Is There a Drive to Love?

Yoram Yovell (Haifa, Israel)

This paper offers a neuropsychoanalytic examination of two partially overlapping issues: the nature of the relationship between romantic love, sexuality, and attachment; and the possible existence of a unique drive for romantic love. Over the last century, Freud’s theories about the mental forces and developmental pathways that lead to adult romantic love have served as a basis for psychoanalytic investigation and understanding of human relationships in general. Drive theory, which has become less popular in contemporary psychoanalysis, was formulated as a systematic attempt to describe the most basic motivational determinants of desire, emotion, thought, and behavior from the perspective of human subjective experience. The work of Bowlby and other attachment theorists provided a different, and in many ways complementary, view about the origins of the human need to love and be loved. Recent advances in the cognitive and affective neurosciences have enabled psychologists and neurobiologists to investigate different aspects of romantic love, including its motivational basis. These developments have rekindled the scientific interest in the concept of drive in general and libido in particular. On the basis of psychoanalytic, psychological, and neuroscientific findings and theories about the forces that drive human love, the paper examines whether romantic love is the product of one, two, or three drives or instincts. The view that human romantic love is ultimately motivated by a single drive or instinct can no longer be sustained. Converging evidence suggests that romantic love is shaped and influenced by the action of at least two independent, interacting psychobiological instinctual/emotional systems. It is proposed that the final number of systems involved in romantic love depends on the definition of “drive.”

Keywords: attachment; Bowlby; drive; Freud; love; neuropsychoanalysis; sexuality

From its very beginning, psychoanalysis has been interested in the nature and origins of romantic love (Freud, 1905d, 1912d; Kernberg, 1995; Mitchell, 1997). More recently, romantic love has also become the focus of research and discussion in the neurobiological, anthropological, and general psychological literature (reviewed in Fisher, 2004). Until the last few years, romantic love and its vicissitudes were often discussed within psychoanalysis—as well as within the cognitive neurosciences—in complete ignorance (or in complete denial) of the contributions of the other group of disciplines to the subject.¹

Recently, however, advances in the cognitive and affective neurosciences have created a situation in which the previously separate and unconnected psychoanalytic and neuroscientific discussions about the origins of romantic love have come to partially overlap. This development is to some extent the result of technological advances in functional brain imaging and in other areas. Over the last two decades, these methodological innovations, together with a growing ability to integrate data from multiple sources, have enabled neuroscientists and cognitive psychologists to ask questions and approach issues and areas that until then were only investigated by psychoanalysts. One such area is love.²

Psychoanalysis and the neurosciences are now engaged, each from its own perspective, in a common effort to understand the motivational basis and the

¹This paper takes the approach that psychoanalysis and the cognitive neurosciences are best conceptualized as two groups of disciplines, rather than as two monolithic entities, each of which is fully internally consistent. These two groups of disciplines employ different methodologies to investigate the two complementary aspects of the human mind—the subjective and the objective. Although it seems self-evident that the findings of one group of disciplines may at times be relevant to the other, this idea is still hotly contested (Blass & Carmeli, 2007).

²Philosophers and poets have, of course, always wondered about the nature of love, and they have defined and classified its different incarnations in various ways (i.e., Plato’s Symposium, 1999). Nevertheless, until recently, the study of love has been excluded from the realm of scientific inquiry. This omission was due, at least in part, to Galileo’s classical distinction between primary and secondary properties (Galileo, 1623). Because love is often conceptualized as a subjective state, it was considered to be a secondary property and was not dealt with scientifically until the emergence of psychoanalysis and experimental psychology during the last century.
functional organization of the human mind. It might therefore be possible to use concepts, findings, and models employed in the neurobiological and cognitive-psychological study of love in order to enrich and enhance the psychoanalytic study of love—and vice versa. Indeed, this is the task of neuropsychoanalysis, which seeks to create bridges between psychoanalytic and neurobiological data and models of the mind (Solms & Turnbull, 2002).

The subject of love in general and romantic love in particular is perhaps ideally suited for an interdisciplinary neuropsychoanalytic inquiry. This is because love is first and foremost a subjective state, something one feels. Animal studies have revealed a great deal about the genetic, hormonal, and neural mechanisms of sexual attraction, mate choice, and maternal nurturance (reviewed in Fisher, 2004; Panksepp, 1998). However, one would also need to pay attention to what humans say about their loved ones and about their loving feelings—and consider unconscious aspects of these feelings and object relations—in order to meaningfully understand love. With that in mind, this paper is an attempt to conduct a neuropsychoanalytic examination of two interrelated and partially overlapping questions concerning the nature and origins of romantic love:

1. How do romantic love, sexuality, and attachment relate to each other?
2. Is there a unique drive or instinct for romantic love, or is it a product of other drives or instincts, none of which is unique to it?

Over a century ago, Freud (1905d) formulated a highly elaborate developmental theory of love. His dynamic model has served as a starting point for psychoanalytic discussion ever since (reviewed in Mitchell & Black, 1995). Even recent psychoanalytic theoreticians who have rejected part or all of Freud’s original drive theory refer to it as a starting point (Apfelbaum, 2005). In the course of the last few decades, cognitive-psychological, neurobiological, evolutionary, and anthropological theories of romantic love have also been offered and refined (Aron, Fisher, & Strong, 2006; Fisher, 2004). Both the psychoanalytic and the cognitive-neuroscientific literature about romantic love explicitly address the two questions outlined above.

It might therefore be worthwhile to examine how these two bodies of knowledge, which employ different methodologies and stem from two different and complementary viewpoints on the human mind, correspond to each other and may be relevant to each other. This is the purpose of this paper. But in order to be in a position to discuss the origins of romantic love and its relation to drive from a neuropsychoanalytic perspective, the definitions of two key concepts that are relevant for this discussion—“drive” and “romantic love”—must be examined first.

The definition of romantic love will be reviewed from a phenomenological, descriptive perspective. In contrast, the definition of drive will be reviewed and discussed in some detail from a viewpoint that attempts to correlate psychoanalytic and neuroscientific findings and concepts. It will then be considered in relation to several other terms that are almost always involved in discussions about the origins of love—emotion, motivation, instinct, object, etc. This may enable the construction of a neuropsychoanalytic hierarchical overview that would place the analytic concept of drive within a larger framework that also addresses recent findings and theories that have emerged in the cognitive and affective neurosciences.

**Defining “drive”: ontology, taxonomy, and functional relations**

Above and beyond its relevance for describing and defining the origins of romantic love, the concept of drive is fundamental for a neuropsychoanalytic understanding of the functioning of the mental apparatus. It is the most basic motivational concept and is therefore the most elementary concept in explaining desire, emotion, thought, and behavior from the perspective of human subjective experience. It is probably no coincidence that Freud, the founder of psychoanalysis, struggled with the concept of drive as he attempted to construct a coherent psychological theory about the structure and function of the human mental apparatus (Freud, 1915c). But a major stumbling block for the psychoanalytic understanding of drive as a source of motivation is the fact that it is as distant from introspective awareness as is possible.

Drive is the most “biological” or embodied side of the mind and is therefore the farthest removed from its conscious surface. It is very difficult to investigate, classify, and define such a basic phenomenon psychoanalytically when the observational data consists of statements such as “I feel like this. . . .” Indeed, Freud’s difficulties with the concept and the definition of the drives, as well as the lack of popularity of drive

---

3 This section is based to a large extent on Mark Solms’ lecture, “Freudian Drive Theory and Contemporary Neuroscience,” given in London on 11 May 2007.
theory in the work of many contemporary psychoanalytic theoreticians (Apfelbaum, 1966, 2005; Mitchell & Black, 1995), may both stem from this formidable observational difficulty.

While the psychoanalytic observational perspective is very distant from basic bodily processes, the inverse is true for the neurosciences, which are well suited for mapping out the relationship between the organ of the mind and the rest of the body. Thus—and relevant for our discussion—the neurosciences may become helpful in defining the drives psychoanalytically. There are three interrelated issues to consider when attempting to formulate a neurobiologically informed psychoanalytic definition of the drives. In addition to their importance for defining drive in general, all three issues are relevant to the question of the existence of a specific drive for romantic love.

1. Issues related to the ontology of the drives: What is meant by drive in psychoanalysis? What are its physical correlates or neural equivalents? How does drive differ from motivation, emotion, instinct, etc.?
2. Issues related to the taxonomy of the drives: How do the neural equivalents of the drives map on to the classical taxonomy of the drives in psychoanalysis?
3. The functional relations of the drives: What are the functional relations between the drives and the bodily processes that generate them? Likewise, what are the functional relations between the drives and the cognitive and emotional processes that they generate or act upon?

In the discussion that follows, the ontology, taxonomy, and functional relations of the drives will be traced in a generally upward direction (“bottom-up”) within the mental apparatus, starting from the physical and advancing into mental phenomena of increasing complexity.

Drive as a frontier element between body and mind

The ontological question of how drive is defined in psychoanalysis was addressed in detail by Freud in his theoretical paper “Instincts and Their Vicissitudes” (Freud, 1915c). His definition was by and large accepted by subsequent psychoanalytic theoreticians, including some of those who have come to the conclusion that drive theory is currently of little use to psychoanalysis (Apfelbaum, 2005; Mitchell & Black, 1995). Freud was quite explicit when he stated that drive is neither a mental concept nor a biological concept. In his view, drive is a frontier element between body and mind (Freud, 1915c, pp. 121–122). Rather than defining it as part of the body or the mind, the Freudian definition of drive has to do with the relationship between the two—how the body becomes mentalized, how it becomes represented in the mind. As a corollary, since drive is not mental, it can never be conscious and can never be experienced (Freud, 1915c, p. 123). When a person says “I feel driven,” this is not a direct experience of a drive because drive is prior to all mental things. The analogy of gravity (Pfaff, Martin, & Kow, 2007, p. 175) may be useful here, in clarifying the relationship between drive and conscious experience: like gravity, drive is an inference, an inferred force. It is never something you feel or see, but, rather, something that explains and predicts what you feel and see.

Freud defined drive as “a measure of the demand made upon the mind for work in consequence of its connection with the body” (1915c, p. 122). There are two aspects of this definition that are important for our discussion. First, if the drives reflect the demands of the body, then in order to look for where the drives might function in the brain, we need to find out where the body’s demands get registered in the brain; according to Freud’s definition, this neuronal locus would be part of the network in which drive influences are registered. Second, Freud speaks of the drives in a quantitative way. But how does one go about measuring the strength of a drive psychoanalytically? Here, again, the neurosciences may be of help. If we can find reliable physiological correlates of the drives, we may be able to measure them in a way that is very hard to do from the purely psychoanalytic perspective. This aspect of Freud’s definition brings up the question of “energy levels,” which will be discussed subsequently.

Brain regions associated with drive

Going back to the question of where the body makes its demands on the mind, according to Freud’s
classical distinction of source–aim–object, the source of the drives is always the body. Freud defined the source of a drive as “the somatic process which occurs in an organ or part of the body and whose stimulus is represented in the mental life” (Freud, 1915c, p. 120). Of course, such a somatic process may also be triggered by external events and by the mind, but the source nevertheless always comes from the body.

Regarding the functional relations of the drives, the obvious place to look for the site where the body’s demands become mentalized would be the hypothalamic “need detectors” (Pfaff, 1999; Solms & Turnbull, 2002, pp. 117–123). These homeostatic control centers register the state of various bodily physiological processes, and they are the sites in which bodily needs are represented in the brain. The influences of these control centers are not transmitted exclusively (or even primarily) by neural pathways but, rather, by more primitive and diffuse mechanisms (hormones, etc.; for a review see Pfaff, Martin, & Kow, 2007).

Freud stressed that these bodily needs or demands are constant. They never cease, not even while we sleep, and this aspect of the drives makes them very problematic for the mind: unlike the environment, they are inescapable (Freud, 1915c, p. 120). You may always run away from a particular environment or object, but you can never run away from a drive; your drives are part of you, and their pressure may vary but never ceases. Seen from this perspective, the psychoanalytic theory of repression describes our attempts to get away from internal sources of pressure (Freud, 1915d).

The other important aspect of Freud’s definition of drive is its quantitative aspect. It was what he called “psychical” energy, and he felt that it was literally the source of all the energy available for the mind. When expressed in nonpsychoanalytic terms, psychic energy would be the amount of energy available for doing mental things. This entity seems to map on to the basic brainstem mechanism for generalized brain arousal (Panksepp, 1998, pp. 164–186; Solms & Turnbull, 2002, pp. 86–90).

Drive and generalized brain arousal

Several lines of evidence (reviewed in Pfaff, 2006) suggest that a basic mechanism for generalized brain arousal exists in all vertebrates, including humans. The activation of this system, nicknamed BBURP (Bilateral, Bipolar, Universal Response Potentiating System) supplies the psychic energy that is required for all motivated thought, emotion, and behavior. It originates in the phylogenetically ancient reticular formation of the medial and ventral brainstem and projects both upwards and downwards (hence “Bipolar”). The BBURP system neurons send out ascending axons that potentiate sensorimotor and emotional aspects of brain responsiveness, as well as descending axons that potentiate autonomic aspects of brain responsiveness. The activity of the autonomic targets of these descending axons may further modulate the output of limbic emotional command systems.

Aminergic transmitters, including serotonin, norepinephrine, dopamine, and histamine, mediate different aspects of the BBURP system’s activities by projecting differentially to anterior, posterior, and limbic areas of the cerebral cortex. Norepinephrine-containing axons project preferentially to posterior somatosensory cortices and modulate aspects of sensory alertness. Dopaminergic axons project preferentially to frontal, prefrontal, and limbic cortices and mediate aspects of goal-directed, motivated behavior. Serotonergic axons project preferentially to the limbic cortex and to the hypothalamus, and they modulate aspects of emotional experience and behavior. Histaminergic neurons, which originate in the hypothalamus, project diffusely throughout the brain and contribute to increased global arousal (reviewed in Pfaff, Martin, & Kow, 2007).

The concept of libido is discussed later on, but it should be noted at this point that the BBURP system cannot be synonymous with libido. While it potentiates all aspects of sexual responsiveness, it also potentiates the action of all other behavioral systems. Neuroanatomical, biochemical, genetic, and behavioral data suggest that every biologically regulated motivation system gets its psychic energy from two sources: arousal forces that are specific to that motivational system, and, in addition, generalized arousal forces that are the product of the activity of the BBURP system (Garey et al., 2003).

Importantly, when the core nuclei of the BBURP system in the brainstem are destroyed bilaterally, this very small lesion causes a sudden and permanent loss of consciousness, rather than apathy and a loss of motivation, as one would expect from a lesion that interferes with libido. Partial lesions may lead to partial but global disturbances in consciousness, and it is now well-recognized that both sleep and surgical anesthesia are in large part the product of variations in the activity

---

5 An operational definition of a behavioral system, as well as a discussion of its psychological correlates, appears below in the section “Attachment theory and attachment security.”
of this system (Plum & Posner, 1982). However, the activity of the generalized brain arousal system lends itself well to the two Freudian characterizations of raw drive that we have outlined above: it is inherently inescapable, and it is inherently quantitative. Pfaff, Martin, and Kow (2007) summarize their review of how generalized brain arousal relates to libido by stating that “generalized arousal could be considered an obligatory precursor of libido, necessary but not sufficient” (p. 180).

As a brief interim summary, we have so far discussed drive in relation to bodily demands and have seen that the hypothalamic need detectors may be involved in representing and mediating these demands. We have also considered drives as the quantitative sources of mental energy and described the role of brainstem mechanisms for cortical arousal in representing and mediating this “quantity” (Pfaff, 2006).

Drive, pleasure, and emotions

A third important functional relation of the drives is their relation to emotions, or feeling states. Freud postulated that drive pressure is experienced as unpleasure and that drive satisfaction is experienced as pleasure (Freud, 1915c, pp. 120–121). While he realized that the relationship may not be as simple as that, he felt that there is a predictable causal link between the oscillations of drive pressure and satisfaction, and the oscillations of pleasure and unpleasure.

Moreover, Freud felt that this is what pleasure and unpleasure are for: that the reason we have not only conscious feelings but actually consciousness at all is so that we would be able to feel the expression of drive pressure and satisfaction. From this perspective, the role of consciousness may be first and foremost to enable us to feel how we are doing in the task of staying alive to reproduce. This idea is at the heart of Freud’s view of the relationship between drive and consciousness (Solms, 1997; Solms & Turnbull, 2002, pp. 79–104). A corollary to this idea, which is now backed by a considerable body of neuroscientific evidence, is that consciousness is fundamentally emotional (Damasio, 1999).

According to Freud, the aim of every drive is to do something to reduce the feeling of drive tension. Under the pressure of the drives, people and animals go about finding, in the external world, objects that would enable them to reduce that tension. But what gives the tension its motivational aim property—the intentionality property—is the feeling of it as an emotional state. Seen in this light, conscious emotional states are the subjective feelings of drive tensions. There are many other self-regulating mechanisms operating in the brain, but this one happened to work very well, and presumably this is why it was conserved in all consciousness-possessing organisms.

Several lines of neurobiological evidence suggest that the critical (not the only) anatomical locus where the generating of a raw feel of pleasure and unpleasure takes place is the periaqueductal gray (PAG; Panksepp, 1998, pp. 316–317) in the brainstem. It would therefore be useful to look at the relationship between hypothalamic need detectors, ascending activation and arousal pathways, and the PAG in order to explain the affective quality of the experience of pleasure and unpleasure (Solms, 1997). The PAG is probably incapable of producing all the subtleties of feeling states, and it therefore likely interacts with other limbic structures—especially the amygdala and the limbic forebrain—in order to generate these feelings. This description of the relationship between emotion and consciousness is quite similar to the model suggested by Damasio to account for the emergence of consciousness (Damasio, 1999; Solms, 1997).

Is drive singular or plural?

Part of the confusion about the number, meaning, and definition of the term “drive” in psychoanalysis, as well as its relation to “instinct,” is probably the result of an editorial decision made by James Strachey in his translation of Freud’s psychological works, the Standard Edition (Strachey, 1966, pp. xxiv–xxvi). He used the same English word—instinct—as a translation for two German words that Freud had used in related but distinct ways: Trieb and Instinkt. In my view, Laplanche and Pontalis (1988) were appropriately concerned when they reflected that because of this editorial/translation decision, there is “a risk that the Freudian theory of instincts may be confused with psychological conceptions of animal instinct, and the unique aspects of Freud’s approach may be blurred, particularly the thesis of the relatively undetermined nature of the motive force in question, and the notions of contingency of object and variability of aim” (Laplanche & Pontalis, 1988, pp. 214–215). The relationship between drive and instinct is discussed below. For the moment, it is enough to note that where Freud referred to Trieb in the German original, “drive” is probably a better English translation than “instinct.”

Until this point, when considering psychoanalytic
(i.e., mostly Freudian) drive theory, I have at times referred to “the drives” in the plural and sometimes to “drive” as a single entity. From the perspective of the Freudian description of the mental apparatus, both uses are allowed. This can be seen in the following paragraph from the *Standard Edition*, as long as we note that the word “instinct” in this paragraph should probably be replaced by “drive.”

It is thus possible to distinguish an indeterminate number of instincts, and in common practice this is in fact done. For us, however, the important question arises whether it may not be possible to trace all these numerous instincts back to a few basic ones. . . . After long hesitanacies and vacillations we have decided to assume the existence of only two basic instincts, *Eros* and the *destructive instinct* (The contrast between the instincts of self-preservation and the preservation of the species, as well as the contrast between ego-love and object-love, fall within *Eros*.) [Freud, 1940a (1938), p. 148, emphasis in original]

This quote is from *An Outline of Psycho-Analysis*, in which Freud, at the very end of his life, summarized his psychological work. Freud described it how his first theory of the drives, which emphasized the polarity of the libidinal drives (= libido) vs. the self-preservative drives (= “ego instincts”) was conflated into his second theory of the drives (Freud, 1920g): Both the libidinal and the self-preservative drives of the first theory were subsumed under “*Eros*” of the second theory, which was contrasted with “*Thanatos*,” or the destructive drive. In both the first and the second theory, then, the duality of libidinal drives vs. ego drives (or *Eros* vs. *Thanatos*) still leaves the libidinal drives/Eros as the only source of raw mental energy in the mental apparatus. Specifically, Freud felt that all the component drives and instincts that are utilized in love and sexuality ultimately stem from one source, which he called libido, *Eros*, or the life drive.

Libidinal drive, instinct, and the SEEKING system

As we have seen, Freud had different views at different times about how to classify the drives (Schmidt-Hellerau, 2001). But all the different ways in which he divided and categorized the drives that are relevant for our discussion were always subsumed under the single heading of libido, *Eros*, or the life drive (Freud, 1915c, 1920g, 1940a [1938]). All the demands that are “made upon the mind for work in consequence of its connection with the body” (1915c, p. 122), all of our different appetites, when taken together, comprise this broad libidinal drive. To Freud, all appetites were, in the final analysis, sexual (Freud, 1915c).

In order to move upwards from the level of drive sources and drive aims to the level of the objects of the drives, we need to introduce other components of the mind that take us away from a pure concept of drive. A drive cannot reach an object without going through the rest of the mind, and therefore we cannot theorize about drives at this level without first turning them into something more complicated. From a psychoanalytic perspective, the general pleasure-seeking drive is without an object. It has a source and an aim, but it is “object-less”. It needs something else, another component, that would enable it to find objects. From the point of view of neuroscience, that component appears to fit exceptionally well with the SEEKING instinc-tual/emotional command system (Panksepp, 1998, pp. 144–163; Solms & Turnbull, 2002, pp. 115–123).

A drive does not have particular behaviors attached to it, whereas the SEEKING system does (Panksepp, 1998, pp. 144–163). It is therefore already a higher elaboration of the drive, something that may be called an instinct in the classical psychobiological sense of the term. Instincts are characterized by having fixed stimuli and by resulting in fixed behaviors. If a drive is “the demand made upon the mind for work,” etc., then here, in the SEEKING system, we have the mind actually performing work. There seem to be stereotyped behaviors attached to the SEEKING system, as well as proto-feelings like pleasurable anticipation (reviewed in Panksepp, 1998, pp. 144–163). In this sense, an instinct is more elaborate than a drive. It is mental; it is more than just a push from below.

Psychoanalytic theory is somewhat blurred at this level, which is far removed from conscious experience. But there must be something between the drive and the object, and as neuroscience discovered the SEEKING system, its psychoanalytic role as being between drive and object has come more clearly into focus (Solms & Turnbull, 2002, pp. 115–123). The SEEKING system fits beautifully with the expression of libidinal drive. Its objectless property is important here—it just seeks. It is an instinct that makes us go out into the world to look for objects that will satisfy our needs. From a subjective perspective it has an optimis-tic quality to it, an anticipation that somewhere “out

---

6 Freud was well aware of this. He acknowledged that “The theory of the instincts is so to say our mythology. Instincts are mythical entities, magnificent in their indefiniteness. In our work we cannot for a moment disregard them, yet we are never sure that we are seeing them clearly” (Freud, 1933a, p. 95).
there” we will find the objects that will make us feel good. Seen in this light, the SEEKING system functions not as a reward system (as it has sometimes been described) but as a general pleasure-seeking system within the mind. It is appetitive, not narrowly sexual. This distinction is, of course, relevant to our discussion about the origins of romantic love.

Primal fantasies
and emotional command systems

From a classical psychoanalytic perspective, we are now almost at the level of what Freud called primal fantasies: the primal scene, the Oedipus complex, castration anxiety, etc. According to Freud, these fantasies represent certain primal scenarios that are inescapably part of growing up human and being driven. For example, if you are human, you necessarily have a mother and a father, as well as some fond attachment to your own genitals. Certain complexities are likely to ensue from this situation. From the point of view of neuropsychoanalysis, the SEEKING system, which brings us into contact with objects, is the level in which these very affectively charged primal scenarios begin to emerge. Thus, the SEEKING system appears to be in a gray area: it is above the drives, closer to what Freud called instincts, and it gives rise to primal fantasies.

From a neuroscientific perspective, once we recognize that the SEEKING system is higher than the level of the drives, we have to recognize that it is at the same level as other instincts, or other emotional command systems. Integrating the findings of many investigators as well as their own, Panksepp (1998, 2003) and Watt (2007, p. 140) have offered a comprehensive provisional taxonomy of these systems. In addition to the SEEKING system, there are other systems that produce other kinds of stereotyped behaviors and proto-emotions: FEAR, RAGE, PANIC, CARE, LUST, etc. Importantly, all these systems seem to be built into the same level of the neuroaxis as the SEEKING system; broadly speaking, they are all “limbic” (Panksepp, 1998, 2003).

From the point of view of our neuropsychoanalytic discussion about love, it is crucial to emphasize that these other instinctual (emotional) systems are not elaborations of the libidinal drive. They are not derived from it, each of them has evolved for its own sake, and they serve other survival needs. Importantly, these other instinctual/emotional command systems are absent from Freudian theory. This absence, and in particular the absence of the PANIC/SEPARATION DISTRESS system and the CARE/NURTURANCE system as separate from (and complementary to) the SEEKING system, has important theoretical implications for our discussion, and it has caused some confusion within psychoanalysis.

Motivation, the libidinal system, and the attachment system

There is now overwhelming evidence that Bowlby (1958, 1969, 1988) was essentially correct when he suggested that there exists in the child, from the very beginning, a strong need to attach to a specific object (Bebe, 2005; Diamond & Blatt, 2007; Lichtenberg, 1989; Stern, 1985). While some of Bowlby’s followers took this to suggest that libido theory is fundamentally wrong, other investigators realized that the libidinal system and the attachment system exist in parallel, that they are in many ways complementary, and that they interact in complex ways to generate different patterns of adult attachment, sexuality, and love (Eagle, 2007; Main, 1995; Mikulincer & Shaver, 2003, 2007). This issue is, of course, central to the question of the origins of romantic love, and it is examined in detail subsequently.

Returning to our discussion of the neural correlates of psychoanalytic drive theory, we are now in a position to formulate the relationship between drive and motivation. Beyond the level of the SEEKING and other instinctual/emotional systems such as the attachment system, we find what Freud (1915c) speaks of as the psychic representatives of the drives—that is, where the drives attach themselves to a representation. According to Freud, at first there is a pressure that has no image attached to it. It then comes to be represented over the perceptually derived cortices, the cognitive apparatus of the brain. These representations then become the objects of the drives. This sequence defines the relationship between a drive and a motivation: a motivation is a drive that has an object.

The neocortex and the emotional command systems—objects, learning, and inhibition

From the perspective of our discussion about the origins of romantic love, an important property of emotional command systems is that they are open systems and thus are subject to learning. They do have a few innate triggers, but by and large they are open, and they need objects to be “plugged” into them. They undergo
intensive learning in the sense that early experience defines the valence of different objects in the world according to the output of these instinctual/emotional command systems. The results of this multimodal learning process are analyzed and stored within the posterior parts of the cerebral cortex, which were traditionally defined in neuropsychology as the unit for the reception, analysis, and storage of information (Luria, 1973; Solms & Turnbull, 2002, pp. 18–27).

As we have seen, these sensory perceptions are coupled with internal feeling states (Damasio, 1999; Solms, 1997). Thus, the establishment of an internal picture of the outside world, which happens during childhood, is inherently affectively laden. The ability (actually, the necessity) to learn from early environment that is built into the emotional command systems may account for the great variety of objects that are capable of becoming recipients of human attachment and love. It may also account for the many forms and nuances that this attachment and love assume.

In our discussion about the relationship of the drives to the structure and function of the human nervous system, we have so far examined the interrelated, hierarchical role of several brain regions: hypothalamic nuclei (bodily needs), brainstem nuclei (arousal and raw drive), limbic structures outside the hypothalamus (instincts and emotions), and the perceptually derived posterior cortices (object representations and some cognitive aspects of emotions). The last important functional relationship that needs to be considered here is the relation of the drives to inhibitory constraints and controls.

A fundamental aspect of the psychoanalytic conception of drive is that it is not allowed free expression. Because our environment is less than perfectly suited for the fulfillment of our wishes and needs, free expression of the drives does not work. Given this state of affairs, which is painfully characteristic of the human condition, there has to exist a mechanism that constrains the free expression of the drives. Learning, which may take place at the level of limbic structures interacting with posterior cortices, is the beginning of this constraint (Panksepp, 1998, pp. 9–40). But if our motivational system had just six or seven options to it (the number of emotional command systems such as SEEKING, FEAR, RAGE, etc.), we could not possibly do justice to the complexities of the world around us and to the nuances of our social environment.

The prefrontal cortices—the dorsolateral, medial, and orbital—provide different aspects of the inhibitory constraints and controls that regulate the expression of the drives that originate in lower parts of the neuroaxis (Luria, 1973; Solms & Turnbull, 2002, pp. 280–284).

The prefrontal cortices are also parts of networks in which higher-order learning and complex reasoning take place. There is some evidence to suggest that what we call free will (O’Connor, 1971) may involve prefrontal inhibition of the output of the emotional command systems and action tendencies (Libet, Freeman, & Sutherland, 1999). The gradual acquisition of the ability to subject the drives to the constraints of such higher-order learning and reasoning is an important part of growing up human.

The refinement of this learned ability over the course of childhood and adolescence corresponds to the development of the functional connectivity of the prefrontal cortices (reviewed in Schore, 1994; Solms & Turnbull, 2002, pp. 280–284). It also corresponds (and adapts) to the gradual but inevitable deterioration in the degree to which our environment is suited and attuned to the fulfillment of our needs and wishes as we grow up.

From a psychoanalytic perspective, the emergence of the superego represents a part of this developmental process, which involves the prefrontal cortices (Solms & Turnbull, 2002, pp. 280–284). The birth of the superego is, of course, also an important junction in the developmental sequence that culminates in the emergence of adult romantic love (Freud, 1905d). Accordingly, this brief overview of prefrontal inhibitory constraints concludes our discussion of neuropsychological aspects of the drives and leads us into a discussion of the definition of love from a phenomenological perspective.

Defining romantic love:
phenomenological considerations

The careless way in which language uses the word “love” has its genetic justification. People give the name “love” to a relation between a man and a woman . . . but they also give the name “love” to the positive feelings between parents and children, and between the brothers and sisters of a family. [Freud, 1930a, p. 102]

Romantic love appears to be a nearly universal phenomenon, found in every culture for which data are available (Janowiak & Fischer, 1992) and in every historical era (Hatfield & Rapson, 2002). It is beyond the scope of this paper to review the rich psychoanalytic literature on romantic love or the many studies devoted to it since it became the object of psychological and neurobiological research. Instead, I try to focus on three related phenomenological issues that are relevant for our discussion about the possible existence of a specific drive for romantic love: the inherent hetero-
The heterogeneity of love

Many authors have noted that people tend to use the word “love” in a “careless way”—that is, to describe different feelings toward different objects. This has caused many variations in both the popular (Aron & Westbay, 1996; Fehr, 1988, 2001; Shaver, Hazan, & Bradshaw, 1988; Shaver, Schwartz, Kirson, & O’Connor, 1987) and the scientific (Davis & Todd, 1985; Meyers & Berscheid, 1997; Sternberg, 1987) definitions of love. But as Freud and others have observed, there are phenomenological, sociological, biological, and psychoanalytic reasons to group all these different forms of love under a single umbrella.

Aron and Aron (1991) have defined love as “the constellation of behaviors, cognitions and emotions associated with a desire to enter or maintain a close relationship with a specific other person” (p. 26). While this definition leaves out love for objects other than people (such as love of a doll, a country, a pet, etc.), it is a convenient starting point for our discussion. Aron, Fisher, and Strong (2006) defined romantic love as love in the context of romantic relationships—that is, relationships of the kind that typically have an explicit actual or potential sexual component, such as dating and marital relationships.

Fehr (1988, 2001) found that ordinary people tend to recognize different instances of love by their resemblance to a prototype, rather than by their conforming to a formal definition. She suggested that this tendency may be one of the reasons for the diversity and heterogeneity of conceptual and operational definitions of love in the scientific literature. Despite the heterogeneity of the definitions, the prototypical features of love that she found were quite similar across societies and age groups (reviewed in Fehr, 2001). In a number of different studies, Aron and Westbay (1996) identified three latent dimensions of these features: intimacy, which was usually the most central; commitment; and passion, which, perhaps surprisingly, often included the least central items.

Using the prototype approach, Shaver et al. (1987) found that love is often described as a form of social contact that is highly specific and focused on the love object, with a desire to be near to, to touch, kiss, etc., the loved person. In an attempt to define prototypical kinds of love (rather than prototypical features of love), Fehr and Russell (1991) found that whereas maternal and friendship love were prototypical of love in general, romantic and sexual love were not.

In sum, from a phenomenological perspective it appears that despite the heterogeneity of definitions, people tend to have a common understanding of what love means in terms of its resemblance to a set of prototype features. The most central of these features of love appear to be related to intimacy, the next most central to commitment, and the more peripheral to passion. Interestingly, and important for our discussion, it was found that romantic or passionate love is not the most prototypical of love in general.

Passionate vs. companionate love

The distinction between passionate and companionate love, which emerged as a key distinction in many phenomenological studies, is of course highly relevant for our discussion. As reviewed by Aron, Fisher, and Strong (2006), Berscheid and Walster (1978) defined passionate love as “a state of intense longing for union with another” (p. 9). In contrast, they defined companionate love as “the affection we feel for those with whom our lives are deeply entwined” (p. 9). Based on their definition of passionate love, Hatfield and Sprecher (1986) developed a Passionate Love Scale (PLS). This scale has been used extensively in many studies and in diverse populations, including studies that differentiated what it measures from companionate love (Sprecher & Regan, 1998). Important for the subject matter of this paper, the PLS contains many items that emphasize sexual desire.

This proximity between sexual desire and passionate love has caused Berscheid (1988) to comment that passionate love is “about 90% sexual desire unfulfilled.” Moreover, in the lay prototype of love developed by Fehr (1988), many of the features identified by Aron and Westbay (1996) as part of the passion factor are sexual in nature, including sexual passion, sex appeal, and physical attraction. Nevertheless, there are many reasons, some of which are discussed later in this paper, to regard sexual desire and passionate love as two distinct and partially overlapping entities (reviewed by Aron, Fisher, & Strong, 2006; Fisher, 2004).

The distinction between companionate and passionate love was also found to partially overlap a related distinction between those whom a person “loves” and...
those (usually a smaller subset) with whom he or she is “in love.” It is only toward the latter group that people usually report sexual desire (Meyers & Berscheid, 1997). However, it is also quite common for people to report sexual desire toward individuals for whom they feel no love (Freud, 1912d, p. 183; Hatfield & Rapson, 1996).

Despite the fact that it is probably the most common form of love, companionate love has mainly been studied not as an independent phenomenon but, rather, as a conceptual counterpoint to passionate love (Masuda, 2003). Another important categorization of love is conceptually based on ancient Greek definitions and focuses on “love styles.” Most research applications in this area have utilized the Hendrick and Hendrick (1989, 2003) measure, which formulates love styles as six relatively independent dimensions: eros (romantic, passionate love), ludus (game playing love), storge (friendship love), pragma (logical, “shopping-list” love), mania (possessive, dependent love), and agape (selfless love).

In an attempt to integrate available phenomenological and cognitive-psychological data, Sternberg (1986) proposed a triangular theory that conceptualizes love in terms of intimacy, commitment/decision, and passion. Sternberg treats these components as three qualitatively different ingredients that in various combinations define types of love. In contrast, Aron, Fisher, and Strong (2006) have called attention to the fact that some of the relationship qualities that were identified as a part (or type) of love have also often been differentiated from love. One such construct is commitment. Fehr (1988, 2001) found that ordinary people conceive of love and commitment as overlapping but not identical. Another such construct is closeness and intimacy. Aron and Westbay (1996) found that the most central dimension to the prototype of love is intimacy, while Aron and Fraley (1999) found that closeness was highly correlated with measures of love.

Aron, Fisher, and Strong (2006) suggest that one way to summarize the data from much of the phenomenological literature about love is to describe it in terms of passion, intimacy, and commitment. Passionate love has been differentiated from companionate love by several analytic and descriptive strategies: It was found to appear as a distinct factor in analyses of lay features of love; it is a strong factor when considering diverse measures of love; it is described as one of the three components in Sternberg’s system; and it is described as eros or mania in the Hendrick and Hendrick system (1989, 2003). Other types of romantic love are less clear-cut. Companionate love seems to be comprised of a combination of commitment and intimacy. It is perhaps deeply linked with relationship satisfaction in general and seems strongly linked with types of love that include friendship love, practical love, and all-giving (agape) love.

It therefore appears that romantic love, which is characterized by its passionate and sexual aspects, is only one instance of love. Moreover, romantic love is not the most prototypical of the phenomena that are collectively called love. Last, and relevant to the subject matter of our discussion, a large body of empirical evidence seems to support the notion that passionate love and affectionate attachment exist as separate and at least partially independent factors or prototypes within the general framework of love.

Unique features of romantic love

While there are aspects of romantic love that are shared with other kinds of love, Fisher (2004) suggested that romantic love is characterized by several features that are unique to it. From a phenomenological perspective, romantic love begins when an individual comes to regard another as special, even unique. The lover then intensely focuses his or her attention on this preferred individual, aggrandizing the beloved’s better traits and at the same time overlooking or minimizing the person’s flaws. People who are in love experience extreme energy, hyperactivity, sleeplessness, impulsivity, euphoria, and mood swings. They are goal-oriented and strongly motivated to win their beloved. Lovers become emotionally dependent on the relationship and may experience profound separation anxiety. Moreover, romantic love is usually depicted as involuntary, difficult to control, and impermanent (Hatfield & Sprecher, 1986; Tennov, 1979).

To further establish that the above-mentioned features are characteristic of romantic love, Fisher (2004, pp. 4–25) used them as domains in her “Being in Love” questionnaire, a 54-item questionnaire on romantic passion that was filled out by 437 Americans (in New Jersey) and 402 Japanese (in Tokyo). An analysis of the results indicated that romantic love does not vary considerably with age, gender, sexual orientation, or ethnic group. For example, people over age 45 and those under age 25 showed no significant statistical differences on 82% of the statements. Heterosexuals and homosexuals gave statistically similar responses on 86% of the questions. American “Whites” and “Others” responded similarly on 82% of the questions. The greatest differences were found between the Americans
and Japanese. On most of the questions where they showed statistically significant variations, these differences were small. The twelve queries that showed marked differences between the two ethnic groups seemed to have straightforward cultural explanations (Fisher, 2004).

Adversity appears to heighten the passion of romantic lovers, a phenomenon known as the Romeo and Juliet Effect or “frustration attraction” (Fisher, 2004, pp. 16–18). Almost a century ago, this apparent paradox prompted Freud (1912d) to note that “An obstacle is required in order to heighten libido; and where natural resistances to satisfaction have not been sufficient men have at all times erected conventional ones so as to be able to enjoy love” (p. 187). In line with this observation, Driscoll, Davis, and Lipetz (1972) found that parents’ disagreement and interference with the mate choice of their offspring serves to increase the love for the forbidden partner. Many works of literature have described this phenomenon. In contrast, most phenomenological studies that addressed this issue found that parental approval tended to increase the desirability of the beloved (Sprecher, Felmlee, & Orbuch, 2002).

Romantic love is often characterized by intrusive thinking, in which the lover thinks obsessively about the beloved. It has long been argued that romantic love is “driven”: people who are in love often experience and express an intense need for physical and emotional union with their beloved. Fisher (2004) points out that while lovers also feel intense sexual desire, their craving for emotional union is usually greater than their longing for sexual contact. She argues that few people whose sexual advances are rejected proceed to kill themselves. In contrast, rejected lovers in cultures around the world commit suicide or homicide, and many more become clinically depressed. For example, Mearns (1991) found that among 114 Americans who had been romantically rejected in the past eight weeks, 40% were clinically depressed and 12% suffered moderate to severe depression.

Indeed, some of the most unique (and dangerous) features of romantic love come to the fore when it is rejected (Fisher, 2004, pp. 153–180). Rejected lovers often go to extraordinary, inappropriate, and even violent efforts to win back their beloved. Grief, longings, and intrusive thoughts about the lost object and depressive affect are all common features of rejected lovers. All these symptoms are characteristic of mourning, and all were described as such by Freud (1917e [1915]). In addition to all the above, many spurned lovers also suffer from “abandonment rage.” This rage can be lethal, especially in the context of jealousy in men.

As noted above, men and women have been found to have very similar attitudes and behaviors regarding romantic love. For example, on 87% of the items in Fisher’s “Being in Love” questionnaire, American men and women responded virtually alike (Fisher, 2004). In contrast, there are important differences in the ways in which men and women respond to romantic rejection. In a study by Fremouw, Westrup, and Pennypacker (1997), 34% of American female college students reported that they had been followed or harassed by a man they had rejected. Stalking exists in rejected women as well, but it is much less frequent.

Rejected men kill. At least 32% of all female homicide victims in the United States were murdered by their spouses, ex-spouses, boyfriends, or ex-boyfriends, and this percentage is probably an underestimate (Goode, 2000). The most common cause of spousal beating and homicide around the world is male jealousy (reviewed by Fisher, 2004, p. 176). These violent and at times murderous responses to sexual infidelity and rejection have been incorporated into the legal systems of many countries: until the 1970s, it was lawful in several American states to kill an adulterous wife (Wilson & Daly, 1992). Likewise, in many Arab countries, including secular and Western-leaning states such as Lebanon and Jordan, the law still provides attenuated punishments for men who murder adulterous women. Such murders are still popularly regarded as a virtue rather than a crime throughout much of the Middle East (Abu-Odeh, 1996; Hassan, 1999).

Women often respond to romantic rejection—whether real or imagined—by repeatedly and obsessively trying to make contact with their beloved through phone calls, e-mails, or letters. In contrast, stalking and murder are much rarer in rejected women than in men, and only 4% of male homicide victims were killed by a former or current female partner (Goode, 2000). Romantic rejection is much more likely to induce self-blame in women than in men. Likewise, although both genders are at risk for killing themselves following romantic rejection, many more women than men attempt or threaten to kill themselves under these circumstances. It has even been suggested that this attempted suicidality may serve as an extreme feminine strategy to manipulate a lover into returning to the relationship (Fisher, 2004, pp. 177–180).

In sum, romantic love is a dramatic psychological

---

Footnote:

8 For example, while 65% of the Japanese endorsed the statement “When I am talking to __________, I am often afraid that I will say the wrong thing,” only 24% of the Americans endorsed it (Fisher, 2004, p. 5).
and behavioral phenomenon. It is characterized by its compulsive, driven quality and by the powerful, often exhilarating emotions that accompany it. It is distinguished from other kinds of love by its sexual components. It differs from sexual desire by its focus on a single object who is overvalued and pursued with tenacity, and by its craving for emotional union with that object. Some of the most dramatic manifestations of romantic love occur when it is rejected, and under these circumstances it might lead to cling ing, stalking, despair, depression, and violence directed at the self and/or the beloved. Whether these features suggest that romantic love is driven by a unique instinctual/emotional system, or whether they may be accounted for by the action of instinctual/emotional systems that are not unique to romantic love, is discussed below.

**The relationship between romantic love, sexuality, and attachment**

So far, our discussion has not included data about the neurobiology of sexuality, romantic love, and other kinds of love. I review and discuss some of these recent and influential findings toward the end of this paper. However, it may already be seen that there exists a broad agreement that romantic love is not a monolithic entity—that is, that it is the product of at least two and perhaps three different and more basic psychobiological components and processes. There is currently no agreement about the number, nature, and interrelationships of these components and processes within the cognitive-neuroscientific literature, nor does such agreement exist within the psychoanalytic literature. As Mitchell (1997) observed, “One of the major conceptual tasks at our current stage in the development of psychoanalytic ideas is the problem of understanding the relationship between attachment and desire” (p. 27).

Virtually all prominent psychoanalytic theoreticians referred in some way to romantic love and defined it in terms specific to the psychoanalytic current that they helped establish or to which they belonged (reviewed in Mitchell & Black, 1995; see also Kernberg, 1995). Because we are interested in the relationship between drive and love, and because drive theory served Freud in his attempts to account for romantic love, I will discuss some of the original Freudian formulations of love and compare them to Bowlby’s different (and in many ways complementary) attachment-based explanations.

Since there has been a gradual tendency within psychoanalysis to move away from Freudian drive theory, many psychoanalytic formulations of love are not immediately applicable to this discussion. Therefore, although they have greatly enriched the clinical and theoretical psychoanalytic understanding of love, they will not be discussed here. One notable recent exception is the work of Kernberg (1995), who offered a view of romantic love that integrates object relations theory with aspects of drive theory to account for the different levels of defensive organization that characterize the ways in which we love.

**Freud’s libidinal theory of romantic love**

As we have seen above, Freud believed that all our different wishes, desires, and appetites ultimately reflect different aspects of “the demand made upon the mind for work in consequence of its connection with the body” (1915c, p. 122). Furthermore, he saw all these appetites as libidinal in nature—that is, sexual, in the broader sense of the word. When he discussed the different uses of the word “love,” he therefore stated that what caused men and women to form love relationships and establish families were their “genital needs” (Freud, 1930a, p. 102). In line with this hypothesis, he believed that “love . . . is originally narcissistic, then passes over on to objects, which have been incorporated into the extended ego. . . . It becomes intimately linked with the activity of the later sexual instincts and, when these have been completely synthesized, coincides with the sexual impulsion as a whole” (1915c, p. 138).

Freud assumed that the baby’s initial affectionate attachment to his mother is causally dependent on the role she plays in reducing the pressure of his drives by providing nurturance, as well as on her role in providing stimulation of the baby’s initial erogenous zone, his oral cavity (Freud, 1905d). In other words, Freud believed that the baby’s attachment to his mother is based largely on sexuality, albeit infantile. Romantic relations in adulthood will be influenced by the vicissitudes of the baby’s relationship with its parents, but they will likewise be driven by libidinal needs alone. This hypothesis has far-reaching ramifications, and it is probably inconsistent with what we know today about the functioning of the emotional command systems (reviewed in Panksepp, 1998) and about the formation of attachment in human and other mammalian infants (reviewed in Main, 1995). The discrepancies between Freud’s views and the emerging psychobiological data about the origins and mechanisms of romantic love are discussed below.

However, there are instances within Freud’s writ-
chic impotence in men, Freud provided the following explanation:

Two currents whose union is necessary to ensure a completely normal attitude in love have, in the cases we are considering, failed to combine. These may be distinguished as the affectionate and the sensual current. The affectionate current is the older of the two. It springs from the earliest years of childhood; it is formed on the basis of the interests of the self-preservation instinct and is directed to the members of the family and those who look after the child. From the very beginning it carries along with it contributions from the sexual instincts—components of erotic interest—which can already be seen more or less clearly even in childhood and in any event are uncovered in neurotics by psycho-analysis later on. It corresponds to the child’s primary object-choice. We learn in this way that the sexual instincts find their first objects by attaching themselves to the valuations made by the ego-ininsticts, precisely in the way in which the first sexual satisfactions are experienced in attachment to the bodily functions necessary for the preservation of life. [Freud, 1912d, pp. 180–181, emphasis in original]

Freud’s distinction between ego instincts and libidinal instincts, which was a key element of his first drive theory, was used here to suggest that attachment may be older than (and at least partially independent of) sexuality in forming the developmental sequence that determines the child’s affectionate tie to his mother. As Eagle points out:

In this passage, Freud, in effect, is proposing that the infant’s attachment to the caregiver is based on a system that predates and that, therefore, is initially independent of infantile sexuality. That system, characterized by the predominance of the “affectionate current,” is “formed on the basis of the interests of the self-preservation instinct,” a perspective that is entirely compatible with Bowlby’s emphasis on the evolutionary survival function of the attachment system. [Eagle, 2007, pp. 46–47]

I now discuss some of the contributions of attachment theory (reviewed in Bowlby, 1988; Main, 1995; Mikulincer & Shaver, 2007) to contemporary psychoanalytic and cognitive-neuroscientific models of adult romantic love. Before doing so, I briefly review a few key concepts in attachment theory that are relevant for our discussion.

Attachment theory and attachment security

Bowlby, who was trained as a psychoanalyst, hypothesized the existence of an inborn instinctual attachment system that “served the function of binding the child to its mother and which contributed to the reciprocal dynamic of binding mother to child” (Bowlby, 1958, p. 351). He based his reasoning on clinical observations, psychoanalytic object relations theory, and data derived from primate ethological research. Importantly, he emphasized that the attachment system was not dependent on drive reduction, and that it was not mediated through infantile sexuality (Bowlby, 1988).

Bowlby (1969, p. 52) characterized the attachment system, which controls the formation and maintenance of the infant’s affectionate tie with its mother, as a behavioral system, a concept he borrowed from ethology. Mikulincer and Shaver (2007) define a behavioral system as “a species-universal neural program that governs the choice, activation and termination of behavioral sequences designed to produce functional changes in the person–environment relationship, which in turn increase the likelihood of survival and reproduction” (p. 52). The SEEKING system (Panksepp, 1998), which we have discussed previously, is another example of a behavioral system.10

Instead of relying on drive-based notions of instinctual needs or on emotion-based models of affective regulation in order to explain what turns the attachment system on and off, Bowlby chose the cybernetic metaphor of activation and deactivation of behavioral systems. His choice was probably not incidental: activation–deactivation emphasizes the role of environmental cues in turning the system on and off, whereas instinctual needs are usually understood as representing an internal build-up of tension-producing impulses that require discharge. Emotion-based models also imply that subjective conscious and unconscious processes contribute to the observed behavior. However, Bowlby agreed with the Freudian emphasis on the crucial role

9 As Diamond and Blatt (2007, p. 3) point out, Bowlby (1969, p. 158) acknowledged that behaviors consistent with infantile sexuality do appear regularly in primate and human infants, and that they are often exhibited toward the parents. However, he did not consider them as organizers of fantasy or intrapsychic experience, and he virtually ignored their contribution to the subjective experience of pleasure and unpleasure.

10 For reasons that are probably obvious, I prefer the term “instinctual/emotional system” over “behavioral system” and have used both terms as synonyms throughout this paper. Wherever I refer to an “instinctual/emotional system,” I am alluding to the same concept that Bowlby, Mikulincer & Shaver, and others in the cognitive and research psychology literature define as a behavioral system.
of early childhood experiences with parental figures in shaping later relationships, including romantic love to a sexual partner.\footnote{Freud believed that while the child eventually denounces his oedipal wishes, he does not lose his taste for the unique features of his opposite-sex parent. In his attempt to account for the influence of the child’s affectionate ties with his parents on his subsequent adult object choice, Freud (1912d) suggested that “These affectionate fixations of the child persist throughout childhood, and continually carry along with them erotism, which is consequently diverted from its sexual aims. Then at the age of puberty they are joined by a powerful ‘sensual’ current which no longer mistakes its aims . . . it will make efforts to pass on from these objects which are unsuitable in reality, and find a way as soon as possible to other, extraneous objects with which a real sexual life may be carried on. These new objects will still be chosen on the model (imago) of the infantile ones, but in the course of time they will attract to themselves the affection that was tied to the earlier ones. A man shall leave his father and his mother—according to the biblical command—and shall cleave unto his wife” (p. 181).}

Attachment theory stipulated that there are individual differences in the functioning of the attachment system and that these differences affect how a person approaches and handles significant relationships throughout his or her lifespan. Further, it postulated that these differences arise because of the variable supportiveness, responsiveness, and availability of attachment figures at times of need during infancy and childhood (Bowlby, 1973). This hypothesis leads us to the concept of attachment security:

Interactions with attachment figures who are available and responsive facilitate optimal functioning of the attachment system and promote a core, dispositional sense of attachment security—a sense that the world is generally a safe place, that attachment figures are generally helpful when called upon, and that it is possible to explore the environment curiously and engage effectively with other people. [Mikulincer & Shaver, 2007, p. 53]

Attachment style and insecure attachments

However, when attachment figures are not reliably available during infancy and childhood, attachment security may be difficult or impossible to attain. Negative working models of self and others are formed instead, and the individual develops and employs secondary strategies of affect regulation. In accordance with the activation–deactivation model for the regulation of all behavioral systems, Bowlby and subsequent attachment theorists defined two such secondary strategies: hyperactivation and deactivation of the attachment system (Cassidy & Kobak, 1988; Mikulincer & Shaver, 2003).

Hyperactivation involves energetic, at times frantic, attempts to get the relationship partner who is felt to be insufficiently responsive to pay more attention and provide more care and support. Hyperactivating strategies include clinging, controlling, coercive responses, and the development of overdependence on the partner (Shaver & Mikulincer, 2002). Individuals with borderline personality disorder (APA, 2000, pp. 706–710) and dependent personality disorder (APA, 2000, pp. 721–725) frequently exhibit aspects of such attitudes and behaviors.

Deactivation refers to inhibition of proximity-seeking inclinations and actions, suppression or discounting of potential threats, and a staunch determination to handle stress alone. Individuals who employ attachment-deactivation strategies tend to maintain physical and emotional distance from others and are uncomfortable with intimacy and interdependence (Shaver & Hazan, 1993). They may also exhibit a self-reliant attitude and often have a limited ability to acknowledge personal faults (Mikulincer, 1998). Individuals with schizoid personality disorder (APA, 2000, pp. 694–697) and avoidant personality disorder (APA, 2000, pp. 718–721) frequently exhibit aspects of such attitudes and behaviors.

Experimental evidence from the study of the relationship patterns of infants (Ainsworth, Blehar, Waters, & Wall, 1978), as well as those of adolescents and adults, led attachment researchers to define attachment styles: the chronic patterns of relational expectations, emotions, and behaviors that result from the internalization of a particular history of attachment experiences (Fraley & Shaver, 2000).

Important for our discussion, Hazan and Shaver (1987) suggested that romantic love might be viewed as an attachment process that is characterized by particular attachment styles. The work of many researchers (reviewed in Mikulincer & Shaver, 2003) subsequently led to the realization that individual differences in adult attachment styles may be defined and measured along two orthogonal dimensions: avoidance and anxiety (Brennan, Clark, & Shaver, 1998). Mikulincer and Shaver (2007) explain:

A person’s position on the attachment avoidance dimension indicates the extent to which he or she distrusts others’ goodwill and relies on deactivating strategies for coping with attachment insecurities. A person’s position on the anxiety dimension indicates the degree to which he or she worries that relationship partners will be unavailable in times of need and relies on hyperactivating strategies for dealing with these worries. People who score low on both dimensions have a chronic sense of felt security, are likely to have had a security-supporting attachment history, and are said to be secure or to have a secure attachment style. [p. 55]
Attachment theory, drive theory, and the pleasure principle

Bowlby’s attachment theory has been deeply influential in general psychology. Experimental paradigms that were based on it have dominated the study of the relationships of infants with their caregivers for the last three decades (Ainsworth et al., 1978; Main, 1995). The early work of Bowlby and his followers was directed at establishing the existence of an autonomous instinctual system that controls the attachment behavior of the child to its caregiver. Inherent in this autonomy was the notion that the attachment system is independent of infantile sexuality, at least initially. As a result, many of the original experimental studies conducted under the influence of attachment theory ignored sexuality altogether, and initial theoretical formulations of attachment had little to say about sexuality.

Eagle (2007) suggests that this situation has recently been reversed because of two evolving processes. First, the veracity of attachment theory and the autonomy of the attachment system were recognized and accepted within general psychology as well as within psychoanalysis (Fonagy, 2001). This has ended the “war of independence” of attachment theory against libidinal drive theory and has enabled the study of its relationship to sexuality. Second, the extension of attachment research to adult attachment, in which one’s romantic or sexual partner is usually studied as the attachment figure, provided both the need and the opportunity to study how these two motivational systems interact (reviewed in Mikulincer & Shaver, 2007).

In addition, the work of psychoanalytically trained “infant observers” resulted in psychoanalytic theories that considered motivational sources other than libidinal drive reduction in order to account for the formation and development of the mother–infant bond (reviewed in Beebe, 2005; Stern, 1985). As a consequence, attachment theory and psychoanalytic theory have gradually become closer. In what appears to be more than a reconciliation, they seem to be moving toward integration (Fonagy, 2001; Lichtenberg, 1989, 2007).

In order to understand what had kept them apart for so long, it might be useful to trace the origins of the rift between Bowlby and the Freudian ego psychologists, especially Anna Freud. That rift was due, in large part, to the different perspectives of attachment theory and psychoanalytic drive theory on sexuality and love. Bowlby himself did not dispute the fact that sexuality exists independent of attachment. His views, as summarized by Diamond and Blatt (2007), are strikingly similar to contemporary neuropsychoanalytic views (Panksepp, 1998; Solms & Turnbull, 2002) about the functioning of the instinctual/emotional command systems:

Bowlby’s model stipulated that there were multiple interacting behavioral or motivational systems, including attachment, sexuality, affiliation, care giving, exploration, subordination and dominance, or aggression, each of which has its own diverse routes to relationships and objects with no need for one system to activate the others . . . Furthermore, Bowlby believed that as development proceeds, the behavior characteristic of any system becomes more complex as does the interaction between the systems themselves. [Diamond & Blatt, 2007, p. 5]

The aspect of Bowlby’s attachment theory that cemented the rift between him and the psychoanalytic ego psychologists was his rejection of the pleasure principle as the primary motivator of human attachment. This caused Anna Freud to comment that:

[T]o assume a struggle for priority or first place between mother attachment and pleasure principle as if they were mental phenomena of the same order does not seem to me to apply. . . . Once this particular misunderstanding is removed, Dr. Bowlby’s and our treatment of the subject are nearer to each other than appears at first glance. [A. Freud, 1960, p. 54, quoted in Diamond & Blatt, 2007, p. 4]

As we have seen, there are reasons to believe that the SEEKING system, whose functions appear to coincide with the classical Freudian pleasure principle (Solms & Turnbull, 2002, pp. 115–123), does indeed operate in parallel with the PANIC and CARE emotional command systems, and that it is not required for their activation, at least initially. In this sense, Bowlby’s account of how sexuality and attachment relate to each other seems to agree with contemporary neurobiological models. It also seems to agree with (and has served as a basis for) several contemporary psychoanalytic formulations (Fonagy, 2001; Lichtenberg, 1989; Mitchell, 1988). However, I share the opinion of Diamond and Blatt (2007) that as far as the origins of adult romantic love are concerned, “the more interesting and important clinical question is not whether the attachment or sexual system is dominant, but how they are integrated or fail to be integrated at the level of the representational world” (p. 8).

How sexuality and attachment interact in romantic love

In light of our discussion up to this point, there appears to be a broad consensus that the “affectionate current”
and the “sensual current” are both present in adult romantic relationships, regardless of the different ways in which they were defined over the years by psychoanalytic, cognitive-psychological, and neurobiological researchers. From the perspective of drive theory, we have already seen that Freud acknowledged the necessity for a “union” of the affectionate and the sensual currents in order to “ensure a completely normal attitude in love” (1912d, p. 180). From the perspective of attachment theory, although Bowlby believed that it might be useful to “keep attachment behavior and sexual behavior conceptually distinct” (1969, p. 231) in order to facilitate their separate and systematic study, he also acknowledged that attachment and sexuality “impinge on each other ... and influence each other” (1969, p. 233). But how do these two systems interact?

We have already seen that romantic-love relationships are usually characterized by sexual passion as well as by affectionate attachment. However, there exists a widespread realization that the “union” of these two currents is often less than optimal. Beginning with Freud (1912d), several psychoanalytic theoreticians have observed that when affectionate attachment and sexual passion are both felt toward the same person, they may become mutually exclusive to a greater or lesser extent (Eagle, 2007; Kernberg, 1995; Mitchell, 1997). Although there has been a general agreement about the phenomenon, it was explained and accounted for in different ways.

Freud (1912d) believed that the universal prohibition against sex with first-degree relatives of the opposite sex (the incest taboo) is necessary because of the existence of an equally universal, usually oedipal incestuous wish that has to be surmounted, or at least inhibited. In extreme cases, failure to surmount the libidinal fixation on mother or sister may cause men to be unable to have sex with anyone they love. According to Freud’s classical formulation, such men face a difficult choice: “where they love they do not desire and where they desire they cannot love.” (1912d, p. 183)

The universality of incestuous oedipal wishes has been challenged many times over (reviewed in Erickson, 1993). In a classical and influential study, Shepher (1971) traced the childhood history of more than 2,500 married couples in Israeli kibbutzim, in which children were reared together in intimate peer groups from infancy to late adolescence. He found only 16 couples (about 0.6%) in which both partners were reared in the same peer group. Even more astonishing, none of these 16 married couples were reared together before age 6. This finding was widely interpreted as supportive of the theory of “negative imprinting.” The theory stipulates that people with whom the child is intimate during the first years of his life are excluded from his sexual interests later on because they have become “imprinted” as non-sexual objects. The theory maintains that this, rather than a universal taboo on a forbidden incestuous wish, is responsible for the rarity of parent–child and brother–sister couples.

Freud himself might not have found this conclusion so convincing. As reviewed by Eagle (2007), Freud (1916–17, pp. 334–335) believed that the universality of the incest taboo is a measure of the intensity of the forbidden incestuous wish. Eagle (2007, p. 30) argues that this is like assuming that the taboo against suicide is evidence for universal suicidal wishes. He also quotes Fox (1980), who challenged the Freudian argument by stating that “we need not assume that we have laws against murder because we all have murderous natures, but only because some murder occurs and we don’t like that” (Fox, 1980, p. 8).

However, on anonymous surveys more than 20% of the general population state that they have had explicit suicidal ideation at some point during their lives. In addition, a third of the population report that at some point they wished they were dead, and there are Western societies in which about half of the general population report that at some point during their lives they have felt that life was not worth living (Moscicki, 1989; Renberg, 2001). Likewise, it was found that most normal young adults (women as well as men) admit to having had at least one concrete homicidal fantasy (Kenrick & Sheets, 1993).

In light of these findings, the wish to kill oneself or someone else is probably much more prevalent than the behavior itself would lead us to believe. It appears that in this case, perhaps like in the case of incestuous wishes, we might be tempted to overestimate our rational and civilized nature when we focus on explicit behavior rather than on latent wish. In agreement with this possibility, Mikulincer and Shaver (2007) describe an empirical priming study that supports the idea that unconsciously perceived oedipal fantasy affects the sexual urges of young adult men.

While these findings and arguments are not in any way conclusive, I am of the opinion that the century-old debate about the possible widespread existence of (mostly unconscious) incestuous oedipal wishes seems to resist efforts to make it go away. Either way, several lines of evidence appear to support the notion that the patterns in which children originally attach and relate to their mothers exert a strong effect on their subsequent object choices and relationship styles.

Mitchell (1997) suggested that the split between
love and desire is the result of the need to “degrade romance”—to render it “safe”—that is, familiar, secure and predictable. Mitchell pointed out that these traits are antithetical to desire and sexual passion and suggested that they may cause the well-known gradual decline in sexual passion that is characteristic of most long-term romantic relationships (reviewed in Fisher, 1992).

From a somewhat broader point of view that integrates contemporary psychoanalytic thinking with attachment theory and animal studies, Eagle (2007) offers a comprehensive and convincing argument for the idea that the sexual system and the attachment system may operate in inherently antagonistic ways. He cites many studies in mammals and humans that suggest that novelty and variety increase sexual interest, whereas familiarity and proximity decrease it, at least in men. He points out that while this bias is adaptive in that it promotes a mate choice outside the circle of one’s own family, it may threaten the stability and longevity of established romantic relationships. This is because the previously novel object will inevitably become familiar, and sexual interest may turn to others outside the relationship. Reviewing the psychological literature on this subject, he summarizes:

Virtually all studies show that sex is more important at the beginning of a relationship, and later in the relationship, emotional support and other similar factors become increasingly important. . . . These studies support [the claim] that sexual attraction brings and holds the two adults together . . . long enough to provide an opportunity for an enduring attachment bond to form. However, the longevity of the relationship will, in large part, be determined by the couple’s ability to maintain the emotional bond in the face of the relatively decreased role of sexual attraction. [Eagle, 2007, p. 36]

This brings up important questions concerning the temporal course of romantic love. These questions are discussed below, in the section devoted to the neurobiology of love. Much of the data about the neurobiology of romantic love is based on animal research. From a psychoanalytic perspective, one may question whether these findings are at all relevant to human romantic love. But as reviewed below, there appear to be similarities between certain aspects of human romantic love and the phenomenon of animal attraction, mate choice, and pair formation.

Moreover, Bowlby’s attachment theory was also originally based on animal research and evolutionary considerations, as well as on clinical observations. Its eventual acceptance into the main body of psychoanalytic thinking, and the many ways in which it has enriched psychoanalytic discourse, suggest that it might be useful to consider the contributions of ethology, evolutionary biology, and the neurosciences to the psychoanalytic discussion of romantic love. Before doing so, I briefly review the phenomenology of animal (mammalian and avian) attraction and mate choice, which were considered by Fisher (2004) to be analogous to human romantic love.

Mate choice and romantic love

While Freud focused on the mental life and subjective experience of humans, he was deeply influenced by Darwin (Morehead, 1999; Ritvo, 1974, 1992). Freud’s drive theory, discussed above, was probably shaped in part by his adherence to Darwinian principles (Dunn, 1993). Darwin hypothesized that humans share many of their subjective feelings with animals (Darwin, 1872). Specifically, Darwin (1871, p. 744) believed that animals fall in love with each other. As Fisher (2004, p. 28) points out, this view was (and probably still is) quite uncommon among scientists. Most scientists apparently prefer to regard emotions as behavioral phenomena and tend to avoid the thorny issue of subjective animal feelings altogether. Nevertheless, it has now become more or less acceptable in scientific texts to attribute to animals such feelings as fear and anger. But the possibility that animals have the capacity to experience anything that resembles human romantic love (as opposed to sexual desire) has not been commonly discussed in the neuroscientific literature.

This is unfortunate, because there appear to be many prima facie similarities between the behavioral manifestations of human romantic love, which were reviewed above, and animal attraction and mate choice: To begin with, mate choice, like romantic love, is about being specific. Observations of the courting and mating habits of rodents (Insel & Hulihan, 1995), elephants (Moss, 1988), and birds (Darwin, 1871) all document this specificity, and similar observations were made in many other species. Whereas sexual desire can be expressed and satisfied in both humans and animals by copulating with different members of the species, attraction and mate choice involve a determined focus on one particular, coveted individual.

Attraction and mate choice are characterized in many species of birds and mammals by a loss of appetite, restlessness, increased energy, focused attention on a specific mate, obsessive following, affiliative and affectionate gestures, possessive “mate guarding,” and an ongoing, persistent, sometimes desperate motivation to win a single preferred mating partner (reviewed
by Fisher, 2004). All these behaviors are part of the phenomenology of human romantic love (Tenov, 1979). Adversity, rather than causing the animal to abandon its pursuit of the specific mate and focus instead on other more available potential partners, leads to increased pursuit of the elusive coveted mate, as it does in humans.

In most species of mammals and birds, this excitatory state of attraction and mate choice is brief. Feelings of specific, focused attraction may last only minutes, hours, days, or weeks (Fisher, 2004). There are exceptions, however, and many bird species form pair bonds that last for a lifetime. Long-term monogamy is rarer in mammals, and only 3% of mammalian species have a relationship pattern that resembles human monogamy. One of the best-studied monogamous mammalian species is the prairie vole (Young, Wang, & Insel, 1998), and the neurobiology of the formation and maintenance of its pair bonding is reviewed below. Even in monogamous species the intense attraction characteristic of the beginning of the relationship is eventually transformed into a less exciting but more enduring attachment bond, as it typically does in humans. With this in mind, we now consider the neurobiology of sexuality, attachment, and romantic love in both animals and humans.

The neurobiology of sexuality, attachment, and romantic love

Helen Fisher (1992, 1998; see also 2004, pp. 77–98) conceptualized human romantic love as consisting of three independent, interacting components. The first of these is the sex drive, characterized by a nonspecific craving for sexual gratification. The second is attachment, characterized by the maintenance of proximity, affiliative gestures and expressions of calm when in social contact with a specific mating partner, as well as separation anxiety when apart. Parental behaviors such as territory defense, nest building, mutual feeding, grooming, and other parental chores are part of attachment. The third is attraction (or “mate choice,” “favoritism,” “sexual preference,” etc.), characterized by focused attention on a preferred partner, as well as by heightened energy, motivation, and goal-oriented courtship behaviors. Fisher hypothesized that each of these three components is driven by a different instinctual/emotional system, and she suggested that each of them has evolved to serve a different evolutionary purpose.

According to Fisher (2004), the sex drive evolved principally to motivate individuals to seek sexual union with a range of partners. Attraction evolved to motivate individuals to prefer particular mating partners and focus their courtship attention on these mates, thereby making a mate choice. The system for adult male–female attachment evolved primarily to motivate individuals to sustain affiliative connections long enough to complete species-specific parental duties. This section presents a brief review of the neurobiology of romantic love. It is based on Fisher’s three-component theory, Panksepp’s (1998) model of emotional command systems, and other relevant models and theories.

The neurobiology of sexuality

In mammals, the sex drive is associated with steroid sex hormones, the estrogens and androgens (reviewed in Pfaff, 1999). In humans, in both men and women, sexual desire is activated by male sex hormones, especially testosterone (Sherwin, 1994; Van Goozen, Wiegant, Endert, Helmond, & Van de Poll, 1997). Men and women who have higher testosterone levels tend to engage in sexual activity more frequently (Edwards & Booth, 1994). Functional imaging studies of human cerebral activity during sexual arousal show that specific networks of brain activation are associated with the sex drive. Increased cerebral activity was found in limbic areas—the hypothalamus and amygdala (Arnow et al., 2002; Beauregard, Levesque, & Bourgouin, 2001; Karama et al., 2002; Tiihonen et al., 1994). Imaging studies have also found that cortical activity is sharply reduced during human male orgasm, except in the right prefrontal cortex (Tiihonen et al., 1994). Several brain areas are activated during human female orgasm, among them the ventral midbrain and the nucleus accumbens, suggesting dopaminergic involvement, as well as the anterior cingulate gyrus and the insular cortex (Komisaruk, Beyer-Flores, & Whipple, 2006). The cingulate and insular cortices are also associated with the more subjective aspects of intense physical pain (Casey, Morrow, Lorenz, & Minoshima, 2001). In women, pain thresholds are more than doubled during orgasm (Whipple & Komisaruk, 1985). These findings, considered together, suggest that a significant (active inhibitory) interaction occurs between orgasm and pain in the insular and anterior cingulate cortices and raises the possibility that they are involved in both pain and pleasure.

Komisaruk, Beyer-Flores, and Whipple (2006) further speculate that these brain regions have some property that is common to both pain and pleasure, perhaps intense emotional expression—controlling the contorted facial expression that occurs both during painful anguish and similarly during impending or-
gasm—separate from the actual different feelings of pain versus pleasure. It seems possible that (at least female) orgasm, which attenuates the aversive component of pain, nevertheless may not attenuate the arousing quality of pain. This might help account for the practice of receiving what would appear to be pain-inducing stimulation in a sexually stimulating context, a combination that apparently intensifies pleasure.

Important aspects of sexual behavior in mammals—and probably in humans as well—are triggered and controlled by the neuropeptide hormones oxytocin and vasopressin (Panksepp, 1998, pp. 225–245). While it was initially hypothesized that oxytocin is associated with female-specific sexual behaviors and vasopressin is associated with male-specific sexual behaviors, it is now clear that both peptides play a significant role in both genders. For example, introducing oxytocin into many areas of the male brain causes sexual arousal, ejaculation, and orgasm (Argiolas & Gessa, 1991). Because many of the behaviors (and probably the feelings) associated with these peptides may be categorized as attachment-related and attraction-related, they are discussed in more detail below.

The steroid sex hormones and the neuropeptides oxytocin and vasopressin are all controlled by hypothalamic nuclei. In addition, sexual desire and sexual behavior are also associated with and dependent on activation of the SEEKING system, which acts mainly through dopaminergic neurons. These neurons originate from the ventral tegmental area in the midbrain and ascend to the dorsolateral hypothalamus, the nucleus accumbens in the basal forebrain, and they terminate in the PAG in the brainstem. The endorphins, a group of neuropeptides known as endogenous opiates, are important for the activity of the LUST system. Activation of the LUST system causes feelings of orgasm, and this effect may be blocked by infusing tiny amounts of naloxone, a narcotic antagonist, specifically into the preoptic area (Agmo & Gomez, 1993).

Fisher (2004) suggests that activation of the sexual system results in a desire to mate with any available partner. For example, when testosterone is infused into the brains of monogamous male sparrows, they leave their mates and chicks and pursue other females (Wingfield, 1994). In contrast, the neurobiology of the attachment system may account for important aspects of long-term monogamy in animals and possibly in man.

The neurobiology of attachment

Several neurotransmitters and brain regions have been implicated in male–female bonding and mother–infant bonding in mammals (Panksepp, 1998; Pedersen, Caldwell, Peterson, Walker, & Mason, 1992). But recent data suggest that oxytocin and vasopressin are the primary neuropeptides associated with monogamous male–female attachment and monogamous parenting behaviors in mammals (Carter et al., 1997; Lim, Murphy, & Young, 2004; Young, Wang, & Insel, 1998). Altering the composition and distribution of receptor sites associated with these peptides causes changes in the affiliative behaviors of rodents (Lim, Murphy, & Young, 2004; Young, Nilsen, Waymire, MacGregor, & Insel, 1999). Moreover, interspecies differences in the activity of these peptides and the distribution of their receptors may account for differences in species-specific male–female attachment patterns (Lim, Murphy, & Young, 2004).

The neurobiology of the sexual system, reviewed above, appears to be associated with some aspects of the Freudian “sensual current” or “passionate love” (Eagle, 2007; Mikulincer & Shaver, 2007). In similar fashion, the neurobiology of the attachment system may account for several aspects of the “affectionate current” or “companionate love” (Aron, Fisher, & Strong, 2006). Oxytocin, a key neurohormone in this system, is involved in several important maternal functions such as uterine contraction during birth, lactation, and nest-building. Panksepp (1998, pp. 246–260) defined the CARE system as the intrinsic brain system that promotes maternal (and sometimes paternal) nurturance, and it is activated by oxytocin.
Pathways from the anterior cingulate gyrus to the bed nucleus of the stria terminalis, the preoptic area in the hypothalamus, the ventral tegmental area in the midbrain, and parts of the PAG mediate the activity of this system. Interestingly, in animals that belong to the small percentage of mammalian species that are monogamous, this system appears to be involved in pair bonding and affiliative behaviors between males and females, as well as in maternal nurturance. As we have seen above, oxytocin is also involved in the action of the sexual system.

Most of what we know about the role of oxytocin and vasopressin in pair bonding was discovered in studies that involved the prairie vole, a small rodent often considered a pest in its native American Midwest. Prairie voles are notable for the fact that around 9 out of 10 of them mate for life with a single partner and rear their offspring together (reviewed in Insel, Winslow, Wang, & Young, 1998; Young, Wang, & Insel, 1998). Briefly, it was discovered that the secretion of vasopressin, which coincides with ejaculation, in the brain of the male vole during its first copulation, causes it to form a lifelong pair bond with its mate. When the action of vasopressin is blocked by injection of an antagonist, the male will not remain faithful to this mate. Similarly, oxytocin, which is secreted during copulation in the brain of the female vole, causes it to form a lasting attachment to its mate. This effect, however, may be blocked by injecting the female with a dopamine antagonist beforehand, suggesting a necessary involvement of the SEEKING system as well.

Some of the neurobiological links between infantile and adult attachment, as well as between infantile attachment and adult sexuality, have become apparent here: a surge in oxytocin is part of the physiological process of birth in all mammalian mothers, and this well-timed increase in oxytocin is probably linked to the intense lifelong bond that new mothers form with their newborns.12

An important aspect of attachment, both infantile and adult-romantic, is separation anxiety, which is painfully apparent in individuals with a preoccupied insecure attachment style (Mikulincer & Shaver, 2007) and dominates the clinical picture of individuals who suffer from borderline personality disorder (APA, 2000, pp. 706–710). As reviewed by Panksepp (1998, pp. 261–279), the PANIC instinctual/emotional system mediates separation anxiety in all mammalian species. Both oxytocin and prolactin, a much larger peptide hormone that is involved in maternal function, are capable of alleviating separation distress. However, the endorphins (and narcotic drugs such as morphine) are among the most potent substances capable of alleviating separation distress. It is likely that all these peptide neurohormones are associated with the PANIC system.

The core of the PANIC system is the anterior cingulate gyrus, which is connected to several thalamic and hypothalamic nuclei, the ventral tegmental area, and the brainstem PAG (reviewed in Solms & Turnbull, 2002, pp. 129–131). Multiple lines of evidence suggest that it is also intimately associated with feelings of sorrow, social rejection, mourning, and depression (Panksepp, 1998, pp. 261–279). Apparently, what makes us loving and tender also makes us sad.

The neurobiology of romantic love

As we have reviewed above, it is well established that many creatures have mate preferences and make mate choices. Fisher (1998, 2004; Fisher et al., 2002) advanced the hypothesis that the behavioral phenomenon of courtship attraction has a specific and distinct constellation of neural correlates; that this system operates in tandem with other neural systems, including the sex drive and specific sensory circuits for mate discrimination; that it is expressed at different times and to different degrees according to each species’ specific reproductive strategy; and that this brain system evolved to enable the chooser to discriminate between courtship displays, prefer those who advertise superior genes, better resources, and/or more parental investment, and motivate the chooser to focus his/her courtship attention and pursue specific mating partners.

In most species of mammals and birds, this excitatory state of attraction is brief. Fisher (2004) argues that in humans, the neural mechanism for attraction and mate choice is more developed, forming the physiological basis of what is commonly known as passionate love, obsessive love, or romantic love. While this state may last up to a few years in humans, it, too, is probably impermanent (Fisher, 1992). As Eagle (2007, p. 36) has suggested, the longevity of a romantic rela-

---

12 The attempts to account for human subjective feelings by studying neural circuits in animals may sometimes lead to “ruthless reductionism.” In order to avoid it, it is essential to remember that while the above-mentioned neurohormonal mechanisms probably contribute to the formation and maintenance of human feelings of attachment, they are in no way essential. For example, adoptive mothers, who have not given birth to their children and have not nursed them, may nevertheless form intense and lifelong attachments to them. These attachments may appear, from a psychoanalytic perspective, to be very similar in their conscious and unconscious aspects to the attachments formed between biological mothers and their children. More neuropsychoanalytic research is required to elucidate the role of oxytocin in human parenting and in adult romantic relationships.
tionship may be determined by the couple’s ability to maintain their emotional bond in the face of the relatively decreased role of sexual attraction.

Few scientists have considered the mechanisms that produce mate preference as a discrete anatomical and neurochemical system (see Fisher et al., 2002). However, Beach (1976) and Liebowitz (1983) proposed that the neurotransmitters associated with arousal—dopamine and/or norepinephrine—may be involved. Fisher (1998) hypothesized that attraction (romantic love) may be associated with elevated activity of the brain pathways for dopamine and/or norepinephrine and decreased activity of the serotonin system. These hypotheses are consistent with considerable correlational evidence. As noted earlier, characteristics of intense passionate love include focused attention, strong motivation, goal-oriented behaviors, heightened energy, sleeplessness, loss of appetite, feelings of euphoria, obsessive thinking about the beloved, and heightened attraction during adversity in the relationship (e.g., Tennyson, 1997). Each of these characteristics is associated with elevated activities of central dopamine and norepinephrine and/or decreased activity of central serotonin in the corresponding brain regions (Flament, Rapoport, & Bert, 1985; Hollander et al., 1988; Schultz, 2000; Thoren, Asberg, & Bertilsson, 1980; Wise, 1989; see Fisher, 1998). Passionate attraction takes a variety of graded forms, however, ranging from romantic love that is returned to unrequited love. So it is expected that these gradations of attraction are associated with different combinations of dopamine, norepinephrine, and serotonin, in conjunction with the activities of many other neural systems (Fisher, 1998).

Recent functional magnetic resonance imaging (fMRI) studies lend some support to the dopamine hypothesis in humans. Bartels and Zeki (2000) scanned a group of participants who reported being “truly, deeply, and madly in love” (p. 3829), and they compared brain activation when looking at the beloved partner versus when looking at familiar friends. Bartels and Zeki found a specific constellation of brain activity associated with looking at the beloved, including activity in the caudate nucleus, which is associated with motivation and goal-oriented behaviors. Of the receptor sites for dopamine, 80% reside in the caudate nucleus, which is associated with the identification of, focus on, and motivation to win rewards.

Aron et al. (2005) conducted a similar fMRI study, but their participants were more recently and even more intensely in love than those in the Bartels and Zeki (2000) study. (In the Aron et al. sample, mean length of time in love was 7 months and mean PLS score was 8.54 on a nine-point scale; in the Bartels & Zeki sample, the corresponding means were 2.5 years and 7.55.) In the Aron et al. study, comparison of activations when looking at and thinking about the beloved (vs. looking at and thinking about the familiar neutral individual) again yielded significant activation in the caudate. Indeed, in this study, the caudate activation was especially strong. Furthermore, as noted earlier, Aron et al. found that this caudate activation was significantly correlated (r = .60) with scores on the PLS. Aron et al. also found significant activity in a region of the right ventral tegmental area that is primarily associated with the production and distribution of dopamine to several other brain regions.

However, Bartels and Zeki (2004) conducted another fMRI study in which they compared patterns of cerebral activity in mothers while they viewed pictures of their own and of acquainted children and, as additional controls, of their best friend and of acquainted adults. The activity specific to maternal attachment was compared to that associated with romantic love described in their earlier study, as well as to the distribution of attachment-mediating neurohormones discussed above. Both types of attachment activated regions specific to each, as well as overlapping regions in the brain’s reward system that coincided with areas rich in oxytocin and vasopressin receptors. Both deactivated a common set of regions associated with negative emotions, social judgment, and “mentalizing”—that is, the assessment of other people’s intentions and emotions.

In sum, Fisher (2004) believes that the considerable data on mate preference in mammalian (and avian) species, and the association of this mate preference with subcortical dopaminergic pathways in human and animal studies, suggest that attraction in mammals (and its human counterpart, falling in love with one special person) is driven by a specific instinctual/emotional brain system: that it is associated with the increased activity of least one neurotransmitter, dopamine, and decreased activity in central serotonergic pathways; and that it evolved to facilitate a specific reproductive function: mate preference and pursuit of this preferred mating partner. Whether these considerations are sufficient to conclude that the system for mate choice is an independent instinctual/emotional system, or whether its functions may be accounted for by the action of the sexual system and the attachment system, is discussed below.

One, two, or three drives?

The questions that this article attempts to address—how sexuality and attachment interact with romantic
love, and whether there exists a specific drive for romantic love—are related to a more general question: how many basic drives underlie the complex and enticing phenomenon of human romantic love? This is a metapsychological rather than a psychological issue, and many contemporary psychoanalytic theoreticians tend to refrain from metapsychology altogether (Solms & Turnbull, 2002, pp. 291–298). Neuropsychoanalysis, by its very nature, is interested in metapsychology, while trying to avoid the “ruthless reductionism” that was often characteristic of neurobiological research throughout the last century (Solms & Turnbull, 2002, pp. 291–298).

For reasons reviewed above, questions relating to the most basic determinants of human motivation may be profitably addressed by taking the neuropsychoanalytic approach, which attempts to examine the human mental apparatus through the study of its components and their interrelationships, from both the subjective (mind) and objective (brain) perspectives. Drive theory, which represents the first attempt to do this within psychoanalysis, has become less popular in recent psychoanalytic writing, probably because it was felt to be mechanistic and deterministic (Apfelbaum, 1966, 2005; Mitchell & Black, 1995). Romantic love is one area where drive theory could be readdressed in an attempt to make it more compatible with current neurobiological data and theories, as well as with contemporary psychoanalytic thinking. This goal is, of course, well beyond the scope of this paper, but the question of the nature and number of drives needed to account for what we know today about romantic love may be a step in that direction.

One is not enough

As I have discussed above, a central tenet of Freud’s second drive theory was that all conscious and unconscious human motivations that have to do with staying alive to reproduce are ultimately different manifestations or derivatives of a single drive—Eros, the Life drive, or libido. Those motivations that were subsumed under the category of “ego-instincts” in his first drive theory, including the “affectionate current,” were also incorporated into Eros in his second theory (1940a [1938], p. 148). Thus, to Freud, romantic love—like all other types of love—is ultimately the product of one drive.

Subsequent psychoanalytic theoreticians doubted the utility and validity of the single-drive hypothesis. Freud’s polar opposite of Eros—Thanatos, the death drive—has not been widely accepted as responsible for human motivations and actions.13 With the emergence of object relations theory, motivations other than the need for reduction of drive pressure were formulated and successfully applied to clinical psychoanalytic data. They were also incorporated into theories about the forces that shape the mother–infant bond. Bowlby’s attachment theory and the research that it has inspired have established the existence of an independent instinctual/emotional system that controls the infant’s affectionate and essential tie with its mother. As we have seen above, there are now several independent and converging lines of evidence, both neurobiological and psychoanalytic, that suggest that there are important human (and mammalian) motivations that are not dependent on the action of the SEEKING system. This is a psychoanalytically meaningful finding, because the action of the SEEKING system is the closest biological correlate of the psychoanalytic concept of the expression of libidinal drive.

What about the brain arousal system as the single, underlying drive we are looking for? The BBURP system, the basic general brain arousal system studied by Pfaff (1999, 2006) and his colleagues, does seem to contribute to the function of all volitional systems, including SEEKING/libido. It is the ultimate source of all psychic energy. In this sense, it underlies all drives. However, from a neurobiological perspective it is clearly nonspecific, and from a subjective perspective there are no reasons to believe that it is connected directly to primal or other phantasies. As we have seen, it cannot be synonymous with libido. To state that romantic love is dependent on the activity of the general brain arousal system, while true, is to ignore the specific contributions of the limbic instinctual/emotional command systems reviewed above. It is, in effect, like saying that romantic love is ultimately dependent on the drive to breathe. I therefore propose that one drive is not enough to account for the motivational underpinnings of romantic love. Despite the explanatory power and the enduring clinical utility of the concept of libidinal drive, there appears to be more to romantic love than libido.

Two drives: the “affectionate” and the “sensual”

As reviewed by Diamond and Blatt (2007) and by Eagle (2007), many contemporary psychoanalytic for-

mulations of romantic love describe it as the outcome of a dynamic interplay between sexuality and attachment. It is now widely accepted within psychoanalysis that sexuality and attachment are the products of two different psychobiological instinctual/emotional command systems—that is, that they represent the conscious and behavioral manifestations of the action of two different drives or instincts.

In addition to its association with the LUST system, explicit sexuality is associated with the SEEKING system, which is involved in other “libidinal,” goal-directed, pleasurable pursuits. Attachment, on the other hand, is associated with the PANIC and CARE systems. These two closely related systems mediate aspects of the relationship between infant and adult caregiver, including its motivational underpinnings (Panksepp, 1998). I have described above how psychoanalytic drive theory may be adapted (and, in effect, has been adapted) to account for the recent findings about the instinctual/emotional command systems.

From the perspective of experimental psychology, there is now overwhelming evidence (reviewed by Mikulincer & Shaver, 2007) that the attachment system and the sexual system are both essential components of adult romantic love. They appear to be roughly parallel in terms of their hierarchical organization, and there is considerable evidence that patterns of attachment that characterize the infant’s tie to his mother will continue to shape his relationships with the objects of his romantic love as an adult.

Likewise, there is a considerable body of neurobiological evidence (reviewed in Fisher, 2004) that suggests that both the attachment and the sexual systems are active in romantic love. In particular, human imaging studies (Bartels & Zeki, 2004) and animal hormonal manipulations (Insel et al., 1998) suggest that the attachment system, which evolved in order to maintain the mother–infant bond, has been utilized for maintaining adult romantic love. In sum, it now appears that sexuality and attachment are two independent, complementary, and at times partially antagonistic instinctual/emotional systems and that they both drive romantic love. Their interplay may influence some of the vicissitudes of the longitudinal course of love relationships. It may also help us understand and ascribe meaning to some of the complex subjective manifestations of love relationships that are the bread and butter of clinical psychoanalysis.

A third drive: choosing who we love

We have defined drive as neither a part of the body nor a part of the mind, but, rather, as a term that describes how the body and its needs become represented in the mind—that is, how the body and its needs are mentalized. As we have seen, it is now reasonably well established that romantic love addresses our basic need to be in a warm, intimate relationship with someone we value, as well as our ongoing, equally basic, need for sex. But is that all there is to it? One typical characteristic of romantic love is that its object is chosen. This discriminating and fateful choice is apparently not an integral part of either the sex drive or the attachment drive. The pressure of the sex drive can be relieved by any one of many suitable partners, at least in men. And as for our attachment to our primary caregivers, it is not chosen: we are born into it. It is imprinted in us at a very early age, usually with little competition. The beloved, however, is always chosen, even if it seems at times as though the gods (or the devil) have chosen him or her for us.

“Are you my mother?” asks baby bird in P. D. Eastman’s (1960) classic children’s book, which he dedicated to his own mother. This question is never asked by most people: we know who our mother is. But we are compelled to search, find, and choose our beloved, and there is some evidence to suggest that there exists a specific, evolutionarily conserved psychobiological system that mediates this choice and strengthens it after it is made. From work done in prairie voles and other animals (Insel et al., 1998), as well as from the fMRI studies reviewed above, we know that at least some aspects of mate choice are mediated by activation of dopaminergic transmission. The activated dopaminergic pathways are part of the SEEKING system, which also mediates aspects of sexuality. Other aspects of mate choice are mediated by the neuropeptides oxytocin and vasopressin, and we have reviewed their role in the formation and maintenance of affectionate attachment. But it is not certain that these contributions fully account for the special characteristics according to which the choice of the beloved is made, nor for the intensity with which it is maintained.

In light of these considerations, as well as many others detailed above, Fisher (2004) suggested that romantic love is one of three independent, interrelated instinctual/emotional systems that together direct courtship, mating, reproduction, and parenting. The

---

14 The relationship between pleasure, anticipation, dopamine, and endorphins in the brain is complex and not fully understood. For example, within the SEEKING system there appears to be an anatomical and functional separation between motivational aspects (“wanting”) and evaluative aspects (“liking”), even as they relate to the same object or goal (reviewed in Berridge & Kringelbach, 2008).
other two systems are the sex drive and attachment. Each brain system is associated with different feelings and behaviors; each is associated with a different constellation of neural correlates; each evolved to direct a different aspect of reproduction; and each interacts with the other two to produce the range of emotions, motivations, and behaviors associated with all types of love. In concluding, I will consider whether the psychobiological mechanism for focused attraction, or the formation and maintenance of mate choice, should be regarded as a drive in its own right.

Conclusion

In this paper we have defined drive and a few related concepts from a hierarchical neuropsychoanalytic perspective and discussed romantic love from a phenomenological perspective. We then attempted to address two questions: how sexuality, attachment, and romantic love interact, and whether there exists a specific drive for romantic love. In addressing the first question, we tried to review the rapidly expanding psychoanalytic, experimental-psychological and neurobiological literatures about the role of sexuality, attachment, and their interplay in romantic love. We found that there exists a wide agreement that sexuality and attachment, as two independent instinctual/emotional systems, interact in complex ways to mediate many facets of romantic love.

Regarding the possible existence of a unique drive for romantic love, Fisher (2004) presented arguments that support the notion that attraction, or mate choice, represents a third neural instinctual/emotional system (in addition to sexuality and attachment) that mediates some of the unique aspects of romantic love: the focused attention on a specific mate, the obsessive following, the affiliative gestures, the possessive “mate guarding,” and the heightened motivation to win a preferred mating partner. She suggested that the combination of increased dopaminergic and noradrenergic transmission, together with decreased serotonergic transmission, may account for the subjective emotional and cognitive states of mind that characterize romantic love, as well as for some of their behavioral manifestations.

While I value the clarity, consistency, and explanatory power of Fisher’s three-drive model, I believe that it is possible to view these neural mechanisms and their manifestations as parts of other instinctual/emotional systems: The increased energy, focused attention, decreased need for food and sleep, and increased impulsivity, all of which are typical of romantic love, as well as the increased dopaminergic and noradrenergic transmission that underlies them, may be due to activation of the global brain arousal system, together with the well-documented activation of the SEEKING system that is so characteristic of the sex drive. Such dopaminergic activation may cause a decrease in serotonergic transmission (Luciana, Collins, & Depue, 1998), which might increase both the impulsive and the compulsive thinking, feeling, and behavior that characterize romantic love. Other features of romantic love have to do with a persistent focus on one particular person. These features (separation distress, possessive mate guarding, persistent attempts to win over a reluctant or rejecting partner, and profound despair and rage upon his/her departure) may all be manifestations of an activation of the PANIC system that mediates separation distress in mammals, when applied to an adult object choice. The evidence for similarities between infantile and adult attachment patterns in humans, as well as the involvement of similar neurochemistries (oxytocin, endorphins, and dopamine) and many overlapping brain areas (Bartels & Zeki, 2004) in both infantile attachment and mate choice seem to support the view that these processes are driven by the attachment system, which was modified to mediate and maintain adult object choice. According to this view, there might not be enough evidence yet to account for a third independent drive for romantic love.

More than different ways to slice the love pie, these differences of opinion might stem in part from different interpretations of the term “drive.” Persistent, specific mate choice is indeed a common feature of the sexual behavior of many mammalian species. The evolutionary advantages of this behavior (reviewed by Fisher, 2004, pp. 99–125) seem obvious, and they are different from the evolutionary advantages of maintaining the mother–infant bond. Moreover, despite apparent phenomenological and mechanistic similarities between attraction and attachment, they are attuned to very different objects and foster very different relationships. Thus, when attraction is viewed as resembling an instinct, especially with objects attached to it, it might lend itself to the third-drive hypothesis. When viewed according to the more conservative definition outlined in the first part of this paper, two instinctual/emotional systems—sexuality and attachment—may suffice. In addition, other as yet undefined and unidentified systems may participate in the complex psychobiological interplay that produces, maintains, and terminates romantic love. Either way, drive theory may now be revised to include the contribution of nonlibidinal instinctual/emotional systems such as the attachment system. It may then serve as a useful link between psy-
choanalysis and the cognitive and affective neurosciences in their combined efforts to study and understand romantic love.

REFERENCES


Lim, M. M., Murphy, A. Z., & Young, L. J. (2004). Ventral striatopallidal oxytocin and vasopressin V1a receptors in the monogamous prairie vole (*Microtus ochrogaster*). *Journal of Comparative Neurology*, 468: 555–570.


When Freud created psychoanalysis, love was a defining element in his patients’ suffering. His psychoanalytic procedure became a process of revealing how forms of love and desire, about which his patients would not or could not speak, were both the sources of, and found expression in, their neuroses (Freud, 1915a). These passions were too shameful or guilt provoking, or too deeply buried to be readily remembered, and/or disguised, to be comfortably acknowledged. Insight into the instinctual sources of these infantile loves and desires cured the patient of his or her symptoms, inhibitions, and anxieties. Knowing one’s forbidden desires, one’s unacceptable drives, Freud envisioned, would set one free from neurotic suffering.

Our understanding of clinical psychoanalysis, and of the mind, brain, body, and social forces that shape us, have deepened and become vastly more complex. But what has changed in our understanding of love? This is the challenge Yoram Yovell takes up in this rich and provocative paper (a paper that Freud would have loved to read).

In pursuing the question of a drive to love, Yovell posits neuropsychoanalysis as an intellectual synergy of the disciplines of neuroscience and psychoanalysis. This neuropsychoanalytic perspective, while avoiding “ruthless reductionism,” can ultimately offer new and useful knowledge about the nature and sources of human motivation.

Since I write, not as a scientist, but as an analytic clinician and educator, one who thinks in terms of understanding and treating patients, I assume that analysts work with three interrelated theories always in (and necessarily not on) their minds:

• a theory of mind
• a theory of suffering or pathology
• and a theory of treatment or cure.

From this point of view, I think that Yovell poses three linked problems:

1. The knowledge problem: What do analysts need to know, from beyond the boundaries of psychoanalysis, that can enhance their clinical understanding and effectiveness?
2. The motivation problem: What do analysts need to know about “what makes people tick” and the neurobiological correlates of motivational systems that influence and shape mental life?
3. The romantic love problem: What do analysts need to know about the nature and forms of love and desire to effectively analyze problems of love?

The knowledge problem

Beyond a certain requisite psychoanalytic knowledge and skill of technique and process—that is, the “craft” of psychoanalysis—valid knowledge from outside psychoanalysis must constrain how analysts can understand and interpret mental life.

Certain psychoanalytic ideas are simply incompatible with what has come to be known about mind, brain, people, and culture and therefore should be abandoned. Psychoanalytic history is littered with problems created by inattention to or rejection of knowledge about being human in the world. Consider the following mistaken psychoanalytic ideas: that dreaming protects sleep by discharging psychic energy; or that memory is a simple, accurately recoverable “registration and storage” brain system, not biased and highly suggestible; or that mental functions develop out of psychic conflict resolution; that depression is caused by “retroflexed rage”; or consider more painful examples such as women having a weaker moral sense, stronger masochism, or an insatiable need for a penis; or that schizophrenia or autism are caused by failed or traumatizing mothering; or that homosexuality is a pathological form of narcissism, or defense against an infantile fear, or a choice.

In addition, there is important new knowledge that will shape psychoanalytic theory and practice. Consider the implications of recent findings about genetic
vulnerability to depression; about maternal perinatal depression on infant vulnerability to stress, trauma, and depression in adult life; about the factors that influence psychological resilience; or about the role of neurotransmitters and hormones on mood, cognition, and behavior.

Patients have theories about the causes of their problems. They are preoccupied with issues of what it means to be normal and to be responsible. They are tortured by unconscious crimes, sins, failures, injuries, trauma, and injustices. They fear the eruption of guilt, shame, envy, emptiness, rejection, entitlement, and loss. Knowledge of how minds develop and function, how mental life is organized, how body and mind influence one another, will all enrich analysts’ efforts to help patients see the deceptions, distortions, and disavowals needed to maintain their neurotic struggles.

This includes all manner of knowledge about the differences between feelings and actions, childhood and adulthood, men and women, or the impact on us of loss and of time; or an appreciation of the fictive and motivated nature of our memory of our personal histories, and of the relative indelibility of fear responses and the “etched-in” quality of early developmental trauma on lifelong adaptation. We are story-telling and meaning-creating creatures. We also live in real historical time and cultural place, which shape us. Knowing more about how our minds develop and function deepens our sense of who we are and how we got this way.

David Olds, co-Editor of this journal, offers his perspective on these questions in his 2006 article “Interdisciplinary Studies and Our Practice.” Calling attention to “the neurobiology of executive function”—those capacities, structures, functions, and processes that involve registration, representation, learning, regulation, and organization—he asks: “Why should psychoanalysts learn about neighboring disciplines?” (p. 857), and suggests that neuroscience will improve our theories and practice:

There have been important changes in technique in the last half century: is it possible to say what kind of contribution the cognitive sciences have made to this evolution? These changes in clinical theory and practice include a more active and interactive stance toward the patient by the analyst; the shift from a libido-economic model of mind to one based more on information, meaning, and narrative; the development of a “two-person” psychology, according the relational matrix greater prominence; and the increased importance of brain and body in the analytic situation, seen most concretely in the common use of psychotropic medication as part of the treatment. [p. 859]

He then goes on to list six areas where information might be relevant: “mirror neurons, procedural memory, cognitive function, affect, trauma, and dynamic systems theories”[p.861].

An intriguing question to add to Olds’s list is about consciousness, a topic receiving increasing attention. Clinically, we assume that conscious self-reflection and self-awareness have significant psychological impact. Knowing more about how the brain mediates these processes could powerfully enhance explorative psychological treatments.

The motivation problem

Is “drive” a clinically useful concept? Defining drive as the demand of the body on the mind for action or response, Freud was positing a neuropsychological model consistent with the science of his day, energies and equilibrium. As Yovell notes, drive theory has fallen out of favor in psychoanalytic theorizing. For decades, analysts were taught to look for and infer “drive derivatives.” Analysts decoded behavior, dreams, and associations to reveal drives as sources of conflict. Interpretation of the drive conflict was expected to lead to curative insight. As a comprehensive explanatory model of pathology, technique, and cure, libido theory’s pride of place has been crowded out by other motivational systems and models. In addition, the death drive has largely been abandoned in understanding aggression and the miseries it causes. We live with a new and uneasy theoretical pluralism about motivation and mental organization.

As a consequence, clinical psychoanalysis has evolved. An analyst’s work has become much more complex, less authoritative, and more participatory, hermeneutic, and modest. Analysts seek to provide a condition of safety for a new object relationship. This potentially transformative relationship allows patients to affectively experience new perspectives on their familiar sense of themselves. By internalizing the experience of the analyst, and through interpretation and insight, new meanings of self-experience are created and integrated. Reaction patterns change. Patients see “what drives them”—their motivations, self-representations, love relationships, histories, etc. Analysis allows them to know themselves both more intimately and with greater objectivity. A renewed developmental process ensues (see Friedman, 2007).

It would be fascinating to know more about the neurobiological correlates of the “I” who is doing the driving or being driven, and of the sense of coherence and continuity in the “me-ness” of subjective experience. How the brain generates the mental structures
and functions that subserve the phenomenology of normal and pathological narcissism would both constrain and enrich analytic understanding of the meanings of desire, love, and attachment.

As Yovell describes, Bowlby was correct in revising drive theory. He recognized that infants seek their mothers or caregivers not because they are hungry (as Freud suggested) but simply because they need them.

This line of thought has led the field of developmental psychobiology (see Hofer, 2005) into the psychoanalytically useful domain of internalization of representations (through forms of learning) that then serve as internal motivational regulators.

The study of emotion has been vast and extremely productive, and beyond the scope of Yovell’s paper and of this commentary. Suffice it to say that emotions are an essential component of motivation, as reaction patterns, appraisals, internal signals, concomitants of action, communications, etc. An enormous amount has been learned about the essential “wired-in” nature of emotion. However, as Jerome Kagan, in his new book What is Emotion? (2007), suggests:

Although every emotion originates in brain activity, each is first and foremost a psychological phenomenon that is underdetermined by a brain state because each brain profile can give rise to an envelope of emotions. The specific emotion that emerges depends on the setting and always on the person’s history and biology. Understanding how history and biology select one state from many contains the same mystery that surrounded the puzzles of why like begets like and why apples fall from trees. [p. 1]

Noting the potential consequences of overdichotomized clinical thinking, Kagan cautions:

Clinicians who conceptualize their patients’ emotionally based symptoms as originating in their neurobiology are biased to excuse them from responsibility for their distress. By contrast, clinician who regard the same symptoms as psychological products of experience are more likely to hold them responsible for their problems. [p. 26]

A third system

But romantic love involves more than a merging of or struggle between sexuality and attachment, of passionate and compassionate love.

Romantic love’s “characteristics . . . include focused attention, strong motivation, goal-oriented behaviors, heightened energy, sleeplessness, loss of appetite, feelings of euphoria, obsessive thinking about the beloved, and heightened attraction during adversity in the relationship.” Romantic love makes people feel crazy, “love-sick”. What makes it such a state of ecstasy, pain, suffering, yearning, destabilization, and so forth? Why is falling in love such a transcendent release or crisis for some people?

Ethel Person’s book, Dreams of Love and Fateful Encounters: The Power of Romantic Passion (1988), addresses the problem of romantic love as an expression of fantasy transcending the desire for sex and attachment. She sees romantic love as an agent of change:

Affectionate bonding and passionate love overlap and have many qualities in common. Both offer tender nurturance, an opportunity for sexual satisfaction, and a variety of other gratifications that seem closely related to our earliest needs and pleasures. But passionate love appears to be characterized, in addition, by two emotional states that are experienced as discontinuous with everything that has preceded them: first, the state of heightened drama and self awareness that accompanies falling in love and the idyllic phase of love; second, the state of transcendence and merger that, intermittently, characterizes the course of passionate love. These states of feeling . . . are the most conducive to significant internal change. . . . Romantic love enacts its role as change-agent in part by giving us a chance to remake the past, . . . change the boundaries of the self, . . . to liberate ourselves from our own subjectivity. [pp. 349–351]

It is precisely this unprecedented, destabilizing, “crazy-making” quality of romantic love that makes it both feared and desired. In fantasy, at least, it offers or threatens to change the boundaries of the self, to alter one’s sense of oneself.

By invoking the power of fantasy as an expression of self-representation and self-organization, we face...
the issue of narcissistic structures and functions in mental life. Freud's (1914c) paper on narcissism began a clinically rich exploration and conceptualization of motivation beyond object-directed libidinal drive theory. Self-love and its vicissitudes, however powered, have grown central in our understanding of mental life, character structure, and psychopathology. Romantic love, beyond sexuality and attachment, can be seen as expressing the unconscious wish “to have and to be one’s ideal love.” Through the storm of romantic passion, one can find one’s ideal “other half,” one’s “true soul mate,” etc. and, in this way, unconsciously repair a damaged self. One can right all the wrongs, undo the injustices and failure of ones’ past, and ultimately validate and vindicate one’s specialness. Self psychology has extended our clinical understanding and tools through its theories of normal narcissistic development, traumatic failures, and the role of grandiosity and idealization in normal and pathological personality structure and adaptation.

This third system, a self-organization system, in addition to sexuality and attachment, seems fundamental to romantic love as it is in all of mental life. Neuropsychoanalysis holds a promise to deepen clinical understanding of the sources of self-esteem, self-representation, and self-organization, to reveal more about how the brain constrains and enhances opportunities to imagine and be more than we feel we are.

In conclusion, a challenging clinical illustration

The following is a brief, highly condensed, composite clinical vignette that illustrates some of the issues raised by this commentary, including the philosophic dilemma of knowing meanings versus knowing causes in mental life.

A man in his mid-40s seeks consultation because he is having a “mid-life crisis.” He tells his story: he has been happily married for nearly twenty years, has three wonderful, prospering children, has been stably but unfulfillingly employed throughout his adult life. He and his wife have an active and satisfying sexual life. He is appropriately sociable and well liked in his world, has outside interests, and enjoys good physical health.

However, he acknowledges a longstanding, private modest sense of dissatisfaction and disappointment with himself, but never to a degree that would have prompted seeking psychological help. His past family history includes significant psychiatric pathology in a sibling who consumed his parents’ time and energies throughout his early life. He felt both fortunate to be normal and healthy, and frustrated at not getting enough attention.

He comes because he has fallen madly and passionately in love with a mature, married co-worker. He feels that he has finally found a “soul mate,” someone who understands him, appreciates him in ways he has never experienced before, and he feels that it is completely reciprocal. Their attraction evolved over many months, with increasingly intimate conversations and more time together, and, while he had always previously been faithful in his marriage, they began an intense affair. He is both happier than he has ever been and anguished in ways he could not have imagined. He loves and wants to maintain his life with his wife and children. He feels terribly guilty and confused about what to do. He has reviewed all his options over recent weeks, and he seeks help in figuring out what is going on in himself and what to do.

Unlike other types of clinical problems—those with absent, failed, reckless, selfish, painful, or inhibited love—this man has been able to maintain both healthy sexuality and attachment throughout his adult life. Now he has found himself in the throes of a “mid-life crisis” of romantic love. While there is some subtle but not flagrant form of narcissistic pathology (in his mild, chronic lower self-esteem), something has happened to him that is “driving him crazy,” something consistent with Person’s definition of romantic love as change agent. He has a crisis in his sense of himself, and of meaning in his life. Is he in some tragic, clichéd, self-delusion? Has something happened in his “mental wiring,” or is he simply in love like he has never been before?

From a neuropsychoanalytic perspective, this troubled man has intact and robustly functioning instinctual/emotional command systems of sexuality and attachment. Considering romantic love as a crisis of self-definition, is the man narcissistically damaged and unconsciously trying to passionately heal an old wound? Does he suffer from a form of narcissistic psychopathology that has caused, or doomed him to, this fate? Has life or his brain dealt him a problematic “set of cards”? I reinvoke Yovell’s wise admonition: beware of ruthless reductionism. Ultimately a way through this man’s anguishing dilemma will probably involve new and painful self-knowledge, loss, grief, and repair. At some point, he will emerge from the analytic work with a different sense of himself and his life.
In the end, he and I will understand more—but still not enough—about what has driven his romantic love.

REFERENCES


Commentary on “Is There a Drive to Love?”

Marianne Leuzinger-Bohleber (Frankfurt a.M.)

The love story of Amor and Psyche, first told eighteen hundred years ago in the fairy-tale by Apuleius, came to my mind when reading the title of Yoram Yovell’s paper: Shall we—psychoanalysts and neurobiologists—really try to decode the last secrets of love and thus risk losing its magic?

Amor visits Psyche every night but disguises his body and his name. Psyche finally cannot control her curiosity any more and approaches the sleeping Amor in order to observe him closely with the aid of an oil lamp. She does not watch out carefully: a bit of hot oil drops on to him: he awakes frightened and flees forever . . .

Love indeed has always been and probably always will be one of the great topics of human life. Shouldn’t we therefore just leave it up to artists and writers to shed light on hidden dimensions of these fundamental questions of human existence?

Yoram Yovell—himself simultaneously a writer, a psychoanalyst, and a neuroscientist—seems to be predestined to meet the challenge to show if and what kind of a contribution contemporary psychoanalysis and empirical psychological and neurobiological research. He combines this overview with profound reflections and striking arguments for further developing a kind of a “metapsychology of romantic love.” He is devoted to one of the most valuable traditions of neuropsychoanalysis: trying to stimulate innovative developments within psychoanalytic theorizing. He examines the bodies of knowledge in psychoanalysis and in the neurosciences, “which employ different methodologies and stem from two different and complementary viewpoints on the human mind, correspond to each other, and may be relevant to each other.” Let me thus first congratulate him for this admirable contribution, written in clear and precise language and explaining the most difficult issues in a way that is easily understandable, even for nonneuroscientific readers. I will leave it to a more competent commentator to appreciate Yovell’s contribution to the neuroscientific body of knowledge.

As a psychoanalyst I would like to concentrate my commentary on some reflections concerning a subject that has been troubling me ever since I tried to engage in clinical as well as extra-clinical research in psychoanalysis. It concerns a field of tension with which researchers in psychoanalysis are inevitably confronted, and which also has to do with the attempt to deal with such existential issues as the suffering from “romantic love” of our patients in the clinical situation—while at the same time trying to improve insights gained in the psychoanalytic situation in the sense of a contribution

Marianne Leuzinger-Bohleber: Sigmund-Freud Institut, Frankfurt am Main, Germany.
to psychoanalysis as a unique kind of “Wissenschaft”. On one end of the scale, we feel that psychoanalysis has developed a very specific method to investigate its very specific research subject—unconscious fantasies and conflicts—following very specific quality criteria for observations within the psychoanalytic situation, observations that can hardly be understood in depth by non-psychoanalytic researchers. Therefore, the withdrawal into a psychoanalytic ivory tower with an exclusive exchange among psychoanalysts—reflecting on their clinical observations, arts, and literature—is a great seduction for me again and again. I can empathize with colleagues who are convinced that, for example, the dialogue with contemporary neuroscientists does not really have much to offer for psychoanalysts, even if I don’t like the fundamentalistic, aggressive style in some of their papers. On the other hand, I passionately see the necessity for psychoanalysis as a clinical practice and as a “Wissenschaft” to be in an open, curious dialogue with the non-psychoanalytic world in order not to lose its own clinical and conceptual creativity or to be marginalized in the current health systems, the medical and academic world. Personally, I experience the exchange with other scientific disciplines as challenging and fruitful even for my psychoanalytic practice, but I also often feel the danger that psychoanalysis could submit too much to a certain “Zeitgeist” and research methodology that is not its own and thus could lose part of its identity.

Often it is overtaxing for me to bear this field of tension in its harshness, to experience the whole spectrum of connected feelings and fantasies, and to reflect on it in a productive and honest way. As I see it, Yoram Yovell also struggles with the perception and reflection of this field of tension and tries to cope with it in his paper in a creative way. Therefore, I would like to focus my commentary on just two remarks in this context: an epistemological one and a psychoanalytic one.

Epistemological remark

Yoram Yovell has been one of the most innovative and productive authors to have taken up the challenge to build bridges between psychoanalysis and the neurosciences in recent years. In the eyes of many contemporary scientists, these bridges seem to be of central interest for the future of psychoanalysis as both a scientific and a clinical discipline (cf. Kandel, 1999, 2008; Leuzinger-Bohleber, Roth, & Buchheim, 2008; Mancia, 2006). The specific psychoanalytic research method (see above) has contributed to a large body of knowledge and cannot be replaced by any other scientific approach. It has developed a variety of different theories creating a situation that has lately been characterized as “theoretical pluralism” (cf. Leuzinger-Bohleber, Dreher, & Canestri, 2003). Arnold Cooper, summarizing the 37th IPA Congress in Buenos Aires in 1991, already interpreted this pluralism of theories as an indicator for a mature theoretical discussion in a “mature scientific discipline” which enables psychoanalysts to approach the complexity of unconscious clinical phenomena from a variety of different theoretical perspectives. However, Iran Nydad (1987) also warned more than twenty years ago that from the perspective of the history of science, this development might also have a dark side and could prove to be destructive for further scientific development. Charles Hanly (2008), president-elect of the IPA, discussed similar concerns in a paper he gave at the last Joseph Sandler Research Conference in Frankfurt. To exaggerate the danger: If we create a situation in contemporary psychoanalysis where “each psychoanalyst has his own theory” and the different theoretical approaches do not show any major differences with respect to their power of explanation, the competition between them (offering different explanations for the same clinical data) might not be fruitful and enriching any more. Instead, we could create a situation in which “anything goes”—a situation of theoretical fuzziness and diffusion and a lack of new, convincing theoretical integration. In such a situation, according to Nydad, a scientific discipline has to open up and try to develop an “interlevel-constraint,” which means comparing its different models and data on another level of abstraction. For contemporary psychoanalysis this could mean that we have to investigate which of the purely psychological psychoanalytic theories (e.g. drive theory, object relations theories, self-psychology, intersubjective models, attachment theory, etc.) prove to be in best concordance with findings from other contemporary sciences—for example, on the one hand, (1) from the neurosciences on a less abstract level of data or, on the other, (2) from the cultural, social, or literary sciences on a higher level of abstraction.

Intention (1) is indeed taken up by many “neuropsychanalysts,” as Yoram Yovell shows so impressively in his paper. He compares different psychoanalytic theories on romantic love with the knowledge base of contemporary brain research and psychological studies focusing on the same issues. He then discusses which of these psychoanalytic models best prove to be “externally coherent” (Strenger, 1991) with these findings. To mention just one of his conclusions: He postulates a new theoretical integration between psychoanalytic drive theory and attachment theory, two models that
had been separated from each other in a kind of conceptual war for many years.

Of course, such an integrative attempt based on the dialogue with the neurosciences does not mean losing the independence of psychoanalysis as a specific “Wissenschaft” of its own nor reducing psychoanalytic observations or concepts to neurobiology. It means systematically comparing the knowledge bases and the models of both disciplines, a process that—in an attitude of openness for new and “foreign” ideas—may initiate a critical reflection of one’s own psychoanalytic models and their explanatory power again and again—thus strengthening new and innovative developments within psychoanalytic theorizing itself. It also does not mean that neurosciences can solve the unsolved theoretical problems of psychoanalysis. This could be a manifestation of the above-mentioned submission to a foreign scientific discipline. Of course, conceptual problems in psychoanalysis have to be “solved” within the psychoanalytic discourses themselves, based on its own core field for gaining scientific insights: the genuine psychoanalytic (research) situation. However, as Yoram Yovell’s paper illustrates, the interdisciplinary exchange—for example, with the neurosciences—may initiate a critical reflection of one’s own psychoanalytic models and their explanatory power again and again—thus strengthening new and innovative developments within psychoanalytic theorizing itself. It also does not mean that neurosciences can solve the unsolved theoretical problems of psychoanalysis. This could be a manifestation of the above-mentioned submission to a foreign scientific discipline. Of course, conceptual problems in psychoanalysis have to be “solved” within the psychoanalytic discourses themselves, based on its own core field for gaining scientific insights: the genuine psychoanalytic (research) situation. However, as Yoram Yovell’s paper illustrates, the interdisciplinary exchange—for example, with the neurosciences—can have an innovative impact on psychoanalytic theorizing, while being at the same time a challenge for a critical reflection of the connected ambitious epistemological problems (see e.g. Ahumada & Doria-Medina Ponce, in press; Brothers, 2002; Hagner, 2004; Hampe, 2003; Kandel, 1999; Kaplan-Solms & Solms, 2000; Leuzinger-Bohleber & Fischmann, 2006; Mancia, 2006).

Within the scope of this commentary, I cannot enter into discussion of Intention (2). Nevertheless I would like to indirectly formulate some hints in this direction.

**Psychoanalytic remark**

Freud’s theories on “romantic love” revisited

Do we need neurosciences at all in order to gain new psychoanalytic insights on romantic love? Bearing this question in mind, most contemporary psychoanalysts would still agree with the summary of Freud’s three theories on romantic love by Bergman (1987) in his classic work, *The Anatomy of Living: The Story of Man’s Quest to Know What Love Is*.

1. The first theory stresses the unconscious dependency of the adult choice of love object on infantile prototypes. So Freud postulates that finding the object “is actually a retrieval of the object” (1905d, p. 125). The longing for fusion with the nurturing and beloved primary object, as well as various satisfactory modalities of the early infantile sexual development, constitute the powerful unconscious motives in the choice of a love object. He considers the unconscious oedipal choice of a partner that is frequently found in patients as a possible source for the impossibility of reconciling love and sexual desire: sexual lust, which is unconsciously directed at the oedipal love object, mobilizes incest prohibition [*Inzesttabu*].

2. The second theory describes from a metapsychological perspective the psychic processes when someone is falling in love: by projection of the ego-ideal, the love for oneself is turned into the love for the other. Freud thus focuses the vicissitudes of narcissistic desires and impulses in sexuality and love.

3. The third theory deals with the maturation process, from which emanates the ability to sustain a lasting relationship without too much destructive ambivalence. Here, Freud asserts that love is more than just a manifestation of sexual drives, because the entire ego is involved. Freud is of the opinion that this kind of love was possible only if psychosexual development had reached the genital stage. Thus he confirms that the condition of having fallen in love is not the same as the ability to love somebody over a longer period of time.

These conceptualizations of romantic love, most often connected with existential human tragedies, are still offering deep insights into the unconscious sources of the lifelong struggle for happiness and satisfaction in “romantic love,” the search for the lost childhood (Marcel Proust’s “*À la recherche du temps perdu*”), and the paradise of the “fusion with the nurturing and beloved primary object” (Theory 1, above). The extreme intensity of the archaic psychic world of drives and affects—coupled with the first imprinting and determining experiences to be “seen” and “recognized” by the primary object as a unique and irreplaceable self, in combination with the basic experiences to be “loved” and “nurtured” in a very unique way—leave their traces in the unconscious world of human beings and form the unique features of one’s lifelong longings and drives (see e.g. Bohleber, 2001; Kernberg, 2005; Loewald, 1986). The insights in these unique unconscious sources of one’s longings for romantic love remain a continual challenge and struggle for psychic integration and self-reflection. The fact that one’s longings and drives will inevitably create con-
conflicts with realities—with the love objects as well as with expectations, rules, and taboos of the culture—is at the heart of Freud’s oedipal conflict. Only by the mechanism of projection is it possible to resolve the confrontation with such frustrating realities and to fall in love, a presupposition to become engaged in the adventure of romantic love (Theory 2). Freud describes the manifold factors that prevent the unavoidable conflicts, deceptions, and frustrations from leading to an abrupt withdrawal from the love object, as opposed to, instead, developing the “capacity to love”—a mature level of psychic functioning and of the self- and object-representations, as well as the quality and the integration of aggressive impulses, a particularly important presupposition for an engagement in continuous love relations.

Since Freud’s revolutionary conceptualizations of romantic love, many important psychoanalytic papers have dealt with these central topics of human life—with happiness and pain, expectations and deceptions—with relatively mature compared to pathological forms of love relationships (see, e.g., the extensive topic of drive conflicts of patients suffering from perversions, narcissistic personality disorders, etc.—for examples, see Leuzinger-Bohleber, 2001). We thus have a large body of psychoanalytic knowledge on “romantic love” that enables us in our everyday psychoanalytic practices to represent, as well as the quality and the integration of aggressive impulses, and takes into account findings from neurobiological as well as animal research, conceptualizes human romantic love as consisting of three independent, interacting components:

- **Sex drive**, characterized by a nonspecific craving for sexual gratification
- **Attachment**, characterized by the maintenance of proximity, affiliative gestures, etc. when in social contact with a specific mating partner, as well as separation anxiety when apart
- **Attraction** (or “mate choice,” “sexual preference,” etc.), characterized by focused attention on a preferred partner, as well as heightened energy, motivation, and goal-oriented courtship behaviors.

According to Fisher each of these three components is driven by a different instinctual/emotional system, which evolved to serve a different evolutionary purpose.

In the sense of the above-mentioned curiosity and openness towards “foreign” knowledge, these conceptualizations might inspire clinical practice. Indeed, many of our patients, particularly men, do suffer from the tragic experience that their constant love partner loses his or her sexual attraction for them, which is often one reason why they become unfaithful or even leave their partner and their children in spite of feeling deeply attached to them. Thus, reflecting on the three different components of romantic love above and the postulated antagonism between the sexual and the attachment system, as well as taking into account, for example, the age of the patient, might provide a valuable body of knowledge for examining such conflicts in the psychoanalytic situation. In this sense it might add a new dimension for insights for analysand and analyst, in addition to the knowledge about the neurobiological findings of romantic love (the different combinations of dopamine, norepinephrine, and serotonin, in conjunction with the activities of many other neural systems) summarized precisely in Yovell’s article.

But do these additional insights really “replace” the above-mentioned psychoanalytic theories of romantic love and their claim to understand and to work through the idiosyncratic unconscious fantasies, the pre-oedipal and oedipal conflicts, and so forth, in the transference relationship with our patients? And do they really mean...
that Freud’s concepts of romantic love have proven to be inconsistent with these psychological and neurobiological findings?

I think we should carefully avoid making what cognitive scientists call a “categorical mistake” (see, e.g., Leuzinger-Bohleber & Pfeifer, 2002). Even if neurobiological research could show that there are two independent motivational systems—the sexual system and the attachment system—this would not mean that Freud was wrong in postulating just one single drive system. Freud’s drive theory is a purely psychological theory based on rich observations in the clinical psychoanalytic situation with individual patients. In the psychoanalytic situation he was able to understand and interpret the manifestation of the analysand’s individual drives and longings, particularly those reactivated in the here-and-now of the transference relationship with the analyst. To summarize it in a simplified way: Understanding the specific meanings of the unconscious dimensions in the longings and drives of the patient might enable him or her to modify nonadaptive, pathological features of his or her actions, feelings, and thoughts—in scientific terms, a “proof” for the “truth” of the psychoanalytic approach (and the concepts underlying it). According to clinical observations, sexual wishes are always connected with desires for “nurturing,” for experiences of tenderness, safety, and continuity, in “normal” as well as “pathological” love relationships. Thus, for example, the unconscious reasons for possible failures to combine sexual and tender wishes in a love relationship (e.g., following unconscious memories of the loving and nurturing relationship with the same primary object: see e.g. Green, 1983; Leuzinger-Bohleber, 2001) have often been the focus of psychoanalytic theorizing since the time of Freud.

The results of neurobiological research, summarized by Yovell, are on a completely different level of observation and explanation. In the sense of the natural sciences, neurobiological models explain their data (e.g., gathered in fMRI studies)—for example, why specific regions of the brain are activated during a psychic state of sexual arousal or while seeing a picture of a central attachment figure. These activations do not say anything about the subjective experience and meaning of this arousal for the person investigated in the scanner. Such explanations following the models of natural sciences should not get mixed up with the purely psychological models of psychoanalysis trying to encode the idiosyncratic meaning of unconscious conflicts or fantasies of a certain patient concerning his or her subjective experience of romantic love. Confounding the levels—the level of explanations of brain mechanisms, with experiences of the subject constructing meanings on a psychological (behavioural) level—would be a categorical mistake!

Therefore, neuroscientific research can neither directly enrich psychoanalytic theorizing nor directly solve technical problems in the psychoanalytic clinical work with a specific patient who is suffering from (unconscious) conflicts in the realm of romantic love. Improving concepts and psychoanalytic treatment techniques must remain in the hands of psychoanalysts themselves and their own specific clinical research. Nevertheless, I hope to have illustrated that an open and curious attitude toward the exciting developments in contemporary neurosciences may inspire psychoanalysts to engage even more in developing their own psychoanalytic theories, trying to test the “external coherency” of their concepts with the interdisciplinary knowledge base and to engage in new and integrative psychoanalytic theorizing—for example, in the field of drive theory, which seems to have been neglected in psychoanalysis in recent years. Therefore, I hope that Yovell’s paper will be studied by many of my clinical colleagues.

REFERENCES


---

**Commentary on “Is There a Drive to Love?”**

Mario Mikulincer (Herzliya, Israel) & Phillip R. Shaver (Davis, CA)

---

**A BEHAVIORAL SYSTEMS PERSPECTIVE ON ROMANTIC LOVE**

In this commentary, we consider two pivotal issues in Yoram Yovell’s article, examining them through the lens of Bowlby’s (1973, 1980, 1969/1982) attachment theory and our own conceptualization of the activation and functioning of what Bowlby (1969/1982) called “behavioral systems” in adulthood (Mikulincer & Shaver, 2003, 2007; Shaver & Mikulincer, 2002, 2007). We begin by questioning the need for a “drive” concept in explanations of human motivation and behavior, and by explaining why we rely instead on Bowlby’s (1969/1982) alternative conceptualization of human motives in terms of behavioral systems. Second, we deal with the concept of romantic love and Yovell’s question (restated in our terms) about the number of behavioral systems involved in this cross-culturally universal and highly engaging emotional experience. We follow Bowlby (1969/1982) in emphasizing three behavioral systems—attachment, caregiving, and sex—and show how individual differences in the activation and dynamics of these systems result in different cognitive, emotional, and behavioral configurations of romantic love.

We leave to others the task of searching for neural correlates of the kinds of love that can be identified and delineated at the level of mind and behavior. In our opinion (and the opinion of a leading contemporary biologist: Mayr, 2007), there is no way to move unidirectionally from the neural level up to the psychological level. It would be especially difficult to do so if one began with a generic construct like “psychic energy,” for which there is not likely to be a neurological analog or correlate. The so-called theory of everything in physics, for which that field is still searching, does not even potentially contain “everything” about genetics or psychology or economics—phenomena that clearly exist at higher conceptual levels. Cross-level integration in science has to proceed largely downward, via reductionism, because phenomena at a higher level of organization cannot generally be predicted, or even imagined, based on phenomena at a lower level. This is why neuroscience is generally looking for and exploring “neural correlates of consciousness” (Koch,

Behavioral systems instead of drives

As Yovell notes, Bowlby was trained as a psychoanalyst but became dissatisfied with the Freudian conception of human motivation based on “drives” and the view of the mind as powered by “psychic energy.” In contrast, Bowlby (1969/1982) assumed that behaviors are not usually caused by drives or drive-like “instincts.” In his view, a conception of motivation based on thinking first about general drives with no objects, then about intermediate-level drives with vague objects, and then about more specific drives with specific objects—the approach taken by Yovell—is misguided. Questions such as the following are unlikely to yield meaningful answers: “Is there a unique drive for putting your money in a savings account, or is it a product of more primitive drives or instincts?” Or: “Is there a unique drive to sing folk songs, or is singing a product of other drives or instincts?”

When a person wakes up in the morning, his or her behavior is not generally governed by drives, except maybe hunger and the pressure to urinate. And even then, hunger pangs and the pressure to urinate need not be explained in terms of a general source of “energy” that somehow channels itself, through the brainstem, into hunger and urination. Typically a person, awakened by his alarm clock, rambles to the toilet and urinates because of signals from the bladder (or out of habit). He may then eat breakfast either because he is hungry (a feeling based partly on stimuli in the gut and partly on signals from the hypothalamus, as Yovell mentions) or because he has read that a person is healthier and likely to remain thinner if he eats a good breakfast each morning. After breakfast, he may brush his teeth—another medically advocated health behavior that would not be well conceptualized in terms of a tooth-brushing drive or psychic energy that, while searching for a way to get itself expressed, channels itself into tooth brushing.

According to Bowlby (1969/1982), the working human brain generates goals, cogitates, evaluates, makes decisions, and steers behaviors by its very nature—by its cellular-network structure and its cybernetic organization. It does not need to be powered by libido, a life force, or any such thing; it is powered by glucose, but not by glucose looking for a way to express itself in mentation or behavior. Moreover, the signals that activate goals may come from the body (Yovell’s emphasis) or from the environment or from associative processes within the brain. There is no need to trace every goal to the body or to imagine how the body empowers the brain.

Following the rejection of Freudian metaphors such as drive and psychic energy, Bowlby (1969/1982), who was influenced by scientific and technological developments in the mid-twentieth century—especially control systems theory, cognitive developmental theory, and ethology—created an alternative model of motivation based on the concept of behavioral systems. These systems were imagined to be species-universal neural programs that organize an individual’s behavior in ways that increase the likelihood of survival and reproduction in the face of environmental threats, demands, and opportunities. Bowlby (1969/1982) viewed these systems as “goal directed” and “goal corrected”—that is, as working like servomechanisms that are turned on by certain internal or environmental demands (such as pain or hearing a scary noise) and terminated by an effective response to these demands (e.g., being held and protected by a sensitive and responsive attachment figure). Responding effectively to these demands—for example, dealing with threats to life and well-being by relying on what Bowlby (1969/1982) called “stronger, wiser” caregivers, exploring environments and learning how to master them, caring for sexual partners and dependent offspring—resulted in the evolution of distinct but interrelated behavioral systems, each with its own primary functions and characteristic behaviors.

According to Bowlby (1969/1982), a behavioral system governs the choice, activation, and termination of behavioral sequences aimed at attaining particular “set-goals”—states of the person–environment relationship that have adaptive advantages for individual survival and genetic reproduction. The adaptive behavioral sequences are “activated” by certain kinds of stimuli or situations (e.g., unfamiliar sounds or people, darkness, the presence of a growling predator) that make a particular set-goal salient. These sequences are “deactivated” or “terminated” by other stimuli or outcomes that signal attainment of the desired goal state (emotional support or protection, in the case of the attachment system).

An important corollary within this conceptual framework, which differs considerably from Yovell’s analysis of Freudian drives, is that “behavior” is functionally defined in terms of its set-goal. A particular behavior, such as moving physically or psychologically closer to another person, is defined as an attachment behavior if it is intended to secure comfort, protection, or relief from stress. The same action is defined as sexual if it
moves a person toward sexual intercourse, and it is viewed as part of caregiving if it occurs in the service of comforting a needy or distraught relationship partner. Similarly, the termination of one kind of behavior and the initiation of another are not defined primarily by particular motor or physical events but, rather, by the seeking or attainment of a particular set-goal.

In addition, and again in contrast to Yovell’s analysis of Freudian drives, Bowlby assumed that a person’s mental processes—for example, his or her hierarchy of set-goals and the chronic and contextual accessibility of a particular set-goal—govern the activation and termination of particular behavioral sequences. Moreover, the psychological meaning of a motor or perceptual act is determined by the intrapsychic state that organizes and governs it. However, this does not mean that behavior does not influence mental processes. For example, moving physically closer to a relationship partner and being comforted often feels good, enhances security, reduces the emphasis on security seeking, and allows other goals and mental states to arise and guide behavior. Moreover, repeated failures of intentional actions (such as proximity seeking) to attain their set-goal (e.g., protection and security) changes the attachment system’s goal structure, along with the cognitions and emotions that accompany and guide the system’s functioning.

In sum, Bowlby’s (1969/1982) theory renders unnecessary the Freudian concepts of drive and psychic energy, which were presumably influenced by Freud’s understanding of nineteenth-century physics—a common kind of importation of physics (billiard-ball causality, “psychic energy,” and a “psychic apparatus”) into psychology that is no longer necessary, given the huge advances in biology since Freud’s time. Contemporary molecular geneticists do not generally look for sources of “energy” that empower cells, except for glucose. And the glucose is used to power genetic machinery; it does not flow around in the body seeking a way to be expressed.

Bowlby (1969/1982) did not assume that goal-directed and -corrected behaviors are activated by an accumulation of psychic energy or an unconscious desire to reduce the level of psychic energy to zero. Moreover, as conceptualized by attachment theory, a person does not experience, over time, an increasing need for attachment or become subject over time to an increasing drive for attachment. Instead of viewing behavior as forced into expression by fluid drives that must be channeled or repressed, Bowlby (1982) proposed that behavior is activated by conditions within a person or the person’s environment that make a certain goal salient. This prominent goal then activates a behavioral system that is organized, or programmed, to seek that goal. The termination of a behavioral sequence is viewed in Bowlby’s theory as a result of set-goal attainment or of one behavioral system being overridden by another that has gained priority at a particular time. For example, when an infant encounters what Bowlby (1969/1982) called “natural clues of danger” (e.g., unexpected noises, an approaching stranger, sudden darkness), he or she terminates whatever activity is in progress (e.g., an exploratory activity such as playing with new toys) and attempts to gain physical proximity to a caregiver. If the caregiver provides adequate protection and comfort, the infant typically becomes interested again in exploratory play, in which case he or she may signal, directly or indirectly, to be put down amidst available toys (Ainsworth, Blehar, Waters, & Wall, 1978).

Bretherton (1992) explained as follows the differences between Bowlby’s conception of behavioral systems and the Freudian view of instincts:

Behaviors regulated by such systems need not be rigidly innate, but—depending on the organism—can adapt in greater or lesser degrees to changes in environmental circumstances, provided these do not deviate too much from the organism’s environment of evolutionary adaptedness. Such flexible organisms pay a price, however, because adaptable behavioral systems can be more easily subverted from their optimal path of development. For humans, Bowlby speculates, the environment of evolutionary adaptedness probably resembled that of present-day hunter-gatherer societies. [p. 766]

As suggested in this quotation from Bretherton, another feature of Bowlby’s conception of behavioral systems, which further distinguishes it from Yovell’s analysis of Freudian drives, is that these flexible systems include learned elements that reflect a person’s history of behavioral-system activation in particular contexts. Although behavioral systems are initially innate and presumably operate mechanistically at a subcortical level, their ability to achieve desired set-goals depends on the extent to which their operational parameters can be adjusted to fit with contextual affordances and demands. One of Bowlby’s (1969/1982) most important observations, which increased his confidence in the notion of “goal-corrected” rather than merely “driven” behavior, is that particular behavioral sequences often get altered to put a person, even an infant, back on the track of goal attainment. Bowlby assumed that actual behaviors and the experiences that result from them can alter both future behaviors and mental states. That is, behavioral systems involve self-regulatory feedback loops that shape the systems’ strategies and influence...
whether a person persists in or disengages from these strategies after discovering that they fail under certain conditions.

Over time, after operating repeatedly in the same social environment (e.g., in interactions with a primary caregiver or other emotionally significant relationship partners), a person’s behavioral systems become molded so that his or her neural and behavioral subroutines fit better with relational constraints and environmental demands. According to Bowlby (1973), the residues of such experiences are stored in mental representations of person–environment transactions (working models of self and others), which organize memories of behavioral system functioning and guide future attempts to attain a behavioral system’s set-goal. These representations, which operate partly unconsciously and partly consciously (Shaver & Mikulincer, 2002), become integral components of a behavioral system’s programming and are responsible for both differences between individuals and within-person continuity over time.

The introduction of reciprocal relations between working models, goal-oriented behaviors, and perceptions of the results of behaviors allows us to see how a behavioral system’s goals, strategies, and cognitive parameters can result in still more differentiated goals and strategies and create individual differences in the activation and functioning of behavioral systems. If the primary strategy of a behavioral system repeatedly results in the attainment of its set-goal (e.g., gaining protection and comfort by seeking proximity to a relationship partner), the working models that get constructed correspond well with the normative functioning of the system (e.g., “When I encounter difficulties, I can call on my attachment figure for comfort and support, and I will then feel better and go back to other activities with a renewed sense of confidence”). This kind of working model, or script (Waters & Waters, 2006), helps to activate and organize the primary attachment strategy (optimistic proximity seeking) whenever the system’s set-goal becomes salient.

However, if the primary strategy repeatedly fails to attain its set-goal, the resulting working models will alter the system’s strategies and some of its goals (e.g., “When I try to rely on others, they are unreliable or outright punishing”). For example, a person may become overly vigilant, intrusive, and hysterical (i.e., anxious with respect to attachment) or, in contrast, wary about relying on relationship partners, emotionally closed to them, and rigidly committed to self-sufficiency (i.e., avoidant with respect to attachment). In consequence, these changes in strategies and goals can result in different configurations of cognitions, emotions, and behavior in relational contexts and shape the subjective construal of specific emotional bonds, including romantic love.

Taking Bowlby’s theory seriously, and considering its similarity to other contemporary theories of motivation based on the concept of conscious and unconscious goals, goal hierarchies, and goal conflicts (see, e.g., many of the chapters in recent anthologies on the psychology of motivation: Elliot & Dweck, 2005; Shah & Gardner, 2007), we conclude that science does not need drives or psychic energy to explain romantic love. Rather, the main question is: “Which behavioral systems are involved in romantic love and how do they combine to create and maintain romantic feelings and, in many cases, an affectional or attachment bond?”

One need not ask, with Yovell, “Is there a unique drive or instinct for romantic love, or is it a product of other drives or instincts, none of which is unique to it?” In the next section, we offer a brief summary of our own conceptualization of romantic love in terms of behavioral systems.

The dynamics of romantic love: attachment, caregiving, and sex

In the late 1980s, Shaver and his coauthors (Hazan & Shaver, 1987; Shaver & Hazan, 1988; Shaver, Hazan, & Bradshaw, 1988) extended Bowlby’s theory, which was designed to characterize human infants’ love for and attachment to their caregivers, to the study of romantic love and adult couple relationships. According to this extended theory, which has been extensively tested (for comprehensive reviews, see Mikulincer & Goodman, 2006; Mikulincer & Shaver, 2007), romantic relationships involve a combination or confluence of three behavioral systems: attachment, caregiving, and sex. Each of these behavioral systems has its own evolutionary functions, and although the systems affect each other in various ways, they are conceptualized as functionally distinct. Moreover, individual differences in the functioning of the three systems lead to differing configurations of romantic-love experiences and romantic relationships.

Whereas the optimal functioning of the attachment, caregiving, and sexual systems facilitates the formation and maintenance of stable and mutually satisfactory affectational bonds, the malfunctioning of these systems creates relational tensions, conflicts, dissatisfaction, and instability and often leads to relationship breakup. Shaver, Hazan, and Bradshaw (1988) also suggested that relational, social-interactional factors also contribute to the functioning of the three behavioral systems (e.g., signals of a partner’s waning interest) and that the
dynamic interplay of these behavioral systems within a relationship is crucial for understanding how people experience and construe romantic love.

Because Hazan and Shaver’s (1987) initial studies of romantic love focused mainly on the conceptualization and assessment of individual differences in attachment, researchers subsequently conducted many studies focused on these individual differences, without paying much attention to the functioning of the other behavioral systems—sex and caregiving—involved in romantic love. More recently this imbalance has begun to be corrected, and more studies have examined relations between the attachment and caregiving systems and between the attachment and sexual systems (for an extensive review, see Mikulincer & Shaver, 2007; see also recent experimental studies, such as those by Gillath, Mikulincer, Birnbaum, & Shaver, 2008). In the following sections, we present a brief overview of the operating parameters of the attachment, caregiving, and sexual behavioral systems and review what we have learned so far about the interplay of the three systems within romantic relationships.

**The attachment behavioral system**

As mentioned by Yovell, the presumed biological function of the attachment system is to protect a person from danger by assuring that he or she maintains proximity to caring and supportive others (attachment figures). The goal of the system is objective protection or support and the concomitant subjective sense of safety or security. When a person encounters actual or symbolic threats and notices that an attachment figure is not sufficiently near, interested, or responsive, the attachment system is activated and the individual is driven to seek and reestablish actual or symbolic proximity to an external or internalized attachment figure (the system’s primary strategy) until the set-goal of felt security is attained. Although the effects of attachment-system activation are most easily observed during infancy, the system continues to function throughout life, as indicated by adults’ needs for proximity, support, and security (Hazan & Zeifman, 1999; Zeifman & Hazan, 2008).

Smooth functioning of the attachment system requires that an attachment figure be available in times of need, sensitive and responsive to the individual’s bids for proximity, and effective in alleviating the individual’s distress. Such positive interactions promote an inner sense of attachment security (based on expectations that key people will be available and supportive in times of need) and lead to the consolidation of optimistic beliefs about distress management; faith in others’ goodwill; a sense of being loved, esteemed, understood, and accepted by relationship partners; and a sense of self-efficacy with respect to gaining proximity to a loving partner when support is needed.

When a person’s attachment figures are not reliably available and supportive, a sense of attachment security is not attained and the distress that activated the system is compounded by doubts and fears about the feasibility of attaining a sense of security. In addition, emotionally negative attachment interactions indicate that the primary attachment strategy—proximity and support seeking—have to be replaced by either hyperactivating or deactivating strategies. Hyperactivation of the attachment system is manifested in energetic, insistent attempts to induce a relationship partner, viewed as insufficiently available or responsive, to pay attention and provide care and support. The strategies include clinging and controlling responses, cognitive and behavioral efforts to establish not only physical contact but also perceived self-other similarity and “oneness,” and overdependence on relationship partners as a source of protection (Shaver & Mikulincer, 2002). Hyperactivation keeps the attachment system chronically activated, constantly on the alert for threats, separations, and betrayals, thereby exacerbating relational distress and conflicts (Mikulincer & Shaver, 2003).

Deactivation of the attachment system includes inhibition of proximity seeking and cultivation of what Bowlby (1980) called “compulsive self-reliance” and “detachment.” These strategies include denial of attachment needs; avoidance of closeness, intimacy, and dependence in close relationships; maximization of cognitive, emotional, and physical distance from others; and striving for self-reliance and independence (Mikulincer & Shaver, 2007; Shaver & Mikulincer, 2002). They also involve active inattention to threatening events and personal vulnerabilities as well as inhibition and suppression of thoughts and memories that evoke distress and feelings of vulnerability, because such thoughts can cause unwanted activation of the attachment system which the person believes will not result in desirable outcomes (Mikulincer & Shaver, 2007).

These individual differences in the functioning of the attachment system can be operationalized in a twodimensional space (e.g., Brennan, Clark, & Shaver, 1998; Fraley & Shaver, 2000). The first dimension, attachment-related avoidance, reflects the extent to which a person distrusts relationship partners’ goodwill, deactivates the attachment system, and strives to maintain behavioral independence and emotional
distance from partners. The second dimension, attachment-related *anxiety*, reflects the degree to which a person worries that a partner will not be available in times of need and engages in hyperactivating strategies. People who score low on both dimensions are said to be secure or securely attached. The two dimensions can be measured with reliable and valid self-report scales, such as the Experiences in Close Relationships inventory (Brennan et al., 1998), and are associated in theoretically predictable ways with affect regulation, self-esteem, psychological well-being, and interpersonal functioning (for reviews, see Mikulincer & Shaver, 2007, 2008).

As Yovell explained, the attachment system is an integral part of romantic love and one of the core components of romantic relationships. Whereas in infancy, the main sources of support and protection are the primary caregivers, romantic partners typically become the most important attachment figures in adulthood, such that proximity maintenance to these partners in times of need becomes a crucial source of support, comfort, and reassurance (e.g., Fraley & Davis, 1997; Hazan & Zeifman, 1999; Zeifman & Hazan, 2008). However, not every romantic partner immediately becomes a major attachment figure. In fact, the transformation of a romantic partner into an attachment figure is a gradual process that depends on the extent to which the person functions as (1) a target for proximity seeking; (2) a source of protection, comfort, support, and relief in times of need (a “*safe haven,*” in attachment theory’s terms); and (3) a “*secure base,*” encouraging the individual pursue his or her goals in a safe relational context (e.g., Ainsworth, 1991; Hazan & Shaver, 1994; Zeifman & Hazan, 2008). These three functions are mainly found in long-lasting, highly committed dyadic relationships.

Moreover, Shaver, Hazan, and Bradshaw (1988) proposed that romantic love in adulthood is conceptually parallel to infants’ emotional bonds with their primary caregivers. Love in both infancy and adulthood includes prolonged, intense eye contact, holding, touching, caressing, smiling, crying, clinging; a desire to be comforted by the relationship partner when distressed; the experience of anger, anxiety, and sorrow following separation or loss; and the experience of happiness and joy upon reunion. Moreover, formation of a secure relationship with either a primary caregiver or a romantic partner depends on the caregiver/partner’s sensitivity and responsiveness to the increasingly attached person’s proximity bids, and this responsiveness causes the person to feel more confident and safe, happier, more outgoing, and kinder to others. Furthermore, in both kinds of relationships, when the partner is not available and not responsive to the person’s proximity bids, the person can become anxious, preoccupied, and hypersensitive to signs of love or its absence, to approval or rejection. Separations or nonresponsiveness up to a point can increase the intensity of both an infant’s and an adult’s proximity-seeking behavior, but beyond some point they can lead to defensive distancing from the partner so as to avoid the pain and distress caused by the frustrating relationship. All of these parallels led Shaver, Hazan, and Bradshaw (1988) to conclude that infants’ bonds with parents and romantic love in adulthood are variants of the activation of the attachment behavioral system.

When one person “falls in love” with another, in cases where secure attachment is the main or most salient goal, the process of “falling” usually includes fantasies about being taken care of, becoming less lonely and needy, having someone to rely on, and so forth. This feeling may or may not be tinged with sexuality and may or may not require the “attachment figure’s” actual presence (it can happen, e.g., with imagined religious figures—Granqvist & Kirkpatrick, 2008—and media celebrities—e.g., Giles & Maltby, 2004). In a classic and still very interesting study, Bell (1902; see also Hatfield, Schmitz, Cornelius, & Rapson, 1988) found that many children had crushes on their teachers or peers that seemed to be more motivated by a desire for proximity to and responsive treatment by the partner than by anything that a modern-day psychologist would call “libido.” Hatfield, Brinton, and Cornelius (1989) found that anxiety is related to this kind of love, as we would expect if the attachment system and an anxious orientation to attachment are involved.

**The caregiving behavioral system**

Yovell views the formation of intimate emotional bonds within romantic relationships as a function of the activation of the attachment behavioral system. However, these bonds also depend on the activation and functioning of what Bowlby (1969/1982) called the caregiving behavioral system, something Yovell does not consider. According to Bowlby, the caregiving system evolved biologically to provide protection and support to others who are either chronically dependent or temporarily in need. When functioning optimally, its goal is altruistic, and it responds to signals of need emitted by another person’s attachment system. The set-goal of the caregiving system is the reduction of another person’s suffering or the fostering of another person’s exploration, growth, and development. The primary strategy for achieving these goals
is to adopt what Batson (1991, in press) called an empathic attitude—for example, taking the perspective of a relationship partner in order to sensitively and effectively help the partner reduce distress or encourage positive growth and development. The caregiving system is focused on another person’s welfare and therefore directs attention to the other’s needs, wishes, emotions, and intentions.

In the realm of romantic relationships, one partner’s caregiving system can be automatically activated by the other partner’s attachment behaviors or signals of need, and the goal is to alter the needy partner’s condition until signs of increased safety, well-being, and security are evident. Therefore, if the attachment system is active within romantic relationships and crucial for the formation of romantic love, the caregiving system should also be active within romantic bonds and contribute to the formation and maintenance of satisfying relationships, as has been shown in numerous empirical studies (Collins, Guichard, Ford, Kane, & Feeney, in press). That is, when one’s romantic partner is in need, one tends to become a source of security for him or her and a provider of care, support, and comfort. In these moments, the activation and appropriate functioning of the caregiving behavioral system is important for the quality of the relationship and the further consolidation of romantic love. Moreover, one aspect of “falling in love” can be wishing intensely to nurture a particular quality of the relationship and the further consolidation of romantic love. Furthermore, one aspect of “falling in love” can be wishing intensely to nurture a particular quality of the relationship and the further consolidation of romantic love.

As in the case of the attachment system, dysfunctions of the caregiving system can trigger either hyperactivating or deactivating strategies. Hyperactivated caregiving strategies are intrusive, poorly timed, and effortful; they are intended to make oneself indispensable to a partner and to assuage one’s doubts about being a competent caregiver. These goals can be achieved by exaggerating appraisals of others’ needs, adopting a hypervigilant attitude toward others’ distress, performing actions aimed at coercing others to accept one’s caregiving bids, and focusing on others’ needs to the neglect of one’s own. Deactivating strategies result in inhibition of empathy and effective caregiving combined with increased interpersonal distance precisely when a partner seeks proximity. In this case, a person is less sensitive and responsive to others’ needs, dismisses or downplays others’ distress, suppresses thoughts related to others’ needs and vulnerability, and inhibits sympathy and compassion (e.g., see Mikulincer, Shaver, Gillath, & Nitzberg, 2005).

**The sexual behavioral system**

Yovell notes that full-blown romantic love cannot be understood without taking into account the activation and functioning of the sexual behavioral system. From an evolutionary perspective, the major function of the sexual system is to pass one’s genes to the next generation by having sexual intercourse with an opposite-sex partner. However, sexual intercourse and impregnation are effortful, goal-oriented activities that demand coordination of two partners’ motives and responses. Accordingly, in the course of human evolution, selection pressures have produced subordinate functional behaviors and psychological mechanisms that solve particular adaptive problems associated with reproduction and reproductive success (Buss & Kenrick, 1998; Gillath et al., 2008). These behaviors and mechanisms are the primary strategies of the sexual behavioral system.

The set-goal of the sexual behavioral system in males is to impregnate an opposite-sex partner in order to pass one’s genes to the next generation. The set-goal for females is to attract a sexual partner and achieve impregnation. The key mechanisms for achieving this set-goal include approaching a potential partner, persuading him or her to have sex, and engaging in genital intercourse. That is, the primary strategies of the sexual system consist of being attracted to potentially fertile partners, which requires being sensitive to signals of fertility in opposite-sex partners, increasing one’s attractiveness as a potential sexual partner, and using
effective persuasive techniques to seduce a potential partner. Viewed from this perspective, sexual attraction is a motivating force that impels individuals to look for either short-term or long-term mating opportunities with a potential sexual partner (Buss, 1999). Of course, its biological set-goal can be blocked by deliberate efforts to avoid conception, just as some of the goals of attachment and caregiving can be blocked by professional training to avoid “countertransference” and falling in love with therapy clients.

In our view, the sexual system is, at its base, functionally independent of the attachment system. Although long-term romantic relationships typically integrate attachment and sexual feelings and behaviors, the systems themselves have distinct origins, functions, and underpinnings. As noted by Yovell, recent studies of the brain substrates of sexuality and attachment confirm this distinctness. Moreover, sexual relations often occur without affectational bonds; sexual partners do not necessarily function as attachment figures; affectional bonding between adults is not always accompanied by sexual desire (Diamond, 2004, 2008); and the search for safety and security provided by a relationship partner does not automatically transform him or her into a sexual partner. Still, the formation of an affectational bond in long-term romantic relationships is frequently initiated by infatuation and sexual attraction (e.g., Hazan & Zeifman, 1999; Sprecher & Regan, 1998). Moreover, studies of long-term dating and married couples have shown that either attachment dysfunction or sexual dysfunction can have a powerful effect on the other behavioral system (for a review, see Sprecher & Cate, 2004). In other words, although sexual and attachment behaviors are governed by functionally different systems, the systems still influence each other and contribute jointly to relationship quality and stability; also, a natural part of sexual reproduction, in the environments of evolutionary adaptation in which the two behavioral systems arose, might include becoming sufficiently attached so that many sexual partners remained affectionate toward and interested in each other long enough for this to contribute to their offspring’s development through the stages of growing teeth and learning to walk and talk (Gillath et al., 2008).

Yovell raises a question about the choice of a specific romantic partner and discusses Fisher, Aron, Mashek, Li, and Brown’s (2002) idea that a different behavioral system—attraction—is responsible for this choice. In our view, the explanation of mating choices does not require another construct or imagined behavioral system. Attraction to a specific relationship partner results from the extent to which this partner facilitates the smooth functioning and attainment of the goals of the attachment, sex, and caregiving systems. In other words, human beings feel attracted to partners who can facilitate the attainment of a sense of security, a sense of generativity, and/or a sense of sexual attractiveness, potency, and release. Of course, in choosing partners for short-term relationships, the extents to which a partner is fertile, attractive, and interested in having sex are likely to be important determinants of attraction and mate choice. However, in choosing a partner for a long-term relationship, the extent to which he or she might be a source of security and protection, or an appropriate and rewarding target of caregiving, could also be determinants of attraction. That is, attraction can be understood as a blend of the goals and forces associated with attachment, caregiving, and sex.

Yovell also discusses Fisher et al.’s (2002) idea about the importance of the sexual system in the initial stages of romantic love. However, as we have already mentioned, children can “fall in love” with a teacher or peer without sexuality (at least genital sexuality) having much to do with it, and in long-term adult relationships the sexual system often continues to be an important part of attraction, accommodation, and satisfaction. There is growing empirical evidence that sexual interactions in which both partners gratify their sexual needs, or achieve their sexual goals, foster positive emotional reactions (love, excitement, vitality, gratitude, and relaxation) and contribute to relationship satisfaction and stability (for a review, see Sprecher & Cate, 2004). In contrast, dysfunctions of the sexual system are major sources of relational conflict which can raise doubts about being loved and loving one’s partner, heighten worries and concerns about one’s relationship, increase one’s interest in alternative sexual partners, and ultimately erode the affectional bond and destroy the relationship (Sprecher & Cate, 2004).

Dysfunctions of the sexual behavioral system, like dysfunctions of the other behavioral systems involved in romantic love, can be conceptualized in terms of hyperactivating and deactivating strategies. Hyperactivating strategies involve effortful, mentally preoccupying, sometimes intrusive, and even coercive attempts to persuade a partner to have sex. In the process, a person can overemphasize the importance of sexual activities within a relationship, exaggerate or bias appraisals of a partner’s sexual needs, and adopt a hypervigilant stance toward a partner’s signals of sexual arousal, attraction, or rejection. In contrast, deactivating strategies are characterized either by inhibition of sexual desire and an erotophobic, avoidant attitude toward sex or a superficial approach to sex that divorces it from other considerations, such as kindness and intimacy. Deactivating sexual strategies include dismissal of
Within romantic relationships, emotional closeness, and heightened feelings of intimacy and love and to enhanced relationship satisfaction in both the caregiver and his or her partner (e.g., Collins & Feeney, 2000; Feeney & Collins, 2003). There is also growing evidence that sexual interactions in which both partners gratify their sexual needs contribute to relationship satisfaction and stability and heighten feelings of love (see Sprecher & Cate, 2004).

Dysfunctions of the attachment, caregiving, and sexual systems, viewed in terms of hyperactivation and deactivation, are crucial for understanding pathologies of romantic love, relational tensions and conflicts, and erosion of affectional bonds. For example, in the domain of attachment, hyperactivating strategies lead anxiously attached people to feel chronically frustrated due to their unfulfilled need for demonstrations of their partner’s love and support, to catastrophically appraise interpersonal conflicts, to exaggerate relational worries and doubts about a partner’s goodwill, and to intensify emotional and behavioral reactions to even minimal signs of a partner’s unavailability or disinterest. In the domain of caregiving, failure to respond empathically to a partner’s needs and refusal to help the partner alleviate distress can also create relational tensions and conflicts, which can reduce intimacy and commitment and provoke a host of relationship-damaging worries, attitudes, and behaviors. Hyperactivation of the sexual system within a romantic relationship can also have negative effects on romantic love and relationship satisfaction and stability. Chronic sexual-system activation is accompanied by heightened anxieties and worries about one’s sexual attractiveness, the extent to which one is able to gratify one’s partner, and the partner’s responses to one’s sexual advances (e.g., Birnbaum & Laser-Brandt, 2002). These anxieties and worries may encourage intrusive or aggressive responses aimed at coercing the partner to have sex, which in turn can heighten the frequency of sex-related conflicts, thereby leading to relationship dissatisfaction, weakening attachment, and reduced caregiving (e.g., Long, Cate, Fehsenfeld, & Williams, 1996).

Dysfunctions in one system can interfere with the smooth operation of the other two systems. For example, high levels of attachment anxiety or avoidance can also linked secure attachment with higher scores on measures of relationship intimacy and commitment as well as relationship-enhancing patterns of emotional reactions to partner behaviors and adaptive strategies of conflict resolution. In the domain of caregiving, evidence is rapidly accumulating that relational episodes in which an individual sensitively attends to and empathically responds to a romantic partner’s attachment behaviors and signals of need lead to heightened feelings of intimacy and love and to enhanced relationship satisfaction in both the caregiver and his or her partner (e.g., Collins & Feeney, 2000; Feeney & Collins, 2003). There is also growing evidence that sexual interactions in which both partners gratify their sexual needs contribute to relationship satisfaction and stability and heighten feelings of love (see Sprecher & Cate, 2004).

Attachment, caregiving, and sex within romantic relationships

In our view, individual differences in the attachment, caregiving, and sexual systems are important for understanding romantic love, because their smooth functioning brings relationship partners together, increases physical and emotional closeness, and heightens feelings of love and gratitude toward the partner as well as feelings of being loved and esteemed by the partner. Borrowing from Yovell’s discussion of Sternberg’s (1986) triangular theory of love, optimal functioning of the three behavioral systems enlarges the area of the “love triangle” by increasing the intensity of its three components—passion, intimacy, and commitment. (This was discussed early in modern theorizing about love by Shaver, Hazan, & Bradshaw, 1988.) Smooth functioning of the three behavioral systems tends to create feelings of communion, connectedness, and togetherness with a relationship partner, thereby sustaining the “intimacy” component of romantic love. The attachment and caregiving systems strengthen the “commitment” component of romantic love. Positive interactions with a partner who is available and responsive in times of need generate not only a sense of security but also feelings of gratitude and love toward this sensitive and responsive person, which in turn motivates the secure person to stay in the relationship and commit him/herself to maintain it and promote the partner’s welfare. Moreover, positive interactions in which a person is effective in promoting a partner’s welfare strengthen the caregiver’s emotional involvement in the relationship as well as his or her feelings of responsibility for the partner’s condition, thereby sustaining the “commitment” component of romantic love. The “passion” component of romantic love is closely related to the activation and functioning of the sexual behavioral system, which creates feelings of attraction, arousal, vitality, and excitement within the relationship.

Attachment researchers have been successful in generating a large body of theory-consistent research findings showing that secure attachment is associated with higher levels of relationship stability and satisfaction in both dating and marital relationships (for a review, see Mikulincer & Shaver, 2007). Studies have

also linked secure attachment with higher scores on measures of relationship intimacy and commitment as well as relationship-enhancing patterns of emotional reactions to partner behaviors and adaptive strategies of conflict resolution. In the domain of caregiving, evidence is rapidly accumulating that relational episodes in which an individual sensitively attends to and empathically responds to a romantic partner’s attachment behaviors and signals of need lead to heightened feelings of intimacy and love and to enhanced relationship satisfaction in both the caregiver and his or her partner (e.g., Collins & Feeney, 2000; Feeney & Collins, 2003). There is also growing evidence that sexual interactions in which both partners gratify their sexual needs contribute to relationship satisfaction and stability and heighten feelings of love (see Sprecher & Cate, 2004).
lead to problems in providing care to needy romantic partners. Specifically, avoidant people, who distance themselves from emotional partners and dismiss signals of need, are less able and willing to feel compassion for a needy partner and less willing to provide care. Anxiously attached people, who seek closeness to romantic partners and are often preoccupied with their own needs, often react to others’ suffering with personal distress rather than empathy, which is likely to produce insensitive, intrusive, ineffective care. Several self-report and observational studies have provided extensive support for these ideas (Mikulincer & Shaver, 2007, in press).

Evidence is also accumulating that attachment processes shape sexual motives, experiences, and behaviors. As compared with insecure people, secure ones (i.e., those who score low on measures of attachment-related anxiety and avoidance) are more motivated to show love for their partner during sex, more open to sexual exploration, more likely to have a positive sexual self-schema, and less likely to experience negative emotions during sexual encounters (Mikulincer & Shaver, 2007). There is also evidence that people scoring high on avoidance are less likely to have and enjoy mutually intimate sex and are more likely to engage in sex to manipulate or control their partner, protect themselves from the partners’ negative feelings, or achieve other nonromantic goals, such as reducing stress or increasing one’s prestige among their peers. Anxiously attached people tend to use sex as a means of achieving personal reassurance and avoiding abandonment, even when particular sex acts are otherwise unwanted (for a review, see Mikulincer & Shaver, 2007).

**Concluding remarks**

We have deliberately steered clear of detailed discussions of neural correlates of attachment, caregiving, and sex, even though there are many relevant studies that could be cited (e.g., studies of the neural correlates of empathy, for example—Hein & Singer, in press—or studies of neural correlates of anxious hyperactivation of attachment-related processes—Gillath, Bunge, Shaver, Wendelken, & Mikulincer, 2005). In our view, attempting to link neural circuits identified mainly in studies of rodents with kinds of love identified by questionnaires, interviews, and behavioral observation of humans is premature. Many of the circuits identified in this way (e.g., Panksepp’s, 1998, SEEKING system) are also involved in other forms of human behavior (curiosity, hunting, gambling), which means that we cannot learn much about human romantic love from beginning with the rodent or human SEEKING system. More work needs to be done at the psychological and behavioral levels so that neuroscientists who use neural imaging techniques with humans (as reviewed, for example, by Coan, 2008) have identifiable psychological processes for which neural correlates can be sought.

Because human love involves many cognitive as well as limbic processes (e.g., cultural ideals regarding sexually attractive partners; working models of past secure and insecure attachment relationships), and because there are many differences between individuals in what they find attractive, what they fear in close relationships, what they are seeking in the way of opportunities for passion, intimacy, and commitment, it will be difficult to find clear neural correlates of love-related states unless types of love and major individual differences related to love are taken into account. Current neuroimaging studies require very specific research designs in which one variable is manipulated at a time, often using fairly artificial stimuli and situations (while a person reclines in a noisy scanner). These studies can reveal correlates of, say, cognitive perspective taking as distinct from empathic concern (Hein & Singer, in press), or anxious distress rather than empathy, which is likely to produce insensitive, intrusive, ineffective care. Several self-report and observational studies have provided extensive support for these ideas (Mikulincer & Shaver, 2007, in press).

Evidence is also accumulating that attachment processes shape sexual motives, experiences, and behaviors. As compared with insecure people, secure ones (i.e., those who score low on measures of attachment-related anxiety and avoidance) are more motivated to show love for their partner during sex, more open to sexual exploration, more likely to have a positive sexual self-schema, and less likely to experience negative emotions during sexual encounters (Mikulincer & Shaver, 2007). There is also evidence that people scoring high on avoidance are less likely to have and enjoy mutually intimate sex and are more likely to engage in sex to manipulate or control their partner, protect themselves from the partners’ negative feelings, or achieve other nonromantic goals, such as reducing stress or increasing one’s prestige among their peers. Anxiously attached people tend to use sex as a means of achieving personal reassurance and avoiding abandonment, even when particular sex acts are otherwise unwanted (for a review, see Mikulincer & Shaver, 2007).

**Concluding remarks**

We have deliberately steered clear of detailed discussions of neural correlates of attachment, caregiving, and sex, even though there are many relevant studies that could be cited (e.g., studies of the neural correlates of empathy, for example—Hein & Singer, in press—or studies of neural correlates of anxious hyperactivation of attachment-related processes—Gillath, Bunge, Shaver, Wendelken, & Mikulincer, 2005). In our view, attempting to link neural circuits identified mainly in studies of rodents with kinds of love identified by questionnaires, interviews, and behavioral observation of humans is premature. Many of the circuits identified in this way (e.g., Panksepp’s, 1998, SEEKING system) are also involved in other forms of human behavior (curiosity, hunting, gambling), which means that we cannot learn much about human romantic love from beginning with the rodent or human SEEKING system. More work needs to be done at the psychological and behavioral levels so that neuroscientists who use neural imaging techniques with humans (as reviewed, for example, by Coan, 2008) have identifiable psychological processes for which neural correlates can be sought.

Because human love involves many cognitive as well as limbic processes (e.g., cultural ideals regarding sexually attractive partners; working models of past secure and insecure attachment relationships), and because there are many differences between individuals in what they find attractive, what they fear in close relationships, what they are seeking in the way of opportunities for passion, intimacy, and commitment, it will be difficult to find clear neural correlates of love-related states unless types of love and major individual differences related to love are taken into account. Current neuroimaging studies require very specific research designs in which one variable is manipulated at a time, often using fairly artificial stimuli and situations (while a person reclines in a noisy scanner). These studies can reveal correlates of, say, cognitive perspective taking as distinct from empathic concern (Hein & Singer, in press), or anxious distress rather than empathy, which is likely to produce insensitive, intrusive, ineffective care. Several self-report and observational studies have provided extensive support for these ideas (Mikulincer & Shaver, 2007, in press).
correlates. There is nothing wrong with developing hunches based on brain studies of nonhuman animals and preliminary neuroimaging studies of humans, but it will not be possible to build an adequate understanding of love from the neural level up. The neural correlates of mental processes (and not just conscious mental processes, contrary to the popular phrase “neural correlates of consciousness”) will not be understood until the mental processes are sufficiently well delineated so that their neural correlates can be discerned.

REFERENCES


SEEKING THE EPIGENESIS OF ROMANTIC LOVE

Yoram Yovell provides an intriguing analysis of the web of linkages among love, sexuality, and attachments, as he probes the currently irresolvable question of whether there is an intrinsic drive in the human brain/mind for “romantic love.” He cautiously and appropriately concludes that romantic love probably emerges from our more primitive urges for sexuality and social attachments, without falling into the pit of ruthless reductionism that is so common in neuroscience these days. In pursuing the rational middle ground, he provides an intriguing essay on the search for the roots of love through modern brain imaging. His analysis is uniquely integrated with a vision of primary-process mammalian emotions and motives arising from a cross-species affective neuroscience.

Yovell’s reading of the evidence, as opposed to the hubris of theoretical speculation common in this field, leads him to conclude that those who have been willing to posit “romantic love” as a primary drive may be adding one too many evolutionary horses in front of the cart of our fundamental social motivations. While I largely agree, I would also like to add the intellectual spice of a few modest qualifications. As I highlighted in *Affective Neuroscience*, two of the major emotional forces for adult love surely arise from our LUST and CARE systems, leading often to confusions and to gender-typical cross-currents about the varieties of human love (Panksepp, 1998). However, developmentally, the separation-distress PANIC system looms large, and we should not neglect the role of PLAYfulness in loving friendships. A great deal of emotional complexity, including various higher-order emotions such as romantic love, are probably built upon the solid foundation of basic affects.

Why do human brain and mind investigators have such a difficult time with primary-process emotions (e.g., Ortony & Turner, 1990; but see response by Panksepp, 1992)? I expect it is because they really have no clear experimental access to such entities. Likewise, most brain-imagers of emotions simply ignore the primary-process issues. Obviously, in the higher cauldrons of the human mind, there is enough confusion about primary-process emotional issues, especially in the theoretically captivated minds of certain social constructivists (e.g., Barrett, 2006; Barrett et al., 2007) who regretfully lack experimental tools to probe such issues (see responses by Panksepp, 2007b, 2008). Conversely, theoreticians who understand and love the primary-emotion perspectives are all too tempted to add more and more primary emotions just on the basis of reasoning as opposed to robust neuroscience data (Ellis & Toronchuk, 2005). Thus, I suspect that one of the more dangerous intellectual exercises these days is to add primary-process emotion systems into the human or animal brain/mind on the basis of meager conceptual “evidence.” Anyone who wishes to do this with “romantic love” is surely encouraging premature closure on an issue that must remain an open issue for the foreseeable future.

This kind of excessive creativity has been manifested recently among theoreticians who have been enchanted by the abundant evidence for at least seven core emotional systems in the mammalian brain (Panksepp, 1998), which can obviously be parsed into larger categories of nonsocial survival systems—SEEKING, FEAR, and RAGE—and the highly interactive social systems—LUST, CARE, PANIC/Separation distress, and PLAY (e.g., Ellis & Toronchuk, 2005). Should we also accept, as they do, that DISGUST and DOMINANCE are basic emotional systems (Ellis & Toronchuk; 2005; Toronchuk & Ellis, 2007)? I don’t think the available data allows us to make such a move, and perhaps the strong feeling of disgust that we can all have should be left in a sensory/homeostatic affect category rather than an emotional one (Panksepp, 2007a). When we exhibit “social disgust,” I think we are symbolically using the primary-process sensory disgust metaphorically. Similarly, since pervasive urges for dominance may be easily constructed from a variety of other emotional primes (perhaps intermixtures of PLAY, RAGE, LUST, and SEEKING), what advantage is there to envisioning it as an emotional prime at the present time? In agreement with Yovell, I believe very similar concerns must presently be raised for romantic love.

There are good historical reasons to advocate con-
servative attitudes on such scientific issues. Exactly these kinds of problems arose with instinct theory in psychological science a hundred years ago. As a result, more rigorous investigators simply got frustrated by the excessive willingness of creative thinkers to posit more and more instincts on the basis of their beliefs rather than scientific evidence, until there were more floating about than anyone with a deeply scientific soul could abide. Those frustrations set the stage for the entrance of a minimalist “behavioral science” that was disastrous for a credible neuroevolutionary analysis of core emotional processes that do exist within the neuromental apparatus. Thus, along with Yovell, I am of the mind that placement of “romantic love” into a primary-process category is not only premature but a scientifically dangerous and highly unlikely scientific wager. This does not mean that the concept, reflecting a uniquely human attitude, is not deeply relevant and important to certain individuals and cultures. However, it is probably created by our capacity to think about the world in certain ways and hence is of relevance for only a subsegment of our species. But once it has become a well-assimilated tertiary-process emotion in certain individuals, it can become a guiding principle of a life well lived, just like principles of justice and so many other higher human concerns. However, I suspect we will never find such primary-process systems in the human brain or in those of other mammals.

However, let me at least pause to consider whether romantic love might have emerged as a unique primary-process aspect of the human mind once we diverged from our ancestral, prehominid kin. Don’t we have a primary-process urge for language—a “language instinct,” as some would phrase it? Surely there can be unique genetically dictated epistemological engravings in the human mind. Surely! I have been overwhelmed by feelings of romantic love, and penned some appropriate verses, but surely both are epigenetic rather than genetically, programmed. In agreement with Yovell, my critical faculties would insist that it is the onus of each investigator interested in the foundations of mind to provide cogent neurobiological evidence, with at least a small iota of genetically relevant data, for every addition to the conservative pantheon of primary emotional processes.

The reason I remained so “conservative” (albeit much too liberal for behaviorists) in *Affective Neuroscience* was that I had established a rather strict criterion for myself. A system was genetically ingrained in the mammalian brain only if clear instinctual-type actions could be aroused by (1) localized electrical stimulation in the same brain regions across all mammals studied and (2) arousal of the underlying neural systems generated positive or negative feeling states as monitored by traditional behavioral measures in animals and the appropriate types of psychological changes in humans.

Also, we can now add another criterion: (3) that the neuropeptides that regulate such outputs will, when appropriate pharmacological tools are developed, modulate the appropriate experiential emotional states in humans; for instance, Substance P is enriched in RAGE circuits of the brain, in amygdala, medial hypothalamus, and periaqueductal gray (Gregg & Siegel, 2001; Siegel, Roeling, Gregg, & Kruk, 1999). Hence, medically approved Substance P receptor antagonists, such as aprepitant, should ameliorate human irritability and anger. There is a host of other such predictions to be made for the many neuropeptides that have been found to modulate specific emotional and motivational processes (Panksepp & Harro, 2004).

And even as we explore emotional primes, we should recognize how many variants of feelings could be derived from the primes through social learning. For instance, items like jealousy can be easily seen to arise from the intermixture of the RAGE, LUST, and PANIC systems (Panksepp, in press-b). This does not mean that the results of social learning are not real neurobiological processes of the brain. They surely are, but they are epigenetic creations rather than genetically provided tools for living.

Indeed, the current fad among evolutionary psychologists to postulate modules for this and that within the cortex is pseudoscientific hubris of the first order (Buller, 2005; Panksepp & Panksepp, 2000, 2001; Richardson, 2007)—well, at least it may be massively premature, theory rather than data again leading conclusions. Even the ever famous “language instinct” may be more a figment of theoretician’s imaginations than a demonstrated foundational aspect of human mind. The epigenetic emergence of language may still be linked to the primitive emotional communicative urges evident in all mammals, sharing or confronting others with their rich emotional repertoires. Perhaps this emotional communicative urge in humans, expressed as motherese during infancy (which may have a passing resemblance to the love songs of adolescence), sets the stage for the capacity for symbolic propositional contents to emerge in Wernicke’s regions of the human brain (which is perhaps genetically ideally suited for multimodal sensory processing, with no other genetic epistemology engraved within the fine-grained circuits that cannot be accessed in any kind of human research) (Panksepp, in press-a). Likewise, all those useful “mirror neurons” peppered in so many regions of the cortex may all be epigenetically, rather than genetically, programmed.
Why do we need to proceed with such caution? Simply because modern neuroscience has highlighted how similar the neocortex actually is to random access memory (RAM). The highly repetitive cortical columns (composed of about 3,000 neurons) seem to be pluripotent—to have an initial equipotentiality that resembles RAM chips in a computer much more than any evolutionarily designated networks with genetically predetermined functions. Just simply consider the fascinating fact that when one eliminates those brain regions, supposedly genetically “dictated” to become visual cortex in fetal mice, the animals develop completely normal visual abilities by subcortical visual systems setting up “shop” in nearby regions of the neocortex that would have been destined to become normally somatosensory or auditory cortices (Sur & Rubenstein, 2005). Clearly, epigenetic processes rule within the highly repetitive neocortical columns of cortical gray matter, although perhaps some associative specificity is present in the abundant association fibers coursing here and there in the underlying white matter.

Those interested in mental evolution might be wise to accept the likelihood that the mammalian neocortex is more akin to tabula rasa than a beehive of evolutionarily dictated “modular” specializations. It seems more likely that most of the higher regions of the brain become modularized as a function of living in the world, as opposed to genetic dictates. Anyone who does not fully consider the high likelihood that most adult neocortical functions have been epigenetically created during the developmental landscapes of ontogenesis is playing with a marked deck of cards. I am willing to surmise that our urges for romantic love are created in our higher brain regions through cultural programming that is motivated by the existence of the emotional primes that Yovell wisely prioritizes in his discussion of love.

Did genetics make many of us the unabashed romantics that we are—or used to be? I suspect my lived experiences achieved that. Romantic love lives in my neocortex and as a result in my limbic regions, because this higher feeling is supported by many primary emotional systems that helped program my cortex from below.

A subset of nonromantic emotional primes may be enough to motivate my romantic desires. But in addition to LUST and CARE, my romantic constructions are also strongly motivated by my SEEKING urges, and also profoundly by my capacity for separation distress/PANIC and the good joy of PLAY. This does not mean that they all have to be woven into your or everyone else’s romantic urges. The epigenetic richness and variety of our higher emotions, including our romantic nurture, are many-stranded braids of great ideographic variety. As Yovell so fully captures in his rich review of modern literature on the topic of love, we do not need to discard the concept of romantic love from our mental apparatus. We simply need to be cautious about making it a genetic tool for living as opposed to an epigenetic stallion of our human nurture. To my knowledge, there is not a sound piece of neuroscientific or neurogenic evidence that such processes exist as emotional primes within the subneocortical realms of our emotional nature. There is abundant evidence that romantic love is a potential of the higher regions of our human minds, and we need to better fathom how human neuroepigenetic landscapes tend to use those brain regions summarized in Yovell’s synopsis of the fine work of a new generation of love-scientists.

I regret that I cannot add anything of scientific substance to this area, but perhaps we will eventually find, as Yovell surmises, that the key processes that permit those higher aspects of love to emerge and to exist are the ancient affective powers of our ancient mammalian minds, most especially LUST, CARE, and SEEKING.

Perhaps two ancient steeds are not quite enough to pull the carriage of romantic love through the circuitous historical paths of our existence—a topic that neuroscientists may never transform into solid science beyond the weak and variable glimmers of fMRI signals.

In fact, a quick scan of Medline indicates how rather profoundly, perhaps wisely, the topic is being ignored. As I sit, pondering what else I might add to Yovell’s fine arguments, I Google Medline and note that “sex” generates 473,398 hits, “love” 9,566, and “lust” a paltry “760”. It does seem that biological sciences are a bit “lust” adverse. And perhaps we are a bit shy in recognizing how powerfully is romantic love, especially of the male variety, driven by our sexual urges. But even as we parse “love” into its varieties, there are few scientific contributions to be noted, with the “erotic” form yielding 75 hits, “passionate” with 32, “companionate” only 4, while “romantic” does come in with a thundering 297.

Clearly there is something about “romantic love” that entrances the human mind, as highlighted by songs of troubadours down through to modern ages. Could we but hear a love song from ten thousand years ago! Could we just fathom the evolutionary sources of music (see special issue of Musicae Scientiae on that topic, in which I too shared my perspectives: Panksepp, in press-a). We cannot with any senses of scientific assurance—but perhaps we can still feel the passions that went into those long-forgotten songs by
appreciating the power of our ancestral social emotions: the caress of CARE, the thrusting urgency of LUST, the psychic pain and despair of PANIC, and even the social-bond affirming power of PLAYful joy. I suspect all are conveyed forward in time and mental space by our ever-present SEEKING urge, one of the most ancient passions of them all (even though we do not have precise access to evolutionary time within the brain). From that perspective, it comes as no surprise that adult sexual bonding and urgency have strong dopaminergic components (e.g., Curtis & Wang, 2003), as do playfulness (Burgdorf, Wood, Kroes, Moskal, & Panksepp, 2007) and many other aspirations of animal and human minds. And this kind of evidence from our fellow creatures may deserve increasing attention in our discussion of romantic love. Still, I hope that in the ultimate accounting, love does not just reflect dopamine activity, or endogenous opioid and oxytocin activities. There is much more: treasured personal memories that are rarely effective targets of scientific inquiry. But surely we can agree that all forms of love are as rich in certain primary-process neurochemistries as are all the other socially constructed emotions. And because of the rich storehouse of associated memories, romantic love furnishes our minds more completely than any of the ancient, initially objectless, emotional primes.

REFERENCES

It was one of the strategies of object relations theorists (broadly speaking), including Bowlby and the attachment theorists, to differentiate their approach from the classical Freudian one by dismissing the theory of drives. There were several reasons for this, including the opinion (cited by Yoram Yovell) that it is “mechanistic and reductionistic,” along with the more substantive consideration that despite its being a quantitative concept, drive energy cannot really be observed, let alone quantified and measured, and so is fairly useless for empirical scientific observation and study. It is certainly the case that Freud’s emphasis on oedipal dynamics in psychopathology needed to be augmented with equal attention to the events and consequences of the pre-oedipal period and its relationships for a more completely adequate understanding of human mental life and its pathology, as well as of appropriate treatment modalities, to emerge in psychoanalytic discourse. One could, however, imagine that this could have been done in a way that complemented, augmented, and modified existing theory rather than abandoning many of its central ideas.

It is therefore heartening to see that attachment theory is currently re-engaging with key “Freudian” ideas about sexuality, with an eye toward seeing how they might go together rather than taking a more “either–or” position. It appears that some of Bowlby’s champions are now aware that he had a restricted view of sexuality, one that limited it to the reproductive copulatory function and did not adequately recognize its manifold subjective dimensions. Yovell’s paper stands as an attempt to reconcile the approaches to attachment and sexuality in the domain where they self-evidently come together—that is, romantic love, which includes a sexual dimension as well as the long-term relational bonding of being “in love.” It is therefore a welcome effort, not least because it seeks to resuscitate the concept of “drive,” recognizing that bodily functions, and what Freud called the “exigencies of life,” provide an impulsion to action and stimulate mental activity to direct and regulate that action in such a way as to meet somatic needs and wants.

Yovell addresses the question of whether romantic love is the result of its own drive, or is a combination of other drives and, if so, which and how many. The main focus of his paper is on the question of whether attachment behavior represents an autonomous process with its own properties, not reducible to the drives of hunger or sex, as Bowlby maintains; or whether Freud’s libido theory is adequate by itself to account for romantic love. If attachment in infants is truly a different system from, say, the lust and reproduction systems, and not also dependent on the satisfaction of the hunger drive, then it would seem that romantic love requires the integration of two separate drives: one for attachment to an “older and wiser” care-giving and protective object, the other to the reduction of sexual tension. Morris Eagle (2007), whom Yovell cites at some length (though not without skepticism), argues that the difficulty men have integrating tender and sexual love for the same object, a phenomenon Freud ascribed in 1912 to the nonresolution of the Oedipus complex (1912d), would be better understood in terms of the difficulty that arises from trying to integrate the nonsexual attachment system with the sexual system, which, he argues, are separate and independent and, indeed, to a certain extent antagonistic.

Yovell reviews Freud’s theory of drives and concludes that in the realm of love, Freud’s theory has only one erotic drive, libido, and that this is in itself inadequate to account for romantic love, which clearly entails very strong elements of long-term intimacy and attachment that, so it is observed, often flourish best when sexuality or “passion” is not at its peak, or even is weak or absent altogether. But is this a fair representation of Freud’s view? To my mind it is not, because while Yovell has usefully resurrected the “instincts” (drives), he seems to have paid insufficient attention to the fact that they also have “vicissitudes.” For Freud, drives—and, in particular, libido—have four components: source, force, aim, and object. The former two are fairly fixed by innate endowment, but the latter two are variable. The object of course is, as Yovell discusses, a matter of choice, though one strongly determined by both internal and external factors. But, more relevant for the present discussion, the aim of the instinct, which in the case of libido is the release of sexual tension, can and indeed should be and usu-
ally is “inhibited,” producing “aim-inhibited libido.” A reading of Freud’s “Project for a Scientific Psychology” (1950 [1895]) shows clearly that from the very beginning of his theorizing, Freud thought of the ego as the agency responsible for the inhibition of libido and for the diversion of it from its aim of sexual release to other purposes essential for the forming of long-term affectionate relationships. He believed that analysis of such aim-inhibited ties showed that they had in fact unconscious sexual correlates.

Yovell follows Eagle, who, in a footnote, comments that one “occasionally finds in Freud’s writings expressions of a point of view that are different from and that even seem to contradict central aspects of a theoretical formulation he has explicitly formulated” (Eagle, 2007, p. 42 n. 1). Eagle adduces as evidence a quote from Freud’s 1912 paper (to which I have already referred above) in which he differentiates an “affectionate current” of love from a “sensual current.” But this is not different from or contradictory to Freud’s central theoretical formulation – it is his central theoretical formulation. Aim-inhibited libido is, for Freud, the essential stuff of all affectionate relations and is derived from libidinal drives, but it is not the same as sexual impulses, which are uninhibited in their aim. Thus libido as Freud conceives of it already contains a separate “attachment” component that accounts for relations of care, affection, and affiliation that are not explicitly or consciously sexual; therefore, libido does not require a separate “attachment” system such as the one Bowlby proposed.

Furthermore, contrary to Bowlby’s reading of him, Freud does not derive the infant’s attachment to mother from the satisfaction of the hunger drive at the breast. The whole point of “anaclitic” love, for Freud, is that it “leans up against” — and thus is obviously not the same as — the “ego drive” for nourishment, so that the infant loves the person who feeds and in general cares for and protects it. This love, for Freud, is total, encompassing both sexual and affectionate components; but these are later split apart and finally become separated through the repressions of the oedipal phase (in different ways for the different sexes). We make the mistake, in trying to understand the child’s attachment to its mother as “sexual,” of picturing the later, split-off, and therefore partial and reduced libidinal tie as the model of what infantile love is like. And usually we make the further mistake of forgetting that this sexuality is only secondarily genital, if at all, and is primarily expressed in looking, touching, hugging, and sucking and is not “linear” like adult climactic sex, except insofar as, according to Freud, a successful feeding episode at the breast leading to blissful sleep is the prototype of later sexual satisfaction, combining as it does the sexual, the affectionate, and the satiating of hunger all into one package.

Upon what arguments or evidence does Freud rest his contention that the seemingly asexual dimensions of affectionate attachment derive from a broader erotic drive? Here is what he says in the Three Essays on the Theory of Sexuality (1905d), the work in which he lays out his “central theory” about libido:

But even after sexual activity has become detached from the taking of nourishment, an important part of this first and most significant of all sexual relations is left over, which helps prepare for the choice of an object and thus to restore the happiness that has been lost. All through the period of latency children learn to feel for other people who help them in their helplessness and satisfy their needs a love which is on the model of, and a continuation of, their relation as sucklings to their nursing mothers. [pp. 222–223]

He then goes on to counter the anticipated objection to this theory thus: There may perhaps be an inclination to dispute the possibility of identifying a child’s affection and esteem for those who look after him with sexual love. . . . [However] a child’s intercourse with anyone responsible for his care affords him an unending source of sexual excitement and satisfaction from his erotogenic zones. This is especially so since the person in charge of him, who, after all, is as a rule his mother, herself regards him with feelings derived from her own sexual life: she strokes him, kisses him, rocks him and quite clearly treats him as a substitute for a complete sexual object. [p. 223]

(Incidentally, I myself have a good deal of trouble seeing this picture Freud draws as “mechanistic and reductionistic,” nor does it seem to contrast as strongly with Bowlby’s formulations as the latter claims it does.)

Many years later (to show that this is not an exception to the central theory), in Group Psychology and the Analysis of the Ego (1921c), Freud writes as follows:

A psychology which will not or cannot penetrate the depths of what is repressed regards affectionate emotional ties as being invariably the expression of impulses which have no sexual aim, even though they are derived from impulses which have such an aim. . . . We are justified in saying that they have been diverted from these sexual aims. . . . Moreover, those instincts which are inhibited in their aims always preserve some few of their sexual aims; even an affectionate devotee, even a friend or an admirer, desires the physical proximity and the sight of the person who is now loved only in the “Pauline” sense. If we choose, we may recognize in this diversion of aim a beginning of
produce ongoing permanent ties, while the latter in incapable of complete satisfaction, are well suited to tided ties over uninhibited ones, since the former, being something new and potentially very useful to of.

Freud then goes on to note the advantage of aim-inhibitied ties over uninhibited ones, since the latter incur a loss of energy whenever they are satisfied (thus accounting for the oft-noted phenomenon that love relations begin with passionate sexual excitement that subsides over time, leaving in its wake a long-term bond of intimacy).

We can deduce easily enough from the passage just quoted what Freud would have thought of Bowlby’s proposed “attachment” system that has no relation to sexuality. At the same time, we know that Bowlby and many other important theorists linked to him and to other similar thinkers found unconvincing Freud’s certainty that analysis would always reveal an unconscious sexual element in the most apparently asexual social relationship. As is well known, Bowlby argued that sexuality (reproduction) and affection are what we would now call separate “modules,” along with others such as care, affiliation, lust, dominance/submission, and so on. To Freud’s argument that analysis reveals the underlying sexual component of the other apparently nonsexual modules, it is easy enough to respond that these may of course during development combine in various ways, and/or that nonsexual modules may become “sexualized” by pathogenic life experiences, so that the sexuality one encounters is not the source of the tie but, rather, a defensive distortion it has undergone or an accretion to it. How, then, on the basis of something beyond ideological commitment to one school of analysis or the other, might one hope to resolve this theoretical difference and decide whether the “duality” found in romantic love results from two separate drives (the view favored by Yovell)—libido and attachment—or from one drive—the Freudian libido—which itself divides in the course of development and repression into two components: aim-inhibited libido and uninhibited sexual libido? (I might mention here that from a clinical point of view, this argument has a bit of the character of guessing at the number of angels dancing on a pinhead, especially since, as we all know, drives cannot be observed but only inferred; but Yovell is making an explicitly meta-psychological argument that may or may not have any clinical relevance.)

It is here that the “neuropsychoanalytic” approach has something new and potentially very useful to offer, since if it can be shown that sexuality and attachment have different underlying brain functional and/or chemical correlates, this would tend to support the idea of two separate drives, whereas if they share the same brain and chemical substrates this would seem to support the “one-drive” theory of libido.

At first glance, the facts regarding the chemical correlates of sexuality and attachment would seem to support Yovell’s (and Bowlby’s) view that sex and maternal attachment are independent systems, with passionate object choice perhaps yet a third system. This is because while sexual excitement in both sexes is closely associated with elevated testosterone levels, oxytocin and vasopressin are associated with childbirth, nursing, and mother–infant bonding. In the study of prairie voles, which normally form monogamous pair bonds, it has been found that oxytocin and vasopressin are the key factors that initiate the onset of long-term attachment, as Yovell shows. Testosterone is thus often regarded as the distinctive sexual chemical associated with the urgency and excitement of sexual arousal, while vasopressin and oxytocin are often understood as the chemistry set underlying maternal warmth, affection, care-giving, and bonding. (Dopamine also plays a role in both the sexual and the attachment systems, but I must leave that to one side here.) Thus it would seem there are two different chemisms and hence two different systems, one with a sexual aim, and one designed to produce long-term affectionate bonds.

However, the picture is complicated by the fact that, as Yovell observes, oxytocin and vasopressin, far from being asexual or antagonistic to sexuality, themselves generate sexual behavior. As he writes: “Important aspects of sexual behavior in mammals—and probably humans as well—are triggered and controlled by the neuropeptide hormones oxytocin and vasopressin. . . . For example, introducing oxytocin into many areas of the male brain causes sexual arousal, ejaculation, and orgasm.”

But he then continues by remarking that “Because many of the behaviors (and probably feelings) associated with these peptides may be characterized as attachment-related and attraction-related, they are discussed in more detail below.” But if vasopressin and oxytocin are “attachment-related and attraction-related,” and if they also, as he himself shows, cause sexual arousal and release, just as testosterone does, then that seems to undo any claim that attachment is not sexual, or does not have a sexual component.

I would therefore conclude that the data Yovell presents here actually make a case for granting some degree of validity to both sides of the argument. On the one hand, it seems clear that attachment and sexual love do present different neurobiological pictures, thus supporting Bowlby’s view. On the other hand, it also
seems clear that the attachment neurobiology itself has a powerful sexual component, lending support to the Freudian view I have sketched above, to the effect that apparently asexual affectionate ties, including the mother–child tie, do have a sexual dimension that is not explicit or readily available to conscious awareness. We also can conclude that (adult) sexuality itself is a complex phenomenon involving several different neurochemical strands, including a testosterone-based one and one based on the different, but also sexual, hormones more closely associated with maternal love and care.

REFERENCES


Commentary on “Is There a Drive to Love?”

Douglas F. Watt (Boston, MA)

PSYCHOANALYTIC DRIVE METAPSYCHOLOGY
AND THE TYPOLOGY OF LOVE

There is much that I genuinely admire in Yoram Yovell’s brave paper. First of all, he is to be congratulated for even attempting a review from a multidisciplinary perspective of such a difficult topic as romantic love. Certainly it is much easier to feel scientifically secure in zeroing in on smaller and smaller patches of territory than it is to tackle such a huge and important problem as romantic love. As someone with a history of gravitating towards the review of near-impossible topics, I find myself in great sympathy with Yovell’s effort. Given the limitations of space and time, let me organize my thoughts on this ambitious effort into two domains.

Drive theory within psychoanalysis

Are drives and instincts of necessity far from the conscious mind? The classical metapsychology of drives in psychoanalysis, in which drives were seen as of necessity operating at a great distance from conscious experience and behavior, has been the Achilles’ heel of psychoanalysis, and for more than one good reason. Although it would be impossible to do justice to the complexities of the subject, or even summarize half of the seminal debates about drive theory in the modest space of this commentary, I think in a nutshell that the problem for psychoanalysis was the creation of a taxonomy and metapsychology for instincts and drives in which affective states were treated as virtually epiphenomenal. Freud, under the ideological sway of Helmholtzian images of the brain as analogous to some kind of energetic/hydraulic system, did not give enough weight to ethology. Human emotional systems were not adequately conceptualized in evolutionary fashion as having of necessity deep continuity with other mammals, this despite Freud’s admiration for Darwin. This attraction to mechanistic drive metaphors left affect in a secondary position as some kind of confusing “shadow” over the real action of drives and tied psychoanalysis to a theoretical anchor of sorts that has almost taken it to the bottom.¹

Contrary to the long-quoted doctrine that “drive

¹ One could argue that the marginalizing of psychoanalysis has taken place because of three primary factors: (1) its refusal to actively bridge toward neuroscience at the beginning of the neuroscience revolution in psychiatry (an error that this journal obviously was created to mitigate); (2) the manner in which metapsychological infighting and philosophical debating between schools of psychoanalysis replaced empirical testing of constructs (ensuring that psychoanalysis, despite its claims to the contrary, could not be a truly scientific discipline); (3) the manner in which metapsychologically turgid and phenomenologically remote drive constructs alienated those potentially more sympathetic to psychoanalysis. If one were inclined toward psychodynamic interpretations, one might be tempted to see all three of these as differential manifestations of some kind of fundamental “characterological” rigidity.
manifestations and activities are always far from the vagaries of consciousness,” thirst, hunger, and pain all reflect the unconditional evolutionary mandate to maintain fundamental fluid/electrolyte balances, to maintain adequate energy supplies, and to avoid damaging the body’s tissues, respectively. These homeostatic mandates are unconditional, and also unambiguous, and when the brain detects that they are being violated, they register in consciousness with an unparalleled urgency, with the “volume” increasing in direct proportion to the homeostatic threat. When the degree of homeostatic threat reaches a life-threatening level, our minds can be aware of nothing else but the regulatory imbalance and the unconditional mandate to rectify it. Indeed, the primal nature and urgency of these experiences argues loudly not that “drive is far from consciousness” but something quite the opposite. It argues instead that homeostatic mandates have a primary and, as it were, “basement-level access” to the machinery of consciousness/mind, a principle still poorly appreciated within large sectors of cognitive neuroscience, where outside of a few theorists like Damasio (1999), Merker (2007), and Panksepp (1998), consciousness is seen as largely unrelated to homeostasis and as tied more to complex sensory/receptive functions. Consciousness gave the body a servant in which homeostatic needs had an absolute, unconditional, and primary registration. To construct virtually any other story line about consciousness is to unequivocally abandon Darwin’s central insight. So far, I don’t think we have strayed that far from Freud’s concepts.

How can we link simple homeostatic drive concepts to prototype emotion? Although one can certainly applaud the insight that instincts and drives are the demands made upon the mind by the body, there was never any filling in of the missing question of how prototype emotion and emotional needs might emerge from homeostasis in what has to be some kind of evolutionary sequence (still an undeveloped issue in large sectors of contemporary emotion theory!). The problem for psychoanalytic drive theory was how to square such simple drive concepts (where one could readily conceptualize how a primary regulatory imbalance generated corrective behaviors) with the far greater complexity of primary emotional systems, especially the vast complexities of adult humans interacting in a complex social and cognitive space. I think Freud genuinely longed for a simple drive model to explain events in this complex social space, and he hoped that such a drive model would give his theory a genuine scientific respectability, but I believe he failed to conceptualize how one might relate primary or prototype emotional systems to these simpler homeostatic drives. Freud continued to try to fit the vagaries of both prototype as well as more “cognized” emotion into a simple “drive-reduction” equation, in a fashion that unfortunately became a Procrustean bed. Affective valence, rather than being epiphenomenal to the “real action” of drives, could be considered evolution’s totally compelling commentary on whether an organism is doing well or badly in relationship to basic survival and organismic needs, that positive emotions signaled the greater likelihood of survival and adaptive successes, while negative emotions signaled the reverse.

I am not entirely sure whether Yovell clearly sees Freud’s conceptual failure here—sometimes he seems to have sense of the limitations of classical metapsychoanalysis and at other times he seems to miss an opportunity to clarify some of its shortcomings. I am concerned when it seems that “neuropsychoanalysis” in people’s minds means “finding the neuroscience that proves that Freud was right!” I do not think that this is by any means our most productive emphasis (and I doubt Yovell would disagree with this), as science by definition has to sift what is heuristic from all pre-neuroscientific ideas about the mind/brain, no matter how prescient, from what is not. The scientific goal is not “finding the neuroscience that proves that Freud was right” but, rather, given that we now stand on the shoulders of many more giants than Freud ever had access to, how can we do better now? What do we need to improve, and how can we refine the metapsychoanalysis of psychoanalysis and bring it into fuller register with neuroscience? I honestly do not believe that this is going to be possible without a significant and major updating of drive theory and, as Yovell correctly identifies, the eventual reconciliation of drive theory with attachment theory. As he nicely outlines, in an operational sense, psychoanalysis has quietly shifted gears, sometimes without acknowledging it, and covertly moved drive theory out of its previous position as metapsychological foundation and largely replaced it with an attachment-centered theory of basic emotional needs. A quiet back-door coup has replaced open rebellion, probably because suggesting revisions of drive theory has always created intense conflict in psychoanalysis. But if psychoanalysis is ever to be a true science, how can Freud’s formulations be considered the last word? There is no “last word” in science.

I think a potential conceptual bridge between these domains of homeostasis narrowly defined and prototype emotion is readily available, potentially providing a less convoluted and clumsily mechanistic metapsychology. Prototype emotional systems, consistent with
the principle that brain evolution is about increasing the brain’s predictive power, reflect how the emotional brain might be predicting a potential homeostatic threat that has not yet happened. In this sense, pain might be more primitive from an evolutionary perspective than fear, as fear is about the prediction of potential or impending tissue damage. In the fear activated by the presence of a large predator (or a dangerous and more powerful rival), we have not been damaged yet (we are not yet in pain), but we are potentially exposed to considerable tissue damage (including death) if we do not take steps to protect our organism. Fear insures that we will take such steps. Analogously, in separation distress, a helpless and small creature has not yet experienced the lethal consequences attendant to long-term reduction of homeostatic supplies and the exposure to predation associated with the loss of protective parental figures, but unless reunion is achieved, such dangers are right around the corner. In this critical sense, prototype emotion has to be conceptualized as an extension of more basic homeostatic systems, reflecting an evolutionary carving of complex behavioral and organismic routines that offered somewhat routinized solutions to prototypic survival challenges and situations. This, of course, suggests a basic image of the brain as nothing more or less than a vast “prediction engine” and that evolution “tacked on” increasing predictive ability and increasingly sophisticated prediction algorithms of various kinds.

I believe that Freud in a sense tethered his entire theoretical edifice to an image of a simpler system, where a simple regulatory imbalance generated a simple corrective behavior (à la the popular thermostatic control metaphors for homeostasis). A basic regulatory imbalance generated a drive, and this was fundamentally unpleasant for the organism, so that motivation was towards drive reduction. It’s a wonderfully simple model that no doubt appealed to Freud’s sense of what sort of mechanisms might constitute an operating system for the brain. But I am not sure that this kind of simple “drive-discharge” model could ever do justice to the next layer of operational complexity in the system where we have prototype emotions operating, as behavioral goals oftentimes are not neatly fixed or simple, but involve much more nebulous and complex targets and aims. I believe this was exactly what Bowlby tried to offer in his conceptualization of a fundamental attachment system, in which the goals were as nebulous as maintaining proximity to another and continuing to interact with the other in certain characteristically positive ways, and where there was a core of prototype affects signaling the operation of the behavioral system. These prototype components would include the mutuality of playful and smiling responses, empathy (a primary mechanism for the reduction of distress and for the induction of nurturant behaviors by caretakers—see Watt, 2007), and separation distress itself (a primary mechanism to achieve reunion out of painful separation). Of course in this simple listing of basic components for attachment I have intentionally made reference to three of Panksepp’s prototype behavioral systems (PLAY, NURTURANCE, and SEPARATION DISTRESS). This suggests that attachment broadly defined is an umbrella of related processes and affective states, and not a simple unidimensional emotion or behavior. But I think this is exactly what Bowlby tried to offer, and it is worth reminding ourselves just how brutally he was punished by psychoanalysis for this effort at corrective reconceptualization, including his even being disowned by his own analyst. It is a painful lesson on the difference between an evolving and growing science and rigid ideology—how difficult it is sometimes to see the difference between these things, and how last year’s iconoclastic and radical idea (psychoanalysis) becomes this year’s encrusted doctrine. How many times have we seen this in science? Sadly, too many to count.

Are there groups of instinctual/behavioral systems, and is there any value to thinking about emotional systems in this way? The next difficult question might be, “Are there families of instincts or emotions?” In a recent target article in this Journal (on empathy: Watt, 2007), I suggested that most of the major “instinctual” behavioral systems (as outlined by Panksepp, 1998—RAGE, FEAR, LUST, SEPARATION DISTRESS, NURTURANCE, PLAY) could be broken down into two large clusters of systems, one concerned with organism defense (Fear and Rage) and one concerned with social connection (Lust, Play, Nurturance, Separation Distress). In this sense, I think Freud was right that there were two large clusters of emotional systems—but it wasn’t Eros and Thanatos, it was, instead, a cluster of systems involved in the protection of the organism when the organism was at cross-purposes with other organisms versus systems that tied organisms together for a shared purpose. This suggests not “life and death instincts” but a simpler typology in which some prototype emotions are about organism defense and some are about social connection (Eros but not Thanatos!). Another principle about prototype emotional systems emerges directly from these considerations—namely, that they reflect evolutionarily conserved routines for dealing with other creatures. This may separate prototype emotions from simpler sensory affects such as disgust. Although disgust also clearly serves a protec-
tive and predictive forward-looking function (obviously aimed at immunological challenges), it does not seem to have this fundamental social embedding, and therefore (in agreement with Jaak Panksepp) I think it belongs in a somewhat lower tier in our emotions taxonomy.

How do concepts about a SEEKING SYSTEM fit with this typology of other instincts? The next thorny set of questions concerns the relationship between these systems and Panksepp’s articulation of a generalized motivational arousal or SEEKING SYSTEM. I have argued elsewhere (and Panksepp can certainly correct me if he thinks I am off-base) that the SEEKING SYSTEM has to be regarded as a special class of one. If this system is seriously damaged, all the other prototype emotional systems appear to be profoundly suppressed. It has been demonstrated that the SEEKING SYSTEM is not simply about the pursuit of rewards and pleasures but that it is also operative to avoid pains and punishments (Schultz, 2007). In this sense, it is a generalized motivational arousal system that has to be at least somewhat turned on for all the other prototype emotional systems to have a chance to operate, and a significant lesion of the SEEKING SYSTEM generates akinetic mutism, a severe disorder of emotional/motivational arousal affecting all the prototype emotional systems (Watt & Pincus, 2004). Indeed, an appealing prediction that emerges from this is that the other prototype systems somehow have to operate within the large trunk line of projections enervated by the ventral tegmental dopamine system, a prediction for which there is certainly some empirical support. In this sense, I would argue that the SEEKING SYSTEM as a special class of one is different from the other prototype systems, that in all probability it is more fundamental, and more primitive in an evolutionary sense, and that it offers a basic foundation for all other emotional systems. This would suggest another prediction: that pro-dopaminergic drugs (like amphetamine) might potentially increase all emotion related to the other prototype systems, that these drugs would not just energize reward-seeking (which they do) but also promote general lability (which also appears to be the case).

The challenging typology of love—is romantic love truly separate from attachment?

I would agree with Yovell’s articulation that romantic love appears to activate and somehow combine three distinct systems: (1) attachment systems; (2) sexual desire (LUST) systems; (3) a system for attraction and mate selection. The question raised by Fisher’s (2004, 2005) work is whether #3 is really separate from #1. I would argue that this system for sexual attraction and mate selection is not so much separate from the attachment systems, more that it operates as a “lensing” or “gating” system modulating the attachment systems (and the LUST system, of course, as well) through a kind of “vetting” system for object choice which evaluates the object's potential “evolutionary fitness” through the only “rapid-assessment” method available—namely, appearance. Humans as well as other mammals had no way of determining whether a potential mate was in good-enough shape to bear or rear children or to provide essential genetic contributions other than by evaluating appearance. There was no “physical workup” or “genetic assay” to help in mate selection in mammalian lines, or in phylogenetically antecedent creatures, hence the focus on appearance (and one has to assume that “tournament species” simply add another layer of control on this “vetting” system). This mate selection/physical attraction system is a way of answering the question “is this person/object choice likely to be a reproductive success?” We are all attracted to and attach more readily to people who are better-looking and who conform more closely to what are largely cross-cultural ideals about physical beauty. This selection bias appears operative in situations that are completely independent of any kind of overt sexual or romantic aspect, suggesting that this system for mate selection, which hinges of course on physical appearance, “gates” or modulates many if not virtually every aspect of social choice and social approach. The pervasive operation of this system may explain why people who are better looking experience more social acceptance, get better jobs, and have doors open for them that otherwise might not open for the less attractive. There is a widespread sense that this is “unfair,” that it is “superficial” and even “shallow,” and perhaps there is truth to those judgments. But it seems reasonable to assume that this kind of gravitation to prototypically good-looking males or females is simply evolutionary fitness selection in operation.

Where I would depart from Fisher’s conceptualization is around the notion that mate selection leading to romantic love is something fundamentally different and even separate from attachment. It’s not, it is simply that this “gating” system for physical attraction/mate selection helps to create a more intense, more child-like, and more regressive version of attachment. Even in her own descriptions of the phenomenology and behavioral landscape of romantic love, we see things not truly different from the normal vicissitudes of attachment, only their dramatic intensification. We show
heightened separation distress, primitive idealization of the other, and heightened vulnerability to abandonment and abandonment rage, and we truly believe that the other is the source of all good things in life and that losing her or him would be unbearable. It is not a big surprise—nor does it suggest some kind of “independence from attachment”—that romantic love activates the ventral tegmental dopamine system. It would be foolish to conceptualize attachment as something separate from “rewards.” Indeed, positive relationships are full of rewards (putting aside even the importance of sexual rewards)—prototypically, smiling and playful responses, as well as being comforted when one is upset. These are all profoundly rewarding, and therefore it is only common sense to assume that reward seeking is centrally activated in the intense attachment of romantic love.

Romantic love is not very different from how we felt as infants and very young children in relation to powerful and nurturing parental figures. It is not an overstatement to say that they held our lives in their hands, just as we feel in relationship to our beloved romantic figure. The notion that romantic love is a truly separate neurobiological system from attachment broadly defined would have to eventually find evidence for the following: (1) that these two states respond differentially to neurochemical manipulations and are modulated by different neuropeptide systems (and/or other neurotransmitters) from one another; (2) that the two systems can be doubly dissociated in a lesion model in animals and that one can knock out one system completely without substantively affecting the other. I am not aware of a single data point for those possibilities (and I can think of several data points and examples against each of these), although I also must acknowledge that these are still probably open questions. However, I believe that it is more heuristic to assume that this evolutionary fitness-detection system (for mate selection and sexual attraction) “gates” or modulates attachment systems in a particularly powerful way as humans enter the age of reproductive fitness, and thus it is able to reactivate a primitive and exceptionally powerful form of attachment that recapitulates our childhood dependency and vulnerability. Such a potent activation of a social bonding system has the downside of exposing us to terrible hurts and losses, but it also has the major upside of preparing an exceptionally strong bond to endure the enormous stresses and tidal pulls of child-rearing and family. But this is not an image of different systems operating independently, it is more about their interaction and interdigitation.

There is one other simple and common experience that argues powerfully against the notion that attachment is fundamentally different from romantic love, and this is simply that (hopefully) we all fall in love with our own children (and, in some cases, other people’s children!). Although this is not a sexual love (outside of highly pathological situations) we use much of the same language as we do in romance, we experience the same tenderness and sense of submission, and we are in the same way utterly charmed, infatuated, and enchanted. We find them adorable, virtually perfect, and we cannot imagine losing them. Of course, this is a stage, too, and evolves into something a bit less idealized (especially during adolescence!), just as a stage of primitive idealization in early romantic love (again, hopefully) evolves into a deeper empathy, a lasting commitment, and a profound friendship that hopefully sets the stage for us to nurture the next generation and each other.

However we might scientifically parse the typology of love, it seems clear that love and connection are the great truths of human life. The quality of those evolving connections seem to determine to an enormous degree the quality of an individual life. The seminal contribution of psychoanalysis has been to understand how early relationships inform and in some sense even determine the social matrix later in life. We carry our relationship history inside us and recapitulate it in every smile, in every frown, and in every connection we (re)create as we move through the vastly complex trajectory of our social spaces. We are all struggling to win battles we lost a long time ago, by recapitulating them in the present, while successful attachment lays the groundwork also for its recapitulation. That psychoanalysis understood this deep principle of human emotional operating systems, and could clearly see these origins and dynamics operating deep below the waterline of consciousness, gave it a purchase on the human mind and brain missing from virtually every other psychological and indeed neuroscience tradition. As I said now more than twenty years ago (Watt, 1986), if psychoanalysis, despite all its metapsychological problems and convolutions, helped countless therapists to understand these deep truths about human attachment and suffering in their patients (and in themselves), then psychoanalysis understood something profound about the brain that neuroscience badly needs to appreciate better. We are making scientific progress in that regard, although it is painfully slow, and neuroscience oftentimes still has an asocial image of our exquisitely social brain, but Yovel’s fine essay provides a good measure of that progress. What I wrote several years ago (Watt, 2005) in an essay on attachment, science, and spirituality forms my only closing thought:
These simple affective truths, of simple enduring human needs for connection, echo through every footstep, every thought, every breath human beings take. However, these deeply resonant values are little more to us than just words and empty abstractions, until we have to confront and thus rediscover them in the social fabric of our individual lives. Then, and only then, do they become the luminous truths that they surely are.

REFERENCES


Commentary on “Is There a Drive to Love?”

Lissa Weinstein (New York)

WHAT DO WE TALK ABOUT WHEN WE TALK ABOUT LOVE?

Harry Harlow, in his Presidential address to the American Psychological Association in 1958, noted that psychologists had contributed little to our understanding of love that hadn’t been expressed more eloquently by writers and artists, and he pleaded for experimental work that analyzed love into its component variables. I would like to thank Yoram Yovell for the opportunity to comment on his ambitious and scholarly paper, clearly an effort in this direction, which summarizes and attempts to integrate so many seemingly disparate literatures in order to further our understanding of that most elusive and unruly of human activities—Eros. He has embarked on a daunting mission—the explication of a complex mental state in terms of its underlying neurobiology. In so doing, he has articulated a carefully reasoned hierarchical model of how different neurobiological systems contribute to the evocation of motivated behaviors; summarized the current experimental research on the neurobiology of sexuality, attachment, and romantic love; and proposed ways in which attachment and sexuality contribute to romantic choice. He has made an excellent case for the continued utility of the economic/quantitative viewpoint as a bridge between neurobiology and drive. To truly explicate the essential ideas introduced would necessitate a book, rather than a paper.

Yovell’s efforts to find correspondences between neurobiology and romantic love are, however, hampered by the fact that the different literatures he tries to integrate define central terms in the discussion (sexuality, instinct, drive, motivation) in unique, sometimes incompatible ways and that few studies address the unconscious or conflicted aspects of object choice. Because the task of integrating neurobiology with (rather than substituting for) psychoanalytic insights is essential for the development of our field, in this commentary I try to delineate areas in need of further clarification, highlight places that offer false integration, or mere renaming, and those that fail to explicate the phenomenon of romantic love, and focus on several interrelated problems: the relative neglect of the representational world, a tendency to, in practice, equate drive and instinct despite being aware of their theo-
retical differences, and the absence of considerations of aggression and narcissism. At times, Yovell falls prey to a temptation to “work the theory of instinctual drives overtime” (Rapaport, 1960) while failing to integrate other intrapsychic determining factors such as defense, those inborn inhibitory factors that might alter discharge thresholds, as well as cognitive factors that allow an evaluation of the external/social context that will also contribute to the experience of romantic love.

Despite Yovell’s claim that one would “also need to pay attention to what humans say about their love ones . . . and consider unconscious aspects of these feelings and object relations,” there is little consideration of the subjective world, particularly those aspects of romantic love that can only be explained by reference to a dynamic unconscious and the manifestation of structural conflicts. The author states his agreement with Diamond and Blatt (2007) that questions of romantic love, attachment, and sexuality need to be studied within the context of their integration in the representational world—namely, how they diverge, converge, and continue to influence each other throughout the life span. Furthermore, he has, in previous publications (e.g., Yovell, 2004), articulated the difficulties of relating subjective mental states and objective quantitative studies and the danger in imputing causality to physiological measures as opposed to noting correlations. Despite this, the paper is primarily oriented toward understanding the biological underpinnings and neural circuitry of the psychological processes implicated in romantic love, although the terms of investigating the psychological experience as opposed to the brain mechanisms and neurochemistry that produce such experiences may not easily map onto each other, nor can they utilize the same experimental strategies.

The author makes the marriage between neurobiology and psychology on the basis of the drive concept, or, more specifically, libido/Eros, “the only source of raw mental energy in the mental apparatus.” He cites several interrelated hierarchically organized systems: the hypothalamic nuclei that register the needs of the body; a generalized mechanism for brain arousal that potentiates the action of all behavioral systems; the periaqueductal gray in the brainstem, which generates the subjective feel of pleasure or displeasure and interacts with other limbic structures like the amygdala to generate more subtle feeling states; Panksepp’s SEEKING SYSTEM, an appetitive system that includes the behaviors that allow one to reach from the drive to objects; and the prefrontal cortices that function as inhibitory constraints and controls. In integrating several systems, Yovell avoids the pitfall of attempting to narrowly localize drive. However, as Diamond and Kernberg (2008) note in their critique of efforts to delineate the multiple brain areas involved in mentalization, it remains unclear how much the specification of the brain areas that underpin motivated behaviors can tell us about complex phenomena. Motivation, like emotion, is intimately tied to aspects of self and identity, which are composite structures that synthesize different states generated by the brain and whose evolutions are tied to different stages of brain development. While it is possible to reliably measure physiological correlates of the drives (i.e., rates of neuronal firing, hormonal levels, temperamental predispositions to action) and use them to predict “state,” one cannot say, for example, why Harry loves Sally, or how Narcissus must choose “From all the faces he had ever seen. Only his own” to become himself “The torturer who now began his torture” (Ovid: Hughes, 1997, p. 74). The bridges that connect the working of these biological systems and the multiaxial compromise formations that result in the obsessive, driven object choices that characterize romantic love are still in the beginning stages of construction, leaving us unable, as yet, to trace the complex symbolic and associative nets through which the drives reach representation.

In addition, if the author’s aim is to tie current knowledge of neurobiology to the psychoanalytic concept of drive, then it is necessary to address those concepts and definitions of drive already present in analytic theory, otherwise one is using an existing term to define a new set of phenomena—a tactic of which Freud himself was often guilty, but which, unfortunately, generated considerable confusion. Historically, as Yovell notes, the concept of drive was developed in order to explain the plasticity and adaptability of human behavior as opposed to the rigid, stimulus-driven behavior of animals. Its distinction from instinct was articulated in different, though not incompatible, ways by the American ego psychologists (Hartman, 1948; Hartman, Kris, & Loewenstein, 1949; Rapaport, 1960) and the French school (Laplanche, 1985). The ego psychologists stressed the functioning of drive within a tripartite structure where aspects of self-preservation handled by instinct in animals were ceded to the ego, eventuating in a greater separation of the drives from external reality. Implied was the impossibility of understanding drive without reference to structural considerations and an acknowledgement of the types and degrees of neutralization of drive energy available to different psychic systems. Laplanche (1985) succinctly differentiates instinct from drive on the basis of source, concluding that because drive always involves
representation (a “delegation”: Laplanche, 1985), the ultimate source of the drive is “The entire instinct with its own ‘source,’ ‘impetus,’ ‘aim,’ and ‘object,’ as we have defined them: the instinct, kit and caboodle with its four factors is in turn the source of a process which mimics, displaces and denatures it; the drive” (Laplanche, 1985, p. 125). These definitions suggest that one could potentially identify instinct with its underlying neurobiology, but this is clearly impossible with drive. More important, they also make clear that the object—the most mutable aspect of the drive—can never be an “objective” object, but is always the subject of fantasy. Thus, by definition, the object of an instinct cannot be identical to the object of a drive, as the object of a drive can never be observed externally, as can, for example, the object of attachment. In this vein, it is important to remember that Bowlby (1958, 1961), following Darwin, considered attachment an instinct—that is, an observable species-universal program that patterned behavioral sequences (i.e. clinging, following) that functioned to increase survival and reproduction and was subject to laws of natural selection and not a drive. Attachment was not subject to the hegemony of the pleasure/unpleasure principle, nor did it meet criteria of being a peremptory, internal appetitive force with a specific cyclic course of rising excitation, a seeking after satisfaction, and a lowering of demand following satisfaction that Rapaport (1960) used to distinguish drive from other causes of behavior. While Yovell is clearly aware of these distinctions, he occasionally uses instinct and drive as if they functioned on the same level of abstraction, and he discusses the object of instinct and the object of drive as if they referred to similar entities.

Sexuality

The heterogeneity of definitions given for the word “love” is equalized by those for the term “sexuality,” where a single word denotes quite disparate phenomena. Much of the social-psychological literature on romantic love deals with adult sexuality (with its vagaries of sexual choice), as does neuropsychoanalytic research (Bartels & Zeki; 2000, 2004). Fisher’s research (1998, 2004) centers on reproductive sexuality, with its strong ties to other mammalian species. Freud himself, as Klein (1969) points out, had two theories of sexuality, one an abstract theory of energy, forces, and discharge, and the other a zone-based set of modal fantasies that binds the effects of bodily excitements and serves as the basis for the symbolic text that it is the analyst’s job to decode (Litowitz, 2002). To further complicate things, infantile sexuality (Widlöcher, 2001) was defined not as an immature form to be later replaced by genital sexuality, but as a recapturing and reconstruction of the memory traces of real environmental events (such as the ethologically based parent–child behaviors that constitute the attachment relationship) that are then altered through the medium of the child’s fantasy life and bodily excitements and continue to exist as a private creative arena throughout adulthood. Thus, infantile sexuality has its origins not in the provision of comfort, safety, and care, but in “pure subjectivity proper to autoerotic activity at the point where the child is able to have a rudimentary conception of itself as separate” (Widlöcher, 2001). However, infantile sexuality and its derivatives may not be available to conscious consideration of the types of self-report measures that are used in studies of adult romantic attachments.

Aggression / narcissism

Terri said the man she lived with before she lived with Mel loved her so much he tried to kill her. Then Terri said, “He beat me up one night. He dragged me around the living room by my ankles. He kept saying, ‘I love you, I love you, you bitch. He went on dragging me around the living room. My head kept knocking on things.’” Terri looked around the table. “What do you do with love like that?”

Raymond Carver, *What We Talk About When We Talk About Love* (1989)

In one of his best-known short stories, Carver’s characters disagree on whether acts such as those described above can be considered a form of love. They highlight, with Carver’s sparse brilliance, the peculiar relationship of aggression to love that Lacan would term “hainamoration” (Lacan, cited in Green, 2005) and the loss of self–object differentiation that is part of passionate love.

While it may be true that that the majority of analysts are not interested in the philosophical speculation of the death instinct, few have dismissed the concept of aggression or the repetition compulsion, both of which seem essential to any explication of the phenomena noted in Yovell’s own description of romantic love: “its compulsive, driven quality . . . its focus . . . on a single object who is overvalued and pursued with tenacity,” and particularly its dramatic manifestations when love is rejected—that is, “clinging, stalking, despair, depression, and violence directed at the self and/or the beloved.” Love’s closeness to hate and the wish to destroy the object seem an unfor-
Attachment

While attachment and sexuality may initially be separate motivational or behavioral systems, as Eagle (2007) suggests, a psychoanalytic perspective must include their constant dynamic interplay, not necessarily in behavior, but in the representational world. In doing so, one cannot help but enter into the realm of symbolism, the construction and maintenance of associative nets. In an earlier paper (Weinstein, 2007) I suggested, after Fonagy and Target (2002) and Fonagy, Gergely, and Target (2007), that the enduring effects of the attachment relationship were not in creating templates of self-with-other, but in leaving its mark on the infant’s neurobiological self-regulatory systems that modulate stress and the deployment of attention, which will also shift the set points for the experience of pleasure and unpleasure. If the attachment relationship is retrieved in memory throughout childhood, forming the raw material upon which the more fantastical constructions of infantile sexuality are based, so too will they be, to some extent, altered by increasing cognitive capacities and shifting zonal excitations. The development of narratives about the self will further impact experiences of pleasure/unpleasure as well as alter the experience of the original attachment figures. Thus, sexuality and attachment inevitably form a complex, bidirectional matrix, whose parameters shift as an individual attempts to find the best compromise between pleasure and safety.

As noted earlier, Yovell was hampered in his efforts by the limitations of the research available on romantic love and monogamy. As he stated, the application of animal models to the complexity of human desire is problematic because of difficulties of cross-species generalizations and of dose–response relationships in animal versus human studies. The social-psychological research, as well as Fisher’s research, rely on conscious assessments of love. Attachment researchers also gather information on attitudes that either are conscious or are close to consciousness. Infantile sexuality, on the other hand, emerges from a relationship between the excitement of the body and language, a piece of which can never be fully reclaimed as an interpersonal experience. One potential advantage of the theoretical position described above is that by including the modulating effects of symbolization on the attachment experience, it points toward experimental strategies that allow the study of the complex mediations that start at the level of the body and eventuate in romantic depiction of the love object.

To take the oft-cited research of Bartels and Zeck as an example: The authors compared the neural circuitry engaged by a mother’s responses to pictures of her own versus other familiar infants, with subject’s responses to pictures of their romantic partners versus other familiar adults, and found largely overlapping neural circuitry for attachment and romantic love in humans in a functional magnetic resonance imaging (fMRI) study. Yet it cannot be proven that the romantic partner is absent from a mother’s mind when she is shown a picture of her infant, as Green (2004) suggests that the mother’s sexual and aggressive fantasies about the father affect her ministrations of the child. Whether or not Green is correct, an analytic understanding of romantic love would necessarily include integrating the conscious and unconscious factors that contribute to our choice of love objects, although the unconscious prototypes may never be identical to the external object. Studies must begin to find strategies to tap into these less conscious aspects of mentation, in conjunc-
tion with fMRI studies. Obvious candidates include the use of projective tests, but also measures familiar in cognitive research such as Bucci’s Referential Activity scales, which, by quantifying the richness and detail of figurative language offer a potential measure of the degree of involvement with a beloved, or Osgood’s Semantic Differential, which could be used to construct a map of attributions about the beloved. While these measures may themselves be flawed, if fantasy and cognition are omitted, the distance between neurobiology and content collapses and a uniquely psychoanalytic understanding is lost.

In closing, I would like to thank Yoram Yovell again, for his wonderful and thought-provoking paper. It was actually quite difficult to comment on, as he clearly anticipated many of my questions. I think the paper reflects both where we are now, the vast knowledge gained through the study of neurobiology, as well as our own wishes to get ahead of ourselves through the provision of an overarching theory. A reasonable next step is, then, the development of experimental strategies that combine the two poles of analytic inquiry, which, at its best, stretches from the base of the body to the highest reaches of symbolic thought.

REFERENCES

Response to commentaries
Yoram Yovell

DRIVEN TO LOVE OR DRAWN TO THE BELOVED?

I feel fortunate for the distinguished and diverse group of commentators that the editors of *Neuro-Psychoanalysis* have chosen to address my article, “Is There a Drive to Love.” Their original and intellectually rewarding perspectives on love, drive, attachment, and the desired relationship between psychoanalysis and the neurosciences have enriched my thinking about these issues. In responding to them, I consider in sequence the two major concepts discussed in my original paper: “drive” and “love.”

Drive

Most of the commentators (Glick, Leuzinger-Bohleber, Panksepp, Paul, Watt, and Weinstein) see some merit in the Freudian concept of drive, while being painfully aware, as I am, of its limitations and its need for a serious upgrade and overhaul. In contrast, Mario Mikulincer and Phil Shaver see no room for drive-based models in contemporary psychology and in the cognitive neurosciences. These prominent researchers, who have been leaders for the last twenty years in the study of the links between infantile patterns of attachment and adult love relationships, also doubt the utility of a bottom-up approach that attempts to correlate between neurobiological findings and psychological phenomena. Their view may be summarized by the subheading “Behavioral systems instead of drives” that appears in their commentary.

The categorical rejection of the drive model by two eminent scientists renders much of what was discussed in my article irrelevant, and it may have far-reaching implications for psychoanalytic theory. However, in my view, the consequences of a total rejection of the drive model resemble the negative consequences that followed the refusal of psychoanalysts in the past to acknowledge and apply Bowlby’s attachment-based behavioral systems model to their clinical work and to their theory building. Because of the centrality of this issue, I have chosen to address Mikulincer & Shaver’s concerns in some detail. Accordingly, the first half of my response is devoted to the task of explaining why I believe that the drive model might still be useful and at times even essential for people who are interested in the mind, the brain, and the ways in which they are correlated. My approach may be summarized as “Behavioral systems as well as drives.”

The behavioral systems approach and the drive-based approach are, in my opinion, no more and no less than two models for the functioning of the human mental apparatus, an entity that is neither brain nor mind but is perceived as both brain and mind (Solms & Turnbull, 2002, pp. 56–58). These two very different models have both strengths and weaknesses, and they are in many ways complementary. I fully agree with Mikulincer and Shaver (2007) that the behavioral systems approach is indeed a powerful and useful model for the functioning of the human mental apparatus. It has direct relevance for the practicing analyst as well as for the cognitive scientist. Moreover, I agree with them that its absence from psychoanalytic metapsychology until very recently, when Bowlby’s contribution was acknowledged and integrated into the mainstream of contemporary psychoanalysis, has been both conspicuous and deleterious. Its absence seriously limited our ability to understand and explain aspects of human experience, including love. Because of this agreement I will only discuss here why I believe that the drive-based approach may at times also be useful and relevant to analysts as well as to scientists.

One reason that Mikulincer & Shaver see no value in the drive model is because they believe that, in making correlations between mind and brain, it is only possible to move downwards—that is, from objectively observed behavior and subjectively felt emotions and thoughts down to the level of neurons and neural pathways. In contrast, the view of neuro-psychoanalysis as I understand it is that correlations between mind and brain may be made on multiple levels and in multiple directions. Both psychoanalysis and the cognitive neurosciences are trying to “carve mental functions at their joints” (Solms & Turnbull 2002, p. 56).

In my target article, I used the term “instinctual/emotional systems” instead of “behavioral systems.” More than a different name for the same entity, I chose this phrase in order to note that there exists a subjective, intrapsychic aspect to these systems, as well as the objective, behavioral aspect that is usually emphasized by cognitive scientists.
While in their commentary Mikulincer & Shaver “leave to others the task of searching for neural correlates of the kinds of love that can be identified and delineated at the level of mind and behavior,” neuropsychoanalysis is attempting to begin to meet this very challenge.

To explain why I think that not only top-down but also bottom-up approaches may be useful in understanding mind as well as brain, I would like to consider the work of Alexander Romanovich Luria (1973), the founder of neuropsychology. Luria used his observations of brain-damaged individuals in order to construct models of “functional systems”—neural systems comprised of multiple anatomical loci that in concert produce the observed behavior and felt subjective experience. Moving upwards from brain to mind, he traced the effects of well-defined cerebral lesions on the subjective experience and objective behavior of his patients. Two important, well-accepted, and instructive examples for the utility of this approach, in which the study of neural lesions has led to a radically new understanding of the mental phenomena in question, are the study of language (Kandel, 2000, pp. 1169–1187) and of memory (pp. 1227–1279).

I agree with Mikulincer & Shaver that “there is no need to trace every [psychic] goal to the body.” However, I believe that they are mistaken when they go on to deny the utility of looking upwards from the body or the brain in order to better understand what drives or motivates mental phenomena. For example, and relevant to the subject of the neural basis and motivational basis of love, our recent understanding of the structure and function of limbic emotional command systems (Panksepp, 1998; Watt, 2007) has enabled us to conclude that anxiety, a strong and ubiquitous motivator of human behavior, is not a unitary phenomenon (as many psychoanalysts, cognitive scientists, and neurobiologists believed in the past). Rather, there is now overwhelming evidence that Melanie Klein was essentially right when she proposed the fundamental dichotomy between paranoid and depressive anxieties. The understanding that anxieties may motivate (or “drive”) multiple behaviors, but that they do so in fundamentally different ways, leading to fundamentally different psychic outcomes, has not been obvious or agreed upon in the past, when this question was approached from the level of the mental phenomena alone. Furthermore, it has direct relevance to the practicing analyst as well as to the cognitive neuroscientist.

In order to support their view that conceptualizing behavior as “driven” has no added value, Mikulincer & Shaver discuss the need to become closer to another person and state that behavior is best characterized by its goal rather than by its driving force. I agree with them that “moving physically or psychologically closer to another person is defined as an attachment behavior if it is intended to secure comfort, protection, or relief from stress. The same action is defined as sexual if it moves a person toward sexual intercourse, and it is viewed as part of caregiving if it occurs in the service of comforting . . . a distraught relationship partner.” However, they then go on to suggest that considering these different motivations as “driven” adds no relevant information.

I strongly disagree with this conclusion. Here is an example of a situation in which a drive-based approach may have much to offer to the puzzle of why people move closer to each other: It is likely that every analyst has experienced at times a powerful wish to move psychologically (as well as physically!) closer to a patient. Perhaps this wish has been motivated by love. But what motivates this wish? A need to feel more secure him/herself? A sexual desire? The need to comfort a distraught person who is under his/her care? Or maybe a need to deny his/her own aggressive impulses towards him/her patient?

Consider also the case of people with eating disorders. Consuming food in order to obtain nutrition (a set-goal of the eating behavior) is usually motivated by hunger (an innate homeostatic trigger of the behavior). However, binges may also be triggered by loneliness, by fear, by envy, and by a host of other conscious and unconscious emotional states that are all subjectively experienced as hunger but have nothing to do with food. The fact that such “hunger” may be relieved by a phone call to a friend suggests that there is more to the behavior than its apparent and conscious goal. Conscious and unconscious motivations may interact and find an outlet in a wide range of behaviors. Although other theories of motivation may be applied to account for these behaviors (Elliott & Dweck, 2005; Shah & Gardner, 2007), such phenomena are at times accurately described and predicted clinically by a drive-based conflict model.

Within contemporary psychoanalysis, theoretical approaches that have completely discarded the drive-based conflict model in favor of pure adherence to the behavioral system attachment-based model have
led to an impoverishment of meaning as well as to impoverished technique. This is completely analogous to the impoverishment of meaning and technique that has characterized psychoanalytic approaches that in the past have denied the value and utility of the attachment-based model. I agree with Robert Paul, who begins his commentary with the observation that “it was one of the strategies of object relation theorists (broadly speaking), including Bowlby and the attachment theorists, to differentiate their approach from the classical Freudian one by dismissing the theory of drives.” In my view, this is an unfortunate case of throwing out the baby with the bathwater. When approaching such complex mental phenomena, we should utilize all the relevant models that are available to us and, therefore, “behavioral systems as well as drives.”

Up to this point, I had discussed why drive-based models may sometimes be useful to the psychoanalyst and the cognitive psychologist. But in addition to claiming that the notion of drive is useless for psychology, Mikulincer & Shaver also suggest that it is useless for neurobiology, because “science does not need drives or psychic energy to explain romantic love. Rather, the main question is: ‘Which behavioral systems are involved in romantic love and how do they combine to create and maintain romantic feelings and, in many cases, an affectional or attachment bond?’”

When stated in rigid mechanistic-dynamic terms, as Freud (1915c) sometimes presented it, the drive model—and especially the idea of psychic energy searching for discharge—may easily be made to look ridiculous, as Mikulincer & Shaver say: “it [the brain] is powered by glucose, but not by glucose looking for a way to express itself in mentation or behavior”; or “Is there a unique drive for putting your money in a savings account?” Still, Mikulincer & Shaver are mistaken when they state that contemporary molecular biologists do not look for sources of energy “except for glucose.” One such prominent contemporary molecular biologist and neuroscientist is Donald Pfaff, whose influential book Drive: Neurobiological and Molecular Mechanisms of Sexual Motivation (1999) describes how the Freudian concepts of drive and libido may be usefully applied to the neural and molecular mechanisms that generate and modulate sexual behavior. Pfaff (2006) also outlined how the brain’s general arousal system, which he termed BBURP, may be viewed as supplying a generalized “drive” that contributes to the execution of all motivated behaviors. In my target article I attempted to consider how his findings and theories may be relevant to current neuropsychoanalytic formulations of romantic love.

In conclusion, when I argue for a place for drive-based models in our current range of theories on the function of brain and mind, I am not in any way suggesting that the Freudian drive model of 1915—or any other drive-based model—is an acceptable model by which to explain all or most of what we know today about human behavior and human subjectivity. I am also not denying the immense explanatory power that the behavioral systems approach has to offer, as Mikulincer & Shaver beautifully show in their commentary, in which they trace the contributions of the attachment, caregiving, and sexual systems to the vicissitudes of human love. However, I am saying that the complexity of the issues we face when trying to decipher the psychic and neural underpinnings of human behavior are such that we cannot afford to discard old theories and models just because they are limited and need to be overhauled and upgraded, or because new and different models have emerged and were applied successfully to many theoretical and clinical dilemmas. We still need multiple models, and each of them has different strengths and weaknesses. As Mikulincer & Shaver wisely note, the so-called theory of everything is still very far away.

Love

In his commentary, Robert Glick considers the search for the motivational basis of romantic love from the vantage point of a practicing psychoanalyst who is interested and knowledgeable about the relevant neighboring scientific disciplines. He has examined how psychoanalytic theory may be enriched by studying the neurobiology of emotions such as anxiety (Roose & Glick, 1995), and he brings this perspective to the study of love. In his discussion of the three problems that were raised by my article (the knowledge problem, the motivation problem, and the romantic love problem), Glick reminds us that “psychoanalytic history is littered with problems created by inattention to or rejection of knowledge about being human in the world.” I could not agree more, and the examples he cites (schizophrenia, autism, homosexuality, etc.) should serve as warning signs along our road to an updated psychoanalytic theory.

However, Glick is well aware of the temptation to fill the gaps in our knowledge by assuming that neurobiological data may replace psychoanalytic insights. The clinical illustration that he brings is fascinating, in that it shows how a sudden burst of romantic love in mid-life may elude an obvious drive-based or behav-
roral system-based explanation. In contrast, viewing this love as a change agent and pursuing its subjective meanings may inform our clinical work without solving the mystery of its neural underpinnings.

In her original, at times poetic commentary, Mari-anne Leuzinger-Bohleber brings up a related concern. She discusses the difficulties that psychoanalysis might encounter if it withdraws into itself and avoids an exchange with other disciplines. She points out that neurobiological research cannot at this point add much to the clinical psychoanalytic work with people who are in love, or who suffer from love's absence. How can psychoanalytic clinical work with people who are in love, or who suffer from love's absence. How can psychoanalytic approaches be informed by available cognitive-neuroscientific findings and theories. However, while seeing the merit in this attempt, she articulates the reasons why such correlations, and the psychoanalytic inferences that are made based on them, cannot replace psychoanalytic clinical and theoretical work. In particular, she discusses the dangers of making a "categorical mistake" (Leuzinger-Bohleber & Pfeifer, 2002). In the context of the subjective experience and objective behavioral and neural correlates of romantic love, she warns that "confounding the levels—the level of explanation of brain mechanisms with experiences of the subject constructing meanings on a psychological (behavioral) level—would be a categorical mistake!"

While I agree with Leuzinger-Bohleber that this "confusion of tongues" is a real danger that permeates all attempts at a dialogue between neuroscience and psychoanalysis, I believe that there are instances in which a neuroscientific insight may inform psychoanalytic theorizing. One such example was cited above, in the case of Melanie Klein's concept of paranoid vs. depressive anxiety. Klein's formulation appears to hold true, whereas other approaches (Otto Rank, Heinz Kohut, and others) that saw all anxieties as stemming from one common source appear to be less valid. Leuzinger-Bohleber is perceptive in her observation that neurobiological research cannot at this point add much to the clinical psychoanalytic work with people who are in love, or who suffer from love's absence. However, whether this might or might not be possible in the future is in my opinion too early to tell. As Leuzinger-Bohleber is well aware, our attempt at bridge-building is still in its infancy.

Jaak Panksepp, who is in many ways the father of modern affective neuroscience (1998), adds in his commentary his well-informed and always fascinating perspective on the place of romantic love among the primary-process, sub-neocortical emotions. I can do no better than to quote him and express my complete agreement with his conclusions. While affirming that there is not enough evidence to justify "the placement of 'romantic love' into a primary-process category," Panksepp acknowledges the veracity of romantic love and its dramatic influence on our lives: "Once it has become a well-assimilated tertiary-process emotion in some individuals, it can become a guiding principle for a life well lived, just like principles of justice and so many other higher human concerns."

But the fact that romantic love is probably not generated by a specific primary-process system should not make it any less real or "biological" than any of our other feeling states: "This does not mean that the results of social learning are not real neurobiological processes of the brain. They sure are, but they are epigenetic creations rather than genetically provided tools for living." Panksepp goes on to explain how romantic love may be based in part on the action and interaction of the LUST, CARE, SEEKING, PANIC/SEPARATION DISTRESS, and PLAY systems.

While acknowledging that not all of these systems are active in every kind of romantic love, Panksepp asks, in his classic and inimitable style: "Did genetics make many of us the unabashed romantics that we are—or used to be?" And he answers: "I suspect my lived experiences achieved that. Romantic love lives in my neocortex and as a result in my limbic regions, because this higher feeling is supported by many primary emotional systems that helped program my cortex from below." Interestingly, his formulation, which is sympathetic to and based on aspects of the drive model, would probably still be accepted by Mikulincer and Shaver (2007), who have come to the same conclusion from a different theoretical perspective. Perhaps the drive baby can be saved from being throw out with the bathwater of hydraulic and thermodynamic metaphors after all.

Robert Paul brings a well-informed neo-Freudian perspective to bear on the old debate between Freud and Bowlby. His elegant commentary follows a direction that is the mirror image of Mikulincer & Shaver’s. Through a careful reading of Freud’s writings on the drives, Paul articulates the case for a semi-independent role of aim-inhibited libido as the origin of affectionate, nonsexual ties in Freud’s emerging metapsychology: "Aim-inhibited libido is, for Freud, the essential stuff of all affectionate relations and is derived from libido-driven drives, but it is not the same as sexual impulses, which are uninhibited in their aim."

If one follows this interpretation, there may appear to be no need for a separate “attachment” system that is fully independent of sexuality. Paul then asks how many drives or systems we would need to invoke in order to explain the vicissitudes of romantic love. He...
astutely observes that “from a clinical point of view, this argument has a bit of the character of guessing at the number of angels dancing on a pinhead, since, as we all know, drives cannot be observed but only inferred.”

He seems to address some of the concerns of Leuzinger-Bohleber when he adds that “it is here that the ‘neuropsychoanalytic’ approach has something new and potentially very useful to offer, since if it can be shown that sexuality and attachment have different underlying brain functional and/or chemical correlates, this would tend to support the idea of two separate drives, whereas if they share the same brain and chemical substrates this would seem to support the ‘one-drive’ theory of libido.”

Paul then notes that there is some neurochemical overlap between the attachment/care system and the sexual system, with oxytocin and vasopressin playing a major role in both. He then concludes that the data grant some validity to both sides of the argument: these two systems are somewhat separate (as Bowlby suggested), and yet the attachment system has a powerful sexual component (as Freud and the Freudians suggested). While I believe that he is correct in arguing that the two systems are indeed not completely separate, there exists a wealth of neuroanatomical, neurophysiological, and neurochemical data, some of which is reviewed above, that suggests that attachment and sexuality are mediated by two independent (albeit somewhat overlapping) instinctual/emotional systems.

Douglas Watt devotes the first part of his intellectually stimulating commentary to outlining the scope of an ambitious and much-needed project: updating drive theory within psychoanalysis and linking it to a modern theory of affects. I am in agreement with the vast majority of his observations and suggestions and would like to reassuring him that I share his view that “finding the neuroscience that proves that Freud was right” is not a useful or appropriate goal for neuropsychoanalysis. Moreover, as I tried to show in my article, contemporary cognitive neuroscience provides several lines of evidence that suggest that Freud’s assumption that all the motivations, behaviors, and subjective states associated with human love relationships are ultimately sexual in nature is probably incorrect.

Watt approaches the question of the typology of love from an evolutionary perspective. Phenomenologically, he accepts Fisher’s (2004) model that views human romantic love as the product of the functioning of three groups of systems: sexual systems (LUST), attachment systems (CARE), and a system for attraction and mate selection. However, he joins Panksepp and me in questioning whether the system for attraction and mate selection is indeed an independent system. He observes that “Romantic love is not very different from how we felt as infants and very young children in relation to powerful and nurturing parental figures. It is not an overstatement to say that they held our lives in their hands, just as we feel in relationship to our beloved romantic figure.” Based on this phenomenological similarity, as well as on the lack of a specific neurochemistry for mate selection and the inability to demonstrate a double dissociation of attachment and mate choice in a lesion model, he favors the idea that mate selection is an enhanced form of attachment.

Watt also acknowledges the seminal contribution of psychoanalysis to the realization that “early relationships inform and in some sense even determine the social matrix later in life.” He adds—and I very much agree—that “if psychoanalysis, despite all its metapsychological problems and convolutions, helped countless therapists understand these deep truths about human attachment and suffering in their patients (and in themselves), then psychoanalysis understood something profound about the brain that neuroscience badly needs to appreciate better.”

Lisa Weinstein brings her sophisticated understanding of psychoanalytic theory to bear on the main goal of my article, which attempted to study the correlations between psychoanalytic and neurobiological formulations of sexuality, attachment, and love. She wisely points our attention to several inherent difficulties and pitfalls that hamper this ambitious, perhaps even reckless, project.

First and foremost, in her commentary she is appropriately concerned about “the relative neglect of the representational world” in my article. Related to this problem is a lack of consideration of the contributions of aggression and narcissism to the subjective states and complex behaviors that characterize human romantic love. While I am not sure that I agree with her other main concern (that the distinction between drive and instinct is sometimes blurred in my article), I fully agree that whenever we try to correlate neurobiological findings with psychoanalytic insights, we are in danger of flattening the complex representational space that psychoanalysis opens up. Weinstein therefore stresses—and again I agree—that “an analytic understanding of romantic love would necessarily include integrating the conscious and unconscious factors that contribute to our choice of love objects, although the unconscious prototypes may never be identical to the external object.”
I also agree with Weinstein that the psychoanalytic and cognitive-neuroscientific definitions of the terms and phrases that my article refers to (sexuality, instinct, drive, motivation, and many others) are very different and at times incompatible. In other words, our ability to meaningfully correlate between psychoanalytic and neuroscientific findings and theories depends on our ability to translate one language into the other, and this is a daunting task, much easier said than done.

In concluding my response to the commentaries, then, I would like to address this last concern, which is of course relevant to everything I tried to say in my article. I can probably do no better than to quote Freud (1920g, p. 60) at the end of one of his most speculative (and perhaps most misguided) attempts to correlate between biological findings and psychoanalytic theory: “It may be asked why I have embarked upon such a line of thought as the present one, and in particular why I have decided to make it public. Well—I cannot deny that some of the analogies, correlations and connections that it contains seemed to me to deserve consideration.”

REFERENCES