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Shame & Belonging in Childhood:
The Interaction Between Relationship and Neurobiological
Development in the Early Years of Life¹

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Abstract

Recent neurobiological research findings parallel, support, and inform Gestalt field theory's notions of childhood development. This article examines the neurobiological research literature involving the role and importance of relationship in structuring neural circuits in the first and second year of life, as well as what this information means from a Gestalt constructionist, intersubjective perspective. Areas covered include the caregiver-infant interconnection that enables brain circuitry development supporting elation/arousal, the role of minor forms of shame and repair that leads to the *normalization of disappointment* as a tool in belonging, the neurological underpinnings of the development of ground shame, and a discussion of how neurological research supports a need to diagnose from a field perspective rather than an individual perspective.

Gestalt field theory heralds the importance of attuned relationship in childhood development. This idea and the correlates that stem from it emanate from Gestalt's long held tenets of how we are interconnected and how intersubjective, co-constructed experience is the basis of self/other development.

This idea is now being reinforced by current brain research, findings of which parallel, support and inform Gestalt theory. For example, note the similarity to the Gestalt idea above to what Siegel (1999) says in the introduction of his book, *The Developing Mind*: "The mind emerges from the activity of the brain, whose structure and function are directly shaped by interpersonal experience." (p. 1) With regard to the developing infant, Siegel states:

Though experience shapes the activity of the brain and the strength of neuronal connections throughout life, experience early in life may be especially crucial in organizing the way the basic structures of the brain develop. (p. 13)

In this article I review the neurological literature around brain formation in the first two years of life. Not only does this information have much to offer in appreciating and refining Gestalt concepts, it also generates further possibilities when viewed through the Gestalt lens.

To a large extent I have used the extensive information gathered by Alan Schore as a source of neurological research. Because the technical aspect of this topic can detract from what I am attempting to do here, I have endeavored to use the least technical

language possible. However, for those who are interested I have included some of the underpinning neurological information in footnotes.

Through out this article we will be looking at the factors that shape a child's developing sense of shame and belonging. Thus as a foundation for this exploration, let's review what shame means from a Gestalt field theory perspective. (Lee, 1995)

What a Shame!

The phenomenon of shame encompasses much more than our common cultural sense of having done something wrong, thus being shameful, or of being flawed in some manner. At its core, shame is about pulling back (Tomkins, 1965). It is our way to attempt to protect our selves or others when we perceive that we won't be received (Lee, 1995; Lee & Wheeler, 1996). This larger meaning is contained in a common usage of the word "shame" in our everyday conversation, although without our awareness. For example, our common reply to being told that 2-year old Jenny lost her favorite "blankie," or that 6-year old Mark's ice cream fell on the ground, or more profoundly that 13-year old Maria's mother just died, or to any incidence of hardship or loss for anyone of any age for that matter, is "What a shame!" This usage of "shame" isn't just a coincidental colloquialism. It makes sense, as on a compassionate level we understand that the yearnings in these examples couldn't get met, and so the children involved had to disengage from mobilizing on their yearnings in these situations. Thus they were primed for the experience of shame to pull them back.

Shame is our body's natural way of retroreflecting when we are off-balance without sufficient support, when we have a desire/want/yearning to connect in some way with someone/something, and we sense that our desired connection may not be possible. As such the potential for shame is woven into every instance of contact. The experience of shame, in this manner, helps us identify the places where we sense connection is not possible so that we can move to and find the places where we can connect.

Shame's family of affects, which help us pull back when we sense that a longed for connection is not possible, include shyness, embarrassment, chagrin, ignominy, shame, humiliation, even "feeling lousy" (Kaufman, 1989; Lewis, 1971; Retzinger, 1987). Ironically, we experience shame as information about our self (as being inadequate, worthless, unlovable, inappropriate, too much, too little, and so on), when in reality it is information about the field around us (others being preoccupied, disapproving, disinterested, uninformed, not knowing how to respond, absent, or the like).

As stated, this form of temporal shame we need as we move through life, we will often experience it as disappointment, shyness, or embarrassment. Among other things, the experience of shame in this manner represents a respect for other's boundaries (again we may experience it as information as about ourselves). We might see this in others or our selves as a sense of humility. Note that behavior that lacks respect is considered to be "shameless."

There is another way that shame can act to attempt to protect us or others that we care about. If the experience of lack of reception is too severe (as in abuse, neglect, or significant loss) or it is consistent enough over time, then shame will link with the experience that we have of not being received such that every time we have a yearning to

be in the world in that manner, shame will automatically be activated to pull us back from mobilizing in the direction of that yearning. There no longer has to be some sensed possibility of unavailability of connection in the environment at the moment. Instead the emergence of our yearning is the trigger for shame. This in effect represents a hardened belief, a fixed gestalt, that our yearning wouldn't have a chance of reception under any circumstances. This form of shame I refer to as *ground shame*. (Kaufman (1989), who introduced this concept, labeled this form of shame "internalized shame." I prefer to use "ground shame," as our ground is our sense of our relational field.)

In terms of Gestalt theory, ground shame is what Perls called "introjects." (See Lee, 1995) And of course, what we project is the unassimilated shame bind, and at the core of Perl's retroflexion is also an element of ground shame. Thus the development of ground shame takes one out of a relational sense of the world and deposits the person in an individualistic paradigm in which they are disconnected, alone, and the subject of blame or disregard. Instead of the excitement and mobilizing possibilities coincident with yearning the person is left with a sense of hopelessness and deflation.

With this summary of shame from a Gestalt field theory perspective, let's move to the other side of this polarity to the development of belonging in the first year of life.

Emotional/Neurobiological Development In the First Year of Life

The last two decades has yielded an explosion of information on emotional/neurobiological development in the first year of human life. Research now shows us that a primary psychoneurological developmental task during this period is enabling the infant's brain to experience and tolerate increasing amounts of elation/arousal, in conjunction with intersubjective experience with an attuned caregiver. The importance of relationship in this process is paramount. As Schore (1998) states in summarizing the neurobiological and related research in the field:

Over the course of this year, the primary caregiver-infant relationship co-constructs an increasingly complex dynamic system of mutual reciprocal influences that mediates the formation of an attachment bond within the dyad. This interactive mechanism regulates the infant's psychobiological states, thereby allowing the child to tolerate more intense and longer lasting levels of heightened, yet modulated, arousal. This ontogenetic achievement, central to human development, enables the infant to experience very high levels of the positive affects of interest-excitement and enjoyment-joy by the end of the first year. (p.58)

This is an example of how the learnings coming from neurobiological research so parallel and support Gestalt field theory's constructionist, intersubjective sense of this human interaction. (See Frank, 2001, and Wheeler & McConville, 2003, on child development.) Schore continues, saying that this process is highlighted by caregiver-infant mutual gazing, coordinated with auditory vocalizations, tactile touching and body gestures. Stern (Stern et al., 2003) describes how interactive mirror neuron and adaptive oscillator circuits are also important in this process. Caregiver and infant become an

energy resonant system with the caregiver reflecting, and in essence holding and amplifying, the crescendos and descrescendos of the infant's psychobiological, internal state. (Schore, 1998; Stern, 1990)

Trevarthen (1993) describes, from his research on mother-infant interactions, this process as an interactive mechanism by which older brains engage with mental states of awareness, emotion, and interest in younger brains. He concludes that infant neurological growth literally requires brain-brain interaction occurring in the context of an intimate (positive) relationship between caregiver and infant.

As this implies, it is now thought that the attachment relationship is essentially a regulator of arousal (van der Kolk & Fislis, 1994). It is further believed that the regulatory process is the precursor of psychological attachment and its associated emotions (Hofer, 1994). All of which underscores that psychobiological attunement is the mechanism that mediates attachment bond formation. Again, this highlights the Gestalt principles of the primacy of co-constructed, intersubjective contact and the importance of the field and support in development. (Frank, 2001, and Wheeler & McConville, 2003)

From a neurobiological perspective, as outlined by Schore (1998), the mother's (caregiver's) gaze influences the neural substrates for emotion by directly regulating the levels of important neurotransmitters (catecholamines, dopamine and noradrenaline) some of which are involved in arousal/elation and others of which act as regulators of neural development.²

Schore states that the developing control center of this neurological structuring in the infant's brain is located in the right orbitofrontal cortex, an area of the prefrontal cortex hidden behind the orbit of the right eye. This area, which is learning to monitor increased levels of elation/arousal in accordance with intersubjective experience with the caregiver, undergoes immense neural growth during this period. (See Schore, 1998, for details of pathways projected to various limbic areas of the brain.)

By the end of the first year, as the infant begins to toddle, the orbitofrontal cortex is sufficiently developed for the infant to be able to access internal working models that include more varied and complex expectations of being matched by and being able to match another, as well as increased ability to participate in the state and experience of the other. These increases in the child's innate ability to appraise self and other in order to meet in a mutually supported, intersubjective state of arousal with the caregiver provides the toddler with the beginning cognitive-emotional foundation necessary for the next step in neurological development. (Schore, 1998; Stern et al., 2003; Trevarthen, 1993)

Shame in a Minor Key: The Normalization of Disappointment

In the second year of life, a task opposite from supporting arousal becomes figural. The toddler can now explore the world considerably more independently than during the first year of life. However, with this extended ability of the infant comes the parental task of providing secure enough limits for the infant's safe exploration. This dictates an alteration in caregiver-infant interactions and presents a challenge in negotiating this changed landscape in an attuned manner. Schore (1998) estimates that at 10 months 90% of caregiver behavior is concerned with affection, play, and caregiving; whereas by the

time infants reach 13 months, caregivers are expressing a prohibition on the average of every 9 minutes.

Remember that through the first year the infant comes to expect that new experiences of interest or joy will be met with a basically holding/approving gaze by the caregiver. However, in the second year there are now many more times when the caregiver, because of safety or other considerations, does not find it in keeping with this new goal to fully support the child's behavior and doesn't enter into the co-regulated state of arousal that the infant expects, instead instituting some perceived needed limit. From the infant's perspective, in accordance with what we discussed earlier, we might say, "What a shame!" And in fact, this interruption in the infant's desired arousal supporting connection triggers the experience of shame, even though an attuned caregiver will wisely deliver the inhibition in a caring manner. As Schore (1998) states:

The ensuing break in an anticipated visual-affective communication triggers a sudden shock-induced deflation of positive affect, and the infant is thus propelled into a state which he or she cannot yet autoregulate. Shame represents this rapid state transition from a preexisting positive state to a negative state. (p. 65)

This, of course, facilitates the child pulling back from mobilizing on his/her yearning, through the involuntary experience of a painful state of distress, characterized by "a sudden decrement in mounting pleasure, a rapid inhibition of excitement, and cardiac deceleration."³ (Schore, p. 66)

Schore states that the experience of shame is mediated by the production of corticosteroids⁴ that start the process of "pulling in." He mentions two such corticosteroids – cortisol and corticosterone.⁵ Others report that even short-lived increased levels of corticosteroids induce inhibition and withdrawal (Stansbury & Gunnar, 1994). Schore sees this interpersonal-dependent experience of shame in the infant as shifting from a state of heightened arousal into a low-keyed inhibitory state of conservation-withdrawal that occurs in helpless and hopeless situations.⁶

How long the child remains in this stress state is an important factor.
(Schore, 1998, p. 66) (Italics added)

The last quote from Schore is of particular significance. If the child is left too long in this corticosteroid bath of shame the literature then turns to describing trauma. Of course, attuned parents intuitively understand this and do not allow this to happen. Instead the attuned caregiver will quickly and compassionately reestablish a mutual bond that serves to regulate and *metabolize* the shame that has been triggered in setting a limit. From a Gestalt field perspective the infant is taken from an experience of **belonging (having an interest or experience of joy and wanting to share it) to** an experience of not belonging (his/her yearning not being met by the caregiver) and finally to a repair experience of belonging (reestablishment of the arousal bond). In the process the orbitofrontal cortex is further organized:

The sudden triggering of shame reflects an alteration of the infant's psychobiological state and the onset of a stress reaction, manifested in elevated levels of corticosteroids in the infant's brain. [which initiates the painful inhibition state]... But during critical periods of cortical maturation these neurohormones do more than just transiently perturb states – in fact, they directly influence brain growth.... Developmental shame experiences thus induce a neurobiological reorganization of evolving brain circuitries. (Schore, 1998, p. 68)

Thus through experiences of shame and repair in the second year, the infant starts to develop an important ability to regulate his/her arousal when not met by significant others. The site of control of this learning is again the orbitofrontal cortex.⁷

The importance of this experience-dependent maturation of the orbitofrontal cortex must be underscored. From a Gestalt field perspective and from my clinical experience, what this represents is the *normalization of disappointment*—or said more concisely—the start of *the inclusion of disappointment as a tool of belonging*. Through this shame and repair dyadic process, lesser forms/experiences of shame such as disappointment become integrated into the experience of belonging. Thus disappointment becomes a tool that is available throughout life to be used as a part of learning. That is, if this process is carried out in an attuned manner, with a minimum of disconnection and timely repair, the child comes to understand/believe that when he/she is not met with an arousal amplifying/regulating gaze it does not mean that he/she does not belong, instead it means that the caregiver will return to engage soon.

Is what is being described here a significant part of the psychobiological underpinning of the development of basic trust? It certainly is a crucial element in being able to negotiate life in general – to experience one's self as being loved and having value, to be able to stay in tune with other's experience in the field, to have access to connective resources, and to be inclusively creative in problem solving. If not sufficiently attained, this deficit leads to off-balancedness and to isolative and over-aggressive creative adjustments that in time find their way to therapy or other sources of social control.

Without the development of this type of brain circuitry, disappointment becomes a trigger for and conduit to deeper experiences of shame. This is the experience of not belonging and of “this is not my world,” which carries with it a sense of worthlessness, all of which is the body's way of protectively pulling back when the environment severely enough or consistently enough does not offer a route for meaningful inclusive connection. (In discussing misattunement here and later, I do not wish to blame parents. This is an area in which parents need a great deal of support, especially if they have not been lucky enough to have received this kind of attunement in their own lives.)

As a side note, these research findings, of the need for re-connective repair after the experience of shame in limit setting, speak volumes against the common practice of disciplining a child of any age by using isolating techniques such as time-outs in a closed room, after misbehavior. Advocates of such techniques might say that what is intended is

to provide the child an opportunity to think about what he/she did and to reorganize in another fashion. Certainly, such techniques provide a time for parents or other caregivers to organize, giving them support. But what children need is more relationship, not isolation, at such times. That is why institutes that serve older children and adolescents and that operate from a relational basis have the child pick a buddy that must be within arms length of the child during times of discipline. (See Kanner & Lee, 2004) The trick is to find a method of disciplining that restores relationship and at the same time supports the whole field.

To return to the course of development with an attuned caregiver in early development, Schore suggests that, with the experience-dependent neural growth in the first and second year of life, the orbitofrontal cortex becomes the control center for social interaction.⁸ From a Gestalt field perspective, this suggests that the orbitofrontal cortex is the monitor of shame and belonging in the field.

Shame in a Major Key The Development of Ground Shame

As mentioned earlier, if the child is left too long in the experience of shame then the literature turns to trauma. There is significant evidence that this also leads to the development of ground shame. Kaufman (1989) has long talked about how experiences of trauma are major sources of ground shame. (Again, Kaufman uses the label “internalized shame.”) So it is not surprising that what Schore identifies as the mediator of the experience of shame, namely the release of corticosteroids, has long been associated with the development of trauma.

In addition, ground shame has been strongly correlated with the majority of DSM IV, Axis I diagnoses. (Cook, 1994) So similarly, it is not surprising that increased levels of corticosteroids (in particular, cortisol) have been associated with many of these same diagnoses.

To list a few of the adverse findings linked with increased levels of corticosteroids:

- A single dose of corticosteroids during early development delays the maturation of auditory-, visual-, and somatosensory- potentials. (Trad, 1989)
- Exposure of the developing brain to corticosteroids affects myelination (the process of protectively covering neurons), neural morphology (premature pruning of cells during critical, early development), neurogenesis (the formation of new neurons), and synaptogenesis (the formation of synaptic connections between neurons). (Schore, 1997; Teicher et al., 2002)
- Cortisol inhibits immune and inflammatory processes. (Teicher et al., 2002)
- Increased levels of corticosteroids have been associated with PTSD symptomatology. (Schore, 1997)
- Increased levels of cortisol have been associated with both childhood and adult major depression and dysthymia as well as with the experience of worthlessness, helplessness, and with suicide. (Trad, 1989).

- Children who lost a parent in the September 11, 2001 terrorist attack were subsequently found to have increased levels of cortisol in association with significantly increased incidence of psychiatric disorders involving anxiety and PTSD. (Pfeffer et al., 2007)
- Cortisol nonsuppression has been associated with anorexia nervosa, bulimia and opiate addiction. (Trad, 1989)

Consider a recent study involving mothers and infants. (Morelius et al., 2007) The mothers in this study were selected because of attunement difficulties and correspondingly the infants had developed attachment problems. (To repeat our compassionate response to such situations—What a shame!) It has been known that maternal (caregiver) inattention increases corticosteroid levels (Teicher et al., 2002), which as covered above is the initiator of the experience of shame. Morelius' group found that cortisol levels increased in both mothers and infants during diaper changes. From our theory above, the need for both mother and child to pull away from their yearnings to connect with each other, through the experience of shame, under such circumstances is understandable. Treatment with these mothers improved their sensitivity to their infant's signals, and cortisol levels in both mothers and infants during diaper changes decreased to normal levels for dyads in which the infant was under 3 months of age. However, the cortisol levels did not decrease in infants older than 3 months. Morelius et al. conclude:

According to the results of the present study, an early intervention is of great importance. Thus we need to continue with early support and to help mothers at psychosocial risk to improve the mother-infant relationship in order to protect the infants from developing long-term health consequences. (p. 137)

I believe that among the long-term health consequences mentioned above is the development of ground shame, which represents the hardened belief that it is not possible for a given yearning to connect to be responded to.

The Need to Diagnose from a Field Perspective

The above example of maladapted mothers and infants highlights the need to diagnose from a field perspective—to understand the human field context in which given symptoms and behavior present. As a further exploration of this concept, consider the dilemma of the child who is unlucky enough to have parents who do not have the ability or support to attend in an attuned manner. The fall into shame for the child, without the needed repair that comes from the reestablishment of an attuned connection, is inevitable. As noted above, this is an experience that is extremely unpalatable. If possible, the child must then devise a way, most likely without awareness, to avoid similar experiences of shame in the future. From this perspective the creative adjustments that later appear in therapy could be seen in many cases as attempts to avoid this horrendous experience of shame, which in the past have not been followed by an experience of repair.

Along this line, Teicher et al. (2002), point out that the brain is designed to be sculpted and molded by experience. Thus they suggest that alterations in brain structure, seen in early experiences of exposure to corticosteroids, are what we would term in Gestalt as organismic creative adjustments which are fashioned in the service of survival:

...we hypothesize that... postnatal neglect or maltreatment provokes a cascade of stress responses [the release of corticosteroids] that organize the brain to develop along a specific pathway selected to facilitate reproductive success and survival in a world of deprivation and strife. This pathway, however, is costly because it is associated with the increased risk of developing serious medical and psychiatric disorders and is unnecessary and maladaptive in a more benign environment. (p. 17)

As this implies, the child's creative adjustment must fit with the environmental conditions present in the family. What are the possibilities? Perhaps a child learns to avoid this unsupported bath of corticosteroids associated with the experience of shame by not attending. If we just look at the symptoms, we might diagnose this child as having Attention Deficit Disorder. Or perhaps the child discovers that if he/she activates their energy through rapid movement he/she can, at least partially; avoid the experience of unsupported shame. In this case, if we solely notice the behavior we may diagnose the child with Attention Deficit Hyperactive Disorder.

Aggression is a frequent strategy used in attempting to avoid shame. This is not surprising from a Gestalt point of view, as Perls thought restoring a person's ability to aggress was the primary path to undoing neurosis. While this strategy is at times useful, he did not see hidden shame. (Lee, 1995) The shame-rage cycle as a means of attempting to avoid shame was long ago pointed out and studied by Retzinger (1987). From a neurohormonal point of view, several researchers have found that cortisol increases are not correlated with hostility, physical aggression, or delinquent behavior. (Popma et al., 2007)

In a recent study concerning interparental conflict and child maladjustment, Davies et al. (2007), found that a child's diminished cortisol reactivity predicted parental reports of the child externalizing symptoms and exhibiting problematic behavior. Interestingly, the researchers were able to determine through their research design that it was the diminishment of cortisol levels that enabled this aggressive creative adaptation in the face of on-going parental conflict.

In my view, the children in these last several examples have acquired ground shame, which controls their underlying yearning to connect, and they have learned to mask and cope with this condition through aggression. (See Kanner & Lee, 2004, for a description of working with adolescents in a relational manner.)

All of this points to the importance of understanding the family context in which the child's symptoms and behavior arise. What does a child's symptoms and behavior say about the underlying needs for support in the family in general? Answering this question means embracing the humanity of the family, and the family's connections in the larger world, in an appreciative manner.

Wrapping Up

Starting in childhood and continuing throughout life, the experience of shame is always an attempt to protect (both our selves and others)—automatically initiating our pulling back when we perceive that we won't be received and we don't have sufficient support. In mild forms (e.g., shyness, embarrassment, and disappointment) it assists us to identify the places where we don't believe connection is possible so that we can move to the places where we can connect. Neurobiological research gives us a further understanding of how gentle limit setting followed by reestablishment of an arousal bond, early in life, normalizes this process (normalizes disappointment) as a part of belonging and as a tool for learning and living.

Neurobiological research also confirms that if infants are, consistently or more severely, left too long in the experience of shame, and don't experience a reparative connection of belonging, then trauma and ground shame result.

All of this points to the need to appreciatively understand the field context, in which symptoms present, when we diagnose. Following the signs of shame appreciatively in an individual can open doors to healing and belonging in the larger field that might not otherwise even be noticed.

Notes

1. This article was originally written for the forthcoming collected volume, R. G. Lee & S. Toman (Eds.) *Evolution of Gestalt II: Relational Child, Relational Brain*. (The Analytic Press/GestaltPress, in press). The author wishes to thank Lee Geltman for his help in editing this manuscript.
2. Amplified levels of interest-excitement in the mother's face also initiates/supports three other effects in the infant's brain—(1) elevated levels of corticotropin-releasing factor (CRF), a neuropeptide produced in paraventricular hypothalamic centers that activates the energy-mobilizing sympathetic division of the autonomic nervous system (ANS), (2) increases in plasma concentrations of noradrenaline, thereby intensifying levels of (sympathetic-dominant) arousal, seen in heightened infant activity levels, and (3) increased levels of endogenous opiates (endorphins) that biochemically mediate the pleasurable qualities of social interactions, social affect, and attachment. The latter occurs via activation of the ventral tegmental dopamine system. (Schore, 1998)
3. Cardiac deceleration is achieved by means of vagal impulses in the medulla.
4. Corticosteroids are a class of steroid hormones that are known to be secreted by the adrenal cortex in response to serious injury or stress and that tend to shift the body from carbohydrate to fat metabolism, to regulate blood pressure, and to affect immune response and regulate inflammation. (Coleman, 2001)
5. A number of other researchers have reported finding a connection between forms of shame and increased levels of corticosteroids (cortisol in particular)—for example see :Dickerson & Gable, 2004; Dickerson, Gruenewald, & Kemeny, 2004; Lewis & Ramsey, 2002; and Tops et al., 2006. At the same time the

- relationship between shame and corticosteroids, as well as the damage that corticosteroids may do, appears to be complex and involve the role of receptors as well. (de Kloet et al., 1999; de Kloet et al., 2005; Stansbury & Gunnar, 1992)
6. The onset of the interactively triggered shame state thus represents a sudden shift from energy-mobilizing sympathetic to energy-conserving parasympathetic dominant ANS activity, a rapid transition from a hyperaroused to a hypoaroused state, and a sudden switch from ergotropic (sympathetically driven) to trophotropic (parasympathetically driven) arousal.... In such a psychobiological state transition, sympathetically powered elation, heightened arousal, and elevated activity level instantly evaporate. (Schoore, 1998)
 7. "This organization includes the fine-tuning of descending projections from the prefrontal cortex to subcortical structures that are known to mature during infancy. Of particular importance is the growth of prefrontal axons back down to subcortical targets on noradrenergic neurons in the nucleus of the solitary tract of the brain stem caudal reticular formation and the vagal complex in the medulla ... and in parasympathetic autonomic areas of the hypothalamus By this process the organization of the lateral tegmental forebrain-midbrain limbic circuit that brakes arousal and activates the onset of an inhibitory state is completed." (Schoore, 1998, p.69)
 8. Schoore (1998) states, "Along with the earlier developing ventral tegmental limbic forebrain-midbrain circuit, the orbitofrontal system now connects into both the excitatory and inhibitory limbic circuits. Its direct connections with the hypothalamus enable it to act as a major center of central nervous system control over the energy-mobilizing sympathetic and energy-conserving parasympathetic branches of the autonomic nervous system." (p. 69)

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