

11

Abnormal Psychology

Humans have struggled for years to understand what makes people hear voices that are not there, become convinced that their family members are trying to poison them, or constantly wash imaginary dirt off their hands. Through the years, the explanations have varied from demon possession to chemical imbalances in the brain. Today there is broad agreement that abnormal behavior often has a biological basis. As a result, one prominent approach to abnormal behavior is called the medical model, which considers it to be like any other disease. But the concept of disease is far from a simple or obvious one. Most importantly for our purpose here, labeling a problem as a disease assumes some understanding of its causes and treatment—a theory. But this is precisely what is largely lacking in the case of abnormal behavior. The confused current state of our understanding of abnormal behavior is illustrated well by considering how psychologists classify behavior disorders.

By far the most influential classification of behavior disorders is the DSM-IV (*Diagnostic and Statistical Manual of Mental Disorders*, 4th edition) (American Psychiatric Association, 1994). The most significant aspect of the DSM from an evolutionary perspective is that it explicitly adopts a non-theoretical approach to classifying the disorders.¹ The reason for this is simple: There is no agreement among psychiatrists and psychologists on the causes of the many disorders, and not much more on how to treat them. Earlier versions of the DSM were heavily influenced by

¹DSM-III-R and DSM-III, the two immediate predecessors to DSM-IV, explicitly claim to be atheoretical. DSM-IV is silent about this but continues the same basic structure and approach as its predecessors (Follette & Houts, 1996).

Freudian theory, which is now in decline. But that still leaves several conflicting theoretical approaches. There is complete disagreement on how to understand mental problems (see, for example, Wakefield, 1992).

One of the main uses of the DSM classification system is practical: It provides a basis for insurance companies to decide whether to reimburse the cost of treatment for a given condition.

Trail Marker: The most influential classification of abnormal behavior has no theoretical basis.

We should not expect great theoretical coherence in such a system, let alone an evolutionary approach. The absence of an evolutionary perspective permits the designers of DSM to list "nicotine withdrawal disorder" and "caffeine-induced anxiety disorder" in the manual. New possibilities being considered for the next edition include "road rage disorder" and "jury duty disorder" (Sharkey, 1997), categories with dubious evolutionary history.

AN EVOLUTIONARY PERSPECTIVE ON THE CAUSES OF MENTAL ILLNESS

Evolutionary theory suggests a variety of different explanations for psychological disorders. We enumerate six causes (cf. Nesse & Williams, 1994) that could produce abnormal behavior. For each cause, we mention a behavioral disorder that might be explained by it. In the section that follows ("A Survey of Mental Disorders") we discuss each of the mentioned disorders in considerably more detail.

Possible Evolutionary Causes of Behavioral Disorders

1. Some may not be disorders, but defenses, analogous to fever or cough. Some cases of nonclinical depression may provide an example of this sort of psychological defense.
2. Some are side effects of genes with fitness benefits, analogous to sickle-cell anemia. Schizophrenia and bipolar disorder are possible examples.
3. Others may be the result of frequency-dependent selection (see Chapter 3). One current theory explains sociopathy in this way.
4. Some disorders may reflect the absence or malfunctioning of a particular module, analogous to defective color vision. Some researchers believe infantile autism results from a defect in one or more modules.
5. As discussed in the previous chapter, some disorders are the result of a mismatch between the current environment and the one that prevailed over much of human evolution. As we have emphasized throughout this book, our psychology is adapted to stone-age conditions. To the extent that current conditions differ from those, we may

expect to experience problems. Post-traumatic stress syndrome and certain anxiety disorders may fit this category

- 6 Some disorders represent the extremes of the distribution of polygenic traits. As discussed in Chapter 3, the population will always include considerable scatter around the optimum value for any trait that is affected by genes at several loci. The extremes of such a distribution would represent exaggerated or reduced levels of normal behavior and be nonoptimal, by definition. Clinical depression could represent such a case.

Before we proceed with an evolutionary analysis of behavior disorders, we stress that some disorders may reflect more than one cause. We need to realize that a disorder may have more than one contributing factor. A person who smokes, eats a lot of saturated fats, never exercises, and has a family history of heart disease has an increased risk of heart attack. We would not try to decide which one was actually responsible if that person should suffer a heart attack. Instead, we would say that he had many contributory risk factors, or many possible causes. We will see that several different causes may contribute to some disorders, such as depression.

A SURVEY OF MENTAL DISORDERS

The disorders we discuss next reflect the several different causes listed above.

Post-Traumatic Stress Disorder

The Vietnam War made us familiar with the concept of **post-traumatic stress disorder (PTSD)**. About 15 percent of U.S. Vietnam veterans suffered from social withdrawal, emotional numbing, difficulty sleeping, and flashbacks. DSM-IV recognizes PTSD as a reaction to "events so powerful that they threaten life or well being, severely tax or overwhelm coping capabilities, and challenge the assumptions that people make about the world and the way it works" (Baum, Gatchell, & Krantz, 1996, p. 92). It is instructive to note that the term PTSD is but the latest used to describe this disorder. During World War I, the same kind of symptoms were described by the term *shell shock*, because many doctors believed that it was a response to the physical concussion caused by exploding artillery. Before that, from the beginning of the Industrial Revolution, the term *railway spine* was used to describe a condition displayed by workers who had survived terrible railroad accidents. That term came from the belief that the trauma was caused by twisting or concussion of the spine. Eventually, scientists became convinced that PTSD, whatever it is called, is a mental health problem, not primarily a physiological one. (We must be careful to note that we are *not* saying that it is "all in the head." Stress has real biological consequences, but mechanical damage to the nervous system is not one of them.)

The significant thing about PTSD from our perspective is that it would be expected to be primarily a disease of modern life. Events like tornadoes, cyclones, and volcanoes generally produce PTSD in less than 10 percent of those who experience them. See Figure 11-1.

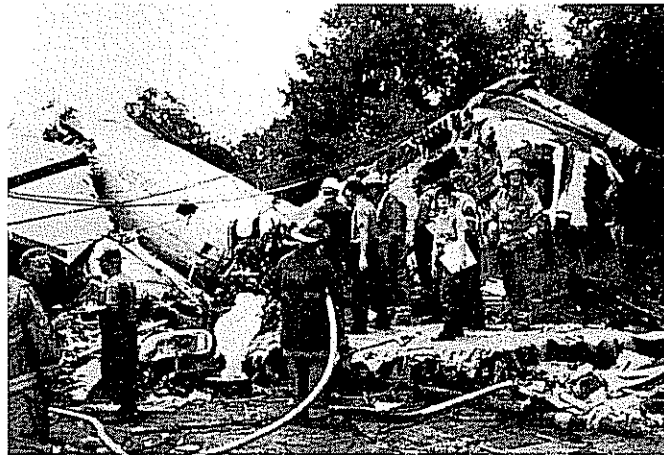


Figure 11-1. *Disaster scene* Modern societies experience disasters on a scale unlikely in the EEA.

By contrast, airplane crashes, flooding caused by a broken dam, and automobile accidents cause PTSD in about 20 percent to 50 percent of survivors (Baum, Gatchel, & Krantz, 1996). You will note that the first category contains natural disasters and the second, human-engineered ones. It appears that modern society is capable of organizing disasters on a scale of horror not known to our ancestors. Stone-age warfare is bad enough, but it cannot match the devastation of modern weaponry.

Thus we see that PTSD may be looked at as a susceptibility to stress that overwhelms our normal defense against threats. The frequency with which it occurs today reflects a mismatch between our evolved defenses and the modern environment.

Depression

Depression has been called the common cold of psychological disorders because so many people experience it at some time in their lives. It is characterized by low energy level, feelings of worthlessness, sadness, and inability to concentrate and to plan for the future. The distinction between clinical depression and normal sadness is based on the length and severity of the symptoms. Everyone gets the blues now and then, but not everyone becomes clinically depressed.

There are several alternative evolutionary ideas about depression. Randy Nesse (1991, 2000) suggests that depression is nature's way of telling us that we are barking up the wrong tree. It keeps us from spending energy on activities that are unlikely to contribute to our fitness or from taking senseless risk. If we have lost a contest with a rival over some resource, depression may keep us from spending more energy in a futile contest and risking even greater loss (Sloman & Price, 1987).

Trail Marker: Nesse suggests that depression is nature's way of telling us that we are barking up the wrong tree.

Sloman and Price suggest that it is not mere coincidence that the loser in a contest lowers his head and avoids eye contact, behaviors typical of depression.

An evolutionary perspective suggests that people who were sad and mildly depressed when action was unlikely to succeed may have outreproduced those who did not experience these feelings. To be effective in this way, depression would have to be properly calibrated. It should be triggered by setbacks of appropriate magnitude; it is appropriate to be depressed if your child dies or your spouse divorces you, but not if you get a \$15 parking ticket. If we imagine that each of us has a polygenetically influenced "depression threshold," then it follows that many people are near the optimum, experiencing depression appropriately, when a "time out" would be helpful. But it also follows that there will be some people whose threshold is too high and who fail to become sad and depressed even when all the signs indicate they are on the wrong track. Likewise, this view also suggests that there are people whose threshold is too low and who experience deep and prolonged depression for very little reason. The latter describes clinical depression. To our knowledge, systematic evidence for the former has not been sought.

Some of the hallmarks of depression seem appropriate to its postulated function. For example, people who are depressed have a lower opinion of themselves and of their prospects for success. Surprisingly, their self-assessment becomes more accurate than that of nondepressed people (Taylor, 1989). As we discussed in Chapter 5, most people have a higher opinion of themselves than they deserve. We suggested that this inflated self-image helps us remain optimistic and effective in the never-ending competition for resources. But there are times when it is best to cut our losses. Depression strips off the rose-colored glasses through which we normally view the world. This helps us to realize that it is probably unrealistic to try to date the most attractive person we know or compete for the highest position in our company.

An evolutionary approach suggests some additional insights into long-standing puzzles of depression. Depression is so much more common in the winter time that this form of it has been given the special name of seasonal affective disorder (SAD). Perhaps SAD kept our ancestors from wasting precious energy reserves on activities that were less likely to bear fruit in the winter when food is scarce and moving about is especially metabolically expensive (Pomerleau, 1997).

The sex difference in rates of depression—women are twice as likely as men to experience depression—may also have evolutionary roots. Cynthia Pomerleau (1997) suggests that because women are physically weaker than men, they have had more to lose by entering a contest in which they could be injured. On this line of thinking she suggests that if depression is an adaptation that removes us from a situation in which we have more to lose than to gain, depression may be more easily triggered in women. A variety of other ideas can also be offered. Perhaps women

experience more depression because their options and scope for action are limited by the fact that men so often make the rules. Alternatively, the modern role of women may be even more out of tune with their evolved psychology than is that of men. For example, women who work outside the home often worry that they are neglecting their parental role; and women who do not work outside the home may suffer social isolation compared to women in hunter-gatherer societies who engage in more communal task-sharing. These suggestions are speculative at this point. Nevertheless, they point the way for possibly productive research. For example, some (but not all) of these hypotheses predict that women's interactions with men are more likely to trigger depression than are their interactions with women.

Why is depression so common, and increasing? The mismatch between the EEA and contemporary life is vast, particularly with regard to the opportunities for frequent small successes, such as a productive foraging trip or hunt, and the opportunity to share such success with friends and relatives, and be praised for it. We did not evolve to live in such large societies where, by definition, a smaller proportion of people are visible at the top of the pecking order, and large groups contain a lower proportion of kin and allies who can be counted on to help us in times of need. We did not evolve to go to school for 12 years or more before we are ready to do productive work. We did not evolve to work at a single repetitive job 40 hours a week for 40 years. In the form of movie and athletic stars, mass media create beautiful and highly competent pseudo-neighbors and lead us to compare ourselves to impossible ideals. Anyone who got her idea of what life is like in contemporary America from television would suppose that the average person is much more attractive and wealthy than is actually the case. She would suppose that life is not only a beach, it is one that swarms with multitudes of rich, beautiful people, all on permanent vacation.

O'Guinn and Shrum (1997) asked people how much television they watched and also to estimate how many Americans own convertibles, cellular phones, and hot tubs; drink wine with dinner; travel abroad; and the like. The more television they watched, the higher their estimates of the frequency of these signs of affluence. In Chapter 15 we consider how implicit comparisons with people we see in movies or magazines can influence our evaluations of our mates.

A different and intriguing idea about the evolutionary function of depression has recently been offered by Edward Hagen (1999). Hagen has focused principally on postpartum depression, a form of depression that affects a significant proportion of new mothers. His novel suggestion is that depression serves a negotiation tool to extract more investment from others. This is a plausible proposal, given the reproductive threshold signaled by the birth of an infant. Rearing a child to adulthood is a huge win on one's evolutionary scorecard, but doing so is fabulously expensive, and one may need to negotiate higher levels of cooperation to succeed.

I argue that PPD [postpartum depression] may be a strategy to negotiate greater investment from father and kin, or to reduce the mother's costs by functioning somewhat like a labor strike. In a labor strike, workers withhold their own labor in order to force management to increase their wages or benefits, or reduce their workload. Similarly, mothers with PPD may be withholding their

investment in the new and existing offspring, or, in cases of very severe depression, putting at risk their ability to invest in future offspring by not taking care of themselves. This may force the father and kin to increase their investment (Hagen, 1999, pp 346–347)

Hagen suggests this “renegotiation” strategy may also be a factor in other, nonpostpartum cases of depression.

Suicide. Depression not only causes a great deal of suffering, it sometimes leads to suicide. Suicide is the eighth leading cause of death in the United States, accounting for 1.4 percent of all deaths (Clark & Fawcett, 1992). Suicide rates increase with age, being about 50 percent higher in elderly (65 and older) than young (age 15–24) people. The serious impact of suicide can be glimpsed from the suffering that leads a person to take his or her own life and the anguish it causes the surviving family.

On the model of depression presented above, most suicides probably occur in people who have too low a depression threshold and thus find themselves depressed much of the time. But some suicides may have an adaptive basis. At first glance, suicide would seem to contradict the principles of evolutionary psychology because taking one’s own life puts a final end to one’s reproductive prospects. But if we remember the theory of kin selection, we have the beginning of an evolutionary understanding of suicide. Recall that we can increase the frequency of our genes by furthering the reproductive efforts of our close relatives, especially our siblings and our children. Is it possible that our death can further the success of our genes? Heroic acts that save our close relatives at the expense of our life further our genes, but that is not considered suicide.

Consider the possibility that death could increase a person’s genetic representation in future generations if the resources spent to keep him alive would be better spent on close relatives. As we age, our reproductive value declines markedly. We can respond to that decline by shifting our efforts from producing children of our own to helping our relatives produce children. (See discussion of the grandmother hypothesis in Chapter 13.) At some point, however, an elderly person becomes a net drain on resources, rather than a producer of resources—another mouth to feed. Reflecting this fact is the common desire of the elderly “not to become a burden to my children.” If, as Sloman and Price (1987) suggest, depression is a reaction to loss of resources needed for reproduction, then it is not surprising that depression is a risk factor for suicide. From an evolutionary point of view, we would predict that the rate of suicide should go up as one’s capacity to promote his or her genetic interests declines: This matches the demographic fact that suicide rates increase with age.

Denys de Catanzaro (1995) tested this hypothesis by examining factors that correlate with suicidal ideation (thoughts). He studied men and women of different age groups from the general population who answered a mail survey. In addition, he studied several other groups, including residents of senior citizens’ housing, mental patients, people institutionalized for antisocial behavior, and male and female homosexuals.

de Catanzaro found that a large number of factors predicted suicidal ideation. We will summarize some of the more important. Perceived burdensomeness to family was a large factor for both sexes and all ages, as the hypothesis predicted. In addition, lack of success in sex was a strong predictor for young males; loneliness, poor health, and financial problems were important for older males. Loneliness was a big factor for all females; health and finances became important with older females. The greater importance of sex in predicting suicidal ideation for males is understandable from their greater variability in mating success. Men are more at risk of dying without children than women are. At the very least, de Catanzaro's results provide for the idea that some suicides are due to a sense of overburdening kin.

Why young people should consider suicide when they are unsuccessful in sex seems paradoxical. True, lack of success in sex is a negative indicator of fitness prospects, but wouldn't theory predict that one should just keep trying? Remember, although suicide may have evolved as a means of furthering the success of our genes under particular circumstances, it does not mean that it operates adaptively in all cases. If people differ in their depression thresholds (as we suggested above), then it is plausible that they differ in how likely they are to become depressed enough to contemplate suicide. Thus some people, including young people, sometimes take a temporary setback as meaning that life is hopeless.

Suicide rates may be exaggerated by a number of novel factors of modern society. The ready availability of guns, drugs, and cars would be expected to increase suicide rate by making it easy accomplish (de Catanzaro, 1995). Finally, and most importantly, note that even if some suicides have been favored by kin selection, that has no bearing on the hotly debated issue of whether suicide is moral—remember the naturalistic fallacy!

Anxiety Disorders

As we mentioned previously, it is adaptive to have a healthy fear about certain situations: about heights, unfamiliar surroundings, venomous creatures, and whether our children are safe. Too little concern about these things and we fall off cliffs, become lost, end up with rattle snakes in our beds, and death or other mishap befalls our progeny. Some people, however, develop excessive anxiety about certain things: *Acrophobia* is fear of heights; *agoraphobia* is fear of being away from home, *obsessive-compulsive disorder* is fear that we have not done some task just right, and so forth

Interestingly, the things we develop phobias about tend to be things that were genuine dangers in the EEA. As many authors have noted, we easily develop fear of spiders, snakes, fierce creatures, heights, and blood. Compare the two fear stimuli in Figure 11-2.

We do not so easily develop fear of electrical outlets, tobacco smoke, or driving without seat belts—all of which are far greater hazards than spiders. One who reads the experimental research on phobia might get the impression that



Figure 11-2. Two situations that our :

snakeb
bia wo
adapta
P
to a da
of thre
terms
general
specifi
V
ders. I
discus:
signed
Chapt
EEA.
need t
or less
sociat
lead t
makes
world

dency
ther a
would
trigge
that t
The p
anxie

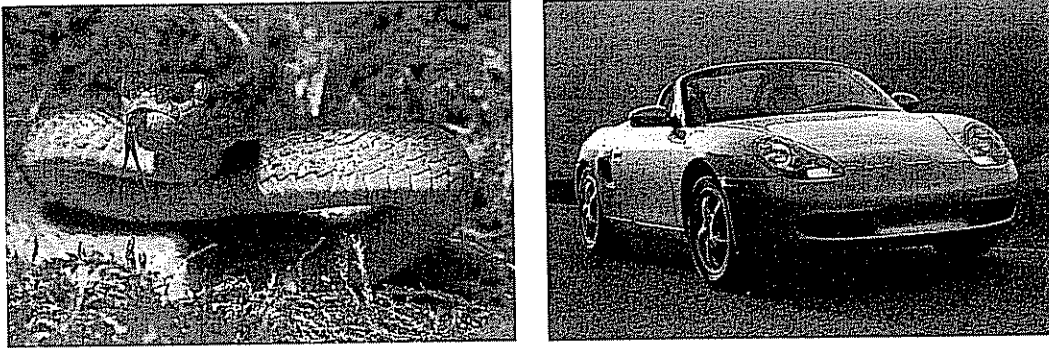


Figure 11-2. Two fear stimuli. Which one looks more frightening? We are more afraid of dangerous objects and situations that our ancestors faced in the EEA.

snakebite is the leading cause of death in the United States. Of course, snake phobia works so well as a model for research on phobia because it taps a fear that was adaptative in the EEA.

Psychologists generally use the term fear to refer to the emotional response to a dangerous situation. The term anxiety is used to refer to a more vague feeling of threat or danger, sometimes when the object of fear is not present, but the two terms are often used interchangeably. Thus we have the related disorder of *generalized anxiety*, which is a sort of free-floating anxiety that is not focused on a specific object or situation.

We suggest two evolutionary reasons for the development of anxiety disorders. First is the mismatch between our current environment and the EEA. As we discussed, there are kinds and levels of stressors in our society that we were not designed to deal with. Strangers are a major source of stress, and we discussed in Chapter 10 that we must meet many more strangers than our ancestors did in the EEA. Industrialization brought many dangerous devices and substances that we need to be concerned about. Instead of being able to avoid dangerous things more or less automatically, we must invest conscious effort into avoiding the dangers associated with cars and electricity, for example. This increased vigilance may itself lead to anxiety disorders. Modern communication can also lead to anxiety: It makes us aware of disasters and epidemics all over the globe, making us think the world is more dangerous than it really is.

Anxiety disorders may also be influenced by genetic reshuffling. If the tendency to be anxious is a polygenic trait, inevitably some individuals will display either a higher or lower than optimal level of the trait. Those at the high extreme would be susceptible to anxiety disorders in the sense that their anxiety would be triggered too easily. Although we do not usually think of it, this logic would suggest that there are some people who are too low in anxiety (Nesse & Williams, 1994). The person who quits a job in a huff without a ready alternative may have too little anxiety.

Sociopathy

Sociopaths are individuals who share a number of traits: On the positive side, they are superficially charming and sociable; but they are also egocentric, impulsive, and lacking in the emotions of shame, guilt, and remorse. Also known as psychopaths, sociopaths realize they are more coldhearted and selfish than other people, but this fact does not bother them. Although they make up only about 3 percent to 4 percent of the male population (there are fewer female sociopaths), sociopaths make up a high percentage (approximately 20 percent) of the prison inmates in the United States. Their crimes typically involve deceiving and manipulating other people: fraud, bigamy, and embezzlement (Mealey, 1995).

Sociopathy has a large genetic component. Sociopathy runs in families, and adopted-away children of criminals have a higher than normal likelihood of becoming sociopaths. In addition, sociopaths differ in their physiology. They show much less emotional arousal than normals do to the same stimuli. Consequently, they tend to seek out situations that maintain high arousal. They are high on a personality measure known as sensation seeking.

Linda Mealy (1995) has proposed that sociopathy may be the result of frequency-dependent selection, which we discussed in Chapter 3. We described the alternative mating strategies of certain male flies, who can either hunt their own nuptial gift or pretend to be a female in order to snatch one away from another male. Mealy suggests that sociopaths are the snatchers of the human world. As long as most people play the cooperative strategy, there will be a niche for a small number of sociopaths to cheat, taking advantage of others' trust. As we discussed in Chapter 6, the social emotions motivate us to cooperate in situations like the Prisoner's Dilemma. Our tendency to give strangers the benefit of the doubt leaves us open to people who treat social encounters as a one-shot Prisoner's Dilemma game, where the best strategy is to cheat.

Trail Marker: Sociopathy may be the result of frequency-dependent selection for cheating.

A person who lacks the emotions of shame, guilt, and remorse can lie and cheat with a straight face, placing him at a competitive advantage to those with normal emotions. As we said in Chapter 5, self-deception can be an aid in deception of others. People constantly use a stranger's emotional behavior to judge their trustworthiness. ("I didn't trust him; he had shifty eyes." "Never mind your ID; you have an honest face.") What better means of self-deception than not to feel emotions?

Recently, Andrew Colman and Clare Wilson (1997) suggested that the game of chicken provides a better model of the dynamics of interacting with a sociopath than does the prisoner's dilemma. Chicken (also known as Hawk-Dove) is modeled in the same general manner as Prisoner's Dilemma, but with payoffs sufficiently different to change its character. An excellent example is given by the game played by the characters in the famous 1955 movie *Rebel Without a Cause*, starring James

Dean. In its typical version two drivers speed toward each other in the same lane. The driver who swerves first is the "chicken"; he loses the contest, and the other wins. If both swerve, the contest is a draw. Of course, the worst outcome for both happens when neither swerves and they crash. Colman and Wilson's mathematical analysis of the chicken game predicts a number of features of sociopathy that Prisoner's Dilemma cannot explain. It remains to be seen which analysis more closely matches the behavior of actual sociopaths.

Evolutionary Insights into Dealing with Sociopaths. Normal people do not commit crimes because the very thought of criminal activity causes negative emotions in them. The mere knowledge that the behavior is a wrong is sufficient deterrent to crime in normal people, without the threat of punishment. ("What will people think; I'll never be able to show my face in this town again.") This knowledge by itself does not deter the sociopath, however, because he does not have the same emotional reaction. Mealy suggests that it may be possible to deter a sociopath by convincing him of two things: first, that the action will reduce his standing in the community, and second, it is likely to lead to punishment. These two ideas may serve as a cognitive substitute, or prosthesis, for his deficient emotion; they make use of his intact cognitive ability to do a cost-benefit analysis of the contemplated action.

Another suggestion for dealing with sociopaths is to find socially acceptable outlets for their unusual tendencies. Sociopaths do not completely lack emotions; they have higher thresholds for emotion. Sociopaths require greater risks than normals to produce the same level of thrill. They like bungee jumping, driving too fast, and sky diving. Mealy suggests that sociopaths might be less likely to get into trouble if they could be steered into jobs that provided enough thrills: stunt man, race car driver, or repo man. We say "man" because sociopaths are predominantly males.

As with many evolutionary hypotheses we have discussed in this book, Mealy's ideas are quite new. It will take time to evaluate them and test the predictions she makes. The journal in which she published her article is unusual in that it publishes many comments and reactions from other scientists alongside the main articles. Mealy's article stimulated a large number of comments. Interested readers may turn to the comments on her article for further discussion.

Autism

Autism is a serious disorder that affects about one person in 1,000, and is between two and four times more common in males than females, depending on the exact criteria used to define it (Bryson, 1997). Autistic individuals are markedly impaired in social interaction, particularly involving eye contact and emotional expression. They show delayed or deficient language development and often use stereotypical and repetitive language. They show repetitive patterns of behavior, such as flapping of hands, and preoccupation with objects (American Psychiatric Association, 1994). The social deficit is central to the diagnosis of autism; the other deficits may

be less severe. Symptoms develop by age 3; hence it is sometimes called infantile autism. Autistic individuals are usually mentally retarded, although some autistic individuals have normal or even high intelligence.

Other people are an important part of every person's environment, and it is of great advantage to understand how they work. Simon Baron-Cohen (e.g., 1995) suggests that what autistic individuals lack is the ability to read other people's minds—not in the ESP sense, but in the ordinary sense of understanding others' motives, intentions, and feelings, and being able to predict how they will act. Baron-Cohen proposes that there is a module, or set of modules, that have evolved by which ordinary people solve the problems posed by our highly social existence. People who lack the ability to read minds suffer from "mind blindness." One insightful person with autism said, "Other people seem to have a special sense by which they can read other people's thoughts" (Frith, Morton, & Leslie, 1991, p. 436).

Precisely because most people can read minds effortlessly, the existence of a mind-reading module has gone undetected until now. Normal people interpret the behavior of others in terms of their intentions—their thoughts, beliefs, and desires. We readily understand that if someone opens the refrigerator, it is because he or she is hungry; or if someone asks if you have seen the car keys, he or she is planning to go somewhere.

People have such a deeply programmed tendency to read intentions into actions that they even project intentions onto inanimate objects. We sometimes say that a computer with an automatic spell checker does not want us to misspell a word, or that the thermostat tries to keep the house warm. Many years ago, Heider and Simmel (1944, cited by Baron-Cohen, 1995) showed that people who watched a display in which two geometric shapes moved around had a strong tendency to interpret the action in terms such as *wanting*, *hesitating*, *trying*, and so forth. Similarly, children often attribute intentions to stuffed animals, clouds, and other inanimate objects.

A clever way to test whether people attribute beliefs to others is to find out if they understand a situation in which someone would hold a belief that is false. This can be studied experimentally. Children watch a doll named Sally place her marble in a basket and then go away (Baron-Cohen, Leslie, & Frith, 1985). Another doll named Anne then takes the marble out of the basket and puts it into a box. The experimenter asks the child where Sally will look for her marble when she comes back. Normal 4-year-olds and 11-year-old Down's syndrome children had little problem with this test: They recognized that Sally could not have known that Anne had moved the marble. Autistic children (age 12), however, usually said that Sally would look for the marble where Anne had placed it, indicating that they did not understand the difference between physical reality and someone else's belief about reality.

Although most autistic individuals are mentally retarded, there is considerable variability. Some autistic people are highly intelligent, even getting advanced degrees and having successful careers. Physician Oliver Sacks describes his investigation of Temple Grandin, who has a Ph.D., is a university professor, and is

autistic. She has great difficulty understanding complex emotions and social situations. Grandin was interviewed by Sacks. "Much of the time," she said, "I feel like an anthropologist on Mars" (Sacks, 1995, p. 259). Grandin knew as a child that she was different:

Something was going on between the other kids, something swift, subtle, constantly changing . . . a swiftness of understanding so remarkable that sometimes she wondered if they were all telepathic. She is now aware of the existence of these social signals . . . but she . . . cannot perceive them.

Grandin copes by keeping her life simple and studying how people react in given situations.

[She] found the language of science and technology [to be] a huge relief. It was much clearer, much more explicit, with far less depending on unstated assumptions (Sacks, 1995, pp 272)

The case of Temple Grandin reinforces Baron-Cohen's view of autism as mind blindness. It also suggests ways of coping with autism, even if we do not know a way to cure it.

We have treated autism so far as a single deficit—as the lack of a mind-reading module. But there is evidence that the mind-reading module is made up of submodules. Moreover, we saw above that autism involves other deficits and that there are several varieties of autism. For these reasons, Baron-Cohen's theory of autism is not likely to be the complete explanation to autism. The mind-reading approach does not explain all features of autism, such as reduced verbal competence. In addition, there are other theories of autism that propose defective information processing modules (Rapin, 1997). Nevertheless, the theory has generated considerable research that appears to shed useful light on the disorder.

TWO DISORDERS THAT MAY BE SIDE EFFECTS OF GENES WITH FITNESS BENEFITS

Throughout this chapter we have taken each disorder and considered what the causes may be from an evolutionary point of view. Many disorders seem to have more than one likely contributing cause. We deviate from that organization now to consider two disorders that may have a single cause: They may be side effects of genes with fitness benefits.

Remember, genes spread if, on average, they enhance fitness. Consider the case of creativity. A gene that enhanced creativity could spread even if it sometimes caused a mental disorder, as long as the benefits of creativity exceeded the costs of the disorder. You should not imagine that creativity would have been of no use to our ancestors. A more creative stone-age person might think of a better way to fashion an arrow, find an energy-saving foraging route, or be better at eliciting cooperation from others or outsmarting competitors. Any of these innovations could have had positive effects on fitness. But the very genes that promote creativity may also, perhaps when they occur in certain genetic combinations, have disruptive effects.

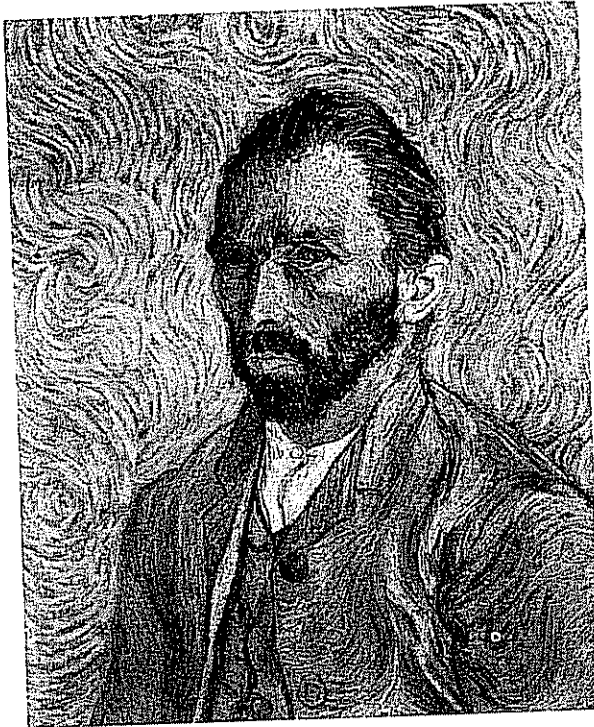


Figure 11-3. Vincent Van Gogh. An example of a highly creative person who suffered from psychological problems. This is a self portrait.

For many years popular psychology has held that creativity is often linked with madness. Vincent Van Gogh, Edgar Allen Poe, Gustav Mahler, Walt Whitman, and Virginia Woolf are only a few of the mad geniuses that come to mind (Jamison, 1995). See Figure 11-3.

But folk psychology is not always wrong, and this is one area where scientific research backs up folk psychology. A substantial literature shows a link between mental disorder and creativity. One study by Nancy Andreasen found that 80 percent of the faculty of the prestigious Iowa Writers' Workshop had suffered either depression or manic depression, compared to 30 percent of a control group (Andreasen, 1987). In another study Arnold Ludwig (1995) considered over 1,000 people whose biographies were reviewed in the *New York Times Book Review*. He found that individuals in the creative arts (e.g., architects, artists, musicians, composers, actors/directors, writers, and poets) had more psychopathology than those in other professions (e.g., athletes, business persons, scientists, military officers, and public officials). Those in creative professions had between two and three times more alcohol problems, drug use, depression, mania, and suicide.

The connection between creativity and psychopathology is not necessarily simple. It is possible, for example, that certain professions tolerate deviance more than others, so people with behavior disorders gravitate to them. A person who likes to sleep until noon, wear unironed shirts, and avoid haircuts would not get very far in banking or the military. Another possibility is that some professions may

be bad for
mental dis

Bipolar

Also known as
swings. A
euphoric
person is
building
cars for
character
they are
denied
of the d
pears th
als are u

Stu
times m
1995) -
characte
tive dur
many m
as he di
two ma
provide
flicted :

Schizo

Schizop
tion. It
perien
belief,
tiple p
all soci
chiatric
likely t
a prol
(Gotte
/
and b
ferers
a gen

be bad for mental health. But examining the behavior patterns of people with mental disorders suggests a causal connection, as we discuss next.

Bipolar Disorder

Also known as manic-depression, bipolar disorder is characterized by severe mood swings. At one time the person may act depressed, but at other times experience euphoria, high energy levels, boundless enthusiasm, and little need for sleep. A person in the manic phase of bipolar disorder may impulsively break ground for a building project without engaging in the usual planning, or go out and buy new cars for every member of the family. In the depressive phase, bipolars show typical characteristics of depression, often severe. Like all seriously depressed individuals, they are at risk of suicide. Bipolar disorder has a strong genetic component, as evidenced by the fact that close relatives of bipolar individuals have an increased risk of the disorder. It is a serious illness that causes much suffering. However, it appears that the condition does promote creativity, although not all bipolar individuals are unusually creative.

Studies of people in the manic phase show that their speech contains three times more rhyming, alliteration, and idiosyncratic words than normals (Jamison, 1995). They are also able to do word-association tasks much faster. These are all characteristics of creativity. Those bipolars who are also creative are most productive during the manic phase. The composer Robert Schumann wrote four times as many musical compositions during two separate years during which he was manic as he did at other times. He wrote nearly 40 percent of all his compositions in just two manic years out of a 24-year career (Jamison, 1995). If, in the EEA, creativity provided sufficient fitness benefits, it may have been favored despite that it also inflicted some costs in terms of impaired performance during the depressive phases.

Schizophrenia

Schizophrenia is a debilitating disorder that affects about 1 percent of the population. It is characterized by a disintegration of the self. Sufferers hear voices and experience inappropriate emotions and incoherent thoughts. Contrary to common belief, it has nothing to do with "split personality," which is properly known as multiple personality and is quite rare. Schizophrenia occurs at about the same rate in all societies, Western and non-Western, industrialized and pastoral (American Psychiatric Association, 1994). Therefore, it is not a disease of civilization, nor is it likely to be an arbitrary social invention. Virtually all scientists agree that it reflects a problem in brain function, and there is strong evidence from family studies (Gottesman, 1991) that it is inherited.

An evolutionary perspective leads one to ask how such a disorder could arise and be maintained in the population. Because schizophrenia is so debilitating, sufferers have lower reproductive success than the rest of the population. Therefore, a gene for schizophrenia cannot be conveying a reproductive advantage in those

cent Van Gogh. An
ly creative person
om psychological
self portrait

s often linked
Walt Whitman,
o mind (Jami-

here scientific
link between
d that 80 per-
ffered either
ol group (An-
ed over 1,000
ok Review. He
usicians, com-
gy than those
litary officers,
wo and three
le.

ot necessarily
evidence more
a person who
ould not get
ofessions may

who have the disorder. At the same time, the prevalence of 1 percent of the population is probably too high for the disorder to be maintained in the population by mutation of one or more genes for schizophrenia.

One possibility is that the gene for schizophrenia conveys some advantage on individuals who carry it but do not have the disorder. One way this could work is by heterozygote superiority (see Chapter 3). In such cases individuals who have a single copy of the relevant allele have higher fitness than individuals who have two or none. Another possibility is that the gene for schizophrenia is dominant, but is only expressed in a minority of cases, for environmental reasons or because of interactions with other genes. This mechanism is called **incomplete penetrance**.

What could be the advantage of carrying a gene for schizophrenia? Karlsson (1984, 1985, 1988, 2001) studied a population of schizophrenics and their relatives in Iceland. He found that first-degree relatives (parents, full siblings, and children) of schizophrenics were about twice as likely as the general population to be members of creative professions (professors, poets, authors, as well as honors graduates and members of Who's Who—but not lawyers, engineers, or physicians). He proposes that individuals with the schizophrenia gene but not the disorder gain an advantage in creativity.

Karlsson believes that schizophrenia is caused by a single dominant gene with incomplete penetrance. The genetics of schizophrenia is not well understood, however. Current evidence suggests that schizophrenia is the result of more than one gene, possibly many (Comings, 1997; Gottesman & McGue, 1991). It appears that Karlsson's hypothesis of a single gene with incomplete penetrance is not likely to be supported (but, see Karlsson, 1998). Nevertheless, we believe that the idea that one or more genes for schizophrenia convey an advantage on nonsymptomatic carriers helps to explain how the disorder may be maintained in the population.

The idea that nonsymptomatic carriers of a schizophrenia gene or genes benefit is similar to our proposal for bipolar disorder. The difference is that bipolar individuals may themselves reap a reproductive benefit—not just their relatives who presumably carry the same or some of the same genes that cause the disorder.

Can Malfunction of a Mind-Reading Module Help Explain Schizophrenia?

Christopher Frith and Uta Frith (1991, C. Frith, 1992, 1994) suggest that the concept of a mind-reading module may help to explain not only autism, but also schizophrenia. The symptoms of schizophrenia are grouped into positive and negative symptoms. Positive symptoms are things a schizophrenic person does that normal people do not do: hallucinations, disorganized thoughts, paranoid delusions, and so forth. Negative symptoms describe areas where schizophrenics lack normal function: poverty of speech, blunted affect, loss of volition, and social withdrawal (Comer, 1999). Frith and Frith note that the negative symptoms of schizophrenia parallel those of autism and suggest that both disorders reflect a problem with the mind-reading module.

We must be clear that they are not saying that autism and schizophrenia are the same disorder. Autistics and schizophrenics share only the negative symptoms,

not the positive ones. Autism develops in infancy, whereas schizophrenia develops later, generally in early adulthood. Frith and Frith suggest that, unlike autistics, schizophrenics had a relatively normal mind-reading module in their youth. So, even when this module begins to malfunction, schizophrenics know that people have their own thoughts and feelings, but they are unable to interpret them correctly. According to this view, their difficulty in reading minds, including their own, causes problems in social interaction and communication. They interpret their own thoughts as those of others, and so have hallucinations. They will not be able to understand other people's actions, and so become paranoid. Or they may simply not make any interpretations. Thus we can have both positive symptoms and negative symptoms. Autistic individuals, on the other hand, grew up without the mind-reading module, and so do not attempt to make such interpretations. Thus they show only negative symptoms.

A number of findings are consistent with the hypothesis. One experiment tested the hypothesis that schizophrenics have difficulty telling whether an action is their own (Frith & Done, 1989). Schizophrenics and normals played a video game that required subjects to shoot a target. The circumstances of the game required them to shoot in different directions according to a demanding set of rules. Thus all subjects made many errors. Normal subjects generally corrected their errors when they occurred; those schizophrenics who experienced alien control of their actions, however, seldom did.

Other studies have found that schizophrenics are deficient in theory of mind (Pickup & Frith, 2001, and references therein). For example, Graham Pickup and Christopher Frith (2001) studied the ability of schizophrenics to solve false-belief tasks similar to those we described earlier when we discussed autism. In one task, subjects were shown a card depicting some rooms in a hospital. Then, the experimenter read to them a story about Andrew, whose book had been moved by a nurse when he was out of the common room. Subjects were asked where Andrew would look for the book. They found that schizophrenics did worse than normals or schizophrenics who were in remission on these tasks. When asked to explain the actions of the character in the tasks, the schizophrenics used fewer statements about the mental states of the character (e.g., "The character thinks such and such").

We believe that the hypothesis that schizophrenics have a malfunctioning mind-reading module has considerable promise in guiding future research on schizophrenia.

SUMMARY

1. The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) adopts a nontheoretical approach to classification.
2. Evolutionary considerations suggest behavior disorders will be explicable in one of six different ways:
 - a. defenses