

**IMPRESSIONS OF DANGER INFLUENCE IMPRESSIONS OF PEOPLE:
AN EVOLUTIONARY PERSPECTIVE ON INDIVIDUAL AND
COLLECTIVE COGNITION**

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Abstract. An evolutionary approach to social cognition yields novel hypotheses about the perception of people belonging to specific kinds of social categories. These implications are illustrated by empirical results linking the perceived threat of physical injury to stereotypical impressions of outgroups. We review a set of studies revealing several ways in which threat-connoting cues influence perceptions of ethnic outgroups and the individuals who belong to those outgroups. We also present new results that suggest additional implications of evolved danger-avoidance mechanisms on interpersonal communication and the persistence of cultural-level stereotypes about ethnic outgroups. The conceptual utility of an evolutionary approach is further illustrated by a parallel line of research linking the threat of disease to additional kinds of social perceptions and behaviors. Evolved danger-avoidance mechanisms appear to contribute in diverse ways to individual-level cognitive processes, as well as to culturally-shared collective beliefs.

Key words: Cognition, Communication, Culture, Danger, Emotion, Evolution, Stereotypes

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As a species, humans typically respond with fear and avoidance to environments that pose real risks to physical well-being. We feel nervous when we peer over a precipitous cliff, for example, and we jump away from snakes that slither out of the grass. These emotional and behavioral responses are functional; they help prevent injury and promote survival. As functional as these psychological tendencies are today, they were surely even more functional among human (and pre-human) populations during the long epochs of the historical past, when, in the absence of modern medical interventions, injury and infection were likely to lead to disability or death. Given these functional consequences, the capacity for fearful, avoidant responses has been evolutionarily adaptive.

This does not mean, however, that these psychological responses are perfectly calibrated to the actual danger lurking in the environment. Far from it. As with many other adaptive responses, fearful responses over-generalize: We often react fearfully even in the absence of any real danger. A precipitous cliff may make us feel faint even when we are strapped securely in a gondola seat, and a garden hose in the grass may scare us just as much as a snake. Despite our capacity for rational appraisal, these reactions can be triggered instantly and automatically by the perception of simple schematic perceptual cues. Fearful reactions to dangerous things are often extended predictably to non-dangerous things as well.

Just as cliffs and snakes are potentially dangerous, so are people on occasion. As such, we react with fear and avoidance to some interpersonal encounters. These reactions can occasionally be justified on clearly rational grounds, but often they are not. Certain people might arouse anxiety and avoidance simply because they have some characteristic that heuristically fits some schematic danger-connoting profile, even if that characteristic is logically irrelevant to any real danger. Just as we sometimes treat garden hoses as though they were snakes, we sometimes perceive benign people to be dangerous.

This psychological tendency has consequences for our impressions about individuals and for our prejudicial attitudes toward groups of people. Moreover, because individual-level acts influence collectively-shared beliefs, the evolved psychology of danger-avoidance may also influence the collective norms that define human cultures. The purpose of this article is to describe some of the subtle ways in which individuals' perceptions of danger influence individual and collective impressions of others.

THE EVOLVED PSYCHOLOGY OF DANGER-AVOIDANCE

Throughout our evolutionary past, specific kinds of cognitive mechanisms are likely to have emerged that helped individuals avoid recurrent dangers. To operate, these mechanisms would have to be sensitive to perceptual cues that predicted the presence of danger. For example, a loud noise like an animal's growl may have predicted the presence of a mammalian predator, and a coiled tubular shape on the ground may have predicted the presence of a snake. Cognitive mechanisms for detecting these cues would have conferred a survival advantage.

While there may be an innate tendency to associate some categories of cues with danger, many specific danger-connoting cues must be learned. However, even when learning is involved, certain kinds of stimuli are more rapidly learned to be linked to danger. For example,

we learn to more rapidly associate aversive outcomes with potentially-dangerous objects (e.g., snakes) than with benign objects (e.g., flowers or mushrooms). We also learn to more rapidly associate aversive outcomes with specific dangerous objects that existed in evolutionarily-relevant epochs (e.g., snakes) than with equally-dangerous objects of more recent vintage (e.g., electrical outlets; for a review see OHMAN and MINEKA, 2001).

Adaptive cognitive mechanisms for detecting danger are not always accurate (HASELTON, NETTLE and ANDREWS, 2004). Because the failure to avoid an actual danger carries serious negative consequences, whereas the erroneous avoidance of benign entities does not, these danger-detection mechanisms are likely to be biased in predictable ways. Specifically, evolved danger-detection mechanisms have probably evolved to be risk-averse: To err on the side of "false-positives" – so as to minimize the dire consequences of "false negatives" – and thus to treat as dangerous many benign environmental cues (e.g., garden hoses) which are superficially similar to the cues connoting ancestral dangers. This implies that in contemporary environments, danger-avoidance responses may be triggered by a variety of cues that are not actually dangerous at all.

Adaptive danger-avoidance mechanisms not only promote hyper-vigilance to cues predicting possible danger, but also activate a pattern of functionally adaptive responses to danger. In avoiding danger, time is of the essence, and so initial danger-avoidance responses are probably rapidly and reflexively elicited by danger-connoting cues (SCHALLER, 2003). For example, the acoustic startle reflex occurs very rapidly in the absence of any conscious cognitive analysis of a situation. The specific response to any perceived danger is likely to involve the automatic activation of specific emotions and cognitions that motivate specific functionally-beneficial behaviors (e.g., avoidance).

Successful danger-avoidance mechanisms must also be attentive to contextual cues providing information about an individual's actual vulnerability to danger. In contexts connoting high vulnerability, the cost of false negatives increases as it is especially dangerous to ignore a potential threat when one is especially vulnerable to that threat. In contexts connoting low vulnerability, the cost of false positives increases. This is because under conditions in which one is truly invulnerable to harm, the functional benefits of a danger-avoidant response are negligible and may in fact be outweighed by the costs of engaging in that response (e.g., caloric consumption, disruption of ongoing tasks). As a result, danger-avoidance responses are often amplified in contexts connoting a high vulnerability to danger and may be inhibited in contexts connoting a low vulnerability to danger. For example, the acoustic startle reflex is amplified in conditions of ambient darkness, a contextual cue that typically signals greater vulnerability to danger (GRILLON, PELLOWSHKI, MERIKANGAS and DAVIS, 1997). Similarly, the engagement of evolved danger-avoidance mechanisms may also be moderated by individual differences in perceived vulnerability to harm. For a variety of reasons, some people feel especially vulnerable to specific dangers, whereas other people feel especially invulnerable. These chronic feelings of vulnerability or invulnerability provide additional information that may amplify or inhibit danger-avoidance responses.

In summary, evolved danger-avoidance mechanisms typically (a) promote hyper-vigilance to danger-connoting cues, (b) are biased to be risk-averse and so are likely to perceive danger even when none is present, (c) automatically elicit functionally-relevant emotional, cognitive, and behavioral responses, and (d) are moderated by both chronic and contextual information that heuristically conveys personal vulnerability to danger.

THE AVOIDANCE OF DANGERS POSED BY PEOPLE

Evolved danger-avoidance mechanisms influence reactions not only to cues in the physical environment, but also toward cues in the social environment. Interactions with specific kinds of people may result in a variety of forms of physical harm (direct physical assault, transmission of infectious diseases, etc.). Just as a specific danger-avoidance mechanism appears to have evolved to promote detection and avoidance of snakes (OHMAN and MINEKA, 2001), other specific danger-avoidance mechanisms may have evolved to detect and avoid specific kinds of people who pose specific kinds of threat to personal well-being (KURZBAN and LEARY, 2001; NEUBERG and COTTRELL, 2002; SCHALLER, PARK and FAULKNER, 2003).

Like other hypothetical danger-avoidance processes, interpersonal danger-avoidance requires detection of specific features in others that heuristically connote harm-doing potential. Upon detecting these cues, an interpersonal danger-avoidance mechanism likely triggers psychological responses (e.g., fear) to motivate behaviors (e.g. avoidance) that reduce the threat posed by potentially dangerous others. In addition, interpersonal danger-avoidance responses are likely to be moderated by chronic or contextual variables connoting vulnerability to specific interpersonal dangers.

This analysis of hypothetical danger-avoidance mechanisms has implications for contemporary social cognition. If some ancestral cognitive mechanisms arose to detect and avoid people heuristically associated with danger, then people who possess similar danger-connoting features in contemporary environments might currently be targets of these reactions. This is likely to occur regardless of whether these features accurately predict the presence of real danger in modern environments, since these mechanisms are responsive to heuristic (but not necessarily accurate) danger-connoting cues. At the level of individual cognition, danger-avoidance processes might underlie various phenomena in the realm of person perception, stereotyping, and prejudice. Some people might be judged to have specific kinds of negative characteristics simply because they share superficial features that trigger evolved danger-avoidance responses. Moreover, at the level of collective cognition, concerns about interpersonal danger might promote the transmission of specific kinds of negative beliefs about people heuristically associated with danger. This may promote the emergence and persistence of specific kinds of culturally shared beliefs about the dangers posed by specific categories of people.

In recent years, several research projects have been motivated by this evolutionary approach to individual and collective cognition, yielding a novel set of discoveries bearing on a diverse set of social cognitive phenomena. We now review some of this research, focusing especially on studies that explore the cognitive and cultural consequences of an evolved mechanism for avoiding interpersonal physical injury.

IMPLICATIONS FOR CONTEMPORARY INTER-GROUP IMPRESSIONS

During much of our evolutionary history, people lived in small tribal units. In this setting, unexpected interactions between individuals from mutually unfamiliar tribes may have aroused physical violence, thus representing a threat to individuals' health and survival. The functional cost associated with these inter-group encounters may have led to the emergence of specific psychological mechanisms that facilitated the avoidance of tribal outsiders. A danger-avoidance mechanism may have evolved to facilitate the learning and detection of cues

identifying tribal outgroups, as well as to facilitate the cue-based arousal of functionally-relevant emotions (e.g., fear) and cognitions (e.g., stereotypic beliefs that linked tribal outgroups with traits connoting danger). While operating directly at the individual level of analysis, this psychological mechanism may also have had collective consequences by promoting the interpersonal transmission of beliefs that focused on the threats posed by members of tribal outgroups.

Although contemporary social environments are very different from those that characterized our evolutionary past, any modern category of people who fit a "tribal" template (e.g., ethnic outgroups) might trigger this evolved danger-avoidance process.

This analysis produces a number of testable hypotheses. If ethnic outgroup status triggers an evolved danger-avoidance process, then encounters with ethnic outgroup members might arouse danger-relevant emotions and cognitions. Existing research supports this idea; interactions with members of ethnic outgroups elicit self-reported fear and anxiety as well as increased cardiovascular reactivity (BLASCOVICH, MENDES, HUNTER, LICKEL and KOWAI-BELL, 2001). Brain structures linked to danger-relevant emotions such as fear are also activated when people perceptually encounter ethnic outgroups (PHELPS et al., 2000). Reactions to outgroups also include specific kinds of danger-relevant cognitions. For example, ethnic outgroups often evoke negative stereotypes that reflect specific concerns about hostility and untrustworthiness.

Additional, more textured, hypotheses are implied by this analysis as well: Any variable (either chronic or contextual) that creates an impression of vulnerability to physical danger may more strongly trigger danger-avoidant responses in response to members of ethnic outgroups. This may occur even if the source of vulnerability is logically unrelated to the outgroup, as an evolved danger-avoidance mechanism is likely to respond heuristically to any signal of personal vulnerability. To test these hypotheses, several sets of studies examine the link between danger-vulnerability variables and functionally-specific cognitions about members of ethnic outgroups.

Functional Projection of Emotion in Interpersonal Perception

An important part of any social interaction is the assessment of others' intentions. One of the primary means of assessing others' intentions is through the perception and decoding of their emotion-relevant facial expressions. A large body of psychological literature has examined the processes that assist, influence, and sometimes bias our perceptions of others' emotions (e.g., NIEDENTHAL and HALBERSTADT, 2003), and danger-avoidance mechanisms clearly play some role here. People are especially quick to detect the emotional expression of anger, which most clearly connotes an impending threat (HANSEN and HANSEN, 1988; ÖHMAN, LUNDQVIST and ESTEVES, 2001). Furthermore, some people are better than others at detecting anger. For instance, children who have been the object of physical abuse, and so may be especially wary of hostility, are particularly accurate at anger-detection (POLLAK and SINHA, 2002). In a recent set of studies, MANER et al. (2004) examined the perception of others' emotions within an intergroup context. These studies tested the hypothesis that individuals who are especially wary of danger are also more likely to perceive anger in the faces of people whose ethnic outgroup membership implicitly connotes potential hostility.

In one study reported by MANER et al. (2004), white American participants were presented with a series of photographs, each depicting a target person. The target persons varied along dimensions of both race (Black versus White) and gender (Men versus Women).

Thus, among the target persons there was a category of individuals – Black men – that fit a cultural stereotype connoting the potential for hostility. While all photographs depicted target persons with neutral facial expressions, participants were told that the targets were photographed while they were deliberately trying to mask an emotion that they were feeling. The task of participants was to rate the extent to which each target person was feeling one of several different possible emotions (anger, fear, happiness, etc.). Prior to this emotion-detection task, participants were shown one of several short movie clips. One of these clips was pre-rated to arouse a fearful, vulnerable, self-protective state in participants. Emotion-detection ratings made by participants in this condition were compared to those made by participants who were shown an affectively neutral movie clip (control condition).

Results revealed that a temporarily-activated state of vulnerability led to the perception of more anger in the faces of Black men. Moreover, this effect was target-specific: There was no such amplification in the amount of anger perceived in the faces of White men, nor was there any such amplification in the amount of anger perceived in the faces of women. This effect was also specific to the functionally-relevant emotion of anger: There was no tendency to perceive greater levels of fear or other emotions in the faces of Black men. Thus, these results cannot be attributed to the facilitating effects of physiological arousal, or to any sort of semantic priming process. The process that does account for these results is a sort of functional projection of emotion. That is, participants feeling a specific emotional state (fear) projected a very different but functionally-relevant state (anger) onto a specific set of others whose outgroup membership (and the cultural stereotype associated with it) heuristically connotes potential danger.

In another study using this procedure, MANER et al. (2004) extended the functional projection phenomena to the perception of a different outgroup. Participants were White Americans and target photographs depicted men and women who were either White Americans or of apparent Arabic ethnicity. It is important to note that this research was conducted during a period of time in which U.S.-Arab relations were strained, and American media portrayals of Arabs tended to focus on potential hostilities. As there was expected to be considerable variability in individuals' stereotypes of Arabs, participants also completed measures assessing their implicit stereotypes of Arabic people. Results revealed that these individual-level stereotypes moderated the functional projection phenomenon. Among participants who held negative stereotypes of Arabs, the pattern of results replicated those of the first study. Fearful participants perceived greater anger (but not other emotions) in the faces of Arab (but not White) target persons. However, the functional projection phenomena did not emerge among perceivers who held no implicit negative stereotype, presumably because Arabic ethnicity could not serve as a heuristic cue connoting potential danger.

Together, these findings reveal that a temporarily-activated impression of impending danger can lead to predictable biases in individuals' perceptions of angry emotional states in ethnic outgroup members. The specific nature of this bias is consistent with the functional analysis of danger-avoidance offered by an evolutionary perspective. The results also reveal that this functional projection phenomenon is variable across individuals, and is dependent on the extent to which individuals perceive the outgroup in specific stereotypical ways. This finding offers the useful reminder that the contemporary consequences of underlying evolutionary mechanisms must be considered in the context of other processes (e.g., idiosyncratic social learning experiences) that affect the attitudes and inclinations of individuals.

Expression of Prejudicial Beliefs

The functional projection findings were observed when perceivers made emotion judgments about individual group members. A conceptually similar phenomenon emerges when perceivers make trait judgments about outgroups as a whole. SCHALLER, PARK and FAULKNER (2003) examined the effects of both chronic and temporarily-activated feelings of vulnerability on the expression of beliefs about an ingroup and an outgroup. Participants were students at a Canadian university. They were asked to rate "men from Canada" (an ingroup) and "men from Iraq" (an outgroup associated with negative stereotypes) on a set of four personality traits. Two of these traits (*hostile* and *trustworthy*) were especially relevant to the potential for threat whereas the other two traits (*ignorant* and *open-minded*) were equally evaluative, but less threat-relevant. Prior to making these ratings, a manipulation was introduced: the level of ambient lighting. Participants in one experimental condition completed their ratings under well-lit conditions, while those in another condition completed their ratings after the lights in the room had been turned off and the room was plunged into total darkness. In addition, all participants completed the "Belief in a Dangerous World" scale (BDW; ALTEMEYER, 1988), a self-report measure assessing chronic concerns about vulnerability to danger. Therefore, the research design provided the opportunity to test the individual and joint effects of a chronic vulnerability cue (BDW) and a temporary vulnerability cue (ambient darkness) – both of which are logically irrelevant to intergroup relations – on trait perceptions of ingroup and outgroup.

Results revealed no effects at all on threat-irrelevant trait ratings. However, an interesting interactive effect of BDW and ambient darkness emerged on threat-relevant trait ratings. Iraqi's were rated to be especially hostile and untrustworthy (and Canadians were rated to be especially non-hostile and trustworthy) by participants who had high BDW scores and made their ratings in the dark. Darkness did not lead to this greater prejudice among low-BDW individuals who felt chronically invulnerable to harm. Similarly, BDW was not associated with greater prejudice for those individuals who made their ratings in a well-lit room (and so were not exposed to an environmental trigger for vulnerability).

These results reveal that chronic and temporarily-activated impressions of vulnerability to danger can lead to more exaggerated prejudicial beliefs about outgroups. Moreover, these variables may interact in interesting ways. Importantly, these effects are specific to very particular domains of judgment - domains that are functionally relevant to perceivers' feelings of vulnerability.

Automatic Activation of Stereotypes

If indeed these phenomena represent the contemporary expression of evolved danger-avoidance mechanisms, then the effects are likely to be rooted in automatically-activated cognitions. SCHALLER, PARK and MUELLER (2003) reported two studies that tested the effects of vulnerability cues on the activation of underlying cognitive structures. These studies examined the interactive effects of BDW and ambient darkness on the activation of specific stereotypes about Blacks.

In one study, participants (non-Black students at a Canadian university) viewed a slide show depicting a series of photographs of young Black men. Afterwards, they rated the extent to which they perceived various traits to be part of the cultural stereotype of Black people – a task that has been used previously to assess the automatic activation (rather than personal

endorsement) of ethnic stereotypes. Some of the rated traits were highly threat-relevant (e.g., criminal, untrustworthy) whereas others were stereotypical but less threat-relevant (e.g., lazy, ignorant). Participants in one condition viewed the slide show under dimly-lit conditions, whereas participants in another condition viewed the slides under conditions of near-total darkness. All participants completed the BDW scale. Results were conceptually consistent with the findings reported by SCHALLER, PARK and FAULKNER (2003). There were no meaningful effects on the activation of threat-irrelevant stereotypes, but BDW and ambient darkness had an interactive effect on the activation of threat-relevant stereotypes. High-BDW participants in the darkness condition were especially likely to perceive danger-connoting traits to be part of the cultural stereotype of Blacks.

SCHALLER, PARK and MUELLER's (2003) second study replicated this finding using a different measure of stereotype activation. Participants completed two versions of an "implicit association task" (IAT; GREENWALD, MCGHEE and SCHWARTZ, 1998) – a computer-based response-time measure that assesses cognitive associations between specific social categories and semantic information. One IAT assessed the activation of an implicit association between the social category "African" and the semantic category "Danger." Another IAT assessed the implicit association between "African" and the broader evaluative category "Unpleasant." Results revealed an interactive effect of BDW and ambient darkness on the African/Danger IAT such that high BDW participants in the dark were more likely to associate "African" with "Danger". No meaningful effect was observed on the less-functionally-specific African/Unpleasant IAT.

These results are consistent with other findings from this line of research, and demonstrate more clearly the effects of vulnerability cues on the automatic activation of functionally-relevant cognitive structures.

Sex Differences in Danger-Avoidant Impressions

There are several reasons to consider the extent to which there might be sex differences in the activation of the danger-avoidance processes that operate in social perception. Women are perhaps more truly vulnerable than men, because women are generally smaller in stature and so less able to repel physical assaults. Consequently, a perspective based on the rational assessment of contemporary vulnerability suggests that the danger-avoidant phenomena reviewed above might show up more strongly among women than men. An evolutionary perspective, however, suggests something quite different. In ancestral environments, it is likely that males more than females were at risk for unexpected intergroup encounters. Among the primate species most closely related to human beings, males range more widely than females and are more likely to spend time at territorial boundaries (GOODALL, 1986; HASEGAWA, 1990). Intergroup contact and intergroup hostilities also involve males more than females (CHENEY, 1986; WRANGHAM, 1987). Therefore, the functional benefits associated with a wariness of outgroup threat (and the cognitive processes underlying this wariness) would have been greater among males. This line of reasoning suggests that the danger-avoidant interpersonal perception phenomena reviewed above may be stronger among men than among women.

Consistent with this evolutionary perspective, in several of the studies reviewed above, effects emerged more strongly among men than among women. In one of the studies reported by MANER et al. (2004), men more than women showed the tendency to perceive anger in Black male faces following the activation of a self-protective state. There was a similar sex difference in the effect of ambient darkness on perceptions of Iraqi's hostility and

untrustworthiness (SCHALLER, PARK and FAULKNER, 2003). Additionally, in one study reported by Schaller, Park, and Mueller (2003), men showed a stronger interactive effect of BDW and darkness on the activation of danger-relevant Black stereotypes. While not all studies show meaningful sex differences, the pattern emerging in these preliminary findings suggests that while danger-avoidant intergroup cognitions do occur across both sexes, they are likely to be triggered especially strongly in men.

Communication and the Persistence of Culturally-Shared Stereotypes

The studies summarized above all examine the operation of danger-avoidance processes at the level of individual cognition. We know, of course, that human cognitive processes are importantly influenced by culture (for a review, see LEHMAN, CHIU and SCHALLER, 2004), and so it might be tempting to argue that these phenomena are simply the result of cultural norms and do not indicate the operation of evolved cognitive processes at all. After all, children are typically socialized to avoid strangers, and there are endless examples of cultural products – myths, legends, and other kinds of collective beliefs – that depict outgroups in unfavorable ways. Logically however, a cultural explanation is not an alternative to an evolutionary explanation. These two kinds of explanations operate at very different levels of analysis. Any explanation based on cultural beliefs and norms demands that we ask why those beliefs and norms have the specific contents that they do – and an evolutionary analysis is useful in supplying answers to that question (ATRAN and NORENZAYAN, in press; KENRICK, LI and BUTNER, 2003; KREBS and JANICKI, 2004; TOOBY and COSMIDES, 1992). As a means of integrating evolutionary and cultural perspectives in the present context, it is fruitful to consider more thoroughly how evolved danger-avoidance mechanisms may shape the collective beliefs that help to define human cultures.

One preliminary empirical exercise of this sort extends previous studies that have examined the role of interpersonal communication in the emergence and persistence of collectively-shared stereotypes. SCHALLER, CONWAY and TANCHUK (2002) report several studies documenting two key findings. First, there is considerable variability in the extent to which individuals are likely to talk about the specific characteristics of other people; some traits are more "communicable" than others. Second, those traits that are more highly communicable are more likely to persist over time in the popular stereotypes of culturally-visible outgroups. These findings implicate a process in which individual decisions, operating within the context of interpersonal communication, ultimately shape the contents of culturally-shared beliefs. The question remains: Why are some traits more communicable than others? One possible answer is this: Those traits that are more diagnostic of danger are more likely to be talked about – and so are more likely to persist in the collectively-shared cultural stereotype of groups.

Some preliminary data support this conceptual analysis. A sample of 43 participants rated 76 traits in response to the following question: "If someone has this trait, to what extent does the person pose some potential danger to others?" Responses were recorded on a 10-point scale anchored by endpoints labeled "no danger at all" and "high level of danger." The mean rating for each trait was computed, and these means were converted into z-scores. The absolute value of these z-scores represented the extent to which the trait was relevant to danger. Higher values were associated with traits that more clearly implied threat or the absence of threat; values close to zero indicated that the trait was not diagnostic of threat. Across the 76 traits, these danger-relevance values predicted a trait's communicability score (obtained from a

different sample and reported by SCHALLER et al., 2002), $r = .37, p < .001$. Apparently, people are more likely to talk about traits that are more clearly diagnostic of danger.

Given the well-documented impact of interpersonal communication on culturally-shared beliefs (HARTON and BOURGEOIS, 2004; LATANE, 1996; SCHALLER et al., 2002), it is possible that normative beliefs about salient outgroups are especially likely to coalesce around danger-relevant traits. This hypothesis can be tested by examining the correlation between a trait's danger-relevance and its persistence in collective stereotypical beliefs. SCHALLER et al. (2002) summarize data that provides 10 different assessments of a trait's persistence in Americans' collective stereotype of Blacks across several generations in the 1900s. Each assessment indicates persistence from some specific time period to some specific later time period (for details, see SCHALLER et al., 2002). For each set of persistence scores, one can compute the correlation between a trait's danger-relevance and its persistence in the collective stereotype. (Following the procedures of Schaller et al., these analyses controlled for the actual level of stereotypicality at the first point in time). These 10 partial correlations, each of which provides a test of the hypothesis, are summarized in Table 1. Given the small number of traits that define a collective stereotype at any single point in time, the actual magnitudes of these correlations are highly variable. What is more meaningful is the fact that every one of these correlations is positive, a pattern of results that is highly unlikely to have occurred by chance alone. The results clearly reveal that traits that are higher in danger-relevance are also more likely to persist as defining elements of the culturally-shared stereotype of Blacks. Given that these results are very preliminary and examine the contents of only one very specific cultural belief (Americans' collective stereotypes of Blacks during the 1900s), it would be premature to draw over-general conclusions. Still, these results do offer some hint that evolved danger-avoidance processes may guide not only contemporary cognitive responses operating at the individual level, but may also shape the collective belief systems that, in part, define a culture.

ADDITIONAL DANGERS, ADDITIONAL CONSEQUENCES ON COGNITION AND CULTURE

In addition to physical danger, a variety of other threats to individual health might also have led to the evolution of specific psychological mechanisms that influence contemporary impressions of specific categories of people (KURZBAN and LEARY, 2001; NEUBERG and COTTRELL, 2002). Moreover, by also influencing the decisions people make about interpersonal communication, these same mechanisms may exert an unintended impact on collective beliefs as well.

Consider briefly the danger posed by the interpersonal transmission of bacteria, viruses and other disease-causing agents. The perceived threat of disease transmission underlies the social rejection of people who we know are afflicted with contagious diseases (CRANDALL and MORIARTY, 1995). An evolutionary perspective reveals how this threat might also underlie more irrational negative reactions to people who are actually physically healthy, but who possess heuristic cues connoting the presence of contagious disease (KURZBAN and LEARY, 2001; SCHALLER, PARK and FAULKNER, 2003).

Avoiding communicable pathogens and parasites is likely to have been a recurring concern throughout human evolutionary history. Psychological mechanisms may have evolved to facilitate the recognition of—and automatic aversive reactions to—superficial cues that were correlated with the presence of contagious diseases in others. Individuals may be responsive to specific physical features that are correlated with the presence of pathogens (RHODES et al.,

2001). In addition, given the tendency for evolved danger-avoidance mechanisms to be risk-averse, it is likely that individuals may also be responsive to broad categories of cues that indicate some sort of physical abnormality. Any salient morphological abnormality may automatically activate disease-relevant emotions (e.g., disgust) and cognitions (e.g., implicit associations between target persons and disease) that motivate behavioral avoidance. These mechanisms may be especially likely to be triggered when perceivers feel highly vulnerable to disease.

Several recent studies provide support for this mechanism and reveal its implications for prejudicial social impressions. PARK, FAULKNER and SCHALLER (2003) report findings from a study that assessed the extent to which physically disabled individuals are implicitly associated with disease. Results revealed that these associations were stronger among participants who were either chronically sensitive to disgust (an emotion presumably linked to disease-avoidance mechanisms) or who perceived themselves to be highly vulnerable to disease. This occurred even though the specific target disabilities were not logically associated with contagious disease at all. Another study (PARK, SCHALLER and CRANDALL, 2004) examined the effects of disease-vulnerability on the automatic activation of stereotypes about fat people. Results revealed that chronic concerns with contagious disease predict stronger expression of dislike for fat people, and also showed that the temporary salience of contagious diseases enhances the tendency to associate fat people (but not thin people) with the semantic concept "disease."

The danger of disease may be heuristically signalled not only by morphologically unusualness but also by cultural unusualness as well, particularly by evidence that others violate local norms governing behavior in disease-relevant domains (e.g., food preparation, personal hygiene). Consequently, an evolved disease-avoidance mechanism may contribute to xenophobic attitudes toward subjectively foreign outgroups. Results from a recent series of studies support this hypothesis (FAULKNER, SCHALLER, PARK and DUNCAN, in press). Both chronic and temporarily-salient concerns with disease predict exclusionary attitudes toward subjectively foreign (but not familiar) immigrant groups.

There is also research that indirectly implies some impact of evolved disease-avoidance mechanisms on interpersonal communication and the consequent emergence of collective knowledge. This work focuses not on stereotypes, but on "urban legends." HEATH, BELL and STERNBERG (2001) examined the influence of disgust – an emotion functionally linked to disease-avoidance mechanisms – on individuals' decisions to transmit these contemporary myths to others. Results revealed that people prefer to transmit urban legends that elicit a greater amount of disgust, and that legends eliciting more disgust are more widely distributed on the Internet. Thus, through the mediating mechanism of interpersonal communication, evolved disease-avoidance processes operating at the individual level may exert an indirect influence on the specific contents of popular beliefs and other culturally-shared knowledge structures.

EVOLUTION, COGNITION, AND CULTURE

An evolutionary approach to social cognition illuminates interesting and non-obvious relations between human origins, human cognition, and human culture. Evolutionary pressures have sculpted cognitive processes through which individuals produce decisions. These decisions influence acts of interpersonal communication, and these acts of communication constrain the contents of culturally-shared beliefs. A consideration of evolutionary pressures

operating in the ancestral past can yield predictive insights into the kinds of knowledge structures that are likely to become culturally ubiquitous in the present, and remain so into the future. This does not discount the fact that cultural norms vary widely across different human populations, in response to contextually-idiosyncratic variables. But lurking beneath these overt cultural idiosyncrasies, there may lie deeper cross-cultural universals rooted in evolutionarily-fundamental facets of human cognition. In a sense, culture is like a coloring book: Evolved cognitive mechanisms provide a finite set of universal templates which may then be colored in an infinite variety of idiosyncratic, population-specific ways.

Just as culture is influenced by cognition, cognition is also influenced by culture. Our evolved cognitive architecture is characterized by a high degree of flexibility that allows us to adjust our behavior to a variety of different socio-cultural contexts. Social learning processes are fundamental here. In any given cultural context, individuals must learn which specific superficial cues connote certain kinds of danger (e.g., specific perceptual cues that differentiate locally-relevant ingroups from outgroups) and which other specific cues connote personal vulnerability to danger. These local learning environments produce population-specific inputs that moderate the outcomes of evolved stimulus-response relationships. Thus, cognition too is like a coloring book: Our evolutionary history has shaped a finite set of basic cognitive mechanisms, and these mechanisms can be informed in an infinite variety of ways by the learning histories of individuals. An important agenda for future research in psychology is to provide a more complete reckoning of the complicated relationships between evolution, cognition, and culture.

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Table 1. Partial Correlations Between a Trait's Danger-Relevance Score and its Persistence in Americans' Collective Stereotype of Blacks.

| Period of Time For Which Persistence Was Computed | Partial Correlation Between Danger-Relevance And Persistence |
|---|--|
| 1930s to 1950s | .99 |
| 1930s to 1960s | .63 |
| 1930s to 1980s | .74 |
| 1930s to 1990s | .35 |
| 1950s to 1960s | .59 |
| 1950s to 1980s | .75 |
| 1950s to 1990s | .24 |
| 1960s to 1980s | .49 |
| 1960s to 1990s | .34 |
| 1980s to 1990s | .20 |