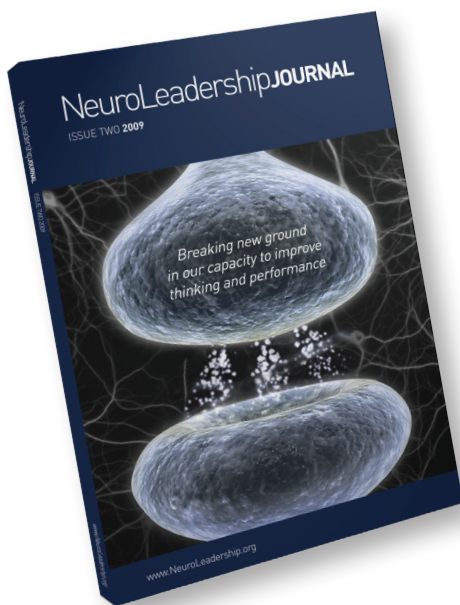


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Emotional intelligence and the amygdala: towards the development of the concept of the limbic leader in executive coaching

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Introduction

The development of social cognitive neuroscience (Cacioppo and Berntson, 2005; Badenoch, 2008) and its application within the corporate environment (Rock, 2006; Ringleb and Rock, 2008; Gordon, 2009; Rock 2009; Rock & Page, 2009) marks a fundamental shift in the organisational application of knowledge about human beings. The essentially descriptive and declamatory writings of a hundred years of psychology and seventy-five years of management theorising are giving way to explanatory models grounded in replicable experimental evidence as to how the brain actually works, and therefore to an early understanding of what the underlying neuro-mechanisms of human behaviour really are.

This paradigm shift – from varieties of guessing to the possibilities of knowing – is of the kind that, also around a hundred years ago, saw the Wright brothers lift off the ground at Kitty Hawk, followed by Blériot's first flight over the English Channel; or the first clinical application of X-rays (Röntgen rays) by Rutherford at Cambridge. In the clinical literature, the work of Masters and Johnson (1966), giving the first laboratory-based description of the physiology of human sexual function, also represents one example of how, when knowledge suddenly clarifies scientifically, intervention consequences follow that could not previously have been considered (Kaplan, 1979).

So it is with current advances in the cognitive neurosciences referenced above and in interpersonal neurobiology (Siegel, 1999, 2007). Executive coaches now have the possibility of structuring individual and/or team change and development

with an explanatory rather than a descriptive system underpinning the professional engagements that they undertake and the intervention decisions that they make.

This parallels developments in the clinical field seen possible by Thomas Lewis and his colleagues (Lewis, Amini and Lannon, 2000), whose writing was in part pre-dated and then subsequently reinforced by the great integrative theoretical and application writings of Allan Schore on the regulation and dysregulation of the Self (Schore, 1994, 2003a, 2003b); which in turn found expression in the developmental field by Gerhardt (2004), and more broadly in the edited work on self-regulation of Baumeister and Vohs (2004) – though it should not go unnoticed that the attachment theory upon which much of this rests, and as developed by Bowlby (1982) especially, was essentially observational rather than explanatory in its insights; it being the case that all good science starts by observing accurately and beginning to describe the regularity of patterns that emerge, as Darwin (1872/2009) among many other great scientists so powerfully showed in creating the big picture for the subsequent endeavours of experimental science.

At this stage of the development of the coaching profession it is probably safe to aver that the great majority of executive coaches are not themselves neuroscientists by background; any more than that the great majority of neuroscientists wish to become executive coaches.¹ This creates the very practical problem for the executive coach who wishes to practice on

¹ *Though Dr. Swart, the second co-author, is in a small group of N=1 in the UK to have made this shift. We look forward to seeing the experimental numbers grow.*

the basis of the new explanatory understandings of the brain as to what s/he might focus on, given the vast array of fMRI and related knowledge that now presents itself to the aspiring NeuroLeadership acolyte. Experimental data may have a substantial claim to truth (or, at the very least, experimental veracity), but the question of how to integrate it and use it practically is the compelling question for those executive coaches who are becoming literate in the neurosciences.

It may also be that organisations increasingly turn to the neuro-literate executive coach as the professionally responsible source of this new knowledge. Now that there is evidence that cognitive behavioural stress management can reduce stress responses, for instance, (Hammerfeld *et.al*, 2006), organisations may increasingly seek the active involvement of executive coaches who are informed in both the neurosciences and the organisational environment. They might do this in preference to seeking advice from the health professionals to whom they now typically expect to turn for health advice, though without the expectation that that would be well-integrated into organisational interventions as might properly be expected from neuro-literate executive coaches.

Experimental data may have a substantial claim to truth ...but the question of how to integrate it and use it practically is the compelling question...

In this regard, the integrative neuroscience model advanced by Gordon (2008) contains huge implications for the practice of coaching. It emphasises the point of view that experimental data should not be over-generalised and that claims made for its applicability are properly founded. But an almost daily experience is that the serious press runs articles making claims for some new discovery about brain function and then over-generalises their implications – a journalistic imperative, it would seem, from which even the more serious generalist publications in the field are not immune.

A cover story – perhaps provoked by the particular date of publication – in *New Scientist* that reads 'What's in a face? How your looks betray your personality' (14 February 2009) is an example of this genre. 'Betray' is itself a curiously and emotionally laden word with which to presage a scientific report. The Contents page varies the journalistic come-on slightly: *What's in a face? Your looks may betray the person within*, and in doing so not only shifts from apparent fact to a less certain possibility but alters the original meaning hugely. 'Personality' and 'the person within' are hugely different constructs.

As it happens the actual article (Highfield, Wiseman and Jenkins, 2009) sets out some interesting questions about the nature of the perceived link between appearance and four interpersonal dimensions; being trustworthy, humorous, lucky or religious. Whatever one might choose to say about such 'dimensions', over a thousand self-selected readers of *New Scientist* submitted frontal facial photographs to the authors and answered a questionnaire, from which the experimenters made composite photographs related to people's reported results of where they rated themselves on the four interpersonal constructs. Pairs of composite photographs representing extreme ends of each scale (trustworthy/untrustworthy, and so on) were then posted online for self-selected respondents to judge which faces fell into which category. More than 6,500 respondents did so. The data showed that women's faces were much more readily and reliably attributed to the scale to which the experimenters had assigned the composite photographs than were the men's faces.

The article itself explores the concept of 'overgeneralization', but the journalese connected to it commits the signal errors of making attributions as if they were scientific facts when, in experimental logic, there might well be other explanations. For instance, a caption to a very pugnacious face says: 'Ice-hockey players with wide faces are more likely to get sin-binned' without, in that heading, making any connection between, for instance, testosterone, facial characteristics and aggressive behaviour; and so suggests direct causal connections where none may arise or have been demonstrated.

This diversion into a brief account of a *New Scientist* piece is not so much to conduct a critical appreciation of the article in question, of which the authors are of considerable renown in their fields, but to make the particular point that the emerging field of applied neuroscience in which executive coaches are involved requires particular rigour if the field is to be seen as having substantially more than magazine-cover value to both its practitioners and clients. The means of ensuring such clarity will come, we suggest from two main sources. The first is personal editorial rigour – knowing what we don't know and not being trapped into making enthusiastic but unsubstantiated claims. The second is the

development of an agreed and shared body of knowledge, which is itself used rigorously and which has the capacity to generate robust debate about practice. It is the second with which this contribution is especially concerned.

'Agreed and shared' is not necessarily an easy state at which to arrive. The very pragmatic, results-driven, short-term-outcome environment within which the clients of executive coaches typically work puts a premium on pushing knowledge to its limits and perhaps beyond; so that what masquerades as fact is, in truth, only opinion. 'Emotional Intelligence' (Goleman, 1996), for instance, is a concept now very widely used in and well beyond the executive coaching world but, in practice, we continuously find that colleagues who readily use the term have no real understanding of what they mean by it or, more importantly, what 'emotional intelligence' consists of either descriptively or, even less so, neuromorphologically.

...if reason makes the lists but emotion makes the decisions, then the integration of thinking and feeling becomes a key area for the development of effective executive functioning...

If, in executive coaching, we are to have a discipline that does entail the great benefit of a shared and rigorously applied knowledge underlying it; and there is an opportunity for executive coaches to lay claim to the neurosciences as the foundation for that knowledge; then it behoves us both to develop and to act within the disciplines of that knowledge.

To these ends this paper sets out to establish and start developing the concept of 'the limbic leader' by reference, in the first place, to what we consider to be the basic knowledge and assumptions necessary for a working application of 'emotional intelligence'; then secondly to lay some emphasis

on the functional pathways of the limbic system in the behaviour of an effective leader; and thirdly to draw attention to the neural pathways connected to the amygdala as a site of interest for the development of leadership capacity in any individual aspiring to become or wishing to enhance his or her attributes as a leader.

Emotional intelligence

A first level of agreement about 'what it is' needs to agree at least on what the number of basic emotions are; what they are to be called; how they are represented in the nervous system; and what their functional relationships are to one another. Underlying all these is the question of whether there is any regular agreement on what distinguishes emotions from feelings and, indeed, whether the two should be distinguished at all. Despite these being quite basic areas for professional agreement it will be seen in what follows that there is, at the present time, no firm agreement on any of them.

Emotions and feelings:

The current state of knowledge about the distinction between emotions and feelings is confused not least because the term 'affect' has become the favourite term in the burgeoning literature of the cognitive and social neurosciences when reference is made to emotional and/or felt states. The terms 'emotions' and 'feelings' are, however, the ones that are deeply rooted in usage in the English language and are, we suggest, the terms that are most likely to be used in coaching settings even if the social neurosciences choose to obfuscate the distinction whilst seeking a 'scientific' nomenclature.

In consequence we are advancing the proposition that the terms '*emotion(s)*' and '*feeling(s)*' need (neuro-)operational clarity for coaches whose corporate encounters take them into professional areas that have clear neurobehavioural ramifications – as, however often they are suppressed, the strong emotions and feelings of corporate life clearly do. As Damasio (1999) has so adroitly pointed out, if reason makes the lists but emotion makes the decisions, then the integration of thinking and feeling becomes a key area for the development of effective executive functioning, which is a view that would be substantially supported by Zelazo and Cunningham (2007) and Gordon (2008). Put bluntly by HBR: 'Emotional Intelligence, it turns out, isn't .. soft. If emotional obliviousness jeopardizes your ability to perform, fend off aggressors, or be compassionate in a crisis, no amount of attention to the bottom line will protect your career. Emotional intelligence isn't a luxury you can dispense with in tough times. It's a basic tool that, deployed with finesse, is the key to professional success'. (HBR 2008)

Self-interest combined with good science that is in daily use by practitioners (coaches) who are not themselves scientists,

directed at a section of the population (senior executives) that is perhaps among the most critical, pragmatic and yet (as much management consultancy demonstrates) gullible, might do well, for its own long-term benefit and to the benefit of those whom it serves, to make sure that at least the terms it uses are agreed and understood.

Emotional reactions are the result of a complex interaction between sensory stimuli, brain circuitry, past experiences, and the activity of neurotransmitter systems.

Reviewing the development of theories about the emotions from Darwin onwards, Bear *et.al* (2007) conclude: 'The experience and expression of emotions involve widespread activity in the nervous system, from the cerebral cortex to the ANS. Emotional reactions are the result of a complex interaction between sensory stimuli, brain circuitry, past experiences, and the activity of neurotransmitter systems'. Interestingly the word 'emotion' does not appear in their extensive glossary of neuroscientific terms. Nor does the word 'feeling', which is also absent from their index. For a book of some eight hundred and fifty pages those might be thought to be curious omissions; but 'feeling' or 'feelings', it transpires, is remarkably absent from the subject index of many major texts. Baumeister and Vohs (2004) have just one index entry for 'feeling tones'. Cacciopo and Berntson (2005) refer 'feelings' to 'Cognitive regulation of emotions'. Gross (2007) has no entry. The same is true for de Haan and Gunnar (2009) and Gazzaniga *et.al* (2009). It seems very curious that a word so central to human experience should be absent from the index entries of the major texts that seek to present current understandings of human behaviour and the cognitive and social neurosciences.

One solution to this is to sidestep any distinction between emotion and feeling altogether. Larsen and Prozmic (2004), for instance, observe that: 'A literature search 15 years

ago on the terms 'emotion' ... (plus others) ... would have produced scant results ... An important exception was an influential, early article by Morris and Reilly (1987) ... Their article marked the start of an era of intense interest in, and active research on, the topic of affect regulation in adulthood ... There are many definitions of affect regulation ... 'Affect' refers to the feeling tone that a person is experiencing at any particular point in time. Feeling tones vary primarily in terms of hedonic valence (*sic*), but they can also differ in terms of felt energy or arousal'. It can be seen here that there is a curtain smoothly drawn between 'emotion' and 'affect' but no effective clarification of the terms. Goleman (1996) says: 'I take *emotion* to refer to a feeling and its distinctive thoughts, psychological and biological states, and propensities to act. There are hundreds of emotions ...'. Alas, that is hardly a working definition though, as is observed later, Goleman did at least offer what turns out to be probably the most useful working list of the basic emotions.

We propose in this paper, therefore, that the term 'emotion', when used in the coaching field, (though it would also be applicable in many others), should be restricted to those states for which there is a reasonable assumption that they have become 'hard-wired' into the evolutionary development of the brain; and 'feelings' be used for everything that: [a] is a developed compound of emotions; [b] structures the individualised architecture of the brain through distributed neocortical networks, themselves developed through relationships; and [c] is the elaborated affective basis of the developed Self.

By analogy, if the primary colours produce, in various combinations, the whole of the colour spectrum then the basic or primary emotions, variously combined, create the whole of the feeling system. The terms 'primary emotions' and 'basic emotions' can be used interchangeably. They are primary in the sense that they exist even in a rudimentary form from birth as part of human (and other mammalian) evolutionary development. They are basic in the sense that they are the basis from which all feelings are derived and there is nothing that subsumes them.

Many practical implications flow from this proposal, not least some understanding of the way aesthetic awareness might be encouraged in education; or, in social policy terms, how limiting to human development are reality television programmes whose only objective is to provoke emotions rather than engage feelings. But it is not the purpose of this particular paper to explore the wider social ramifications of the proposal that is being made, but to offer it as a means of generating robust debate about the limbic processes that underlie effective (or even 'affective') leadership.

It should not go without notice, however, that even the terms 'basic' and 'primary' are not without controversy or confusion when trying to establish some necessary and

sufficient understanding of emotions. Siegel (1999), for instance, distinguishes between 'primary' and 'categorical' emotions. Solms and Turnbull (2002) link the basic emotions to inherited memories and (following Panksepp, 1998) use the term 'basic-emotion command systems', of which they describe four. Gazzaniga *et.al* (2009) refer to 'basic emotions, as seen through facial expressions' and 'dimensions of emotion, seen as reactions to events'. Bear *et.al* (2007) sidestep any discussion on the matter altogether in favour of describing the history of the idea of emotion.

We have emotions first and feelings after because evolution came up with emotions first and feelings later.

LeDoux (2007), on the other hand, does make a clear distinction between emotions and feelings, the latter being related to conscious awareness and the former not necessarily so, making it possible for him to study emotional memory in rats without recourse to conscious report. Gordon (2008) proposes an Emotion-Thinking-Self-Regulation continuum based upon the key organising principle of the brain to minimise danger and maximise reward. For Gordon, feelings emerge with thinking as aspects of the conscious awareness of nonconscious emotions. Similarly, though based on evolutionary argument rather than structural neuroscience, Damasio (2003) also makes a robust distinction between emotions and feelings but in terms of precedence. '... in our attempt to understand the complex chain of events that begins with emotion and ends up with feelings, we can be helped by a principle separation between the part of the process that is made public and the part that remains private. For the purposes of my work I call the former part emotion and the latter part *feeling* ... We have emotions first and feelings after because evolution came up with emotions first and feelings later.'

Gordon's neuroscience may be more compelling than Damasio's thoughts on evolution; though the evolutionary concept is more persuasive than the public/private concept, for which exceptions can readily be found. Damasio sees feelings and emotions as part of the evolutionary development of homeostatic regulation that starts with metabolic regulation, basic reflexes and immune responses, moves up through pain and pleasure behaviours, develops

into drives and emotions and then branches into emotions and feelings (p.17, *op.cit.*). But the evidence for such a system does not seem as robust as the assertion that proposes it. Le Doux (1996) is firmly in support of the evolutionary argument but in his earlier work made no serious distinction between emotion and feeling, eliding them completely. 'An emotion is a subjective experience, a passionate invading of consciousness, a feeling.' In this he is at odds with Damasio's distinction between public and private.

Where, then, does this leave the hapless coach, knowing that this emotional/feeling stuff seems to be very important; that it underpins all decision making; and that it is a very difficult area in which to engage the systematic attention of busy executives *even though* it may be vital to their own development and crucial to their effectiveness?

Confusion in the matter of the emotions is confounded by the widespread usage of the terms 'positive' and 'negative'. It is never clear as to whether these are objective attributes of the emotions in question; the responses of the person(s) experiencing the emotion; the responses of the person(s) witnessing the behavioural outputs of the emotion; or some other attribute related to general social approval or disapproval.

An emotion is a subjective experience, a passionate invading of consciousness, a feeling.

Oschner and Gross (2004), for instance, as being one among many instances that might be cited, report the results of fMRI localisation studies when experimentally increasing or decreasing 'negative' emotion. The description of their work seems to centre on variations of perceived sadness, their interest being in cortical control of affective states internally re-appraised. The term 'negative' is, however, a highly evaluative concept which, we suggest, is unlikely to advance the cause of a developing science because it lacks objective status; nor is it linked to any macro understanding of the structure or the elements of the neurocortical system they are studying. So the concept of 'negative' (and 'positive') emotions gets perpetuated experimentally when it is in fact

part of the un-thought/un-felt substructure of a field that will not be resolved by any amount of localisation studies if the central concepts are not agreed and shared.

We suggest that, for the time being and in pursuit of operational clarity, the essential distinction between emotions and feelings rests partly upon the evolutionary arguments advanced by Le Doux (1996) and Damasio (2004), but increasingly upon the rigour of Gordon's explanatory approach (Gordon, 2000, 2008, 2009). *A priori*, an evolutionary argument would fit within the mainstream of modern scientific understanding. But it is through clarifying the main structural and functional distinctions between emotions and feelings through detailing the primary (limbic/hypothalamic) and secondary (neocortically and viscerally distributed) pathways that advances in practice are likely to come.

How many are there and what are they called?

So in pursuit of the practical purposes of this paper and as well as agreeing, following Le Doux (2007) – though for different reasons – that the terms 'emotion(s)' and 'feeling(s)' should not be used interchangeably but as describing different states that will be represented differently neuromorphologically, a working understanding of the emotions also needs to start from an agreement as to how many there are and then what they might be called.

Not surprisingly, given the observations already made, this is not an easy state to arrive at, partly because, as already noted, the literature seems to be moving not only towards a wide use of the term 'affect' but also because higher order abstractions seem to be increasingly in favour. Thus Zelazo and Cunningham (2007), for instance, say: '... we use the term 'emotion' to refer to an aspect of human information processing that manifests in multiple dimensions: subjective experience, observable behaviour and physiological activity among them'. Thompson and Meyer (2007) work from the standpoint that '... emotions arise from person-environment transactions that are meaningful and motivational because they are relevant to the individual's goals and ... emotions entail interconnected changes in subjective experience, behaviour, physiology and expressions', and cite Gross and Thompson (2007) as the theoretical base of such a view.

It may be particular to the cognitive and social neurosciences that there is not a great deal of interest in defining exactly what the emotions are by name or number, the preference being for exploring neurocortical pathways that are experimentally rather than experientially defined. But that is likely only to add to confusion in the places where operational value needs to be extracted from clearly defined concepts; the everyday workplace of the executive coach, where the question 'So what?' is the typical utilitarian coachee's response to anything that is ill-defined. If a fundamental change in our understanding of the brain

and how it works has implications for our understanding of everything that the brain controls, especially the human behaviours in all their manifest forms that are the only source of profit in market-led economies (Wallace, 2002), then the sooner coaches are rigorous and agreed upon their understanding of their new knowledge the more likely is the value they will extract from it. Perhaps equally importantly, the experimental neuroscientists might also acquire some clear understanding of what the coaches would like better understood.

...the sooner coaches are rigorous and agreed upon their understanding of their new knowledge the more likely is the value they will extract from it.

So how many are there of these emotions? And what are they called? If these two key questions seem to be largely ignored in the cognitive and social neuroscience literature, it is difficult to be certain upon whether the huge interest that there is in emotional regulation is founded if there is no certainty about what it is that is being regulated. Despite the fact that Solms and Turnbull (2002) follow Pinksepp (1998) in recognising four 'basic-emotion command systems', Siegel's plaintive observation of a decade ago that 'There is quite a bit of controversy among scientists about what emotions actually are' still rings true (Siegel 1999).

We rely, therefore, on Goleman's early (1996) listing of eight primary emotions² which, surprisingly, appears not to have generated much directed research to establish whether or not they have neurological correlates. So his

² *Actually he described what might more readily be thought of as 'clusters' or 'families' of emotions, each cluster have a signifying emotion. But a firm distinction between 'emotions' and 'feelings' leaves open the possibility that particular feelings may be compounded most extraordinarily and not linked to familiar clusters at all.*

list has not been systematically challenged experimentally. If it could be shown, for instance, that there are separate pathways for each of a discrete and defined set of emotions then there would be some real foundation for the basis of a body of knowledge.

However, in proposing eight basic emotions, Goleman took little account of their representation within the autonomic nervous system or its two major subdivisions, using as the origin of his own listing Ekman's work on cross-cultural facial recognition of four emotions (Ekman & Friesen, 1975) that later became six (Gazzaniga *et.al*, 2009). If, however, one adds into the evolutionary assumption described above an understanding of homeostasis and considers that the emotions, being completely linked into the energy systems of the body, would have homeostatic properties attached to them, which would in turn be mediated by the ANS, then it becomes possible to see the eight basic emotions operating primarily within the subdivisions of the nonconscious limbic and autonomic nervous systems of the body. That then permits a rather more refined understanding of the primary emotions, which we present as follows.

Of the eight primary emotions that Goleman has proposed, five (fear, anger, disgust, shame and sadness) are likely to be represented post-limbically within the sympathetic division of the ANS. These are all escape/avoidance/survival emotions, generating complex behaviours accordingly. One emotion, a potentiator (surprise/startle) can flip response states into being escape/avoidance/survival or into one or both of the parasympathetic, attachment emotions (the two spectra of excitement/joy³ and love/trust). Sometimes, of course, all eight emotions can be firing simultaneously. Intense jealousy, by way of example, might be such a compound.

It is noticeable that in this formulation of the eight primary emotions, by far the greater number (five) are to do with survival. That would make evolutionary sense and also give us some understanding as to why it is so much easier to develop motivational systems based upon fear and its companions than upon excitement/joy and love/trust. In large measure, the energy that comes from the survival emotions goes inwards to protect the individual. The energy that comes from the two attachment emotions goes outwards into nurturing and creating. The energy that comes from the one potentiator is cleverly used by stand-up comics, the big-dipper industry and horror-film makers, among others. We are held by surprise/startle until there is clarification as to what is going to be triggered – clarification that may take only milliseconds and have no immediate conscious representation at all.

³ Goleman uses the term 'enjoyment'. We are of the view that 'enjoyment' is more properly thought of as a feeling than a primary emotion with 'excitement/joy' as the underlying emotion.

...this is what human experience is; the firing of our primary emotions and, if we have had the fortune to be well-nurtured, the distribution and elaboration of them in our pre-frontal cortical structures as refined feelings...

In popular writings the survival emotions would be thought of as 'negative' and the attachment emotions as 'positive'. They are not so at all. They are part of a complex, interdependent and integrated system in which it is possible to have all firing at the same time, though to great existential confusion when they do. But this is what human experience is; the firing of our primary emotions and, if we have had the fortune to be well-nurtured, the distribution and elaboration of them in our pre-frontal cortical structures as refined feelings, attached to the myriad of experientially-encoded neurotransmitters to which they might be attached so that they bring all the colour and meaning to our lives of which they are capable, thereby fulfilling their integrating purpose in the priming of our thinking and behavioural processes. Siegel's (2007) concept of the mind being the means by which the raw, complex neuro-chemical physicality of the brain is patterned into energy and information outputs through relationships is one particularly elegant model that relies upon such an understanding.

So our working model of emotional intelligence rests upon an understanding that there are eight emotions that presume integrated systemic processes that will have definable neurological pathways mediated by homeostatic mechanisms; that the emotions will be largely sub-cortical (limbic, visceral); that feelings (and the control of both emotions and feelings) will be largely neo-cortical (pre-frontal); and that all feelings (and hence the development

of the Self) are the elaboration of an extraordinarily complex and individually unique mixing of the primary emotions. Circuitry rather than specificity of localisation is of the essence in this concept and, following Bechara and Bar-On (in Cacioppo *et.al*, 2006), the limbic system is key.

...coaching interventions that set out to effect the primary emotions within the limbic pathways are more likely to produce results than those that are designed to operate at a neocortical level...

Subject to ongoing debate, we therefore propose here a working understanding of 'emotion(s)' underlying the application of the idea of 'emotional intelligence' that is true to the emotions' underlying neuromorphology and functional applicability in the organisational and coaching context. In doing so we propose that the standard working definition of 'emotional intelligence' [perhaps even sanctioned by the NLI]⁴ should at least include the following known and agreed distinctions:

1. There *is* an essential distinction between emotions and feelings.
2. There are eight basic emotions, of which five are escape/avoidance/survival; one is a potentiator; and two are attachment emotions. These differences are represented subcortically in the limbic system, and in the autonomic nervous system and its sympathetic and parasympathetic subdivisions.
3. That distinguishing 'positive' and 'negative' emotions bears no relation to the neuromorphology of emotions; is contradictory to a systemic view of a functional nervous system; and should be lost to professional usage.
4. The two attachment emotions are best thought of as each having a spectrum – excitement/joy and love/trust. It seems at the present state of knowledge to be easier

to convey the complexity of each of these through the idea of a spectrum rather than by a single descriptor.

5. 'Feelings' are the cortically distributed compounds of emotions.
6. Research has still to finalise these (1–5) proposals. They are, for the time being, a working hypothesis as to the most likely final outcome, but subject to verification.

We are conscious of the fact that the case we offer for these propositions is based more upon the confusion and incompleteness that exists in the literature than upon scientific finality at this stage. But we wish to start a clarification process and are of the view that there is sufficient certainty to begin that process of clarification.

The amygdala and the limbic leader

It is axiomatic, following the above, that the effective leader will have the attributes of an integrated, well-managed emotional system that has created and continues to support a well-distributed feeling system. For the leader who wishes to develop his or her effectiveness in a contract with a coach, upon what aspects of the system should coaching interventions focus?

Since Goleman's (1996) description of emotional hi-jacking, much has been made of the role of the amygdala⁵ and their involvement in fear reactions. This seems to us to be too limiting an understanding of the role and function of the amygdala, however. While all data streams are assessed by the amygdala for their threat value, it seems not improbable that all incoming (external and internal) data is assessed for all emotional values. Having been assessed by the amygdala, then *the limbic system acts as the primary distributor; for which the developed Self is the primary integrator.*

The conclusion that we reach on the basis of this understanding is that, where personal development and change is on the agenda, coaching interventions that set out to effect the primary emotions within the limbic pathways (bottom-up) are more likely to produce results than those that are designed to operate at a neocortical level (top-down), and that the mechanisms for establishing change are triggered by the limbic resonating capacity of the coach

⁴ It may be a development within the NLI that a Standing Committee is established to begin to agree the formal understandings of the neuroscientifically-determined terms that coaches use in practice – much as the key medical disciplines set out the definition of terms to help regulate communication and standard practice in specialist fields.

⁵ It might even be useful for the imagined Standing Committee to clarify the standard use of the term 'amygdala'. We use it here in its plural sense of the two almond-shaped nuclei that lie in the anterior temporal lobe. We have seen 'amygdalae' in use, as if 'amygdala' were singular; and occasionally 'amygdalum' when the singular is intended. Rather like 'data', it is probably doomed to be a word that is the same in the singular or plural, depending upon context.

and coachee in the relationship that is central to the coaching encounter⁶. So the coach's special task is to find ways of operating professionally at the very point at which the amygdala is assessing the emotional loading (valence) of any incoming signal and sorting out its allocation to an emotional pathway and hence starting its journey into the distributed network – bearing in mind that this is a process of milliseconds rather than minutes.

So whilst with his concept of the emotional hijack Goleman emphasised the threat appreciation function of the amygdala, what got left out of his formulation was the much more complex sorting task that the amygdala have. '... the amygdala ... is involved in the ways that our likes and dislikes are formed, how our emotions affect our actions and memories, and how we interact socially with others.' (Aggleton, 2006). Adolphs and Tranel (2006) have contributed to understanding how the human amygdala processes emotion by having the rare opportunity to study an individual with selective bilateral damage to the amygdala and accumulating similar data from laboratories other than their own. They conclude that '... one attractive hypothesis views the human amygdala as one component of the neural systems whereby we can trigger a physiological response, or the internal representation (i.e. the somatic image) of a physiological response in sensory neocortices, whose structure attempts to stimulate the internal state of another person, i.e. the amygdala (together with other neural structures, such as cortical regions located in the right hemisphere) allows us to engage a certain dispositional (emotional or social) state, and this state can be used to guide behaviour or to reconstruct conceptual knowledge, depending on the precise demands made by the experimental task in question.'

Whalen and Phelps' (2009) recent work on what they identify as '... the subcortical gray matter found rostral to the hippocampus in the medial temporal lobe' that is called the amygdala sets out to clarify, through animal, human and human dysfunction (psychiatric) studies the current (limited) state of knowledge about the amygdala. The developmental work reported (Tottenham, Hare and Casey, 2009) shows that although the basic neuroanatomical architecture of the amygdala is present at birth, fine-tuning of amygdala function continues throughout childhood and adolescence and – at least so far as facial recognition is concerned – '... what associations are formed between a stimulus and its emotional significance change as the emotional and/or social environment changes.'

⁶ This may also be true for psychotherapy, and may answer the so-far unresolved question that if there are more than four hundred forms of psychotherapy now recorded why is it that all psychotherapies seem to work some of the time but not some psychotherapies all of the time?

The limbic system and its role in leadership

The experimental design most commonly used to explore the amygdala as the gateway to the limbic system involves stimulating fear reactions of one intensity or another. If fear is (probably) the oldest of the emotions and the one most easily triggered (because it especially ensured mammalian survival), it is the most important function of the amygdala *but it is not the only one*.

...the limbic system is where the emotional system not only resides but is distributed; and from where the real meanings of messages arise in interpersonal communication...

If the limbic system is where the emotional system not only resides but is distributed; and from where the real meanings of messages arise in interpersonal communication; and where all incoming messages are initially assessed through the gateway agency of the amygdala; then it is perhaps of more practical purpose to know as much as we can about the limbic system than be especially concerned as to where the neuro-emotional pathways are developed cortically. This will aid the development of the concept of *The Limbic Leader*, in whom the key capacity is to be able to function with a high degree of freedom from fear and be well-tuned into external reality; whose amygdala are highly effective in the primary distributed emotional choices that they make; and whose neurocortically-distributed feeling system is fed by the primary emotions among the complex inter-hemispheric pathways of the corpus callosum that enable complex subtleties to be appreciated, filtered and then returned for transmission to and from those to whom the leader relates. Only the internally well-connected individual can really become a well-connecting leader.

As we see it, the special quality of the limbic leader in being able to function with a high degree of freedom from internal

fear is to be able to allow external threats to create an appropriate sense of appropriate fear, and thereby be able to modulate and manage all emotions in such a way that s/he manages the resonating of that fear in others as they internalise their capacity to manage it too. The key to success as a leader is in developing the external awareness of what is required, and the internal versatility (aesthetic) to be able to access and establish resonance using the appropriate style based upon appropriate feelings. The leader who gets hijacked by a poorly-regulated internal system (limbic processes flood the neocortex) will not establish the credibility necessary for effective leadership.⁷

Ochsner (2008) has suggested five ways in which the fear reaction may be modulated, though the concept of the limbic leader presented here would require that all eight emotions are under effective management. The work of the Center for Creative Leadership at Greensboro has identified fourteen characteristics that would usefully define the limbic leader. They all include a sense of the person's internal world being available for external use and continuous re-validation, and so imply a well-developed and integrated Self. It is perhaps this that is the single most important (though complex) aspect of the limbic leader and the aspiration of much coaching.

In conclusion

In doing justice both to the rigours of current neuroscientific research and the development of a profession founded upon such research, this paper has argued for the professional necessity to establish high levels of integrity in developing an agreed knowledge base and its application. The authors hope to have made a start in this explicit aim by stating the elements of what they consider are the essentials of an understanding of the emotions underlying emotional intelligence; and have elaborated that understanding with reference to the neurobiology of the effective leader, in whom the limbic system would be well-resonating through the gateways of amygdala that were scanning at their most effective; and where not only fear but the other seven main emotions were effectively modulated in the service of a whole sense of Self. From such a position an individual might become, by choice and effective coaching, a limbic leader – challenged in the leadership task but not challenged by their own internal limbic limitations.

So a task that will increasingly fall to the executive coach will be to make some high-value decisions in the early stages of a coaching engagement as to what s/he judges the coachee's emotional capacity (resonating tone) to be, and where the coach's efforts might be best applied. Having in mind the

tripartite differentiation between escape/avoidance/survival, surprise/startle, and the attachment emotions will, we suggest, offer a guided way into this key professional task.

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⁷ Except, of course, by selectively hiring staff (subordinates) who have themselves in their formative patterning experiences been exposed to the stresses induced by poorly-regulated bosses (parents).

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