You startle awake. Was that the dog? Palms sweaty, heart rate up, anxious—you strain to listen for clues. Then you hear the tinkle of breaking glass from downstairs. Although your physiological response is similar, now you're scared. As you reach for your Louisville Slugger, you wonder about the differences in the neural circuitry underlying anxiety and fear. Well you’re in luck! A report by Izquierdo and Murray (this issue p. 2023–2039) on the effects of lesions to the amygdala and outflow areas in the orbitofrontal cortex may shed some light on this question.

Although the amygdala is thought to be central to mediating both anxiety and fear, different outflow pathways may be critical to generating these emotions and their attendant reactions (Davis 2000). Moreover recent evidence suggests that within the amygdala there is dissociation between systems that mediate affective responses to definite outcomes, characterized by goal-directed actions, and systems that mediate affective responses when consequences are more ambiguous, characterized by elevated attention and vigilance. A number of investigators have proposed that the basolateral complex is particularly important for the former function whereas the central nucleus, extended amygdala, and basal forebrain cholinergic system may be more important for the latter (Davis 2000; Holland and Gallagher 1999; Whalen et al. 2001). In this issue, Izquierdo and Murray (2004) report an interesting dissociation between the effects of combined, unilateral lesions of amygda and orbitofrontal cortex on affective behavior that may reflect the involvement of these different systems.

These researchers made unilateral lesions of amygdala and orbitofrontal cortex in monkeys and tested them on a battery of four tests. Two of these tests involved learning to respond appropriately to arbitrary cues (visual objects) associated with unambiguous appetitive outcomes (food rewards). The third and fourth tests, which required no new learning, assessed appropriate responding to innately aversive cues (plastic snakes and hairy spiders) and an ambiguous social cue (neutral human observer). The authors compared performance in monkeys with lesions in the right or left hemisphere to identify hemispheric specialization for affective processing.

They observed no differences in affective processing between hemispheres, however they found that unilateral lesions to this circuit produced mild but significant impairments compared to the performance of monkeys without lesions. Monkeys with lesions to the amygdala-orbitofrontal circuit in either hemisphere exhibited inappropriate responses in discrimina-
speculation is consistent with the results of Kalin et al. (2001) who found that the defensive reactions in the human intruder paradigm to be unaffected even after bilateral amygdala lesions.

Of course most situations involve both ambiguity and the need for action, but the balance may determine which system is dominant in generating behavior. To return to our story, you don’t know what woke you up, so you activate amygdalar outflow through basal forebrain to promote vigilance. When the source of the sound becomes clear, you recruit prefrontal mechanisms to respond to the threat. But as you creep downstairs with your bat in hand, you wonder—is the bat big enough to fight off all those plastic snakes and hairy spiders?

REFERENCES