

EVOLUTION AND THE SOCIAL MIND

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How the Mind Warps A Social Evolutionary Perspective on Cognitive Processing Disjunctions

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Our Basic Model of How Fundamental Motives Influence Cognitive Processes
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If you walk down a crowded street at noon, which of the passing strangers could you pick out of a lineup an hour later? From the standpoint of common sense, and of the traditional model of attention and memory, your ability to remember other people ought to depend on initial visual attention—you'll encode those faces you spent more time looking at, and later remember those encoded faces that managed to make it into long-term memory. Our research program on basic social cognitive processes began with just this set of apparently straightforward assumptions—that memory for faces will depend on encoding, which will in turn depend directly on initial visual

attention (e.g., Craik & Tulving, 1975). We were surprised to find that we were wrong.

Let's begin with the classic three-step model of memory that has appeared in general psychology textbooks for decades. In simplified form, this traditional view involves a series of reasonably linear steps (Atkinson & Shiffrin, 1968). First, some subset of all the information in a person's current environment is registered in sensory memory. For example, we visually attend to some stimuli and never even rest our fovea on others: A person walking across a crowded college campus would likely scan at the height of people's faces, as opposed to looking up at the sparrows and finches in the trees above her head (the opposite might be true if she were a birdwatcher, but then the finches, but not the faces, would get registered). At the second step, a smaller subset of the most "important" information is selected for encoding and conscious processing in short-term memory (Cowan, 1988). For example, most people in a large crowd may be scanned but never consciously registered; we fixate on a particular few, such as the man on stilts dressed in a clown costume, the fashion model, and the blue-haired grandmother carrying a poodle. From this smaller subset of information making the cut for short-term memory, a still smaller subset is presumed to get deep enough consideration to make it into long-term memory (Ranganath, Cohen, & Brozinsky, 2005). If, for example, you have a conversation with the fashion model, who turns out to be your best friend's cousin, you will remember the conversation later, while the fleeting image of the blue-haired grandmother and her poodle are lost forever. In this chapter, we explore a number of intriguing "disjunctions"—discrepancies between early and later information processing that violate the expected linear order in interesting ways. For some categories of faces, for example, observers better remember those they looked away from; other categories of faces get preferential initial processing but are then forgotten.

One goal of this chapter is to begin developing a model of when and why one might find these sorts of processing disjunctions. Toward this end, we will consider disjunctions as they reflect more generally on evolution-inspired models of cognitive processing. The central assumption driving our research program is that cognitive processing ultimately reflects a mind designed to extract and ponder information prioritized by functional relevance. We begin with the broad assumption that attention, encoding, and memory, as well as the linkages between these basic processes, are designed to serve adaptive ends. If one encounters unexpected nonlinearities, we believe it may be a mistake to adopt a default presumption that they simply reflect glitches in the system. Instead, it is worth considering whether such apparent glitches may reflect a generally functional system (cf. Fletcher, Simpson, & Boyes, 2006; Forgas, chapter 7, this volume). Following a brief examination of several data sets in which we have observed interesting disjunctions, we suggest the outlines of a conceptual model with implications for understanding when and where disjunctions will be found. Finally, we reflect on some additional empirical implications of thinking about cognitive disjunctions more generally.

OUR BASIC MODEL OF HOW FUNDAMENTAL MOTIVES INFLUENCE COGNITIVE PROCESSES

With Mark Schaller and Jon Maner, we've been conducting a series of studies designed to explore how simple cognitive processes (e.g., attention, encoding, recognition memory) are affected by what we've been calling fundamental motivational states (Kenrick, Neuberg, & Cialdini, 2005; Maner et al., 2005). Under the rubric of fundamental motivational states we include affiliation, self-protection, status-seeking, mate-search, mate retention, and familial care. We assume each of these motivational states is species-typical for *Homo sapiens*—involving goals that our ancestors would have needed to meet to successfully survive and reproduce in human social groups (Kenrick, Li, & Butner, 2003).

We presumed there would be interesting interactions between bottom-up processes like visual scanning and top-down effects of fundamental motives. A fundamental motive is often activated by bottom-up processes—as when a social stimulus array indicates a mating opportunity, a threat to safety, or a chance to enhance one's status. Once any powerful motivational state is activated, however, we presume it prompts increased attention to relevant features of the situation and suppresses attention to others. Figure 4.1 depicts a partial model.

As shown in Figure 4.1, we presumed that activation of a mating goal would increase attention to attractive members of the opposite sex. We also presumed this activation would inspire goal-relevant interpretations. In line with evolution-based assumptions of error management theory (Haselton & Buss, 2000), for example, we expected males in a romantic frame of mind would be especially likely to see beautiful women as feeling sexual inclinations. We also expected selective attention to attractive women would lead to overestimations of the frequency of those women in crowds of varying attractiveness. Finally, we expected men would be more able to pick those attractive women out of a lineup later. We expected both men and women in a self-protective frame of mind to attend instead to outgroup males, and to encode those men as relatively threatening. Given the phenomenon of outgroup homogeneity, we weren't sure whether this initial attention would translate into better memory for outgroup males; instead, we thought frightened participants might make more false alarms, falsely recognizing outgroup men that they had not seen.

In some ways, our findings supported our predictions (Becker, Kenrick, Guerin, & Maner, 2005; Maner et al., 2003, 2005). But, as often happens, some unexpected findings were the most thought-provoking.

AN UNEXPECTED DISJUNCTION BETWEEN VISUAL ATTENTION, FREQUENCY ESTIMATION, AND MEMORY

One series of studies examined visual attention indirectly using frequency estimation (Maner et al., 2003, Exps. 1–3). Observers were briefly presented with

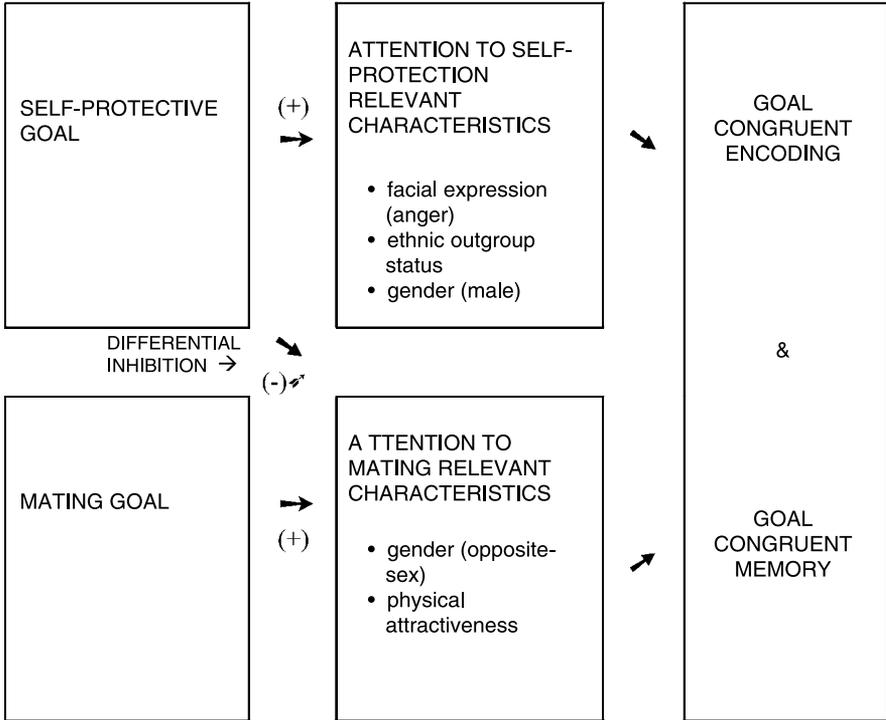


FIGURE 4.1 Basic Model of Fundamental Goals’ Effects on Information Processing. This model presumes activation of a given goal increases attention to goal-relevant stimuli, and then biases how we encode those stimuli, enhancing later memory for those stimuli. The model also presumes that activation of one goal inhibits processing of stimuli relevant to other goals, and that some goals (such as self-protection) have stronger inhibitory effects than others

arrays of attractive and average-looking male and female faces. Because observers had limited time to process the faces, we expected that faces capturing initial attention—such as attractive members of the opposite sex—should receive greater processing and therefore be preferentially encoded into long-term memory. Thus, when asked to estimate the frequencies of various categories of faces, observers of both sexes should overestimate the number of attractive members of the opposite sex.

Results showed both sexes overestimating the number of attractive female faces, suggesting that attractive female faces captured everyone’s attention (Figure 4.2). Although the same effect was observed in both sexes, it did not seem to be due to the same mechanism: Such overestimations were more likely in men not involved in committed relationships, but women who were involved in relationships.

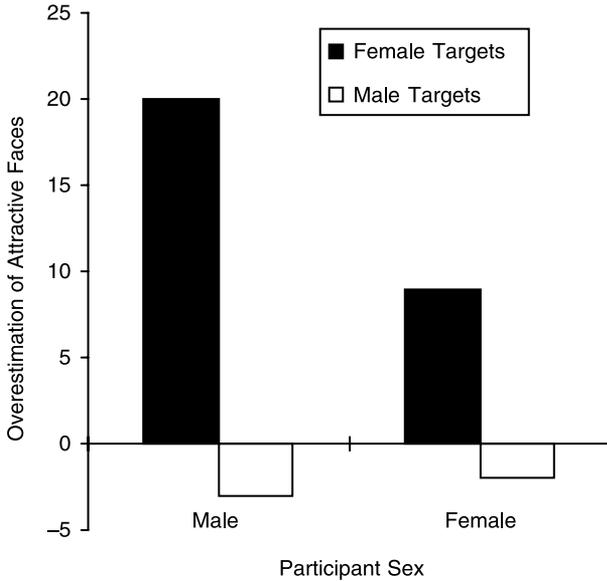


FIGURE 4.2 Frequency Estimation and Attractiveness. When people are briefly exposed to arrays of faces, both men and women overestimate attractive female faces but not attractive males. Overestimation scores were created by taking estimations of attractive faces in briefly shown arrays and subtracting estimations of attractive faces from a control condition where arrays were shown for an extended period of time (so participants had time to process all of the faces). Thus, scores greater than zero indicate attractive faces were overestimated and scores less than zero indicate attractive faces were underestimated (data drawn from Maner et al., 2003, Exp. 1, Table 1)

We were surprised to find female participants did not overestimate the number of attractive males, given that male attractiveness is a well-supported component in female mate preferences (e.g., Gangestad & Simpson, 2000). However, these men were complete strangers to the women, and a strange man simply may not reach the threshold as a mating opportunity for a woman, for reasons discussed below.

The frequency estimation data suggested that people were preferentially attending to attractive women, but don't really prove it, since frequency estimation involves a judgment that is cognitively "downstream" from attention per se. To examine visual attention directly, we turned to eye-tracking methods (Maner et al., 2003, Exp. 4). In these studies, participants are presented with arrays of different faces, and we record how long they dwell on different faces, and which ones they return to. As expected from frequency estimation results, participants of both sexes did preferentially visually attend to attractive females as compared to average looking females. This was especially true for male participants with

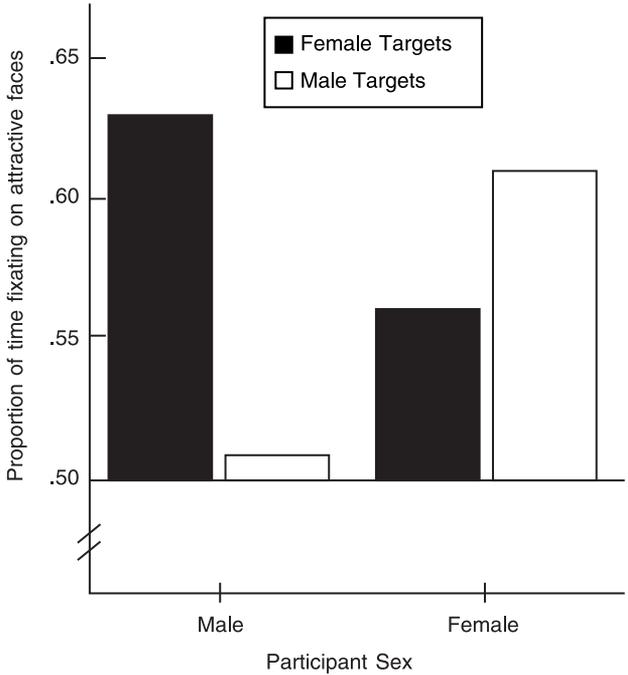


FIGURE 4.3 Visual Attention and Attractiveness. Fixation scores greater than .50 indicate preferential attention to attractive faces. Both sexes preferentially attended to attractive female faces and women preferentially attended to attractive male faces. Had a disjunction not occurred the pattern in this graph should match the graph in Figure 4.2 (based on Figure 4 from Maner et al., 2003, Exp. 4 © American Psychological Association)

unrestricted mating orientations. Counter to the frequency estimation findings, however, women also preferentially looked at attractive over average looking males (see Figure 4.3; Figures 4.2–4.4 were constructed so without a disjunction each graph should have an identical pattern).

These results were perplexing: Indirect measures suggested that attractive males did not draw women’s attention, yet direct measures—tracking where women’s eyes went—showed the opposite pattern. A final study helped resolve this paradox. This study tested participants’ memory for attractive and average members of both sexes. Results showed that both sexes, and women in particular, had accurate memory for attractive female faces but poor memory for attractive male faces (Figure 4.4). So, female responses to attractive men provided our first evidence of a disjunction between one stage of processing and another: although attractive men captured women’s initial attention, this extra visual processing did not translate into greater downstream processing—the attractive men were promptly forgotten, and their frequency was not overestimated.

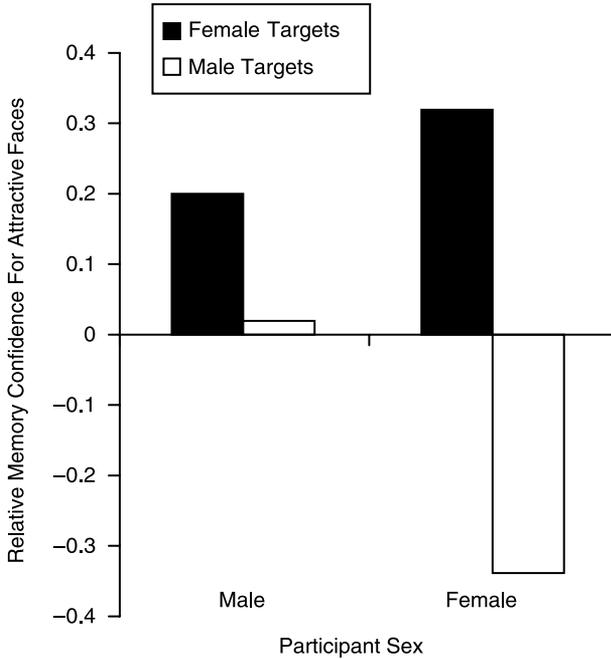


FIGURE 4.4 Memory and Attractiveness. Both sexes preferentially remembered attractive females. Women had particularly poor memory for attractive males. During testing, participants were shown previously seen faces as well as novel foils and asked how confident they were that they had seen the faces before. Relative memory confidence scores are based on ratings of previously seen faces. These scores were computed by taking confidence scores for attractive faces and subtracting confidence scores for average faces. Scores above zero indicate participants were more confident in having seen attractive than average faces of that category, whereas scores below zero indicate the opposite. The effect shown in this graph probably helps understand the disjunction depicted in Figures 4.2 and 4.3: Although women preferentially attend to attractive men, they do not remember them and thus do not later overestimate them. These results are not an artifact of response bias: For novel foils, both sexes were *more* confident that they had not seen novel male faces than novel female faces. In other words, previously seen and novel female faces were more accurately discriminated from each other than previously seen and novel male faces (based on Figure 5 in Maner et al., 2003)

Another series of studies found a similar pattern among participants playing a version of the old Concentration game requiring them to remember the location of faces concealed behind tiles, and to match identical faces (by turning over only two tiles on any given trial). Again, we found people of both sexes especially good at processing attractive women but not attractive men. Indeed, across three studies, attractive men were matched somewhat less well than were average-looking men (Becker et al., 2005).

Furthermore, there was again an intriguing disjunction between early and later processing. In one experiment, we first flashed up the full array (24 faces) for 6 s, before proceeding with the Concentration game as usual. In this variant, women were more likely to match handsome men than average looking men or women, but only on the initial trial (immediately after getting a view of the whole “crowd”). By the end of the game, however, this initial advantage for good-looking men had been lost. Again, handsome men (or at least handsome strangers) had a very brief attentional advantage in women’s eyes, but that advantage did not persist into downstream processing (see Figures 4.5 and 4.6).

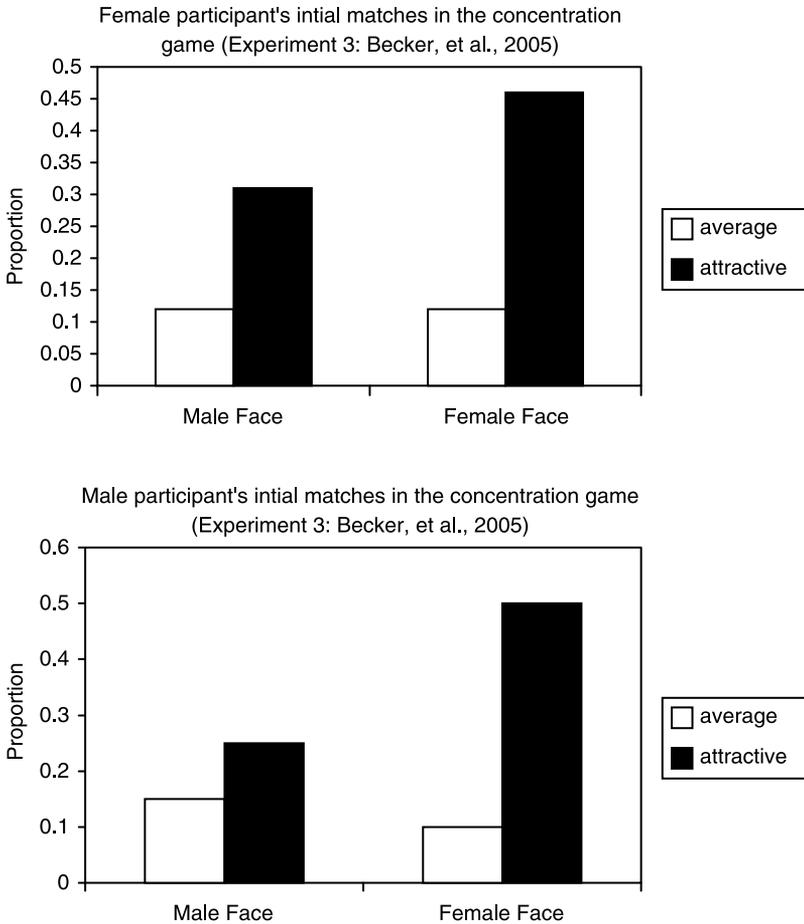


FIGURE 4.5 Results from Concentration Game Study, Initial trial. These results are from the first trial only in a condition in which all participants first were briefly exposed to all faces. These results suggest both sexes’ attention was drawn by attractive females, and that handsome men also drew initial attention (the latter trend was significant only for female participants)

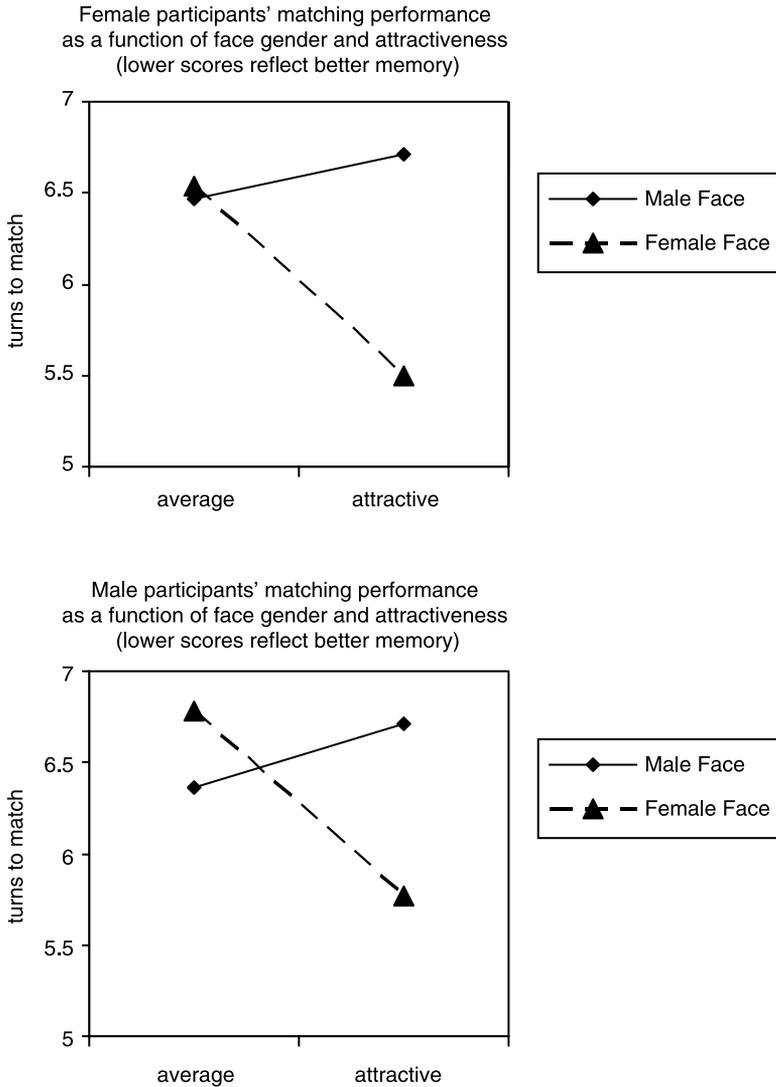


FIGURE 4.6 Results from Concentration Game Study: Overall memory across all trials. These results suggest any initial processing advantage for the handsome men (as shown in Figure 4.5) was lost quickly after the initial trials

AN OPPOSITE DISJUNCTION FOR OUTGROUP MALES

Our model of goal-directed cognitive processes led us to predict that activating a self-protection motive would cause people to (a) pay greater attention to other people who might be associated with heuristic danger cues, and (b) have biased

interpretations of the possible threats those individuals might pose. In particular, we expected that perceived dangers would increase attention to outgroup males.

Consistent with our model, we did find that White students who are feeling threatened (after watching a scary movie) are more likely to perceive anger in the faces of Black men (but not in the faces of Black women or White targets of either sex) (Maner et al., 2005). These effects are not typical “priming effects”—in which people feeling a particular affective state perceive that same state in others (e.g., Forgas & Bower, 1987). Rather than projecting fear onto other people’s faces, frightened participants projected anger, and did so only for members of a potentially threatening outgroup. Fear also led students with implicitly negative attitudes toward Arabs to project anger onto the faces of Arab men and women. We also found that White participants in a self-protective state overestimated the number of outgroup faces in the arrays (Becker et al., 2006).

Another set of eyetracker studies reveals that self-protective motivation, rather than causing White subjects to spend more time looking at outgroup males, actually led them to look away from men in general (Figure 4.7, top panel). This visual aversion also occurs if the men in the photos appear to be looking directly at the participant, and is enhanced if the face is wearing an angry expression.

We would thus have expected to find that pictures of Black men, from whom visual attention has been diverted, would be especially difficult to pick out of a line-up later. But instead we have found that priming self-protection caused these nonattended outgroup males to be later remembered as well as, and sometimes better than, nonthreatening faces of ingroup members (Becker et al., 2006; Figure 4.7, bottom panel). In addition, and contrary to findings on outgroup homogeneity, we repeatedly find that Black men are remembered with especially high accuracy if they are angry (Ackerman et al., 2006; see Figure 4.8). Neutral black men, on the other hand, produce a high hit rate, but also a high false alarm rate. The punchline of these latter studies is that outgroup males all look the same, unless they’re angry, in which case they are remembered with high accuracy. White participants do not, however, remember these angry outgroup males because they look at them for a longer time; instead threatening faces seem to manifest a version of “flashbulb memory” and require less visual attention to achieve superior recognition (Brown & Kulik, 1971).

SUPPRESSION AND AMPLIFICATION

These two types of disjunction can be called *amplification* and *suppression* effects. Amplification disjunctions occur when limited processing at an early stage leads to preferential “downstream” processing (illustrated in the upper line of Figure 4.9). The findings for Black and angry males illustrate an amplification

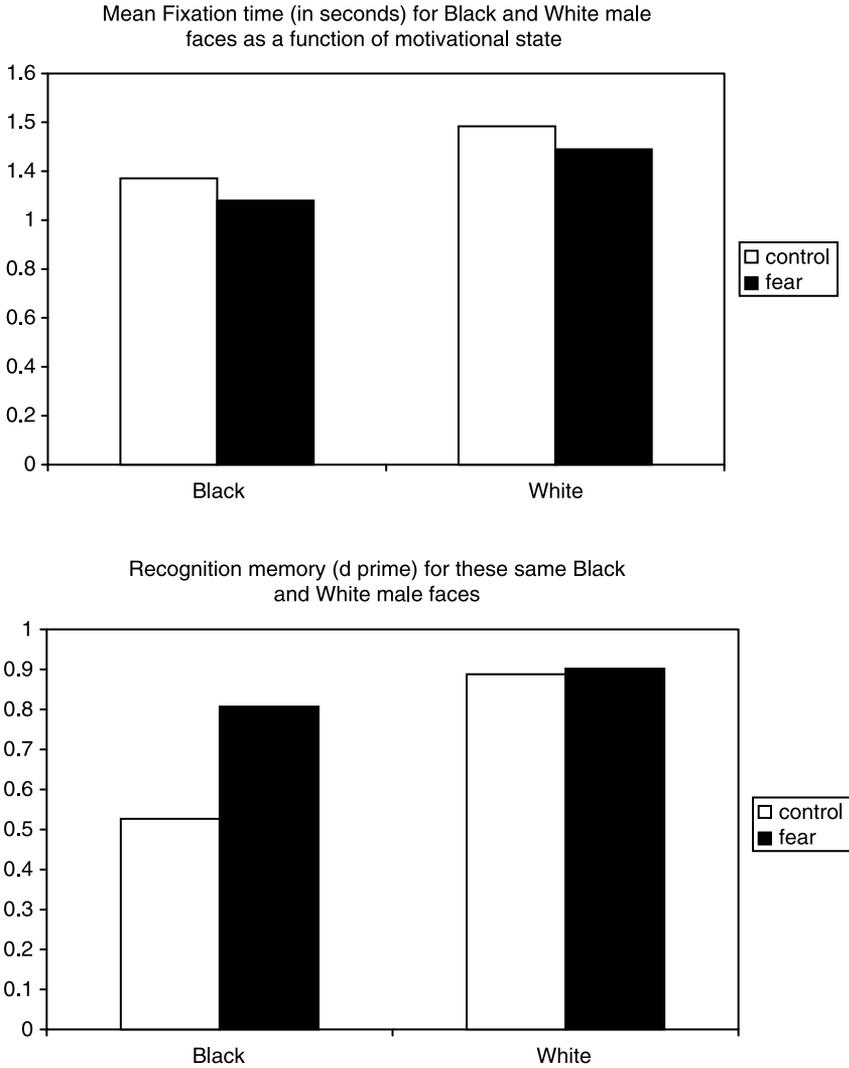


FIGURE 4.7 Attention to Black and White Male Faces (top); Memory for These Same Faces (bottom) (from Becker et al., 2006, Exp. 1)

disjunction: Fearful spent less time looking at the faces of outgroup males yet had better memory for them. Conversely, suppression disjunctions occur when preferential processing at an early stage does not translate into preferential processing at a later stage (illustrated in the lower line of Figure 4.9). An example of this is women's reactions to handsome male faces—women look preferentially at these men, but do not remember them later.

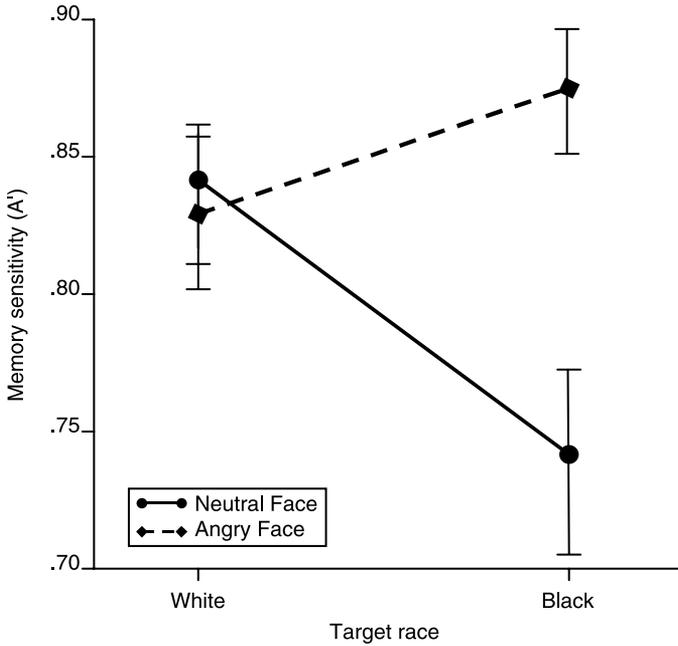


FIGURE 4.8 Memory for Black and White Faces. Although White participants are not especially accurate at recognizing Black males with neutral facial expressions, they are quite accurate in recognizing rapidly presented faces of angry Black men (based on Ackerman et al., in press). This finding provides a disjunction with other results showing that people look away from potentially threatening faces (especially outgroup males with angry expressions)

DISJUNCTIONS' FUNCTIONS

Why should these two types of disjunction occur? In retrospect, both the amplification and suppression effects we found make functional sense. Because staring at a stranger can be a threat gesture, it should have been unsurprising that people look away from potentially dangerous others—outgroup males, for example, particularly if they are angry and staring back, and particularly if other cues, such as your own feelings of fear, suggest the current situation may be dangerous. A fascinating implication of this research is that not looking does not mean not attending. Given that those individuals nevertheless pose a threat, it makes sense that the mind continues to process them even though the eyes have discreetly moved away. Thus, the amplification effect reveals a sort of a “flashbulb memory” in which a brief but important stimulus gets enhanced mental representation later.

The suppression effect for handsome male strangers seems less intuitively sensible at first, but does fit well with findings on women’s criteria for mate

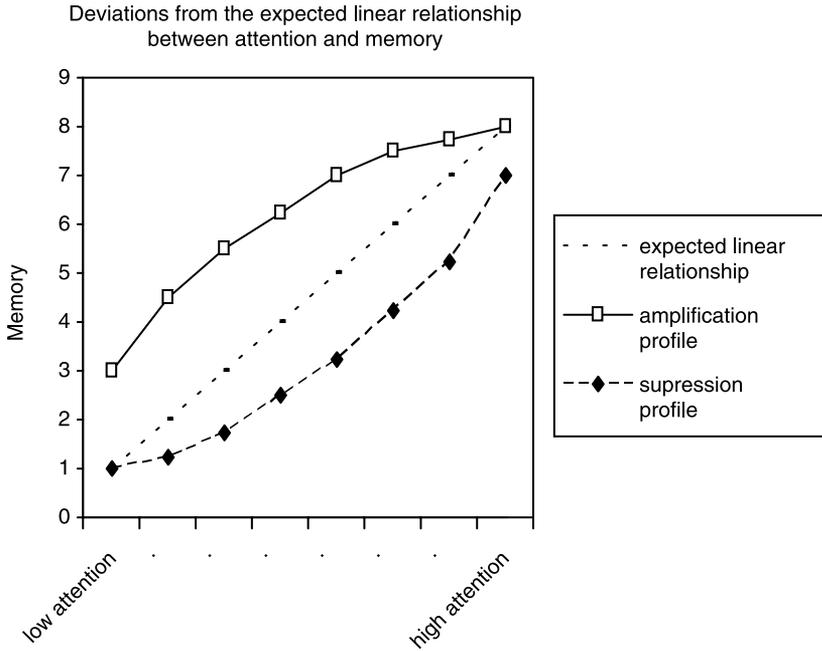


FIGURE 4.9 Two Different Types of Disjunction (Note: thanks to Mark Schaller for suggesting this graphic depiction of disjunctions)

choice. Several evolutionary psychologists have provided evidence to suggest that male physical attractiveness is associated with so-called “good genes” (e.g., Gangestad, Thornhill, & Garver, 2002). Hence, it makes sense that handsome men’s faces elicit initial attention from women. Consistently, we found more visual fixations for handsome men amongst women who are ovulating, who are unrestricted, or who are in a romantic frame of mind. However, even if a woman is interested in a short-term relationship, it is unlikely that that relationship will be with a man who has not stayed around long enough to pass several levels of initial screening. Before committing to a relationship with a man, women generally require additional information, including reliable information about the man’s social status or financial status (Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002; Kenrick, Sundie, Nicastle, & Stone, 2001; Li, Bailey, Kenrick, & Linsenmeier, 2002). Clark and Hatfield (1989) found in two studies conducted across two decades that not a single woman accepted an offer of a sexual liaison with a strange man, even though about half were willing to go on a date with him. One presumes that some of these women, undergraduates at Florida State during the peak of the sexual revolution, were unrestricted, and that some were ovulating. But a total stranger, regardless of his good looks, simply does not pass the initial threshold for a woman to consider as a sexual partner. On the other hand, Clark and Hatfield’s data also made it abundantly clear that, for most

men, a total stranger is well above threshold to meet his selection criteria—with over 70% of men saying yes to an offer of sex from a woman they had never before met.

Although both types of disjunctions violate the traditional linear view of information processing, they make sense in light of a model presuming information processing functions to promote survival and reproductive goals. Rather than leading us to scrap our general functional model of cognitive processing, then, these disjunctions have reinforced our view that cognitive systems are inherently adaptive.

A GENERAL MODEL OF THE BIASES UNDERLYING DISJUNCTIONS

Evolutionary approaches to cognitive psychology generally presume some degree of modularity; which implies that different types of content receive different types of processing (e.g., Kenrick, Sadalla, & Keefe, 1998; Tooby & Cosmides, 1992). A functional analysis of cognition thus suggests that content is of central importance; the decision rules used for processing information about a potential mating opportunity, for example, are different from the decision rules used for processing information about a potential threat.

An evolutionary perspective implies that the particular cognitive biases used by any species should reflect functional constraints imposed by typical problems their ancestors had to face. So, for example, diurnal birds (with good vision for finding food in daylight) condition nausea to the visual features of novel foods they encounter, but rats (nocturnal creatures with poor vision who find food at night) condition nausea to the taste of novel foods more easily than to visual features (Wilcoxon, Dragoin, & Kral, 1971). Further, a given bird species may use different rules for remembering locations of food stores, features of aversive foods encountered in the past, and the song of their species. The features of aversive foods are conditioned to nausea in a single trial, and are very difficult to unlearn; the locations of stored foods are repeatedly and easily learned and forgotten, the species' song is learned during a particular critical period by different rules depending on the social arrangement typically confronted by members of a particular species (Sherry & Schacter, 1987).

In addition to different cognitive rules for learning and remembering different kinds of input, animals also have different sensory capacities and different innate templates for recognizing recurrent patterns of stimulation with functional significance. So, for example, hawks, which hunt small and fast-moving animals from high above the earth, have exquisite color vision, including two separate foveas, and several times the density of rods that humans have (Ehrlich, Dobkin, & Wheye, 1988). On the other side, rabbits, a favorite food of these raptors, have “hawk detectors”—early level pattern detectors built into their

retina (to avoid the several milliseconds' delay associated with central processing, enough time for a speedy hawk to arrive) (Levick, 1967).

Just as other animals inherit cognitive templates, so too do humans. For instance, all species have mechanisms that allow them to recognize members of their own species and even their specific mates or offspring, and we would expect humans to have reliably developing templates for recognizing attractive and unattractive members within each sex. These templates, while adaptively influenced by the developmental environment, should also have a great deal of built-in content (Lieberman, Tooby, & Cosmides, 2003). Similarly, humans may have a template for *outgroup member*, but this template needs to be "filled in" with a great deal of information from the environment—the look of an enemy varies by place and time, and the template must be learned and contrasted with learned features of people with whom we are familiar (cf. Hirshfeld, 1996).

An evolutionary approach to cognition implies strongly that adaptive design of nervous systems did not suddenly stop with *Homo sapiens*, but that our species has a brain and sensory mechanisms adapted to the recurrent demands of human life. Humans don't need early warning hawk-detection systems, but we do confront a series of special problems involved in living with other humans. For one thing, we need to be highly attentive to the grunts and groans emanating from the mouths of other humans, and to be able to recognize and make fine discriminations regarding very complex patterns within those utterances. It makes a big difference whether someone just said "No worries, mate" as opposed to "Nick's worried, Mark!" Indeed, ample evidence suggests that the human brain is specially designed to receive and transmit linguistic information in a way that even our most intelligent primate cousins are not (Pinker, 1994).

Our model of fundamental motivational systems presumes there is special and differential processing for information relevant to different social goals. Table 4.1 indicates what we think some of those biases are.

We also presume there are evolutionarily significant variations in how different individuals respond to different types of information associated with these fundamental problem sets. Some of those individual differences, like sex, are innate; some, like mating strategy, depend on interactions between innate characteristics and developmental inputs, and some, like one's current mating status or the existence of offspring, are mainly determined by experiential inputs that trigger species-typical biases.

SOME EMPIRICAL IMPLICATIONS OF CONSIDERING DISJUNCTIONS IN EVOLUTIONARY/ECOLOGICAL TERMS

Although not considered in an evolutionary framework, traditional cognitive psychologists have uncovered evidence of analogous disjunctions in such phenomena as "inattention blindness" (not consciously registering objects even though a person is looking at those objects) and "covert attention" (conscious

Table 4.1 Domains of Social Life Posing Recurrent Problems, with Examples of Decision Constraints, and Cognitive Biases Associated with Each

Social problem domain	Evolved decision constraints (examples)	Resultant cognitive biases (examples)
Coalition formation	Exchange relationships are ultimately beneficial to the extent exchange partners (a) share our genes, (b) are good bets for future reciprocation.	Coalitional goals should lead to preferential attention to smiling or scornful expressions, particularly on targets not sharing our genes.
Status	Men tend to compete for status more than women do.	Status goals should lead to preferential attention to large dominant males or attractive well-dressed females. Males should be especially prone to such biases.
Self-protection	Outgroup members and unrelated members of own group pose recurrent sources of competition, disease, and physical threat.	Attention to signs of anger, particularly on faces of males and/or outgroup members. Attention to signs of disease in unrelated others.
Mate choice	Mating opportunities are low cost for men, potentially higher cost for women; male commitment is key for female reproductive success.	Mating goals should increase attention to physical attractiveness in women, to status in men, and to one's own mating relevant characteristics. Women should be attentive to signs of commitment in desirable males.
Relationship maintenance	Costs associated with loss of mating and parenting investment, slightly different, though overlapping, for women and men.	Preferential attention to potential interlopers, particularly those of own sex with desirable mating characteristics, or signs of interest in one's own mate.
Parental care	Human parents have high investment in biological offspring, potential conflicts with interests of unrelated children.	Preferential attention to behavior of unrelated children who are age-mates of own offspring, or to behaviors of adults likely to pose threats (e.g., low status males).

processing of objects without looking directly at those objects) (e.g., Carrasco & McElree, 2001; Mack, 2003). A consideration of the different domains of social life suggests other places to look for disjunctions between the different stages of cognition. For example, perhaps activation of status concerns will lead to a tendency to look away from high status males, but to remember them better than when other motives such as affiliation or family care are activated. In describing his years in Tibet, for example, Heinrich Harrer (1996) noted that everyone looked immediately at the ground if the Dalai Lama came into view. One doubts that they forgot the initial glimpse of the young god-king, however. When parental motivations are activated, on the other hand, people may look away from, but still remember, low status males (who are otherwise quickly dismissed from further processing). One might also expect that men with their relational

partners might show such a pattern for beautiful women—looking away, but covertly devoting attentional resources.

One might expect amplification disjunctions for subtle cues linked to social exclusion, signs of a mate's infidelity, potential threats to one's own status, or disease cues in strangers, all of which are likely candidates for privileged processing (Eisenberger, Lieberman, & Williams, 2003; Faulkner, Schaller, Park, & Duncan, 2004; van Vugt & Kurzban, chapter 14, this volume). On the other side, one might expect suppression effects for information suggesting one's own insensitivity to the needs of rejected or downtrodden others, or to information suggesting one's own potential infidelities ("I really don't think the attractive new lab assistant is flirting with me, dear, she's just a naturally friendly person").

There are potentially interesting connections between these simple cognitive disjunctions and other cognitive phenomena. What kinds of social stimulus do we have difficulty keeping out of conscious working memory? One suspects some social stimuli are harder to suppress than thoughts about white bears, and these might map nicely onto the domains in Table 4.1, and include insults to one's status, threats to one's children, attractive offers of infidelities, others flirting with one's mate, etc. There are also undoubtedly interesting adaptive discontinuities in judgment processes (cf. Todd, chapter 9, this volume). Further, some forms of psychopathology may be understood as individual differences in attention to, encoding of, and memory for, evolutionarily significant social situations (cf. Badcock & Allen, chapter 8, this volume).

We have found theoretically meaningful individual differences linked to these cognitive biases, with males and females showing different reactions to attractive members of the opposite sex, for example, and individuals concerned about safety being more susceptible to processing biases involving potential threats. From an evolutionary perspective, other individual differences in cognitive processing might be expected based on life-history phase of the judge (different cues ought to be privileged or suppressed by people who are prepubescent, courting, young parents, or grandparents, for example), or the judge's kinship status *vis-à-vis* the targets being processed (cf. Laham, Gonsalkorale, & von Hippel, 2005; Park & Schaller, 2005).

Another interesting set of questions involves the neuropsychology of disjunctions. Perhaps emerging neuropsychological methods could be used to examine the possibility that certain social stimuli (such as recently encountered handsome strangers) are inaccessible to conscious processing, but nevertheless accessible to processing at other levels. Might females show physiological signs of recognition of these attractive men even as they are reporting an inability to recall them? If so, this would be a memory equivalent of the findings on "blindsight"—in which people with certain types of brain damage are unable to report seeing a stimulus, but can point correctly when asked to guess where it is in the visual field.

CONCLUSION

Evolutionary models of cognitive processes are, in a sense, all about preferential treatment of certain classes of inputs, which often deviate from the standard assumptions applying to the processing of nonsense syllables or other “neutral” stimuli. Evolutionary models of cognition also typically assume that these preferential processing biases are associated with functionally relevant individual differences (Kenrick, 1994). As one example, consider the findings that, although men are good at outdoor map-following tasks that would have fit with dispersed hunting, women are better at detecting and remembering the location of objects in complex arrays, a skill critical to successful foraging (which is more often the province of women in preliterate societies) (e.g., Silverman & Eals, 1992). Likewise, detecting people who cheat on social contract rules is much easier than detecting violators of logically identical rules that are not social contracts (Cosmides & Tooby, 1992).

A particularly appealing feature of an evolutionary approach to cognition is that, by emphasizing content, it can bring a whole new set of dimensions to traditional process-oriented approaches. The emphasis on domain specific qualifications to domain-general processes, which suggests numerous separate and specialized cognitive modules adapted to specific fitness problems, has a number of fruitful heuristic implications. The disjunctions we discussed here imply that the operation of domain-general cognitive processes themselves, and specifically the links between them, may be conditioned by more ancient motivational and emotional systems. Thus, while the traditional approach has yielded numerous important general descriptions of cognitive processing, adding an evolutionary perspective opens a whole new set of questions about how efficiently these basic processes work. Understanding these processes should be important to developing a comprehensive and sensible model of how humans understand and represent the social world.

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