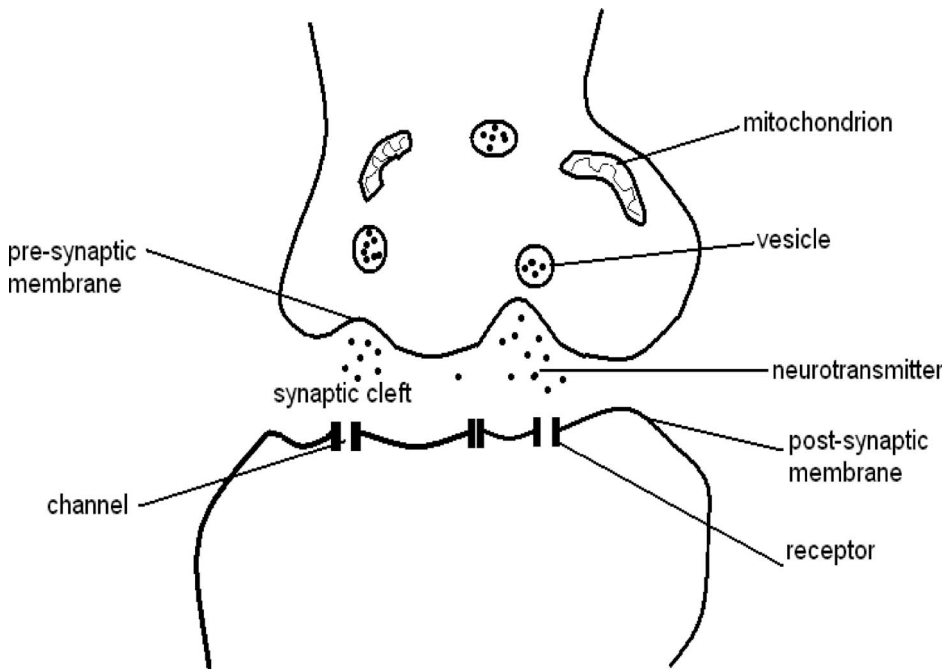


Figure 1. A diagrammatic representation of a synapse. The pre-synaptic and post-synaptic membranes are separated by a narrow gap called the synaptic cleft. Stimulus is conveyed across the cleft by chemical neurotransmitters released from the vesicles into the gap (Hart, 2008).

Clinical illustration: an episode in which the left brain was used in affective regulation

During a session seven months into therapy and three weeks after a potential adoptive link had been identified, Zack was playing with wooden bricks, a selection of cars (he had chosen five) and the sand tray. The idea of moving to a new family had been introduced to Zack two months previously, but now Zack's carer was starting to introduce more specific details and the subject was an ever-present backdrop to all of Zack's activities.

At the start of the session, Zack had rolled his cars along the lip of the sand tray. He then quite suddenly flipped all the cars into the sand and buried them. He spent several minutes playing at finding the cars one by one and hiding them again. Thinking about the significance of five cars, I talked of how he might want me to think with him about a new family and how much he hoped that ‘Nan-Nan’ and ‘Granpa’ (the names he used for his carers) would come with him.

Zack moved away from the sand tray and started to build a series of towers with the wooden bricks. He took a truck and placed a small piece of play dough in the back and began rolling the truck between the towers he had built.

I, probably like Zack, was finding the thought of his potential move rather overwhelming and I was struggling to put into words a helpful interpretation about such a huge potential change in his life. However, the moment was lost as Zack brushed the side of a tower whilst moving the truck. The tower tumbled. Zack started to jump up and down and flap his hands. He bared his teeth momentarily and then, using his right hand, which is controlled by the brain’s left hemisphere, he slapped his left arm and told himself to stop. Zack then knelt at the table and rebuilt the brick tower.

Thoughts on the process of left hemispheric regulation

Over the first three years of life, an infant experiencing ‘good enough’ parenting internalises an object that manages affect regulation on behalf of the infant until the infant has developed the structures and capacity to regulate affect for himself. This process occurs in the brain’s right hemisphere, which is directly connected to the body. The right Orbitofrontal Cortex (OFC) is connected to the Central Nervous System (CNS), the limbic system and both the sympathetic and parasympathetic components of the ANS. The right OFC regulates the hypothalamic–pituitary–adrenal (HPA) axis, which governs the body’s response to both internal and external changes in the environment.

When Zack slapped himself and then told himself to ‘stop’, he would have been processing his experience in both left and right hemispheres, language and intentionality of action predominantly being processed in the left hemisphere, whilst affect would have been predominantly processed in the right hemisphere (Chaminade *et al.*, 2006; Cunnington *et al.*, 2006).

Research by Teicher (2000) suggests that connections between left and right hemispheres, particularly the corpus callosum,³ are impaired following traumatic experiences. I wonder whether the severity of Zack’s early trauma meant that now he had to ‘learn a concept’ in his left brain as a step towards improving left and right hemispheric communication.

Clinical illustration: the regulation of affect, which implies internalisation

In June, our service was moved to larger premises. The move coincided with a holiday break for Zack. I therefore had not seen Zack for three weeks and this was his first appointment in the new building. In the waiting room, Zack turned away from me as I approached. He entered the therapy room holding hands with his carer whilst also

trailing behind her. It was a hot day and I had a freestanding fan switched on in the room. As Zack came into the room, he focused on the fan and stared as if hooked into a trance. He remained like this for several minutes and the 'trance' was only broken when I turned the fan off. I talked of how difficult it was to come to a new place to see me and how perhaps he was not sure I was the same Carolyn.

Zack turned towards me and looked at me, but he did not engage with me. His carer picked him up and sat him next to her on the couch. I started to build some brick towers. Unexpectedly one tumbled. This must have triggered some memory in Zack that enabled him to engage with me. He scrambled down from the couch to kneel on the floor opposite me. He handed me a brick and together we rebuilt some towers. I talked about how it was possible for us to come together again and make things together even when it felt like everything had fallen apart.

Zack deliberately made the towers tumble. He then took a car and rolled it back and forth in the maze of tumbled bricks accompanying the movement with 'vroom vroom' sounds. I talked of the difficult journey Zack was making. It was so easy to feel lost. Zack then rolled his car between the bricks across the room towards the desk. On reaching the leg of the desk, Zack turned towards me and said, 'I've arrived!'

Thoughts on the psychoanalytic process

Schore describes dissociation as a process of hypo-arousal immediately following hyper-arousal. He regards it as a mechanism designed to protect the brain. Schore describes how, during dissociation, mitochondria (intracellular structures responsible for producing energy) stop functioning. The cells no longer have enough energy to transmit electrical impulses between neurons. The brain literally shuts down, which in turn prevents mentalisation. As a consequence, there is no possibility for either introjection or projection. I would suggest this explains the frequent occurrence of pervasive developmental delay in children subject to chronic abuse in their early experience.

When a patient dissociates, the work of the therapist must therefore be centred on providing 'the correct dose of stimulus', allowing for a return to homeostasis and subsequent dyadic interaction. Some children may need to be helped to stay in the room when the impulse is to leave, others may need gentle reminding of the here and now as opposed to the 'place' they have merged with.

In recent years, much has been written about the importance of intersubjectivity and affect attunement in achieving healthy emotional development. A particularly important development has been the discovery of so-called mirror neurons, which play a crucial role in imitative learning in integrating left and right hemispheres of the brain (Cozolino, 2006) (see note 1). Likewise, the different functions of left and right hemispheres and their respective parts in implicit and explicit memory are also well documented. What is less well discussed is what I believe to be the vital importance of affect attunement in recruiting mirror neurons.

Urwin (2006: 206) asserts that 'the problem for the infant is that the psychic life of the mother may not be known from surface qualities, but must be construed through *active imagination*' (my emphasis). Instinctively, I feel that the attainment of an 'active imagination' must involve bringing mirror neurons into play through the use of affect

attunement. Affect attunement differs from parent/infant mirroring in that crucially, *it captures the emotional 'essence' of a moment and expresses it cross modally*. Stern (1985) states:

Attunements have the following characteristics, which make them ideal for accomplishing the intersubjective sharing of affect:

1. They give the impression that a kind of imitation has occurred. There is no faithful rendering of the infant's overt behaviour, but some form of matching is going on.
2. The matching is largely cross-modal. That is, the channel of expression used by the mother to match the infant's behaviour is different from the modality used by the infant . . .
3. What is being matched is not the person's behaviour *per se*, but rather some aspect of the behaviour that reflects the person's feeling state . . . Thus the match appears to occur between expressions of inner state . . .

(Stern, 1985: 141–2)

Even though the emotional 'essence' is expressed in a different format, it remains an affective, non-verbal, right-hemisphere-to-right-hemisphere communication. I would suggest that it is this cross-modal expression that enhances connectivity *within* the right hemisphere and across hemispheres (Cozolino, 2002) During the moment-to-moment 'dance of attunement', the processes received by the child from the mother/therapist will differ from those emanating from the child and received by the mother/therapist. I would further suggest that it is the act of crossing modalities (and all the implications of recruiting new mirror neurons) that is the important mechanism by which a move from pure imitative learning to exploration is accomplished.

It is now accepted that the right hemisphere is dominant in the brain until the age of three. It therefore follows that when working with primitive defence mechanisms, affect attunement must precede any attempts by the therapist to engage the left hemisphere. It may also pave the way for transfer from right to left through the development of prosodic and metaphoric basis of language, as Stern's (1985) work suggests.

During my early sessions with Zack, much of the communication was non-verbal. I used gesture that would have stimulated Zack's mirror neurons. My interactions with Zack would not only have stimulated his physical responses, but would also have helped develop his systems for emotional processing. That is, I would have stimulated the feelings related to his actions – his pleasure or pain.

There has also been speculation that the activation of neural systems that are interconnected with mirror neurons forms the neural basis of emotional feeling and empathy (Zanocco *et al.*, 2006). Mirror neurons working in conjunction with Broca's area are implicated in the process by which language develops from prosodic sound and gesture to syntactical language.

Stern (1985) regards 'attunement as a stepping stone towards language'.

An attunement is a recasting, a restatement of a subjective state . . . If one imagines a developmental progression from imitation through analogue and metaphor to

symbols, this period of the formation of the sense of a subjective self provides the experience with analogue in the form of attunements, an essential step toward the use of symbols . . .

(Stern, 1985: 161)

In this way, my use of rhythmical gesture along with the making and breaking of facial contact were not only attempts at attending to Zack's infantile experiences of affect dysregulation, but also may have increased neural connections that help to establish new pathways leading to language development and expression of emotional experience.

Once dissociation lessened, a transference relationship emerged between Zack and I. This relationship would have been dependant on a 'mirror neuron dance'. As I began to label feelings, integrating both left and right hemispheres, he connected with action, at first non-intentional, a somatic tremor. Later, when Zack slapped himself, the combined verbalisation and action was intentional. I believe this was the start of 'simultaneous re-regulation of networks on both vertical and horizontal planes' (Cozolino, 2002).

Wilkinson (2006) suggests that the therapist's use of metaphor and interpretation engages both left and right hemispheres of the brain. It can be inferred that the use of metaphor and interpretation will be most effective only when there is adequate connectivity within the right hemisphere to support development of the corpus callosum. However, Cozolino (2002), Siegel (2003) and Wilkinson (2006) go further and propose that it is precisely this simultaneous use of left and right hemispheres that facilitates integration of left and right hemispheres during the process of psychotherapy.

The question still remains as to how to view the relationship between projective identification, dissociation and somatic tremor. It could be argued that a somatic tremor rooted in body-mind experience represents the most primitive level of Zack's functioning. However, my observations were that Zack developed a tremor some months into our work. Moreover, the tremor occurred when Zack would have previously dissociated. In this context, the occurrence of Zack's tremor could be thought of as some kind of progress. I would speculate that over time, in therapy, Zack began to internalise 'just enough' of a sense of me as a containing object to enable him to avoid frequent wholesale dissociative collapse. However, Zack's ability to both introject and project was not established strongly enough to maintain a differentiation between psyche and soma when a kindling process activated the fear circuits associated with 'pathological anxiety'. Perhaps true progress would only have been made if it were possible to quench the kindling.

Conclusion

An understanding of the neuroscience involved in personality development is a valuable additional tool in the clinical setting. Careful observation enables psychological concepts and neuroscience to be integrated, thus creating a fuller picture of the child at a given moment in time. This in turn informs adjustment of therapeutic technique. When

working with ‘unconscious unrepressed memories’, the actual biographical memories are not available. Because it is not actual memories, but the feelings and responses derived from actual experiences that can be thought about, it is necessary to pay close attention to the timing, prosody and content of what is said in order to engage in a ‘mirror neuron dance’ of affective transference.

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Notes

1. Mirror neurons are specialised networks of neurons found in the brain, which fire both during an action and when observing the same action performed by another – as if the observer was himself acting. It is speculated that mirror neurons are involved in: 1) learning new skills through imitation, 2) understanding the action and intentions of others, 3) empathy, 4) the acquisition of language and 5) the development of theory of mind (Cozolino, 2006).
2. Myelin is a fatty (phospholipid) electrically insulating sheath that covers the axons of many neurons. A myelinated fibre is able to transmit impulses at greater speed than an unmyelinated fibre. Therefore, the degree of myelination has implications for brain function.
3. The corpus callosum is a thick band consisting of millions of nerve fibres (axons of cells in the cerebral cortex) that orient themselves to link left and right hemispheres of the brain.

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