CHAPTER 8

An Evolutionary Framework for Understanding Grief

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The idea that grief may be a useful biological trait that is shaped by natural selection seems both preposterous and somewhat cold-blooded. The overwhelming pain and the inability to carry on with daily life after the loss of a loved one seem to be sufficient evidence that grief is useless. Also, the idea that the capacity for grief may exist because it somehow increases Darwinian fitness is deeply disturbing. Whether the grief is one's own or that of a loved one, most people do not care why it exists; they just want to know how to relieve the pain.

From another vantage point, however, grief is not only normal, it is an essential aspect of our humanness. Imagine, for a moment, that scientists discovered a drug that safely prevents grief and all its pain. If grief were just an abnormality or some useless evolutionary accident or social construction, then presumably it would be sensible and humane to encourage wide use of the drug to eliminate grief. To many, such a world would seem inhuman indeed. Vast suffering would be eliminated, but at what cost? We do not know, but most people instinctively recognize that grief is intertwined with the meaning of our relationships and our lives.

The intensity and centrality of grief in human life have motivated many scientific studies about its nature. We now know a great deal about the symptoms and course of grief, who experiences it, and its complications. We are learning more about how grief varies across individuals and cultures. Many pervasive, but questionable, assumptions about grief are gradually giving way

in the face of mounting evidence that not everyone experiences grief, grief work is not always necessary, and delayed grief is rare (Bonanno & Kaltman, 1999; Wortman & Silver, 1989). The recent publication of a millennial *Handbook of Bereavement Research* describes a field chock full of data and theory from scores of fine researchers (Stroebe, Hansson, Stroebe, & Schut, 2001). These leaders in the field agree on the facts but they also agree that we lack, and badly need, a unifying framework for understanding grief.

This chapter argues that an evolutionary understanding of why grief exists will eventually provide the foundation for building such a framework. So far, however, agreement remains elusive even about how to pose the question about why grief exists. The straightforward approach is to assume that the capacity for grief is, like physical pain, a useful trait shaped by natural selection. This approach fits nicely with tendencies to assume that grief is a monolithic phenomenon and that grief after the loss of a spouse late in life is fundamentally the same as grief after the loss of a child. However, these assumptions may be incorrect. Whether natural selection directly shaped our capacity for grief is unknown, but there is no doubt that selection shaped the mental mechanisms that give rise to grief. If we understand them, we will better understand grief in general and grief among older bereaved spouses in particular.

Readers unfamiliar with ethology and behavioral ecology may have difficulty following this line of thought. The crucial idea is that natural selection shapes brains that give rise to adaptive behavior in much the same way that it shapes physical traits such as the shape of the finch's beak. The process of natural selection is simple. For instance, when a drought eliminates all but the toughest seeds, the individual finches with larger beaks will get more food and have more offspring. Because beak size is passed on to offspring, the average beak size will become progressively larger in each generation when only tough seeds are available. When the environment is more stable, individual finches will be at a disadvantage if they have beaks much larger or smaller than average. There is no such thing as an optimal trait except with reference to a certain environment. For instance, if a new predator appeared, finches with greater tendencies to avoid risks would do better and natural selection would gradually shift the population to a lower tendency to take risks. Such behavioral tendencies are shaped by natural selection in the same way as more tangible traits.

Though it initially seems preposterous to think that the capacity for grief might have some useful function, many useful traits are aversive and disabling. Pain is the exemplar. It might seem wonderful to eliminate pain, but the few people born with an inability to experience pain are unfortunate in-

deed; they are all dead by early adulthood. This is not to say that all negative experiences are somehow useful. Seizures, paralysis, jaundice, and cancer are utterly useless. The challenge is to distinguish useful responses shaped by natural selection from abnormal or useless responses that arise only because for some reason natural selection has not been able to make the body better. This is the core question for grief.

The fundamental question addressed here is, *What selection forces shaped the brain mechanisms that give rise to grief?* Finding an answer to this question is not only of theoretical interest; the gap in knowledge also holds back research, treatment, and even diagnosis. For instance, enormous effort has been dedicated to determining when grief is "normal," when it is "abnormal," and when it is "traumatic" (Prigerson et al., 1997). At the extremes, the distinction is easy—ordinary grief after loss of a close loved one is recognized as normal (if only because it is the typical response), while extremes of grief are recognized as pathological because of their severity, duration, and complications. However, without understanding why the mechanisms that give rise to grief exist, all criteria for separating normal from abnormal grief are essentially arbitrary. Defining the boundaries of pathology requires an answer to the core question.

Understanding what grief is will also advance treatment. Controlled studies reveal that treatment for ordinary bereavement is not very effective and can be harmful (Schut, Stroebe, Van den Bout, & Terheggen, 2001). Why don't interventions work reliably, and how do they sometimes make things worse? Is it sometimes a mistake to interfere with grief? Treatments for extremes of grief can be effective, but why are some individuals so vulnerable to grief? How do different loss circumstances influence grief? Are these differences epiphenomena, or do grief regulation mechanisms adjust grief depending on the circumstances? An answer to the fundamental question about the origins and possible functions of grief is important in seeking answers to each of these more specific questions. Furthermore, if pharmacologists do discover drugs that block the experience of grief, answering the core theoretical question becomes an urgent practical necessity.

The hope that an evolutionary perspective can help provide a framework for understanding grief is justified by the experience in every other area of biology, where the need to understand evolutionary origins and functions is taken for granted (Alcock, 2001). Researchers who study fever know that it is useful during infection. They use this knowledge to determine when fever is normal and when it is abnormal or useless (Kluger, Bartfai, & Bartfai, 1999). Seeking evolutionary explanations for behavioral regulation mechanisms is

equally essential (Alcock, 2001). For instance, anxiety is useful in the face of danger, but the selection forces that shape the regulation mechanisms make us prone to useless phobias (Marks & Nesse, 1994).

There is no shortage of theories about grief (Weiss, 2001). Despite the human tendency to emphasize the differences between new theory and old, the field seems to have avoided the balkanization that characterizes some areas of psychology. Most authorities on grief applaud the plurality of approaches, even as they note the need for an integrating framework (Bonanno, 2001; Shaver & Tancredy, 2001). However, no amount of integration of diverse perspectives can substitute for an evolutionary understanding of what grief is and why it exists at all. To arrive at this basic understanding of grief requires a fundamentally different approach.

Biologists distinguish between "proximate" questions about *how* organisms work, and "evolutionary" questions about *why* organisms are the way they are. Ernst Mayr's (1974) essays introduced this idea to most biologists and Tinbergen's (1963) classic article "On the Aims and Methods of Ethology" defined the four different questions that must all be answered to explain any trait fully. He describes two kinds of proximate explanations. The first is *mechanism*, that is, explanations based on anatomy and physiology and learning. Mechanistic explanations are about the organism's devices and how they work at all levels of organization, from the neuron to psychological mechanisms. The second is *ontogeny*, the sequence and forces that develop a zygote into a mature form. Tinbergen also described two separate kinds of evolutionary explanations. One explains the selection forces that shaped a trait, often described in terms of the trait's evolutionary function. The other examines the phylogenetic history of a trait. These four questions are not alternatives; answers to all four are necessary for a complete explanation of any trait, including grief. Many current theories of grief provide answers to more than one kind of question without always distinguishing the separate questions addressed.

For instance, many aspects of grief are recognized as emotions, so knowledge about emotions generally is useful in understanding grief (Bonanno, 2001). This knowledge includes an understanding of how emotional capacities develop, cues and cognitions that regulate emotions, brain mechanisms that mediate emotions, individual differences in emotional experience, and the evolutionary origins, phylogeny, and functional significance of emotions. This plurality is needed, but not recognizing the separateness of each question leads to much confusion (Plutchik, 2003).

Much grief research has also been organized around the vulnerability-stress-coping paradigm (Bonanno & Kaltman, 1999). However, as Shaver

and Tancredy (2001) note, stress has become a "garbage can" for all manner of more specific negative emotions, and researchers would do well to attend separately to each of the 15 or so emotions aroused in grief.

The Dual Process Model proposed by Stroebe and Schut (1999) has been particularly successful in organizing grief phenomena with its emphasis on separating attempts to cope with the emotional loss from attempts to reorganize the instrumental aspects of life after a loss. While primarily descriptive, we will see that this distinction maps nicely onto a functional model of different sources of emotion and concern after a loss.

Of the several traditional perspectives on grief, two are so influential they deserve detailed consideration: attachment theory and studies of relationships (Weiss, 2001).

ATTACHMENT THEORY

Most research on grief is based on Bowlby's attachment theory (1969, 1973, 1980). His evolutionary perspective on social bonds and loss initiated a long and influential tradition of considering the functional aspects of grief (Belsky, 1999). Researchers' acceptance of this paradigm has been so uniform that few have proposed critiques or expansions despite substantial modern evolutionary advances in understanding attachment, relationships, and emotions.

Taking his cue from conversations with the ethologist Konrad Lorenz, Bowlby recognized that infants who develop strong attachments to others will be more likely to survive than those who do not; staying close to mother is generally wise. Especially useful are the reactions to broken attachments—protests and then despair. However, Bowlby's evolutionary explanation for universal patterns of attachment is inextricably entangled with his developmental explanations for individual differences and pathology. Like other psychoanalysts, he was convinced that differences in adult behavior resulted mainly from differences in early childhood experiences. For instance, a child might develop an anxious and dependent attachment style because of experiences with an unempathic mother. Along with Ainsworth, Blehar, Waters, and Wall (1978) and Main (2000), Bowlby described the variations in terms of several categories: secure, avoidant, or anxious/ambivalent. As many as half of the children in some studies showed avoidant or anxious patterns of attachment, yet only the secure form of attachment was recognized as "normal."

Three aspects of attachment theory deserve comment here. First, Bowlby's evolutionary view of attachment and reactions to its disruption is fundamentally correct and far ahead of his time. Offspring who stay close to their

mothers are more likely to survive, so natural selection preserves genetic tendencies to respond to separation with distress and motivation for reunion. Maternal attachment tendencies do not benefit the mother directly, however, so they require a different explanation. As many have noted, Bowlby had no access to newer models of how selection works; he tended to think in terms of benefits for the species, instead of benefits to individuals who increased the frequency of genes for a trait (Belsky, 1999). Hamilton's (1964) discovery of kin selection was a landmark advance in understanding animal behavior that is just now being integrated with attachment theory. In simple terms, genes that induce organisms to do things that shorten their own lives, such as taking risks for the safety of their offspring, can nonetheless persist in the gene pool because half of their genes are identical to those in their children. Because children share only 50% of a parent's genes, sacrifices for offspring make evolutionary sense only when the benefit to the offspring is at least twice as great as the cost to the parent. Such situations are common. Evolutionary explanations based on kin selection have replaced previous explanations for such behaviors that were based incorrectly on benefits to the group or species.

The principle of kin selection highlights the different selection forces that shape the mother's attachment to offspring versus the offspring's attachment to the mother. Attachment behavior in offspring benefits them directly, but maternal attachment behavior benefits the mother only via kin selection. Obviously, such factors can influence fathers as well, but the mother-offspring attachment is overwhelmingly the observed phenomenon in most species, and for the good evolutionary reason that mothers know who their offspring are, but males often do not (Low, 2000). I will use the phrase "genes for attachment" as shorthand for wordier expressions that indicate that the genes in question interact with environments to result in behavioral tendencies toward attachment behavior.

The importance of this for studies of bereavement in elderly spouses is profound. The attachment between spouses may have phenomenological similarities to attachments between mothers and children, but the origins and functions of these attachments may be quite different. The principles of mother-infant attachment may prove relevant for understanding marital attachment and grief, but it is essential to recognize the leap involved and to address the question of whether these behaviors in adulthood were themselves shaped because they are useful and whether they arise from the same mechanisms as childhood attachment.

Another advance in evolutionary thinking has also begun to influence attachment theory. Attachment theory, as applied in a clinical context,

tied notions of normal attachment closely to happy relationships free from psychopathology. It has become increasingly clear, however, that aversive emotions are as useful as positive ones, otherwise they would not exist (Nesse, 1990, 1991). In addition, warm, mutually supportive, secure relationships are wonderful and desirable, but they are not always the best route to reproductive success so it is not surprising to find many other patterns in nature. Several researchers have suggested that so-called abnormal patterns of attachment may offer selective advantages in certain circumstances (Belsky, 1999; Chisholm, 1996). The baby of an uninterested mother may do better by being clingy, or by being so distant that the mother must take responsibility for maintaining proximity. Whether or not infants actually discern maternal inclinations and adapt their attachment patterns, and whether these patterns give a selective advantage that could shape them and such a regulation system, is still up in the air. The conclusion for now is that we should not assume that secure attachments are normal and optimal in all circumstances.

One final issue is whether the phenomena in adult close relationships are best understood in terms of the same attachment mechanisms characteristic of childhood (Hazan & Zeifman, 1999). Much research now demonstrates that early attachment patterns are correlated with adult beliefs about relationships (i.e., schemas, or working models) and that variation in adult relationship patterns are a function of childhood attachment patterns. The same mechanisms that mediate childhood attachment to parents may also mediate adult close relationships. It is possible, however, that somewhat different mechanisms mediate these similar appearing phenomena. The continuity of individual attachment tendencies across the life span could reflect general personality or emotional tendencies instead of the persistence of the same mechanism. As is so often the case for such biological tendencies, the complexity of what actually happens may be hard to describe in the crisp categories and simple causal models that our minds prefer.

What are the implications of these advances for understanding grief? They move us away from the simple view that all normal attachments have the same form, origin, and function. The attachment of mother to infant is shaped by fundamentally different selection forces than the attachment of infant to mother. Patterns of non-secure attachment may be alternatives, not abnormalities. Moreover, attachments between mothers and children are not necessarily mediated by the same brain and psychological mechanisms as attachments between spouses. These differences suggest that the global response to loss of an attachment is an insufficient explanation for grief and we may need to seek different explanations for grief arising from different kinds of losses.

RELATIONSHIP LOSS

Grief is caused by loss of relationships. Consequently, understanding the meaning of grief must be based on an understanding of relationships (Weiss, 2001) and how they give a selective advantage (Fiske, 1991). Lack of such an evolutionary understanding has stymied grief research. The attachment model offered a good start by interpreting the utility of grief responses in adults as analogous to the benefits attachment offers to mothers and offspring. However, an evolutionary understanding of relationships has advanced rapidly in recent decades and now has much more to offer grief research. The original breakthrough, Hamilton's (1964) recognition of kin selection, offered an explanation for why close relatives tend to offer each other generous help that may harm their individual interests. It quickly became apparent, however, that altruism in non-kin relationships needed a different explanation. The answer came from Trivers's (1971) insight that the exchange of favors often offers a net benefit to both parties. Since studied in exhaustive detail using models based on the Prisoner's Dilemma, the benefits of such reciprocal exchanges are now recognized even more clearly than they were by the early Utilitarian philosophers as the bedrock of social life (Axelrod & Dion, 1988).

When Trivers wrote his seminal paper, the study of the evolution of communication signals was flourishing, with a focus on the many strategies of deception and manipulation found in nature. In conjunction with continuing preoccupation about how to explain altruism, this led to an emphasis on modeling short-term exchanges among strangers in which the maximum advantage comes from cooperating when it is necessary and defecting or deceiving others when that gives a maximum payoff (Krebs & Dawkins, 1984). This model matches many observations from everyday life and the expectations of individuals whose internal working models are not based on basic trust. What it leaves unexplained are generous behaviors in close relationships where costs are high and tangible payoffs are low or absent, such as caring for a sick parent or a disabled spouse.

Scholars continue to flesh out our understanding of how intimate relationships work, but one perspective is particularly germane here. In relationships characterized by what economists call "commitment," individuals will have an advantage if they can convince others that they will offer help even in the absence of a guaranteed payoff (Frank, 1988; Hirshleifer, 1987; Nesse, 2001a). The advantage is that the other is likely to make the same commitment, thus giving both parties access to help at the times when it is most needed, to say nothing of a genuine friendship that does away with the record keeping and negotiations that drain energy from exchange relationships.

Whereas noncommitted partners are keeping score and ensuring that they do not allow the other to go too deeply into debt, committed partners are helping each other in various ways irrespective of the circumstances. These relationships are a lot like those based on kinship and the psychological tendencies that make them possible may well have originated to manage kin relationships. Also, social groups, especially religious groups, often promote such relationships with ideology and sanctions that require helping other members of a close-knit group that is costly to join and even more costly to leave. The close-knit group that best exemplifies commitment in our society is marriage. The care provided by a spouse at the end of life is not explained by reciprocity or kinship, but by something more like commitment.

The special value of such commitments explains much of what is lost when intimate relationships end. If an exchange partner is lost, a replacement is often available. If a commitment partner is lost, however, the investment needed to establish trust in that relationship is gone and it may be years (or never) before another such relationship can be established. These different kinds of relationships are very close to the distinction between relationships based on attachment and those based on affiliation (Weiss, 2001), and the distinction between communal and exchange relationships (Fiske, 1992; Mills & Clark, 1994). After the loss of a loved one, the bereaved spouse cannot just start up again with someone else, because the entry costs are high and long experience is essential to establish trust. Trust is an expensive social resource. It is not replaceable without another similar huge investment.

JOHN ARCHER'S ASSESSMENT

The psychologist John Archer (1999) has undertaken the task of integrating Bowlby's discoveries with modern evolutionary perspectives on human behavior to create a comprehensive model of grief. He includes much relevant information to support his thesis that grief has not been shaped by natural selection but is an epiphenomenon of the capacity for attachment. He argues that grief has such high costs that it is implausible to think that natural selection shaped it. He explains the persistence of grief despite these fitness costs by arguing that attachment offers enormous benefits and natural selection has not been able to shape mental mechanisms that offer the benefits of attachment without the costs of grief. He sees the specific adaptive function of attachment bonds as maintaining "the persistence of social bonds when the other is absent," (p. 555) and he emphasizes the phylogenetic continuity of human grief and the searching exhibited by animals looking for lost kin (Archer, 2001a). We humans know that death is

permanent, but we nonetheless persist in reactions that are fundamentally similar to this searching behavior in other animals.

Archer offers by far the most careful and comprehensive assessment of the evolutionary origins of grief, but I am not at all sure that he is correct (Nesse, 2000b). One misgiving is the weight he gives to evidence that grief is costly to fitness via effects on physical health. First, there is continuing controversy about the strength of this evidence. Although some studies find earlier death after loss of a loved one, it is not at all clear that this effect is robust; a correlation between experiencing loss and shortened life span can be accounted for by many factors other than the mediating effects of the grief response (Martikainen & Valkonen, 1996). There is also a significant risk that negative or equivocal findings on this question remain unpublished. Furthermore, most of these studies are of elderly people where the effect of natural selection would be weak in any case, although there is some indication of small increases in mortality in younger populations (Bowling, 1987; Kaprio, Koskenvuo, & Rita, 1987). Similar criticisms apply to studies that show decreased immune responses, more sickness, and so forth in the bereaved.

Definitive confirmation of Archer's hypothesis would require evidence that people who do not experience grief experience significant Darwinian fitness advantages compared to those who do. Such evidence would be hard to come by, and the relevant environment would be that of hunter-gatherers in the Paleolithic. If grief is a disadvantageous epiphenomenon, however, this predicts that those who have a tendency to experience grief will have advantages from better attachments but selective disadvantages from the impairment imposed by experiencing grief. There is little evidence to support this. The evidence that grief disrupts life and causes depression is strong, however, and these costs do require some kind of explanation of grief, either as an epiphenomenon selection cannot eliminate or in terms of some kind of benefits.

Another problem is Archer's emphasis on costs and his neglect of possible benefits. Ignoring the benefits of painful responses is a common problem in medicine as well as in psychology (Nesse & Williams, 1994). For instance, doctors routinely treat fever because it is uncomfortable and may cause seizures. These costs make it hard to see the utility of fever in fighting infection. The costs of diarrhea are even more dramatic. It is the leading cause of death in children worldwide, so this would presumably select against any capacity for diarrhea. The mechanism persists, however, because the benefits of having a capacity for clearing infection from the gastrointestinal tract are greater, on the average, than its sometimes-fatal costs. Pain offers yet another example. People who experience pain, especially chronic pain, are disabled, and this would certainly decrease their ability to survive and reproduce. This

does not, however, support the conclusion that the capacity for pain was not shaped by natural selection; it instead means that the benefits of pain must be so substantial that they outweigh its costs. The usefulness of pain is clear from the tragic cases of individuals born without any capacity to experience pain; almost all are dead by early adulthood (Sternbach, 1963). Below I argue that individuals born with no capacity for grief experience analogous disadvantages.

IS GRIEF A SPECIALIZED KIND OF SADNESS?

The power of the attachment paradigm has made it difficult to consider alternative explanations for grief. In particular, many aspects of grief make sense as aspects of sadness, either generic sadness, or sadness that has been specialized to cope with loss of a close relationship. Emotions such as sadness, joy, fear, and rage are special states that are useful only in certain situations. There has been a tendency to seek evolutionary explanations for emotions by describing their possible functions. Emotions do serve functions such as focusing attention, communicating, and making certain behaviors more likely, but describing such functions does not offer a full evolutionary explanation. A more complete explanation comes from considering how natural selection shaped the capacity for emotions. They adjust physiology, motivation, perception, and behavior in ways that increase the ability to cope with certain situations. The situations are those that were repeatedly important to fitness over the evolutionary history of a species, such as being threatened by a predator or being near an attractive potential mate. Each emotion is shaped by natural selection to cope with the adaptive challenges of the situations. The correct question to ask about an emotion is not, "What is its function?" but is instead: "In what situations have the changes characteristic of this emotion given a selective advantage?" (Nesse, 1990).

Positive emotions, such as love and joy, seem useful while negative emotions, such as anger and anxiety, seem maladaptive. This is an illusion, the same "clinician's illusion" that makes it hard to see the utility of bodily defensive responses such as fever and pain. The high costs of negative emotions and body defenses demonstrate not that they are useless, but the opposite: their high costs confirm that they offer substantial benefits in certain situations. They will sometimes be expressed in situations where they are maladaptive, and the systems that regulate defenses make mistakes (Nesse, 2001b; Nesse, 2005), but overall they give an advantage.

Although it is harder to see the utility of negative emotions, most people readily recognize the utility of anxiety. In the face of a potential danger,

protective responses prevent damage or loss. Sadness, however, typically occurs after a loss. The horse is already out of the barn, as it were, so how can any kind of response be helpful now? However, an evolutionary view highlights different questions: Is the loss of a valuable resource an event of adaptive significance? To put it more specifically, are there things an organism can do after a loss that might increase its fitness? There are many, including attempting to undo the loss, trying to prevent future losses and warning others. (For a more complete list, see Table 8.1.)

This list in Table 8.1 is not exhaustive, but it does describe responses that could be useful after the loss of any valued resource. The list of possible ways that general sadness could be useful applies to any loss, but is especially germane for situations in which a loved one has died. To make this all horribly vivid, imagine a mother whose child has just drowned. She will immediately search for her child, call for help, get her other children out of the water, and warn others. In the future, she will avoid exposing her children to the same danger, and will think endlessly about what she might have done to prevent the tragedy. Mothers without these tendencies may suffer less and live longer, but their children will be at risk. Later in life, a person who anticipates the pain of grief will take care to protect his or her spouse. This will not result in more children, but it will make life much better and both members of a couple will do better at taking care of children and grandchildren who share their genes.

TABLE 8.1
Sadness: Behaviors That May Be Useful After a Loss

1. Search for what was lost, or otherwise try to undo the loss.
2. Stop any actions that were associated with the loss to prevent additional immediate losses.
3. Take other protective actions to prevent further immediate losses.
4. Escape from the situation to prevent more immediate losses.
5. Warn kin about the danger.
6. Signal a need for help.
7. Come together with close relatives and friends for mutual protection.
8. Avoid the situation and actions that preceded the loss to avoid future similar losses.
9. Experience mental pain after the loss, and when thinking about situations that caused it, to motivate avoidance of the situation and to find ways to prevent future losses.
10. If the lost object can't be found, search for a replacement.
11. If no replacement is available, adjust life strategies to cope with the absence of the resource.

Selection also shapes mechanisms, such as learning, that allow individuals to cope with the kinds of threats and losses prevalent in their particular environment. An evolutionary approach to emotions does not view organisms as robots responding to cues. Human emotions arise from cognitive appraisals of the meaning of a cue or event for an individual's ability to reach important personal goals (Ellsworth & Smith, 1988). Thus, discovering a pregnancy may arouse joy in a married woman who wants to have a baby, but anxiety and guilt in a single woman for whom the news may mean being rejected by her community. Likewise, loss of a spouse may give rise to different responses depending on exactly what is lost and the details of the individual's life situation after the loss.

Sadness differs from low mood and depression. A discrete loss that does not block long-term goals will arouse sadness that soon fades. If, however, the loss makes it impossible to reach important goals, continued striving toward an unreachable goal gives rise to low mood, that is, mild depression. Klinger describes how low mood can be useful in disengaging effort from unachievable goals and how persistence in pursuit of such goals could escalate ordinary low mood into full-fledged depression (Klinger, 1975). This paradigm has now developed so it is widely recognized that mood is influenced by events that indicate a change in expected rate of progress towards crucial goals (Carver & Scheier, 1990, 1998) although recognition of the relevance of these discoveries for psychiatry is still nascent (Nesse, 2000a).

Generic emotional responses were shaped into partially differentiated subtypes to cope with specific kinds of situations. There are specialized kinds of anxiety, for instance, to cope with heights, predators, and social threats. Different kinds of losses arouse different negative emotions. Tissue damage arouses pain. Loss of a friendship arouses guilt and motivation for reparations and reconciliation. Violation of a minor group norm arouses embarrassment that signals respect for the group and motivates future conformity. Failing to live up to a performance expectation arouses shame that signals recognition of the failure and motivates avoidance and striving to improve (Gilbert, 1998; Keltner & Busswell, 1996). The aversiveness of each of these reactions is useful to promote escape and future avoidance, and as a guide for future mental planning.

Evidence that natural selection has differentiated emotions to cope with specific situations highlights a crucial question: *Is grief a special kind of sadness shaped to cope with the adaptive challenges posed by loss of a close relative or loved one?* This hypothesis can explain much of what we know about grief. It is very different from the hypothesis that grief arises only from broken attachments and it can explain some phenomena that are otherwise mysterious such as

the grief aroused by loss of a relative who is genetically close, but emotionally distant—say, a brother who has been overseas for many years. It also predicts that the reaction to loss of an intimate companion, such as a spouse, may be quite different from the reaction to loss of a relative. The hypothesis that grief is a specialized kind of sadness also nicely matches the well-established "dual-process model" of grief, which recognizes the need to both adjust the instrumental aspects of life to the absence of the loved one, and to also make the emotional adjustment to the loss (Stroebe & Schut, 1999). The next challenge is to examine what we know about grief to see how past research and theory fits with the predictions of models based on attachment as compared to specialized sadness.

ASSESSING POSSIBLE EVOLUTIONARY EXPLANATIONS OF GRIEF

Precipitants

The single most salient fact about grief is its precipitant: the death of a close relative or other loved one. People also experience sad feelings when a close loved one moves to a distant place where he or she will not likely be seen again, but these feelings are not the same as grief. This seems very important. Grief is aroused not by simple separation, but by knowledge that the person has died. Even learning about a death that occurred in a distant place months previously can set off intense grieving. This was taken to an extreme in a scene from a science fiction movie about intergalactic explorers who travel toward a distant galaxy for 3 million years, then turn back and retrieve mail that has caught up with them. One man gets the news that his father has died and begins to weep bitterly. His companions are incredulous, saying, "Why are you crying, he has been dead for 3 million years? They all have been dead for 3 million years!" "I know," replies the man, still weeping, "but I just found out now."

The other core fact about grief is that it is aroused more by the loss of close blood relatives than other close relationships. The loss of a longtime spouse or friend certainly arouses grief, but the exemplar precipitant is the loss of a child or parent. Moreover, the percentage of genes shared in common with the lost relative predicts the intensity and duration of grief (Crawford, Salter, & Jang, 1989; Littlefield & Rushton, 1986; Segal, Sussman, Marelich, Mearns, & Blozis, 2002). When teenagers die at that point in life when they are maximally surly and distant, the parent's grief is by no means lessened. One can attribute this to the persistence of the bond despite con-

flicts. But this raises the question of why such bonds should exist when there is little emotional support or mutual helping. One answer is that relatives have shared genes. When other factors are held constant, it appears that grief is maximal when the lost person is at the age of maximum reproductive value (the age of first reproduction), which is just what might be expected from an evolutionary view (Crawford et al., 1989; Littlefield & Rushton, 1986).

The degree of estimated grief even appears proportional to the percentage of genes in common (Littlefield & Rushton, 1986), and grief responses to loss of close relatives are estimated to be greater, on average, than responses to loss of a spouse (Segal & Bouchard, 1993; Segal et al., 2002). Grief at the loss of a co-twin is greater than loss of another sibling, although it is hard to argue that selection would shape a mechanism to detect and respond to the rare circumstance of having an identical twin. More likely, the experience of being a twin draws on the mechanisms that usually regulate feelings of kinship (Segal & Bouchard, 1993).

Much more research and theorizing is needed to determine exactly how grief is influenced by different aspects of relationships, but the data to date suggest that grief is influenced most by the degree of kinship, considerably by degree of emotional closeness and commitment, and some by the degree of close everyday contact and the degree of instrumental exchange. The phenomenon of intense grief that individuals feel for famous people they never met, such as Princess Diana, is important but not easy to explain. Media images seem somehow to be able to create emotional connections whose disruption creates full-fledged grief.

Grief Phenomena

The most prominent characteristic of grief is its painfulness. The pain of depression is similar to grief as are other depressive symptoms such as low energy, inward turning, preoccupation, guilt, and self-criticism. However, grief is less often characterized by low self-esteem, pessimism, and hopelessness. The significance of emotional pain is most likely parallel to that of physical pain. People who respond to tissue damage with physical pain escape damage now and avoid danger in the future. Losses of resources, including health, material resources, territory, status, relationships or kin, cause comparable emotional pain. People who experience emotional pain in response to such losses have a better chance to prevent further losses now and in the future. Conversely, individuals who lack negative emotions are at a disadvantage parallel to the disadvantages experienced by people who cannot experience

physical pain. Those who do not experience anxiety may take unjustified risks. Those who have no capacity for low mood may have difficulty reallocating their efforts from unreachable to more achievable goals.

In this framework, pain following the loss of a relative has a straightforward interpretation. Few other events harm one's reproductive success as much. The experience of pain and the anticipation of such pain should motivate intense efforts to prevent death of relatives. Genes associated with this response tend to become more common via kin selection—the relatives who benefit share some of the exact same DNA sequences including those that shape tendencies for pain after a loss. This is supported by evidence that grief intensity is proportional to the degree of genetic relatedness. Whether grief in response to loss of friends or others arises from the same brain mechanisms is uncertain, although it seems likely that they do.

The shock and denial of a loss, and the intensity of searching for the lost loved one, are exactly what one would expect from a useful specialized form of sadness. If there is any chance that the person might still be alive, the search should go on. In the ancestral environment, such losses occurred regularly and such searches might often have paid off. Individuals with relatives who searched long and hard would have an advantage. It is interesting to note the public's deep emotional engagement with news reports of a child lost in the woods, even if the woods are a thousand miles away. Something about such situations grabs our emotions. None of this proves, however, that searching for the deceased is always useful. When people search for someone they know is dead, it seems preposterous. This is a good example of a behavior whose regulation remains crude perhaps simply because selection cannot make it better. In modern times, the concealment of death, such as funerals with closed caskets, may foster excessive searching. This is extreme and poignant in the relatives of prisoners of war (POWs), still hoping after decades.

Many people report "seeing" or "hearing" a deceased relative (Baethge, 2002), a phenomenon that gives rise to belief in ghosts. Similar phenomena are encountered in searches for other objects. A vivid search image facilitates recognition but results in many false positives. A sound or image that vaguely resembles one associated with the deceased is interpreted as indicating his or her presence. Sometimes such experiences are true hallucinations, not just illusions based on misinterpretation of similar stimuli. Experiences of the presence of the deceased are unlikely to have any direct utility, but they strongly indicate the presence of a search image and thus reinforce the above interpretation of the value of searching.

Rumination over whether something could have been done to prevent the death is thought to exemplify pathological grief (Nolen-Hoeksema, 2001).

This common reaction seems abnormal because it is often obvious that survivors could not have prevented the loss and should have no reason for guilt. In an evolutionary framework, however, such ruminations may be automatic; major losses may trigger a cognitive process examining every minute action or inaction that could have prevented the dire outcome. This may be another example of an evolved mechanism that remains somewhat crude.

Not often highlighted, but commonplace, are personal fears aroused by a death. Few eat steak at the funeral dinner for a man who died from a heart attack. Indeed, much of people's preoccupation with a loss is related to their own fears and fears of mortality have inspired the whole area of "terror management" (Nolen-Hoeksema, 2001; Pyszczynski & Greenberg, 1987). As Gerard Manley Hopkins put it in his poem *Spring and Fall* (Hopkins, Gardner, & MacKenzie, 1967),

> Margaret, are you grieving
> Over Goldengrove unleaving?
> . . .
> Now no matter, child, the name:
> Sorrow's springs are the same.
> Nor mouth had, no nor mind, expressed
> What heart heard of, ghost guessed:
> It is the blight man was born for,
> It is Margaret you mourn for.

Personal fears are but one part of loss, however. The loss of a spouse takes away the very structure of daily life (Utz et al., 2004). All the everyday rituals, and the overarching goal of caring for and pleasing the other, are yanked away. Bereaved spouses often attempt to continue old habits. They set the table for the lost spouse, they converse even though the person is not there, and they think automatically about what the individual would like. Such habitual behaviors sometimes are rudely interrupted by the sudden realization that the spouse is deceased. Such behaviors are habits, but they are also efforts to continue to pursue goals that are no longer reachable. The low mood, lack of incentive, and general moroseness of grief are characteristic in general of situations in which motivation is being disengaged from wasted efforts (Wrosch, Scheier, Miller, Schulz, & Carver, 2003).

This brings up a central question. If grief exists to foster the transition after a loss, why is it so enduring and so impairing? Why not just get on with it? One might even predict that after a major loss the optimal reaction would be to experience optimism about new possibilities, to move on with gusto.

That is not what people do. To understand why, consider how we react to people who do move on with nary a backwards glance. We think there is something wrong with those who do not grieve, and our reaction is not just curiosity, but critical condemnation. This moral reaction may help to explain the preoccupation with absent grief. From the beginning of organized studies, grief researchers have believed, and have believed that they have found evidence for, the pathological nature of absent grief. In the era when Freud's ideas dominated psychology, absent grief was thought to indicate denial and the repressed affect was presumed to return later to cause symptoms not easily traced to the loss. Alternatively, absent grief has been thought to arise from lack of attachment and associated personality pathology. Prolonged grief, conversely, is hypothesized to arise from unconscious ambivalent feelings about the deceased, with depression explained by these hostile feelings turned against the self.

Data from prospective studies such as Changing Lives of Older Couples (CLOC) study challenge early claims about the uniform necessity of grief. A large proportion of people carry on relatively unfazed after the loss of a spouse, often reporting mild short-lived symptoms (Bonanno et al., 2002). Delayed grief is so rare as to be nearly nonexistent. Also, these data show that more ambivalent relationships give rise to milder grief reactions (Carr, House, Wortman, Nesse, & Kessler, 2001). None of these findings are evidence against the complexity of reactions, including psychodynamic defenses, after a loss. However, they do pull attention back to more straightforward interpretations of grief as a special kind of sadness.

A period of low mood, low initiative, and pessimism is characteristic after losses in general, not just losses of loved ones. Loss of a job, a house, or even loss of a garden mowed down by a woodchuck can kick motivation in the solar plexus. After such losses people often withdraw and do little except thinking, sometimes ruminating, about what was lost and why and what to do now. Gut (1989), in her book *Productive and Unproductive Depression*, describes such reactions as a necessary and useful reallocation of effort to planning instead of action, a chance to consider options, weigh them, and reorganize one's ventures and values before plunging on ahead. This makes perfect sense. However, a simpler advantage may arise for individuals who tend, after a loss, to stop activities that might lead to more losses, and to pause to consider what to do in a new situation.

Overall, considerable evidence suggests that natural selection has partially differentiated generic sadness into a special state that facilitates coping with the loss of a loved one. As noted above, prolonged searching, self-blame,

ruminating about what could have prevented the loss, coming together with close friends, and withdrawal from the routines of everyday life may all be useful responses to loss, on average. However, because selection can never start afresh and merely tinkers with previous patterns, such as generic sadness, there is no expectation that every aspect of grief should be useful or even that generally adaptive aspects of grief are always useful. Selection leaves many rough edges that give rise to suboptimal patterns of behavior, such as months of useless rumination or the persistence of clinical depression.

Thinking about the deceased has been seen as a hallmark of useful "grief work," or the process of reorganizing mental life to cope with absence of the loved one. However, a growing body of evidence suggests that emotional outcomes are not influenced much by the amount or quality of thinking about the deceased (Bonanno & Kaltman, 1999). It is also unclear why such reorganization could not take place without such suffering and disability, although Archer (1999) suggests that ruminations about the deceased may be nonadaptive products of a system that is useful to maintain social bonds despite absences.

Grief also usually includes much crying, often agitated. This is certainly a signal, but to whom, meaning what? The reactions of others tend to be sympathy and wishes to help. It could be as simple as that—expressions of grief bring needed help from relatives just as the crying of infants brings help from parents (Zeifman, 2001). Or, crying could be simply a manifestation of the pain, with no specific adaptive significance for grieving adults, a hypothesis that is consistent with much crying that is kept secret.

Expressions of public grief also testify to the bereaved person's character. They signify an ability to have relationships based on emotional commitment, not just instrumental convenience. Such expressions differ vastly in different cultures, perhaps in part because the nature of close relationships differs, as well as because of related differences in social norms. Failure to express grief may be dangerous to a person if others interpret it as a lack of ability for genuine caring. For instance, Wortman and Silver (2001) describe a man convicted of murdering his wife based mainly on his lack of expression of grief on learning about her death.

Guilt after a loss is often as incomprehensible as it is powerful. It is often the most doting parent or the most committed spouse who is paralyzed by ruminations about what could have been done to prevent the loss. A tendency to ruminate over any oversights that could perhaps have prevented the loss is useless for the loss already incurred, but may be invaluable in preventing future losses. Here again the adaptive mechanism seems quite crude—guilt

arises routinely after a loss, often with little correspondence to actual culpability. Even if grief is a specialized form of useful sadness, many of its aspects in many individual instances are cruelly unnecessary.

The Course of Grief

While stage theories of grief have been rightly discredited, some phenomena, such as looking for a replacement, necessarily follow earlier stages of looking for the lost object. Likewise, giving up on finding the lost person comes only after the search.

Many studies have investigated the course of grief. The purported duration of grief has steadily lengthened, from the figure of a few weeks cited in Lindemann's (1944) classic Coconut Grove study, to recent work emphasizing that people do not get over losses, they gradually get used to them and move on even while retaining a continuing relationship with the deceased (Klass, Silverman, & Nickman, 1996). Despite some variation, however, it is clear that grief is most intense in the first weeks after a loss and that it continues for months, with some aspects of grief (not just the relationship) persisting for a year or so in many individuals (Bonanno & Kaltman, 2001). This is useful information in seeking its utility; whatever grief does must require extended, but not indefinite, processing.

Animal data

Grief-like reactions observed in animals can offer useful clues to the functions of grief, especially by correlating the reactions to loss with typical patterns of relationships in the species. Data on reactions to loss in animals are sparse. Simple reactions to loss of kin can be found even in insects. The death an ant, for instance, triggers a fixed action pattern response in other ants who dispose of the body. This response was shaped by selection to cope with loss of related individuals, but it is nothing like grief. Archer reviews evidence on reactions to the loss by death of related individuals in chimps, elephants, and dolphins (Archer, 1999, 2001b). In each case, the exemplar is a mother who stays with or continues to carry an infant who has died. This behavior is easy to explain as an aspect of normal attachment. Giving up too soon would be such a serious error that the system is designed to maintain proximity even long after an infant is dead. The reverse situation, death of the mother, also gives rise to profound reactions of the sort described originally by Bowlby (1980). Jane Goodall reported of the death of Flint, an 8-year-old chimpanzee who died, apparently of grief, after the death of his mother Flo (Goodall, 1986). In broad summary, in many species mothers show distinct reactions

to death of an offspring, but it is difficult to tell if this is a special response or just a continuation of previous attachment behavior.

Cultural Influences on Grief

The profound cultural differences in grief are becoming clearer thanks to better summaries of ethnographic data (Rosenblatt, 1988). There is no doubt that cultures have strictly enforced expectations that shape the expression of grief, just as social norms influence diet, marriage, child care, and other important aspects of social life. In this sense, manifestations of grief are socially constructed. However, it is an elementary mistake to think that evidence for strong social influence on the nature of grief is evidence against the hypothesis that grief was shaped by natural selection. The universality of special social rules about how to behave after a loss testifies to a universal underlying phenomenon despite the wide variation in the nature of the social expectations.

Are cross-cultural differences in grief experience and expression correlated with differences in the nature of relationships in those cultures? It would be very interesting to compare the results of independent surveys of grief and relationship patterns in dozens of cultures to test this idea. The above speculations about the role of grief in commitment versus exchange relationships predict that grief among close friends is much more intense in cultures where friendships are mediated more by commitment than exchange.

Individual Variation in Grief Responses

Individual differences in reactions to loss should offer additional clues about the origins and functions of grief. Emotional closeness is associated with grief intensity. Though it seems likely that the closeness leads to the grief, it is also possible that a tendency to experience pain after interpersonal losses may result in closer relationships or that people who develop closer relationships tend to be people who experience more negative emotion in general. The exact aspects of a relationship that influence the intensity of grief remain uncertain. In addition to emotional closeness, other factors include the amount of time people spend together, the daily disruption the loss causes, the availability of other supports, or personality factors such as dependency that influence relationship patterns and emotional experience more generally.

It is also becoming clear that much suffering after a loss arises not from the loss itself but from the instrumental changes in life (Utz, Carr, Nesse, & Wortman, 2002; Utz et al., 2004). A loss may disrupt a supportive circle of friends, may cut income dramatically, or may require moving or accepting

unwanted help from others. Such sequelae of loss create symptoms, but perspective comes from data showing that most people do well and that there are gains as well as losses after a death. Social support, for instance, goes up, not down, after a loss.

Within-Individual Variation in Grief Responses

There is no good way to study the distinctive effects of different kinds of actual losses experienced by the same individual, but studies that estimate grief intensity offer useful information (Littlefield & Rushton, 1986). Useful information is also available from studies of individual differences in grief as a function of age of the deceased, genetic relatedness, emotional closeness, situation of death, or other characteristics. The most important conclusions, as mentioned already, are that grief is highest if there is a high genetic relatedness and emotional closeness with the lost individual, and if the individual is just entering adulthood.

Assessment

Many aspects of grief appear to be aspects of the generic sadness response that were shaped by natural selection to deal with any loss, but it seems likely that natural selection differentiated generic sadness into a special pattern to deal with the special aspects of loss of kin. Losses of close emotional attachments reliably arouse grief, but the strength of the attachment is not the whole story. Evidence includes the intensity of grief after loss of a relative with whom there is little emotional closeness, and the peak of grief intensity for losses of children at the age when they are just becoming adults. The loss of an unrelated relationship partner gives rise to grief that may be less or different. Attachment bonds are so strongly correlated with degree of genetic relatedness that it is difficult to determine the relative contribution of the degree of relatedness, the loss of emotional support, and the loss of instrumental factors.

This evolutionary perspective on grief as a specialized form of sadness predicts several factors that should influence grief. Grief intensity should be a function of characteristics of the person lost, including the coefficient of relationship (percentage of genes in common), reproductive value, nonreplaceable instrumental value, and strength of an irreplaceable committed relationship. All of these will be influenced by individual, group and cultural variations. Of course, such a summary does not do justice to the profoundly individual nature of the grief experience, nor does it incorporate the psychodynamic defenses so powerful they can turn unconscious hatred and love into

the opposite conscious experience. Also, it says nothing about religious beliefs and other cognitive factors that change the meaning of a loss. Nonetheless, data on differences in grief remain useful in helping us toward a first approximation of a framework for understanding why we experience grief at all.

Does grief exist simply because natural selection cannot shape a mechanism that gives the benefits of attachment without the extraordinary costs of grief? No mechanism of the body is perfect, and trade-offs are ubiquitous, such as those that sustain the mechanism for clearing toxins from the gut despite the costs of diarrhea. While trade-offs account for some aspects of grief, such as a chimpanzee mother carrying an infant for days after its death, no global trade-off can explain the existence of grief. Attachment bonds maintain a cognitive representation of absent others, but exactly how this gives benefits is hard to make explicit. Knowledge about others can be maintained with cognitive mechanisms that do not involve much emotion, and we maintain clear memories of absent others whether or not we are attached to them. The special values of committed relationships could foster special attention to the absence of these individuals and perhaps mechanisms to allow such relationships to pick up in their special way upon reunion. However, this does not seem sufficient to support an argument that grief is maintained by such trade-offs.

Other suboptimal designs result from constraints on what selection can accomplish. For instance, because of a happenstance in phylogeny, the nerves to the retina run on the inside of the eyeball and create a blind spot at their exit. Similarly, the mechanism for relationship bonds could be so rigid and crude that it simply cannot be turned off after a loss. However, this is a bit like suggesting that selection could not create a mechanism to turn off pain after an injury heals or that it could not turn off fever after the threat of infection has passed. I see no reason why the benefits of attachment cannot be dissociated from the many costly aspects of grief. Furthermore, in many cases the loss of a close bond does not lead to intense grief, so it is obviously possible. In animals, where attachments are as significant to fitness as in humans, there are few reports of grief responses that decrease fitness compared to the many common situations in which attachment serves its function well and a loss of an attachment results in only temporary disability.

Implications

This framework and its tentative conclusions have implications for how we think about grief, how we study it, and how we treat it. However, it is once again essential to emphasize the difficulties, emotional as well as scientific, of

attempting to understand the origins of grief. It is upsetting to think about the origins of grief. If it is simply a nasty epiphenomenon of the brain mechanisms that make loving attachments possible, grief has no meaning except as a defect in design that we may well and justifiably try to overcome with pharmacological or genetic engineering. The view that grief exists in part because it benefits our genes is disturbing in a different way. In this view, grief at least has meaning and a significance that helps to explain it, but the meaning offered is very different from the spiritual and personal significance that so many people seek.

Much in this overview coheres with recent developments in grief research, in particular, Stroebe and Schut's dual-process theory (1999). Bereavement requires both dealing with the emotional loss and coping with the changed everyday realities of life. This maps well onto the distinction between aspects of grief that arise from kin selection and committed relationships and those that arise from losses of resources and the benefits of exchange relationships. To greatly oversimplify, sadness is about what we lose that was useful for us, but much of the pain of losing a relative is useful only for our genes.

IMPLICATIONS FOR RESEARCH

An evolutionary framework may help grief researchers to distinguish more explicitly between proximate and evolutionary questions and to use data to test predictions from an evolutionary view. For instance, they should determine how much of the association between strength of grief and strength of bonds is accounted for by degree of relatedness and vice versa. Is the peak of grief for one's children at their age of maximum reproductive value an artifact of the emotional closeness at that age? Nearly every question in grief research can be reexamined in an evolutionary perspective and existing data can be useful in better understanding the origins of grief. Data on absent grief should be particularly useful. In the CLOC study, I had hoped to find a group of people who lacked the "normal experience" of grief so I could determine how their lives were impaired by the absence of this response. The experiencing was chastening.

More than a quarter (28.3%) of bereaved spouses interviewed 6 months after the loss reported experiencing no "painful waves of missing your (husband/wife) in the past month" and 7.9% reported them, "Yes, but rarely." When asked if they had "EVER experienced painful waves of missing," 13.2% reported never experiencing such feelings.

When asked if they had experienced "feelings of intense pain or grief over the loss" in the past month, 36.6% said, "No, never" and 10.2% said, "Yes, but rarely"; the other half of the sample reported sometimes or often experiencing such feelings. When asked if they had "at any time" experienced feelings of intense pain or grief, 17.0% answered, "No, never." When asked if they had experienced "feelings of grief, loneliness or missing your (husband/wife)" in the past month, only 5.7% said, "No, never," with 4.9% saying, "Yes, but rarely."

Overall, 5.7% reported experiencing no feelings of grief, loneliness, or missing at all, 13.2% reported no "painful waves of missing" the deceased, and 17.0% reported no "feelings of intense pain or grief" in the first 6 months after the loss. Of 250 widows, 58 reported no symptoms ever on one of the three questions. But of the six who reported never experiencing "feelings of grief, loneliness or missing" since the loss, three reported "painful waves of missing" within the past month, and one reported some "painful waves of missing" in the past 6 months. Of the 35 subjects who reported never experiencing "painful waves of missing" since the loss, 18 reported "feelings of grief loss or loneliness" in the past month. The good reliability of the data set in almost all respects argues against transcription and coding errors; it is much more likely that some subjects simply gave inconsistent answers.

Subjects who reported little grief were, at baseline, in most respects the same as the larger subject pool. They showed no tendency toward social isolation, no obvious mental disorders, and they had less of a tendency to depression than others. They could not be distinguished by their age, race, sex, or religion. Their relationships with their partners at baseline were comparable to those of other couples. After the loss, they seemed to adapt well, not demonstrating any particular pathology.

Concurrent with my analysis of the CLOC data, I had occasion to talk with a number of people who were in the midst of coping with loss of a loved one, some of whom I saw in my psychiatric practice. Their reports illuminated the empirical data, and lack of results, from the numbers in the database. One woman had been dissatisfied for years with a husband who was uncaring and even abusive. But now, her adaptation to widowhood was associated with fond memories about his few tender moments and how she had provoked his temper outbursts. Another woman was very depressed after the loss of her husband, but her thoughts were rarely about him. Instead, she worried incessantly that she would have to move from the home and neighborhood where she had spent her whole life, and she feared that no one would ever take care of her again. A man who lost his wife felt sad for a

few days after her loss, after which he found himself besieged by attractive women who offered him anything and everything. He took up with one after another in a sequence that seemed not to be a defensive reaction but more of a grand time. Finally, a woman who was depressed and aloof her whole life became more so after her extraverted husband died.

As I tried to put these stories together with the CLOC data, I realized how amazing it is that any patterns emerge from aggregated survey data obtained from random samples of individuals. Their individual hopes and fears are stirred not only by what happens but by their assessments of what events mean for their peculiar personal goals. There is just enough consistency in the goals of defined groups of people—say, white, healthy, middle-income, Presbyterian widows in their 70s, for example—to make some generalizations valid. However, the observed consistencies in their reactions to loss are likely to arise mainly because they are correlated with consistencies in their relationships, personalities, goals, and strategies of social influence.

I began by asking if it would be wise to use an imaginary drug that blocked the pain of grief. With the previous paragraph in mind the answer is, unsurprisingly: "It depends on the person and the situation." However, my interpretation of grief's possible utility to our genes joins with Archer's (1999) thesis to suggest no personal disadvantage to use of such a drug. If grief is important for protecting relatives, however, widespread use of such a drug could well change the very social structure, dissolving family feeling even further. Such a drug might undermine useful aspects of sadness that occur after the death of a loved one. There is a good analogy to pain. Even though the capacity for pain is normal and useful, it can be blocked safely or reduced an overwhelming proportion of the time. This is because the systems that regulate pain were shaped to ensure that pain was sufficient every time it was needed even if they quite often were excessive at other times.

The most valuable contribution of an evolutionary foundation for a framework of understanding grief may be its heuristic value in suggesting new questions and the kinds of data that can answer them. Some examples include:

1. Do types or intensities of grief symptoms differ depending on coefficient of relatedness with the deceased, after controlling for emotional closeness?
2. Do kinds or intensities of grief symptoms differ depending on the reproductive value of the deceased, controlling for relatedness and emotional closeness?
3. Do kinds or intensities of grief symptoms differ depending on the instrumental losses controlling for relatedness and emotional closeness?

4. Is the intensity and duration of grief arising from death of a friend greater for relationships based on commitment rather than exchange?
5. Is grief more intense, prolonged and public in groups and cultures where relationships are based more on commitment than exchange?
6. How do outcomes differ in bereaved people treated and not treated with antidepressant medications?

Therapy

Therapeutic recommendations should be based on controlled studies, not theory. In the real world, however, analysts try to help their patients get in touch with anger turned inwards, cognitive therapists try to channel thoughts in different directions, and biological psychiatrists prescribe drugs. Although an evolutionary framework for grief does not suggest a specific kind of therapy, it reminds all therapists that grief is normal and natural and some aspects are probably useful, albeit perhaps not for the grieving individual. Furthermore, the wide range of intensities and content of grief experiences does not necessarily represent a small middle with much pathology at each extreme. The system itself may vary considerably among individuals just as people's tendency to get a fever varies. In addition, some of the variation may arise from facultative mechanisms shaped to detect and respond differently to different circumstances. At this point, we are far from being able to dissect such mechanisms. Even worse, behavioral regulation systems often do not have the crisply outlined inputs, processors, and outputs that would satisfy our wishes for a simple comprehensive explanation. We may have to discipline ourselves to accept the fuzzy margins and multiple connections of an evolved system. Nonetheless, much work remains to flesh out these systems in order to understand the origins of grief.

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