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Brief article

Do infants possess an evolved spider-detection mechanism?

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Abstract

Previous studies with various non-human animals have revealed that they possess an evolved predator recognition mechanism that specifies the appearance of recurring threats. We used the preferential looking and habituation paradigms in three experiments to investigate whether 5-month-old human infants have a perceptual template for spiders that generalizes to real-world images of spiders. A fourth experiment assessed whether 5-month-olds have a perceptual template for a non-threatening biological stimulus (i.e., a flower). The results supported the hypothesis that humans, like other species, may possess a cognitive mechanism for detecting specific animals that were potentially harmful throughout evolutionary history.

Keywords: Infancy; Perception; Cognition; Evolution; Fear; Spiders; Adaptations

1. Introduction

From an evolutionary perspective, failing to survive past childhood posed a grave adaptive problem: those who died before puberty failed to become ancestors. As a

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result, there would have been powerful selection pressure for the evolution of psychological adaptations that helped infants and children to avoid recurrent threats to survival. Of all the non-human animals that were potentially harmful to hominids over evolutionary history, in all likelihood none were more recurring than spiders and snakes. Today they are among the most common object-related phobias in adults in North America, and both are strongly represented in the mythologies of Greece, India and Africa, and South America (Nesse, 1990). One adaptive solution for learning that snakes and spiders, in particular, are potentially harmful is for a cognitive mechanism to specify their appearance so that they may be attended to and the appropriate response learned. Has evolution provided humans with a means to identify these animals so that a fear response for them can be quickly acquired?

There is considerable evidence that human infants develop fears for various stimuli other than snakes and spiders that were recurring hazards throughout evolutionary history. For example, infants develop an apprehension of heights around the time they start to crawl (Campos et al., 2000; Gibson & Walk, 1960), and during the same period they also start to fear one of the most recurring physical threats, namely, male humans (Ainsworth, Blehar, Waters, & Wall, 1978). Öhman and Mineka (2001) hypothesized that humans and non-human primates also possess an evolved fear mechanism for snakes and other fear-relevant stimuli (e.g., spiders) that is selectively sensitive to, and is activated by such stimuli. This mechanism causes individuals rapidly to attend to snakes and spiders when they are present and facilitates rapid learning of an association of fear with such stimuli. In support of this view it has been found that adult humans detect fear-relevant stimuli such as snakes against a background of non-fear-relevant stimuli (such as flowers and mushrooms) more quickly than they detect fear-irrelevant stimuli hidden amongst fear-relevant stimuli (Öhman, Flykt, & Esteves, 2001). In addition, young lab-raised rhesus monkeys more rapidly learn to associate snakes with a fearful response – as emitted by another monkey – than learn to associate flowers with a fearful response (Cook & Mineka, 1990).

We hypothesized that if humans possess an evolved fear module, then early in life they should have a perceptual template for snakes and spiders that specifies their basic shape and configuration (Rakison, 2005). That is, a mechanism that causes an individual selectively to attend to specific stimuli must incorporate an initial representation of those stimuli that can be matched with their real-world counterpart. Evidence of such a perceptual template in human infants has been found in the domain of face recognition such that newborns and young infants preferentially track a face-like schematic image longer than a linear or scrambled version of the image (Johnson, Dziurawiec, Ellis, & Morton, 1991; Johnson & Morton, 1991). However, despite considerable research on a fear mechanism in adults, to date no research has examined whether human infants possess a perceptual template for snakes or spiders. In the four experiments outlined here, we examined whether 5-month-old infants show evidence that they have a basic perceptual representation of spiders. We also investigated whether a similar representation exists for a non-threatening biologically plausible stimulus, namely, a flower.