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CHAPTER 5

The Neuropsychological Correlates of Forgiveness

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Forgiveness is a complex neurocognitive and affective process that has multiple facets and has been increasingly recognized as an important aspect of psychotherapy and behavior change. However, a complete understanding of forgiveness requires knowledge of its underlying neuropsychological mechanisms, particularly those of the sense of self, a recognition of harm to the self, and revenge behavior. This, in turn, requires a review of the forgiveness process and its phenomenology. It is also necessary to consider any possible evolutionary origins of forgiveness that might suggest neuropsychological as well as social mechanisms. Such an analysis then necessitates a review of the neurophysiology and overall brain function that may be related to the act of forgiveness. Finally, we consider an initial model for the mechanism of forgiveness, which we hope leads to empirical testing or, at least, the possibility of future directions for research into this concept.

THE NEUROEVOLUTIONARY BASIS OF INJURY PERCEPTION AND REVENGE

When considering the evolution of forgiveness behavior, it is important to examine how various human brain functions evolved from the brain functions of more "primitive" animals. This type of neuroevolutionary process

has been called "encephalization" (Laughlin, McManus, & d'Aquili, 1992). Encephalization of brain functions in primate and human evolution allows primitive survival mechanisms to be represented in the newly developing brain, although in a highly modified form. Thus, new and "encephalized" functions can be quite different from the primitive function on which they are based, often being only structurally or formally similar. For example, the frontal and prefrontal lobes originally developed to direct simple motor behavior. With the advent of the genus *Homo,* the frontal and prefrontal lobes developed the additional ability for the animal to plan and prioritize motor behaviors, and to develop and organize goal-directed motor behavior (Pribram & McGuinness, 1975; Stuss & Benson, 1986). Eventually, not only did motor behaviors come under the auspices of the frontal and prefrontal lobes, but cognitive and emotional responses also were planned and prioritized by these areas. Therefore, these frontal and prefrontal functions, while seeming to be far removed from simple movement, nevertheless represent a highly sophisticated and abstract evolution of function that is primarily based on motor behavior (Joseph, 1990). It is becoming clearer that to truly understand complex hominid behaviors, particularly those embedded in, and crucial to, culture, one must understand their homologues in prehominid behavior. It is this kind of approach that we must have if we are going to arrive at any significant understanding of a complex human behavior such as forgiveness.

We must begin by exploring some of the more primitive behaviors among humans and other animals in order to derive an understanding of forgiveness. It must be mentioned here that there may be other mechanisms, separate from evolutionary ones (i.e., religious or social), that play a role in the development of the forgiveness process in human beings. However, for the purpose of this chapter and its focus on neuropsychological mechanisms, we consider the possible evolutionary basis of such mechanisms.

Since forgiveness seems always to presuppose that an injury has been incurred to the self, one might begin by determining the nature of "injury to the self" and how this occurs neuropsychologically and evolutionarily. A perception of injury to the self has several substrates: (1) a sense of self; (2) an ability to evaluate the behavior of conspecifics as being injurious or beneficial (the notion of conspecific congruence); and (3) memory of the event in order to link that injury to the offending person. As we describe, these also appear to be substrates for forgiveness and can help toward an understanding of why forgiveness occurs at all.

Sense of Self

As Geschwind (1965), and especially Luria (1980), first demonstrated, the inferior parietal lobule, particularly on the dominant side, underlies the ca-

pacity for abstraction and reification. In other words, the ability to generate classes of objects from particulars and to turn relationships into "things," both of which are necessary conditions for language, arises from the development and elaboration of this area of the brain. The inferior parietal lobule probably begins to become functionally significant at the Australopithicene level in evolution if the interpretation of skull structures has any significance at all (LeGros Clark, 1963). Probably the most important development is that the input of the body's senses and functions, as well as mental functions, are formed into a unified sense of self, and indeed, even a self-reflecting self. We must note here that the inferior parietal lobule in both the dominant and nondominant hemispheres has rich interconnections with the limbic system, which is the part of the brain primarily involved in the modulation of emotion (Joseph, 1990; Kandel, Schwartz, & Jessell, 1993). It is the inferior parietal lobule on the dominant side that probably modulates the sense of self (Joseph, 1990). The self is therefore imbued, when it is vividly experiencing, with the emotional tone of the dominant hemisphere. Several investigators (Hommes & Panhuysen, 1971) neatly demonstrated that when the dominant hemisphere of the brain is put to sleep with a barbiturate, what is released on the nondominant side is depressive affect. When the nondominant hemisphere is put to sleep, what is released on the dominant side is elation or hypomania. Both of these emotional responses are mediated by the limbic system in their respective hemispheres (Joseph, 1990; Kandel et al., 1993). The sense of self therefore, which for the most part is a function of the inferior parietal lobule on the dominant side, tends to be associated with positive affect at the very least, and often with some degree of hypomania. This partially explains why patients in serious depression usually have a significant struggle with their sense of self and, most certainly, asserting their selves (Deitz, 1991; Jackson, 1991; Segal & Blatt, 1993; Mukherji, 1995).

The expansion of the perception of the ego or self is such that we tend to perceive ourselves in a grander manner than we perceive other individuals (Jackson, 1991). This makes sense, since it is the self that must perceive, analyze, and evaluate all input regarding the self (Laughlin et al., 1992). This process may involve both the posterior superior parietal lobe and the limbic system, since these areas are involved in providing a sense of self and the affective valence toward the self, respectively. From an evolutionary perspective, such a perception is necessary for the maintenance of the self above all other things. If such an expansion of the self did not occur, it would make a person less interested in protecting his or her self. However, this expansion of the perception of the self also arises because all of our perceptions of emotions and sensations are perceived as part of our self and not usually as part of someone else (with the possible exception of dissociative states). This naturally sets up a greater sense and perception of the self and all things that happen to it.

Conspecific Congruence

The second substrate for the perception of injury is the notion of "conspecific congruence," which refers to the perceived nonhierarchical relationship between a given individual and the other conspecifics (or individuals) in the group. Along with hierarchical ordering, conspecific congruence is one of the more powerful psychosocial forces creating and limiting the structure, relationships, and roles within human (and other mammalian) social groups. Whereas hierarchical ordering is "vertical" within a society and represents, as it were, the "protoaristocratic" element in social organization, conspecific congruence is "horizontal" and represents the "protodemocratic" psychosocial element. Both always seem to be present to some degree, however, within all stable human social groups.

A dramatic example of the interweaving of these two psychosocial forces would be a medieval serf's physically attacking his lord when the latter came to claim his "right of the first night" (*ius primae noctis*) with the serf's new bride. Rare as such incidents may have been, they are known to have occurred. In such a case, the serf is "appealing" to conspecific congruence even in the face of well-established and extremely powerful hierarchical ordering. Thus, conspecific congruence helps create a balance within the social group such that all members understand their role and relationship with all the others in the group. Clearly, both hierarchical ordering and conspecific congruence have the evolutionary advantage of helping to maintain the integrity of the group's social structure. Social organization itself has clearly been an adaptive advantage in both the hominid line and in other species (d'Aquili, 1972). Behaviors that help support the social structure therefore have an adaptive advantage.

In considering the evolution and dynamics of forgiveness, both conspecific congruence and hierarchical ordering play a role; however, conspecific congruence is central to our understanding of this phenomenon at its core. Conspecific congruence among human beings probably developed out of the structures in the brain that underlie the ability to form classes of groups with perceived similarities in humans and other animals. In human beings, the higher order cognitive and emotional functions of the brain allowed for the perception of the class "human," but more importantly, perception of the class "our group" or "our tribe." This was the essential neuropsychological basis for the emergence of conspecific congruence. Conspecific congruence is asserted when all members behave to maintain social balance.

An individual utilizes conspecific congruence to evaluate the behaviors of conspecifics to determine if they may result in altering the congruence in either a positive or negative manner. It is interesting that the same area of the brain (the inferior parietal lobe), which we discussed earlier

with relation to abstractive ability and reification, is the same area of the brain that provides a number of logical-grammatical categories and functions (Bruce, Desimone, & Gross, 1986; Burton & Jones, 1976; Geschwind, 1965; Jones & Powell, 1970; Seltzer & Pandya, 1978; Zeki, Symonds, & Kaas, 1982). Comparisons such as "greater than," "lesser than," and "equal to" are also formulated by this part of the brain. Such comparisons are also given emotional bias via the connections between the inferior parietal lobe and the limbic system. Obviously, this function is essential to the principle of conspecific congruence. A change in congruence, with the subject positively valenced, is perceived by the subject as a favor or kindness, with the consequent obligation to return it in some way in order to balance the incongruence. A change in the congruence that is negatively valenced is perceived by the subject as an injury, an attack on the self, with the likely consequent desire for revenge to restore the congruence.

We propose that the principle of conspecific congruence could not have evolved without the development of the inferior parietal lobule, allowing both the perception of the "equality" of conspecifics and the perception of incongruence. It is also important to add that as the notion of conspecific congruence became encephalized into the human brain, this function expanded to include not only conspecifics, but also, eventually, the entire world. Thus, human beings have a perception of the relationship of their self to the entire world (Jackson, 1991). Such a relationship may be termed "self-world congruence," because it implies that a person has a certain understanding of the self and the congruence that exists between that self and the rest of the external world. We will consider the self-world congruence later in this chapter, but for now, we continue with the association between congruence and the perception of harm and revenge.

It is in the face of a change in conspecific congruence with the subject negatively valanced, that the process of forgiveness or revenge may occur. Revenge appears to be a more active approach to restoring congruence (Berscheid, Boye, & Walster, 1968), whereas forgiveness seems to restore congruence in a different manner. The evolution of human revenge behavior is, at first, easier to understand than the evolution of forgiveness. It seems to be more clearly related to self-preservation. Its cultural and derivative manifestation, justice, is certainly central for the preservation of societies and cultures. The *Lex Talionis,* that is, the law of "an eye for an eye and a tooth for a tooth," seems to be present in all cultures in one form or another. It is both the most primitive manifestation of justice and the clearest manifestation of personal revenge. True revenge, as practiced within the genus *Homo,* is certainly a considerable elaboration of the self-preservation motif. Since revenge behavior is based upon a negative change in conspecific congruence, true revenge requires a sense of self

and the internal drive to equalize incongruence between two conspecifics. Thus, when an individual is offended or hurt, there is a strong impulse to return the hurt and thus bring the imbalance into congruence. Although this may be the basis of revenge, it is not the only example of conspecific congruence. Generous gift giving or granting favors by socially dominant individuals, such as the Patlatch among the native Americans of the northwest during banquets and drinking fests of Anglo Saxon Aethelings, causes a disequilibrium in conspecific congruence, with the resulting obligation on the part of the receivers of the generosity to return it in one form or another. There are a number of examples of the necessity among humans to restore the equilibrium that is destroyed when conspecific congruence is contravened. Here, however, we are only concerned when the disequilibrium is caused by a perceived hurt or injury generating a desire in the injured party to restore the balance by getting revenge.

Long-Term Memory of Injurious Events

In addition to the sense of self, its inflation, and the principle of conspecific congruence, another element must be in place before full-blown human revenge behavior can take place. This is the final substrate that we mentioned earlier regarding perception of injury—the evolution of long-term memory of causal events. Obviously, an individual who cannot carry the injury in memory for any significant time cannot get revenge on the perpetrator of the injury. For example, Murphy (1988) has defined forgiveness as the forswearing of resentment, which is differentiated from forgetting, which, he states, just happens. Thus, forgiveness requires memory of the causal framework within which the injury to the self occurred, so that the offender and the events are remembered. Murphy sees forgiveness as something that helps one to avoid the painful consequences of holding onto the memory of negative emotions associated with resentment. We maintain that, at a more primitive level, forgiveness involves forswearing revenge (Enright & the Human Development Study Group, 1991; North, 1987). Forswearing revenge is already an extremely encephalized and highly developed version of the forgiveness phenomenon.

What are the neuroanatomical and neurophysiological structures and functions that must have evolved in order for these elements to be present and grafted upon the basic prehominid instinct for self-preservation? These elements in what we call the "revenge complex" are not based on any single neural structure within the brain but rather on a number of structures related to each other in complex neural networks. The evolution of long-term memory arose from the development of the hippocampal–amygdalar memory system (Milner, 1970; Mishkin, 1978; Rawlins, 1985; Sarter & Markowitsch, 1985). This involved the evolution

of neural connections between the limbic system (especially the hippocampus and amygdala) and various parts of the neocortex. It is hard to tell when this long-term memory system evolved, but it may have been in place among protohominids (Laughlin & d'Aquili, 1974).

In turning to the evolution of forgiveness, we can begin to understand how it neuropsychologically relates to the substrates of injury perception and revenge. One might intuitively understand the adaptive advantage of revenge-seeking behavior as related to conspecific congruence. Indeed, some studies suggest that individuals who, in one way or an another, retaliate when wronged tend to be wronged less frequently (Baron, 1973, 1974; Rogers, 1980). It is certainly far less intuitive to understand the evolutionary advantage of forgiveness behavior. Forgiveness consists of persons "giving up" their right to redress a wrong, to restore equilibrium, and to reestablish conspecific congruence in the usual way. We might get a clue as to the nonhuman homologue of forgiveness by looking at the animal world around us. There are a number of reconciliatory behaviors, including submission gestures, that help to terminate fighting between conspecifics. It is likely that forgiveness is the neocortical homologue of these types of behaviors. However, future studies of such behaviors in animals will be necessary in order to substantiate any claim specifically relating animal behaviors with human forgiveness.

Why Forgiveness?

But why would forgiveness have evolved? What is its adaptive advantage? Let us return to that interesting characteristic of humans to exaggerate both the self and the degree of wrong done to that "exalted" or "grandiose" self (Lynch, 1991). This exaggerated misperception of the offense to the subject results in an attempt to redress the wrong. Since the person who initially committed the offense is human also, he or she will perceive the excessive redress as even more excessive. With this mechanism operating, it is almost impossible to restore equilibrium neatly. Every attempt to restore equilibrium results in further disequilibrium. Such a neuropsychological system, if unchecked, could lead to the social chaos it initially evolved to avoid. Forgiveness, curiously, often eliminates the bellicosity in one's opponent (Enright, 1996). Thus, although forgiveness does not always eliminate hostilities, it usually does (Komorita, Hilty, & Parks, 1991).

Furthermore, forgiveness, or at least nonretaliation observed by others, may have the curious quality of generating empathy and warm feelings for the injured victim from observers who were usually in no way involved in the initial fight or confrontation (Kanekar & Kolsawalla, 1977; Kanekar & Merchant, 1982). This can have remarkably profound social consequences. For example, a huge number of converts were gained for Christianity during the 10 great persecutions by the Roman Empire be-

cause of the empathy and warm feelings generated in many spectators observing Christians suffering and forgiving their persecutors. A third-century Christian dictum was *sanguis martyrorum semen christianorum* (i.e., the blood of martyrs is the seed of Christians), illustrating the profound neuropsychological effect upon many individuals who simply observed acts of forgiveness. The effect on many observers is usually the same as the effect on the hostile opponent, namely, an upsurge of empathy and warm feelings for the forgiver. Although this is a general response, it is clearly not a universal one. Individuals diagnosed with antisocial personality disorder do not seem to have a genuinely empathic response to a forgiving person. Assorted other individuals, as well, may also lack this response. But generally speaking, an empathic response to a forgiving person may be a primary evolved complement to forgiveness.

To summarize, the evolution of forgiveness behavior is profitable for social groups in that it tends to cut off progressively escalating revenge behavior. Such escalating revenge behavior is based on an affective misperception of the importance of the self, with its consequent misjudgment of the amount of revenge necessary to restore conspecific congruence. Thus, if the revenge interactions are approaching a lethal level, forgiveness may literally save one's life. Furthermore, the forgiving individual may gain significant advantage in social support owing to the positive affective alignment toward the forgiver that is generated in observers. Overall, the social advantages of forgiveness, as well as the advantages for the individual forgiver, almost certainly outweigh the dangers that arise from forgiving the relatively rare, nonresponsive person. Furthermore, as we describe, the individual may benefit emotionally from the act of forgiving.

Another possibility is that forgiveness does not inherently have an adaptive advantage but is linked to another trait that does serve an adaptive advantage, such as the ability to form family or social groups (Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998). While such a possibility cannot be excluded at this time, it is likely that forgiveness may have played a role in the behaviors with which it is linked. Therefore, if forgiveness evolved in people more likely to form social groups, forgiveness may have been a behavior that, at least, helped facilitate group cohesion, as described earlier.

One additional point to consider is what it means neuropsychologically to give up the right for revenge. To answer this question, one must first ask what it means neuropsychologically to give up anything, or more subtly, one's "rights" to anything. The neuropsychological model presented for this human behavior is more speculative than the neuropsychological substrates of injury perception and revenge. First of all, the inferior parietal lobule is necessary for conceiving the abstract concepts involved in revenge. Once these concepts exist, whether or not the brain's

linguistic operators give them a name, they can be related to each other via subtle or not-so-subtle emotional valences. This, again, is where the functioning of the limbic system may be involved in order to help provide a valence for the relationship between the concept of the self and the concept of revenge. A positive valence means that revenge (a specific revenge towards a specific person) is part of the self. A negative valence means that this revenge is not part of the self, that it is other, and therefore does not draw the self into revenge behavior. We would hypothesize that forgiveness, or giving up revenge, involves a shift of affective valence between the self and a "specific revenge," from a positive valence to a negative valence. Such an explanation of forgiveness evokes a whole theory of "affective valencing" (for which space does not permit greater elaboration) as at least one possible way of relating conceptual entities.

SOCIAL CONTROLS OF REVENGE BEHAVIOR

We have seen how injury perception and revenge evolved as encephalized manifestations of the more primitive self-preservation function in order to restore and correct any disequilibrium in conspecific congruence. Its obvious "purpose" was the enhancement of social cohesion by discouraging violations of the rights of other individuals. We have also posited that revenge behavior is poorly modulated and can easily lapse into an excessive mutual retaliation owing to an excessive evaluation of the self, with the consequent miscalculation of what is needed to restore equilibrium. This somewhat grandiose evaluation of self may have had many evolutionarily adaptive advantages, but it resulted in revenge behavior often working in an uncontrolled and faulty way. We have seen "the attempt" of biological evolution to correct this by the coevolution of forgiveness, which may be the encephalized manifestation of primitive submission gestures.

Superimposed on revenge behavior, one can discern cultural evolution attempting both to modify this behavior directly and to shore up forgiveness behavior and its neural substrate to allow for better modulation and control of revenge. Some researchers have even identified a feeling of the "obligation" to forgive as one of the motivators of forgiveness (Rowe, Halling, Davies, Leifer, Powers, & van Bronkhorst, 1989).

Justice and Law

One cultural mechanism that attempts to control revenge was the concept of justice and, later, of law. Justice attempts to get around the overvaluation of self by the social attempt to define "objectively" the nature of the offense and precisely what is necessary to reestablish congruence. Whether it is the judgment of a tribal council, the decision of a sovereign,

or the ruling of a court of law, we are dealing in all cases with the sociocultural attempt to correct the imperfect revenge behavior. In this case, we see a culturally developed concept, justice, arising out of the biologically evolved revenge behavior, which itself is an encephalized manifestation of self-preservation. This is a good example of three levels of the development of a single theme, two levels arising from biological evolution and one from cultural evolution.

Spiritual Meaning and Forgiveness

A second mechanism in the attempt to control revenge behavior is for many societies to positively sanction and powerfully reinforce forgiveness. Unlike the evolution of justice, at least in its most primitive form, the *Lex Talionis,* the positive sanctioning of forgiveness is not a cultural universal, although it is very common. It reaches a summit in the theoretical ethos of Christianity, more often honored in the breach than in the observance. Nevertheless, the cultural reinforcement of forgiveness is still a powerful help in the modulation of revenge.

It would seem that the most usual way for cultures positively to sanction forgiveness is by investing it with a transcendent or religious meaning. In other words, God (or the gods) is said to love and bless the forgiver. That cultures can do this, and that the transcendent exists at all as a cultural category, may possibly arise from the biological evolution of unitary experiences. In other works, we have presented a model of how this occurs, involving, among other things, partial or total blocking of input into the posterior superior parietal lobule (d'Aquili & Newberg, 1993a, 1993b). Blocking of input into this area may possibly result in progressively greater unitary experiences that can be arranged along a spectrum or continuum. At the lower end of the continuum are aesthetic experiences in which the perception of unity over diversity is only slightly greater than baseline. As one moves along this continuum, the unitary experiences are successively more powerful, such as romantic love, religious awe, various trance states, Cosmic Consciousness, and, ultimately, what we have termed Absolute Unitary Being (AUB). AUB is the ultimate unitary state in which the boundaries of discrete entities in the world are dissolved, the perception of space and time are obliterated, and even the self-other dichotomy dissolves (d'Aquili & Newberg, 1993a, 1993b). Experiences at the lower end of the aesthetic-religious continuum are common. Those at the upper end are extremely rare. However, what is important for a consideration of forgiveness is that the sense of the transcendent, now conceptualized in the form of God, the gods, or other power sources, can be used positively to sanction any behavior or institution that the culture considers important. This helps to provide the social control over conspecific congruence by utilizing the transcendent to sanction behaviors and emotions that support conspecific congruence.

But the association of the transcendent with forgiveness is a little more tricky than simply an issue of positive sanctioning by the culture. As noted earlier, forgiveness generates positive feelings in the forgiver and usually in the forgiven aggressive opponent. These positive feelings seem somehow to be related to a lessening of the sense of self of the forgiver, resulting from a diminution of ego assertiveness. This is precisely the sort of state that may be associated with a mild unitary experience (unlike the negative affect associated with the difficulty in obtaining a sense of self in depression), likely on the part of the forgiver and perhaps in others as well. As we have shown in other works, these unitary experiences, even mild ones, tend to be perceived as transcendent. Hence, the mild unitary experience of the forgiver may tend to reinforce the positive sanction of the culture, making it clear to the forgiver that in the act of forgiving, he or she has briefly entered into a transcendent world.

THE FORGIVENESS PROCESS

We have already described forgiveness as a complex neurocognitive process that has multiple components. In order to examine the possible neurophysiological mechanism underlying forgiveness, we must consider the phenomenology of the forgiveness process. This entails following forgiveness from its early stages through its final endpoint. Of course, for something as complex as forgiveness, it is difficult to adhere to a rigid description of its phenomenology. Forgiveness, as we will consider, can often occur via a number of different paths. However, by considering the most consistent aspects of the forgiveness process, we may be able to identify certain specific patterns and paths that form at least the minimum requirements for forgiveness to occur. Such analysis has already been performed by several investigators who have suggested more global models of the forgiveness process. These models have been based on psychological theories, moral development, and the actual phenomenological process of forgiveness (Fow, 1996). Based on such analyses, the underlying neuropsychological mechanisms can be superimposed upon the psychological phenomenology of forgiveness. Psychological models generally divide the forgiveness process into the following: (1) recognition of the injury to the self; (2) commitment to forgive; (3) cognitive and affective activity; and (4) behavioral action (McCullough & Worthington, 1994).

Recognition of Injury to the Self

Psychologists have argued that for forgiveness to be able to happen at all, there must be an initial harm or injury to the self that is recognized (Close, 1970; Enright, 1996; Rowe et al., 1989). The injury or harm may

take many forms, which can be grouped into two basic categories that find their bases in the neurobiological substrates we described earlier. The first category is harm that occurs directly to the individual. This could be in the form of physical, mental, sexual, or verbal actions (this includes self-inflicted harm) that directly damage an individual. Harm can also be incurred via a secondary mechanism. For example, persons may perceive their self to be damaged as the result of harm being done to a friend or relative. Even more derivative is injury to the self because another person committed some act against other human beings in general. This may cause harm to the self because of newfound fear, mistrust, or disappointment in other people as a result of the inciting act. Thus, for forgiveness even to be a consideration, there must occur some form of damage that alters a person's existing conspecific congruence or, if the injuring event is caused by a nonhuman object in the world, a person's self-world congruence.

For damage to an individual to occur, there must be a sense of the self. After all, there must first exist a self that can be injured before it can actually be injured. Furthermore, this sense of self must be distinguished from the one causing the damage. Once the harm is identified as having occurred to the self, the source of that injury can be determined. The injury can be self-induced, in which the person injured is also causing the injury. Examples of self-caused injury might be found in people suffering from anxiety, depression, eating and personality disorders, and even those who have poor self-esteem. However, in these cases, there is often a distinction made between that part of the self that causes the damage and that part that receives the damage. The injury can also be perpetrated by something or someone other than the self. Examples of injury caused by others can be in the form of physical, mental, sexual, or verbal injury. Therefore, there is usually a subject-object relationship (resulting directly from either conspecific or self-world congruence) between the damaging agent and the self that is damaged. This relationship is considered in a causal framework and requires the ability to make the distinction between self and other.

That the injury requires placement in a causal framework also appears to be an important aspect of forgiveness. If one cannot "track" the causality of the injuring event to a particular person or object, then it will not be possible to forgive. In addition, it is important to be able to maintain long-term memory of the causal set of events that resulted in the injury as well as of the individual(s) responsible for causing the injury. The abilities to think causally and to maintain a memory of the injury and its perpetrators are necessary elements prior to the initiation of the forgiveness process. If either of these is lacking, it will not be possible to remember the event requiring forgiveness or to identify the object or individual to be forgiven. While these statements seem intuitive, they may be empiri-

cally tested in certain patient populations suffering from stroke or dementing illnesses in which the ability to experience causal sequences or to remember events is impaired. However, to date, there have been no such studies reported in the literature.

After the damage has been incurred, the injured self interprets the damage either with respect to conspecific congruence or the rest of the external world (i.e., self-world congruence) depending on the nature of the offender and the offense. The psychological basis for this interpretation may be defined by many factors. Experiences from the past with parents help to shape a persons sense of morals and norms regarding behavior (Bonar, 1989; Shontz & Rosenak, 1988). Lapsley (1966) has theorized that, as children, individuals develop concepts of good and evil, as well as rules and categories for normative behavior.

Neuropsychologically, the development of abstract concepts such as good and evil, right and wrong, and justice and injustice, likely arise with the development of the inferior parietal lobe. It is this structure, along with its connections with the limbic system, that allows for these opposing concepts to be utilized by the individual to establish a set of norms or rules by which to evaluate future events and injuries. When an injury occurs and is compared to the previous understanding of the relationship, there is an incongruency. This injury-induced incongruency is not only disturbing in and of itself, but also it is understood that the new relationship between self and other is now experienced as inferior. Furthermore, this inferior relationship to the world is associated with negative emotions such as anger, because the person perceives the self to be worse off that before the injuring event (Fow, 1996).

Cognitive and Affective Processing

Once all the ramifications of the injury are perceived, the incongruency must be rectified, which, as we described earlier, may occur either via revenge behavior or via forgiveness (Enright, 1996). The initial decision to commit to forgiveness may be based on a number of affective and cognitive considerations, including the social controls as well as the other advantages that we previously described.

Forgiveness requires a complex neurocognitive process such that the new understanding of the self and its relationship with the world is analyzed so that the new and old understanding eventually are reconciled (Enright, 1996; North, 1987; Fow, 1996). This can occur via many possible neurocognitive and affective processes. For example, one possible solution to any given problem is to invoke a higher being (i.e., God) that can subsume responsibility, or at least explain the causality for any given damaging act. Thus, a person might state that God caused the event to happen for reasons that cannot be explained without divine knowledge. Because

of God's role in the injuring event, the previously identified person who was originally held accountable is now perceived to have a different relationship to the injuring event and is therefore in the position to be forgiven. There are probably an infinite number of approaches to resolving the internal and external incongruency related to an injuring event. For interpersonal forgiveness to occur, these mechanisms may involve mutuality, concern, and desire on both sides that a congruent relationship continue, a sense that reconciliation has to occur, and that the offender has to take responsibility for his or her actions (Martin, 1953). Intrapersonal aspects of forgiveness include concepts of trust, benevolence, and the absence of anger and need for revenge or retaliation. All of these aspects are likely to become involved as part of the affectual and cognitive process necessary for forgiveness to occur (Cunningham, 1985, 1992; the Enright & Human Development Study Group, 1991). Regardless of the approach for revising the conspecific or self-world congruence in relation to the incurred injury, there is eventually a restoration of some type of equilibrium in which the world is understood again in such a manner that the incurred injury is incorporated within it and no longer is causing an internal disturbance.

Part of the ability to forgive most likely comes from the injured person's ability to identify or empathize with the offending individual (Rowe et al., 1989). The injured person realizes that the offender is also human and capable of making mistakes, and might also perceive that the offender should be forgiven much the same way that the injured person would want to be forgiven if the situation were reversed. In this approach, one might even consider that there is a sense of unity (as described earlier in the section on social controls of revenge behavior) between the forgiver and the offender, because both are perceived as being human.

Therefore, there are many variables that enter into the forgiveness process regarding the restoration of the conspecific or self-world congruence, as well as the ability to alter the emotional response to the offending person. The ultimate result is a new conspecific or self-world congruence that includes the offending individual, the offense, and the resolution of that offense (Rowe et al., 1989). Once the incongruity is resolved, there is a revised understanding of the self and its relationship to conspecifics and the world. This alleviates the emotionally disturbing problem of the incongruity itself and results in a sense of "acceptance" of the injury (Bergin, 1988). It should also be noted that the offending individual is part of both the original and new understanding of the relationship between the self and world. This is why, for example, an injury caused by a spouse can be more damaging on the one hand because of the deep relationship, but also more easy to forgive on the other, because of the previous trust and love.

Behavioral Activity

The positive affective response from the resolution of the incongruity can be directed outward toward the offending individual via behavioral activity. Such behavior includes both motor and verbal changes and generally reflects the more positive affective state of the forgiver. In addition to the decrease in general anger and resentment, there is a concomitant increase in demonstrations of compassion and empathy toward the offender. This may even relate to the newly realized sense of unity between the forgiver and the offender (as part of the revised self–other or self–world congruence) such that both are now realized to be human and capable of mistakes, of inflicting pain, and so forth.

AN INTEGRATED NEUROPSYCHOLOGICAL MODEL OF FORGIVENESS

We are now ready to propose a neuropsychological model of the forgiveness process based upon both the previously described neurophysiology and the phenomenological analysis of forgiveness. Such a model (see Figure 5.1) is only meant to provide a basic understanding of the underlying neuropsychology of forgiveness. Since forgiveness is such a complex phenomenon, it is unlikely that any rigid, all-encompassing model can be developed. However, it is probable that the basic components of forgiveness follow a relatively prescribed pattern, with the details dependent on the injurious event, the relationship between the offender and the injured, and the injured person's conspecific or self–world congruence. To develop our model, we proceed through the major stages of the forgiveness process and propose particular brain structures that are operative in each part of forgiveness.

As described earlier, since forgiveness requires an injury to the self, the first requirement is to have a sense of the self. The sense of self most likely requires an intact posterior superior parietal lobe, especially in the dominant hemisphere, since, as described previously, this brain region helps distinguish self from other. Furthermore, this part of the brain identifies specific objects that can cause damage to the self. The interconnections between the parietal, frontal, and temporal lobes (with input from the sensorimotor system) help to form what might be called the "primary circuit" that connects the self with the external world, and the person's relationship with the offender. This relationship is what helps us to understand the existing conspecific or self–world congruence. This relationship can be "fixed" in the brain via the memory circuits of the hippocampal and possibly the amygdalar formation. The hippocampus maintains memory of previous sensory, cognitive, and affective experiences and coordi-

nates them into an overall description of the self and its relation to conspecifics and the external world.

The initial damage, or injury to the self, necessarily enters the brain via one or more of the sensorimotor systems. This input is then compared to the existing memory of the self and its relationship with the world. When there is an incongruency, a stress response in the injured self may cause activation of the sympathetic nervous system via the limbic system and the hypothalamus (the latter of which regulates activity in the sympathetic nervous system). This causes a feeling of "upsetness" and discomfort, as well as generating more visceral feelings via alterations in heart rate, blood pressure, and various stress hormones. Further negative feelings derived from the hippocampus are a response to the realization of the injurious nature of the incongruency and the possibility that there is danger in the lack of conspecific congruence. This stress response, caused by activity in the sympathetic nervous system, with concomitant release of norepinephrine, may result in alterations in neuronal plasticity (Kolb & Whishaw, 1998). Should such stress responses occur frequently, and without intervening resolution, more permanent effects may result, such as to the cardiovascular, nervous, and immune systems (Newberg & Newberg,

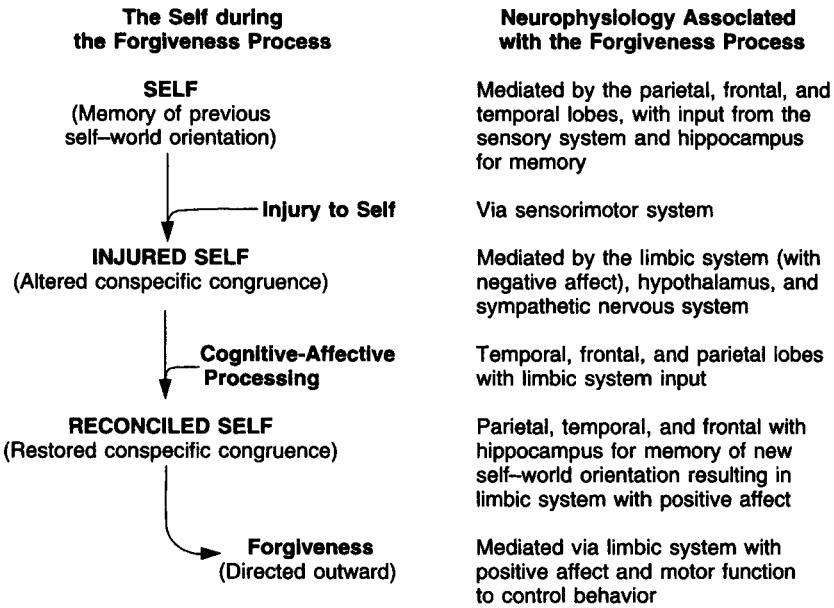

FIGURE 5.1. Simplified neurophysiological model of the forgiveness process.

1998). Thus, the negative emotional response to the injurious event could add to its impact and also provide a motivational force to help resolve the incongruency (Rowe et al., 1989).

This disturbance then causes the brain to begin to analyze the incongruency so that it can eventually be resolved. This resolution occurs via cognitive and affective processing within the temporal, frontal, and parietal lobes, which are responsible for higher order functioning as well as within the limbic system. Eventually, the cognitive and affective processes of the cerebral cortex, with help from neuronal alterations and plasticity, create the revised understanding of the self, or reconciled self, and its relation with conspecifics and/or the world. Part of this process likely involves concurrent activity in the right and left hemispheres of the brain. The right hemisphere is often used creatively to solve problems presented by the abstract and linguistic processes of the left hemisphere. When such a resolution to a problem occurs, there is a discharge from the right hemisphere (which helps in problem solving) that activates the parasympathetic nervous system, resulting in a feeling of happiness and relief that the problem is resolved. Phenomenologically, the act of forgiveness is often described as a revelation (Rowe et al., 1989), which is precisely the type of experience associated with the problem-solving ability of the right hemisphere with subsequent parasympathetic discharge. This also causes further activity in the limbic system such that the process of directing that positive feeling outward, toward the offending individual, may begin. Actually, strictly speaking, the positive feeling is not projected "outward" but is associated via a neural network with the imaginal representation of the offending individual in the sensorium, which is experienced phenomenologically as "external." In any case, this will eventually result in the establishment of positive feelings and behaviors directed out (via motor functions to control behavior) towards the offending individual as part of the revised understanding of the self and its relationship with the world. These positive feelings also have beneficial effects on the individual by decreasing the negative impact of the stress-induced changes that accompany the unresolved incongruity. Such beneficial effects may be mediated either through decreased sympathetic nervous system activity or increased parasympathetic activity. There are also the adaptive advantages to such a process (described earlier in the section on the neuroevolution of forgiveness).

CONCLUSION AND IMPLICATIONS

A neuropsychological analysis of forgiveness may also help us to understand the specific mechanisms by which forgiveness may contribute to improved psychological functioning. It is by utilizing autonomic and other

neurophysiological parameters, in addition to more traditional psychological parameters, that some of the direct effects of forgiveness might be measured. Decreases in heart rate and respiratory rate, anxiety and depression, and feelings of hostility and anger, and improved self-esteem have been associated with various practices designed to augment parasympathetic activity such as meditation (d'Aquili & Newberg, 1993a; Newberg & Newberg, 1998). Such changes may therefore occur in patients undergoing the forgiveness process. One might also conceive of studies utilizing brain imaging techniques to measure various aspects of cerebral function as they relate to forgiveness. We have also indicated that forgiveness might improve a person's standing within a social group, which may improve interpersonal relationships. In addition, the forgiveness process itself is almost necessary for strong interpersonal bonds.

Encouraging forgiveness, therefore, might be a powerful therapeutic intervention with transforming consequences. A neuropsychological analysis of forgiveness helps to identify particular parts of the nervous system involved and points to future directions in research and clinical applications. Finally, a neuropsychological model suggests that forgiveness may ultimately have beneficial effects on the body, such as decreased levels of stress hormones and improvements in sleep patterns. In other words, forgiveness and healing might go hand in hand. It is difficult to accomplish one without the other, and a neuropsychological analysis of forgiveness can begin to delineate why forgiveness is such an important phenomenon psychologically, physically, and spiritually.

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