

# Understanding Others: The Face and Person Construal

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The face is a critical stimulus in person perception, yet little research has considered the efficiency of the processing operations through which perceivers glean social knowledge from facial cues. Integrating ideas from work on social cognition and face processing, the current research considered the ease with which invariant aspects of person knowledge can be extracted from faces under different viewing and processing conditions. The results of 2 experiments demonstrated that participants extracted knowledge pertaining to the sex and identity of faces in both upright and inverted orientations, even when the faces were irrelevant to the task at hand. The results of an additional experiment, however, suggested that although the extraction of person knowledge from faces may occur unintentionally, the process is nonetheless contingent on the operation of a semantic processing goal. The authors consider the efficiency of person construal and the processes that support this fundamental facet of social–cognitive functioning.

*Keywords:* person perception, face processing, person knowledge, social cognition

Your face, my thane, is as a book where men may read strange matters.

—Shakespeare (*Macbeth*, Act I, Scene 5; Durband, 1985)

The human face is without rival as a stimulus in the person perception process. Daily experience suggests that even the briefest inspection of a face may be sufficient to furnish information about the sex, age, emotional status, and gaze direction of its owner. Moreover, if the person is familiar, one can quickly decode his or her identity (e.g., Sean Connery) and gain access to any associated material that may reside in semantic memory (e.g., Scottish, golfer, James Bond). As Haxby, Hoffman, and Gobbini (2000) have reported, “face perception may be the most developed visual perceptual skill in humans” (p. 223).

That the face occupies a pivotal position in social cognition has been acknowledged for centuries. Over 2000 years ago, Cicero (106–43 BC) noted that “all action is of the mind and the mirror of the mind is the face.” Endorsing this prescient observation, contemporary researchers have sought to unravel the mysteries of human face processing. Although social psychologists have made noteworthy contributions to this rapidly emerging literature (see Blair, Judd, & Chapleau, 2004; Blair, Judd, & Fallman, 2004; Livingston & Brewer, 2002; Zebrowitz, 1997), for the most part,

work on face processing has been dominated by cognitive psychologists and neuroscientists. As a result of their efforts, much is now known about the neural operations that support face processing, the efficacy of person recognition, and the extent to which person identification is compromised following damage to discrete regions of the brain (see Bruce & Humphreys, 1994; Farah, Wilson, Drain, & Tanaka, 1998; Haxby et al., 2000; Haxby, Hoffman, & Gobbini, 2002; Kanwisher, 2000; Tarr & Gauthier, 2000).

Notwithstanding impressive developments in the neuroscience of face processing, a number of important questions remain—questions that pertain to the social products of person construal. Notable among these is the issue of how readily perceivers can extract different classes of person knowledge (e.g., categorical information, identity-based information) from available facial cues (see Cloutier, Mason, & Macrae, in press; Quinn & Macrae, 2005). For example, during their interactions with others, must perceivers intend to glean this information from faces or can it be extracted as an incidental (i.e., unintended) consequence of some other processing objective? In a related manner, how efficient is the process of person construal? Do perceivers extract information about others without impediment, or is the acquisition of person knowledge impaired under conditions that are known to obstruct aspects of face processing? We explored these issues in the present investigation.

## The Face and Social Cognition

Although the human face conveys a wealth of potential information, social–cognitive research has focused almost exclusively on identifying the conditions under which categorical knowledge (i.e., stereotypes) is activated in response available stimulus cues (Bodenhausen & Macrae, 1998; Brewer, 1988; Fiske & Neuberg, 1990). Emphasis has fallen on this issue for good reason: Once activated, categorical knowledge structures guide the behavioral outputs (e.g., impressions, memories) of the person perception process in a predictable manner. Accordingly, considerations of

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why, when, and for whom category-driven processing is triggered and implemented have dominated research and theorizing in social psychology for almost 50 years (see Allport, 1954; Bargh, 1999; Blair, 2002; Macrae & Bodenhausen, 2000). Informative though this work has been, this single line of inquiry has necessarily obscured other important components of person construal, with the result that process-based accounts of person perception speak only to the issue of how categorical cues activate associated knowledge structures in memory (Bodenhausen & Macrae, 1998; Brewer, 1988; Fiske & Neuberg, 1990) and not how categorical representations themselves are activated. These models make little provision for the process of categorization itself or for other classes of knowledge that can be gleaned from faces, such as information pertaining to the identity, gaze direction, and emotional state of a target (see Mason, Hood, & Macrae, 2004; Mason, Tatkow, & Macrae, 2005; Macrae, Hood, Milne, Rowe, & Mason, 2002). To find frameworks that encompass the multiple products of person construal, one must turn to cognitive and neuropsychological treatments of the topic.

Bruce and Young (1986), for example, have advanced an influential dual-route model of face perception in which qualitatively distinct (i.e., independent) mental operations are hypothesized to handle the processing of different forms of information gleaned from faces. Following the structural encoding of a face, one set of operations is believed to deal with the task of person identification, while a quite distinct processing stream extracts information pertaining to the sex, age, race, emotional expression, and gaze direction of an individual (see also Burton, Bruce, & Johnson, 1990). Acting in parallel, these dual-processing routes furnish perceivers with the myriad products of person construal. Although support for the Bruce and Young (1986) model and others like it (e.g., Haxby et al., 2000, 2002) has been garnered from a variety of sources, perhaps the most compelling evidence for the putative independence of these processing routes comes from the observation that prosopagnosic patients never fail to acknowledge that they are looking at a face, yet they remain singularly unable to identify (i.e., name) the individual in question, suggesting that they possess an intact structural encoding module but an impaired face recognition system. These patients are also frequently able to report the sex, age, race, and emotional status of a person, again suggesting a dissociation between processing operations that extract generic information from faces and those that support face recognition (e.g., Calder et al., 1996; Tranel, Damasio, & Damasio, 1988).

### Extracting Person Knowledge

Although significant strides have been taken in delineating the neural structures that subserve face processing (Haxby et al., 2000, 2002), considerably less is known about the ease with which perceivers can extract different aspects of person knowledge from faces (Cloutier et al., in press). This oversight is puzzling as the products of person construal make up the building blocks of everyday social interaction. Establishing that a person is male, angry, and staring into the distance not only provides useful clues as to how one should respond to the individual, but it also conveys valuable information about the current information-processing environment. From the standpoint of social-cognitive functioning, it

is therefore important to consider the efficiency of the cognitive operations through which perceivers glean social knowledge about others. In considering this issue, the widely held assumption in many quarters is that person construal is a mandatory (i.e., automatic) mental process (Allport, 1954; Brewer, 1988; Bruce & Young, 1986; Fiske & Neuberg, 1990; Haxby et al., 2000, 2002). Expose perceivers to a stimulus target and person knowledge will inevitably follow. While recent debate has centered on the alleged automaticity of this process with respect to the acquisition of stereotypical knowledge (see Bargh, 1999; Blair, 2002; Macrae & Bodenhausen, 2000), few would deny that the ability to extract information from the human face is a finely tuned cognitive skill. As Bruce and Young (1998) report, "The human face provides a bewildering variety of important social signals . . . a face tells us if its bearer is old or young, male or female, sad or happy, whether they are attracted to us or repulsed by us, interested in what we have to say or bored and anxious to depart" (p. 1).

So just how efficient is the process of person construal? Is it really the case that different aspects of person knowledge (e.g., sex, identity) can be extracted from faces with rapidity and ease (Bruce & Young, 1986; Fiske & Neuberg, 1990; Haxby et al., 2000; Macrae & Bodenhausen, 2000)? An extensive literature confirms that perceivers are skilled decoders of facial information when they are instructed to process faces for a particular reason (Bruce & Young, 1998). For example, a request to report the sex of a target can usually be accomplished without effort or thought (Cloutier et al., in press). What is not yet known, however, is whether person knowledge is similarly extracted when processing objectives neither demand the explicit appraisal of a face nor direct attention to the face itself (but see Young, Ellis, Flude, McWeeny, & Hay, 1986). If person knowledge continues to be extracted under conditions such as these (i.e., incidental acquisition of person knowledge), then this would speak to the efficiency and flexibility of the cognitive operations through which perceivers glean social knowledge about others (Brewer, 1988; Bruce & Young, 1986; Fiske & Neuberg, 1990; Haxby et al., 2002). Such evidence would also highlight the need for contemporary models of person perception to consider the multiple sources of information that can be extracted from faces following the registration of a stimulus. That is, although numerous social-cognitive investigations have measured the accessibility of stereotypic traits following the presentation of priming categorical stimuli, usually (though not always) verbal labels (e.g., Devine, 1989; Dovidio et al., 1986; Lepore & Brown, 1997; Macrae, Bodenhausen, & Milne, 1995; Macrae et al., 1997), very little research has been directed toward a consideration of the initial perceptual processes that guide person construal (see Blair, Judd, & Fallman, 2004; Cloutier et al., in press; Livingston & Brewer, 2002).

### The Present Research

To investigate the dynamics of person construal, we used a variant of the classic Stroop color-naming paradigm (Stroop, 1935). Picture-word versions of this methodology have been used elsewhere (e.g., de Fockert, Rees, Frith, & Lavie, 2001; Jenkins, Lavie, & Driver, 2003; Lavie, Ro, & Russell, 2003; van Leeuwen, & Macrae, 2004) to establish the extent to which information is extracted from task-irrelevant stimuli which, in turn, speaks to the

automaticity of the cognitive operations undertaken on these stimuli. In these investigations, participants are presented with words (i.e., target stimuli) superimposed on or adjacent to pictures (i.e., irrelevant stimuli) and their task is to make a response to the verbal stimulus. For example, participants may be presented with the names of famous politicians and singers superimposed on the faces of exemplars from each of these categories (e.g., the name “David Bowie” superimposed on the face of Bill Clinton). Their task is to classify the occupation (“singer” or “politician”) of the person depicted by the name (de Fockert et al., 2001). Of critical interest are participants’ responses on mismatching trials; that is, trials in which the name and face belong to competing categories. If occupational information is extracted from competing (but irrelevant) facial stimuli (i.e., Bill Clinton = “politician”), then reactions to the mismatching names (i.e., “David Bowie” = “singer”) should be impaired via response competition. Indeed, previous research has shown that distractor faces interfere with the assignment of mismatched written names to occupational categories (e.g., de Fockert et al., 2001; Jenkins et al., 2003; Lavie et al., 2003) and the pronunciation of face-incongruent sex and age labels (Kavcic & Clarke, 2000—but see Young, Flude, Ellis, & Hay, 1987, for a lack of influence of distractor faces on the pronunciation of names, and Beall & Herbert, 2001, for a lack of influence of emotional faces on the pronunciation of emotion-related words). In this way, interference paradigms can be used to index the automaticity of person construal—specifically, the extent to which socially meaningful information is extracted unintentionally from task-irrelevant stimuli. If responses to targets vary as a function of target–distractor congruency, this indicates that the distractor face has been perceived and recognized in some way.

In the present investigation, we similarly used mismatch interference as the cognitive signature of person construal (i.e., knowledge extraction) and examined the extent to which participants extracted information about sex and identity when this information was conveyed by task-irrelevant facial stimuli. In addition, to further explore the nature of the cognitive operations through which person knowledge is extracted, participants responded to verbal stimuli superimposed on both upright (i.e., optimal) and inverted (i.e., suboptimal) faces. As Leder and Bruce (2000, p. 513) have observed, “Faces tell us who people are, their age and sex, and at least occasionally how they feel. We are very skilled in reading these types of information. But when faces are presented upside down . . . this information extraction is severely disrupted, and it is particularly difficult to recognize and identify faces.” This so-called face inversion effect (FIE) has been demonstrated on numerous occasions, but most notably with respect to people’s ability to recognize others (Diamond & Carey, 1986; Valentine, 1988; Yin, 1969). The favored explanation for the FIE relates to the efficiency of the processing operations that support face recognition. It has been suggested that, together with the coding of local facial features (e.g., big nose, blue eyes), upright face processing relies on additional configural (or holistic) encoding operations—operations that are impeded when faces are inverted (see Diamond & Carey, 1986; Farah, Tanaka, & Drain, 1995; Rhodes, Brake, & Atkinson, 1993; but see Leder & Bruce, 1998, 2000; Prkachin, 2003).

In the present experiments, we were not interested in the questions of whether social information processing is configural in

nature (as suggested by slower or less accurate responding to inverted vs. upright faces) or whether inversion does indeed disrupt configural rather than featural processing (but see Cloutier et al., in press). Rather, we sought to take advantage of a documented phenomenon as a benchmark against which to evaluate the efficiency of person construal. The first two experiments investigated the extent to which people extract information pertaining to a target’s sex (Experiment 1) and identity (Experiment 2) from both upright and inverted (but task-irrelevant) faces. In so doing, the studies sought to examine the ease and efficiency with which categorical and individuating information can be extracted from faces. In a final study, we explored the boundary conditions of the effects observed in Experiments 1 and 2.

## Experiment 1

### Method

*Participants and design.* Fifteen undergraduates from Dartmouth College completed the experiment for additional course credit. The experiment had a 2 (face orientation: upright or inverted)  $\times$  2 (target status: matching or mismatching) within-participants design.

*Stimulus materials and procedure.* Participants arrived at the laboratory individually, were greeted by a female experimenter, and seated facing the screen of an Apple Macintosh computer (IMac). The experimenter then explained that the study comprised a name-classification task. In the center of the computer screen, a number of forenames (e.g., “Peter,” “Susan”) would appear. The task was simply to report, by means of a key press, whether each forename was male or female. The experimenter also reported that each forename would appear on a background that was either a human face or an arbitrary shape. Following previous work of this kind, participants were instructed to ignore the background information (e.g., de Fockert et al., 2001; Jenkins et al., 2003).

In total, 80 forenames appeared on the screen, 40 of which were common male names and 40 of which were common female names (accessed from <http://www.babycenter.com/babyname/>). Each forename was paired with three backgrounds: a sex-congruent face; a sex-incongruent face, and a face-like oval (i.e., baseline). The stimulus faces were 240 color graphics files depicting 80 female faces, 80 male faces, and 80 face-like shapes. The faces depicted targets in a frontal pose conveying neutral facial expressions. Each file was standardized to 400  $\times$  400 pixels. The face-like shapes were used to establish baseline performance on the name-classification task.<sup>1</sup> The forenames were superimposed on each background (i.e., face or face-like shape) using Adobe Photoshop v. 5.5. A standard font (Arial) and font size (20 point) were used. The forenames appeared at one of four pseudorandomized locations on the face: forehead, left cheek, right cheek, or chin. The purpose of this manipulation was to prevent participants from being able to predict the location of the target name or word, thereby ensuring that participants processed each face fully.

On each trial, a fixation cross appeared for 1000 ms, followed by a forename superimposed on a background stimulus. The stimulus remained on the screen until participants made a response or 4000 ms had elapsed. Each forename was paired with the three backgrounds (i.e., congruent-face, incongruent-face, and face-like shape) and the backgrounds were presented in both upright and inverted orientations, giving a total of 480 experimental trials. The order of presentation of the items was randomized and the

<sup>1</sup> Because the face-like distractors were not matched to the target distractors in terms of their perceptual characteristics, the data from these trials did not provide appropriate baseline information and so were excluded from the analyses.

response key mappings (i.e., male/female or female/male) were counter-balanced across participants. The computer recorded the accuracy and latency of each response. On completion of the task, participants were debriefed and thanked for their assistance.

### Results and Discussion

For each participant, median reaction times (RTs) were calculated for matching (i.e., sex-congruent) and mismatching (i.e., sex-incongruent) trials, collapsing across the sex of the forenames and the faces. Trials on which errors were made (4.5% of trials) were omitted from the statistical analysis. The resulting data were then submitted to a 2 (face orientation: upright or inverted)  $\times$  2 (target status: matching or mismatching) repeated measures analysis of variance (ANOVA). The results are depicted in Figure 1. The only significant effect to emerge from the statistical analysis was a main effect of target status on reaction times [ $F(1, 14) = 37.93, p < .001$ ], such that participants took longer to classify the forenames on mismatching than matching trials (median RTs = 820 ms vs. 778 ms, respectively). As this effect was not modulated by the orientation of the faces [Face Orientation  $\times$  Target Status interaction,  $F(1, 14) = 1.77, p = .21$ ], it appears that inversion did not obstruct the extraction of sex-cuing information from the task-irrelevant facial stimuli.

These findings provide preliminary evidence for the efficiency of person construal. Although attention was not explicitly directed to the presented faces (Young et al., 1986), participants extracted information pertaining to the sex of the targets. They did so, moreover, even when the faces were presented in an ostensibly suboptimal (i.e., inverted) orientation. That inversion did not impede the extraction of sex information is interesting, as it suggests that the machinery of person construal can effortlessly glean social knowledge from faces (Bruce & Young, 1986; Haxby et al., 2000, 2002). But does this operating efficiency also extend to what is arguably the most important component of person construal, knowledge of an individual's identity (Baldwin, Carrell, & Lopez, 1990)? As already noted, inversion costs are usually reported in the context of people's ability to explicitly recognize others (Diamond & Carey, 1986; Valentine, 1988; Yin, 1969). The explanation that is offered for this effect is that inversion impairs the configural processing operations that support face recognition (Farah et al., 1995; Rhodes et al., 1993). It is worth noting, however, that in no sense does inversion completely eliminate people's ability to rec-

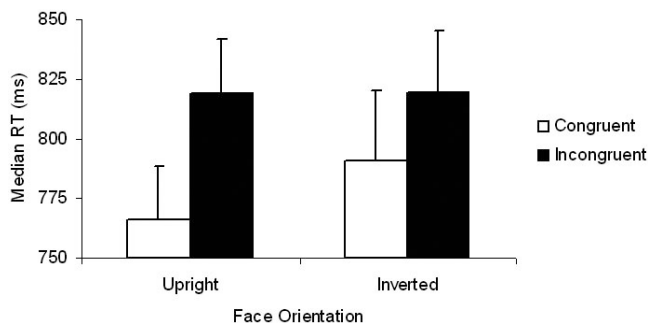


Figure 1. Median sex categorization latency as a function of target-distractor congruence and distractor face orientation, Experiment 1.

ognize others. In a recent investigation, Collishaw and Hole (2000) reported that recognition accuracy for famous faces fell by only 12% as a function of inversion (i.e., upright = 80%, inverted = 68%). Thus, even under suboptimal processing conditions, recognition performance remains well above chance, suggesting that perceivers are still able to extract information that supports the explicit judgment. In our second experiment, we investigated the possibility that identity-based information, like sex-cuing information, may be extracted unintentionally from faces in both upright and inverted orientations (Haxby et al., 2000; Tarr & Gauthier, 2000).

## Experiment 2

### Method

**Participants and design.** Sixteen undergraduates from Dartmouth College completed the experiment for additional course credit. The experiment had a 2 (face orientation: upright or inverted)  $\times$  2 (target status: matching or mismatching) within-participants design.

**Stimulus materials and procedure.** Experiment 2 was a replication of the previous experiment, but with some important modifications. Rather than classifying verbal stimuli according to sex, participants were presented with the names of female actors (e.g., "Cameron Diaz") and singers ("Britney Spears") and requested to classify the names (via a button press) according to occupation (as in de Fockert et al., 2001; Young et al., 1986). As in the previous experiments, the verbal stimuli were superimposed on either faces or a face-shaped oval stimulus. This time, however, the faces (color graphics files) depicted the actors and singers whose names were also presented to participants. Only female faces were used to ensure that the experimental trials matched or mismatched the presented names only in terms of occupation and not also in terms of sex. Pilot testing was conducted to ensure that individuals from the participant pool were able to recognize the faces and names of the selected celebrities. In total, 105 irrelevant background contexts were used: 35 actor faces; 35 singer faces; and 35 face-like shapes. The target items were the names of the actors and singers depicted by the faces. Each name was paired with the 3 background contexts (i.e., occupation-congruent face, occupation-incongruent face, & face-like shape) in both upright and inverted orientations, giving a total of 210 experimental trials. In no case did any target's name appear with her own face as a distractor. The computer recorded the accuracy and latency of each response. On completion of the task, participants were debriefed and thanked for their assistance.

### Results and Discussion

For each participant, median RTs were calculated for matching (i.e., occupation-congruent) and mismatching (i.e., occupation-incongruent) trials, collapsing across the occupation of the names and the faces. Trials on which errors were made (10.4% of trials) were omitted from the statistical analysis.<sup>2</sup> The resulting data were then submitted to a 2 (face orientation: upright or inverted)  $\times$  2 (target status: matching or mismatching) repeated measures ANOVA. The results are depicted in Figure 2. The statistical analysis revealed main effects of face orientation [ $F(1, 15) = 4.89, p < .04$ ] and target status [ $F(1, 15) = 4.38, p < .05$ ] on reaction

<sup>2</sup> The greater error rate for occupation versus sex categorization likely reflects greater variability within our sample in terms of knowledge of celebrities versus familiarity with gender-typed names.

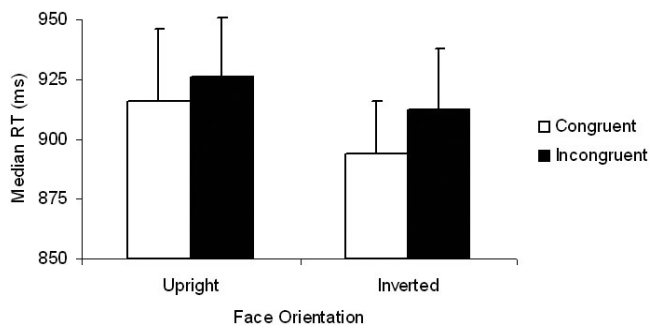


Figure 2. Median occupation categorization latency as a function of target–distractor congruence and distractor face orientation, Experiment 2.

times. As in the previous experiment, participants took longer to respond to items on mismatching than matching trials (median RTs = 919 ms vs. 903 ms, respectively). Interestingly, participants also took longer to respond to items superimposed on upright than inverted faces (median RTs = 920 ms vs. 904 ms, respectively), suggesting that less identity-related information was extracted from inverted faces. The Face Orientation  $\times$  Target Status interaction, however, was not significant [ $F(1, 15) = .17, p = .68$ ], thereby confirming that the degree of influence of the task-irrelevant faces was not moderated by the orientation of the stimuli.

These findings replicate the general pattern of effects observed in Experiment 1. Identity-related information was extracted from task-irrelevant faces in both upright and inverted orientations. Thus, although explicit recognition may be impaired by facial inversion (Diamond & Carey, 1986; Valentine, 1988; Yin, 1969), comparable effects did not extend to one of the most elementary products of person construal, knowledge of an individual's unique attributes. The interference that was observed on occupation-incongruent trials is suggestive that participants could readily extract the identity (hence occupation) of the celebrities (de Fockert et al., 2001; Lavie et al., 2003; Young et al., 1986), even when the faces were inverted. Of course, if featural cues contribute to the identification of highly familiar targets (Leder & Bruce, 2000) and inversion fails to fatally disable person recognition (Collishaw & Hole, 2000), then just such an effect would be expected to emerge.

The results of the first two experiments demonstrate the ease with which perceivers are able to extract socially meaningful information from faces. In both cases, participants were seemingly incapable of ignoring the social relevance of faces. That is, although the faces were irrelevant to the task at hand (i.e., classifying verbal stimuli), the semantic information in the faces that related to the processing goal that was operating exerted a predictable influence on participants' responses. Together, these experiments suggest that the extraction of social information from faces is automatic in that its influence on participants' responses was unintended (Bargh, 1989). But is this really the case? Is mere presentation of a face sufficient to trigger person construal? In the studies reported thus far it is not possible to answer this question as participants were given semantic processing objectives as part of the experimental task (Macrae et al., 1997). As such, the

apparent automaticity of person construal may have been contingent on the operation of these processing goals. We explored this possibility in our final experiment. In this study, participants were asked to make a semantic (female/male) judgment in one block of trials and a perceptual (upper/lowercase) judgment in another block of trials on forenames embedded in faces. We reasoned that comparing the relative influence of distracting stimuli following the activation of semantic and nonsemantic processing goals would inform the issue of how automatically perceivers extract categorical information from faces.

### Experiment 3

#### Method

**Participants and design.** Twenty undergraduates from Dartmouth College completed the experiment for additional course credit. The experiment had a 2 (judgment task: perceptual or semantic)  $\times$  2 (target status: matching or mismatching) within-participants design.

**Stimulus materials and procedure.** Experiment 3 was a partial replication of Experiment 1, but with some modifications. Rather than classifying forenames according to sex when those forenames were superimposed on upright and inverted faces, participants were presented with forenames superimposed on upright faces only and requested to evaluate them (via a button press) according to their sex in one block of trials (i.e., a semantic judgment) and the case in which the names were written (i.e., uppercase vs. lowercase; a perceptual judgment) in another block of trials. Block order was counterbalanced across participants. As before, the words were superimposed on either faces or a face-shaped oval stimulus. The stimulus materials (i.e., the set of distractor faces and the forenames) were those used in Experiment 1 (i.e., 80 female faces, 80 male faces, 80 face-like shapes). Each block (semantic or perceptual) comprised 240 trials and participants were given a short break (1 min) between the blocks. The computer recorded the accuracy and latency of each response. On completion of the task, participants were debriefed and thanked for their assistance.

#### Results and Discussion

For each participant, median reaction times (RTs) were calculated for matching (i.e., sex-congruent) and mismatching (i.e., sex-incongruent) trials, collapsing across the sex of the forenames and the faces. Trials on which errors were made (4.3% of trials) were omitted from the statistical analysis. The resulting data were then submitted to a 2 (judgment task: perceptual or semantic)  $\times$  2 (target status: matching or mismatching) repeated measures ANOVA. The analysis yielded a main effect for judgment task [ $F(1, 19) = 36.34, p < .001$ ] indicating that participants were faster to make perceptual (i.e., case) judgments than semantic (i.e., sex) judgments (median RTs = 670 ms vs. 833 ms, respectively). The analysis also yielded a main effect for target status [ $F(1, 19) = 24.52, p < .001$ ] indicating that participants were faster to judge target names that matched rather than mismatched distractor sex (median RTs = 739 ms vs. 764 ms, respectively). These effects, however, were subsumed within a Judgment Task  $\times$  Target Status interaction,  $F(1, 19) = 14.85, p < .001$  (see Figure 3). Inspection of the means indicated that, as in Experiment 1, participants were slower to categorize the sex of the target name in the mismatching versus matching trials,  $p < .001$  (median RTs = 810 ms vs. 856 ms, respectively). When making a perceptual (case) judgment,

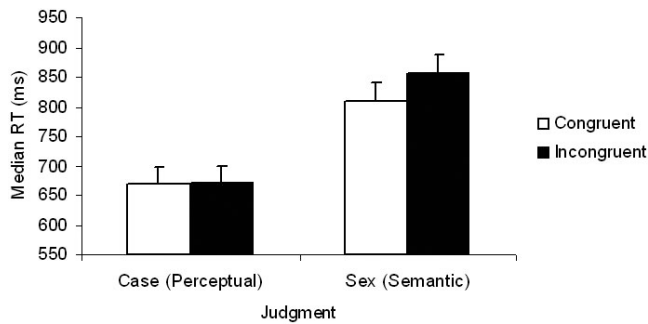


Figure 3. Median sex categorization latency as a function of target-distractor congruence and judgment task, Experiment 3.

however, participants demonstrated no such interference effect,  $p = .71$  (median RTs = 668 ms vs. 672 ms, respectively, for matching vs. mismatching trials).

These results suggest that although the extraction of categorical knowledge from faces may be relatively effortless and may even occur unintentionally, the process is nonetheless contingent on the operation of a semantic processing goal (Macrae et al., 1997). Even though the task required participants to look directly at the faces, there was no evidence of attention to category-related features in that responding was neither facilitated nor impaired by target-distractor congruence when the goal was to make a perceptual judgment about the target name. What this suggests is that person construal is sensitive to perceivers' current processing concerns (Macrae & Bodenhausen, 2000).

### General Discussion

#### *What's in a Face?*

A central puzzle in social cognition is establishing how and when perceivers decode facial cues to extract person knowledge about others. The challenging aspect of this problem is that even the briefest of glances at a face is seemingly sufficient to furnish an abundance of information about its owner. For example, one may quickly cognize that a person in a nightclub is female, young, happy, and staring longingly into the eyes of her handsome partner. On further inspection, one may realize that the woman is in fact Britney Spears. At any given point in time, the machinery of person construal can extract both invariant (e.g., identity, sex) and dynamic (e.g., emotion, gaze direction) aspects of person knowledge from available facial cues (Bruce & Young, 1986; Haxby et al., 2000, 2002). It is somewhat surprising, therefore, that social-cognitive research has tended to consider only the conditions under which stereotype-based thinking guides people's dealings with others (Bodenhausen & Macrae, 1998; Brewer, 1988; Fiske & Neuberg, 1990). In reality, knowledge of the groups to which an individual belongs is but a single source of information that may be used to inform the person perception process. Of equivalent, or perhaps even greater, importance in a variety of settings may be knowledge of a target's emotional status, identity, or gaze direction (Bruce & Young, 1986).

Notwithstanding social cognition's focus on categorical thinking, this work has addressed what is arguably the foremost issue in

the psychology of person construal—whether or not perceivers automatically extract person knowledge (e.g., sex, age) following the registration of a triggering stimulus cue (Macrae & Bodenhausen, 2000). Although this question continues to engender debate and discussion (see Bargh, 1999; Blair, 2002), few would challenge the assertion that categorical knowledge can be extracted from faces with relative ease. It is therefore somewhat surprising that very few studies have actually used faces to investigate the dynamics of person construal (see Blair, Judd, & Fallman, 2004; Cloutier et al., in press; Livingston & Brewer, 2002; Quinn & Macrae, 2005). For the most part, researchers have employed verbal stimuli (e.g., category labels) as a proxy for real people in their investigations (see Macrae & Bodenhausen, 2000). When researchers have used facial stimuli to investigate person construal, measures have tended to focus on downstream processes such as stereotype activation (e.g., Blair, Judd, & Fallman, 2004; Kawakami & Dovidio, 2001; Macrae et al., 1997) and stereotype-based inferences (e.g., Blair, Judd, & Chapleau, 2004), or have examined categorization using memory-based rather than online measures (e.g., Maddox & Chase, 2004; Maddox & Gray, 2002). As a result of these methodological approaches, relatively little is known about the conditions under which categorical information is extracted from available facial cues (cf. Blair, 2002; Blair, Judd, & Fallman, 2004; Livingston & Brewer, 2002). Moreover, this omission in theorizing and experimentation extends to other aspects of person construal, such as access to an individual's emotional state, gaze direction, and identity. Acknowledging that additional work on this topic needs to be undertaken, the current research considered the efficiency of the cognitive operations through which perceivers glean categorical and identity-related knowledge from faces (Cloutier et al., in press; Mason & Macrae, 2004).

In considering the dynamics of person construal, two basic questions were addressed: first, whether perceivers unintentionally extract aspects of person knowledge from task-irrelevant faces; and second, whether the efficiency of person construal (i.e., knowledge extraction) is compromised when faces are presented in a suboptimal orientation (i.e., inverted) or when processing goals are nonsocial in nature. The results were unequivocal. Across two experiments, participants extracted knowledge of the sex (Experiment 1) and identity (Experiment 2) of social targets when this information was conveyed by task-irrelevant faces in both upright and inverted orientations. In a further experiment, however, participants did not extract information about sex when a nonsemantic processing goal was in place (Experiment 3).

These findings then speak to the overall efficiency and flexibility of the processing operations through which perceivers gain social knowledge about others (Bruce & Young, 1986; Haxby et al., 2000, 2002; Tarr & Gauthier, 2000), knowledge that may play a crucial role in their dealings with the individuals in question. But just how automatic are the effects observed herein? Is mere exposure to a stimulus target sufficient to trigger the machinery of person construal? In his influential writings on social-cognitive functioning, Bargh (1989, 1994) has delineated the conditions under which different varieties of automaticity are manifest in everyday life. As he notes, "All automaticity is conditional; it is dependent on the occurrence of some specific set of circumstances. A cognitive process is automatic given certain enabling circumstances, whether it be merely the presence of the triggering prox-

imal stimulus, or that plus a specific goal-directed state of mind and sufficient attentional resources" (1989, p. 7).

From this standpoint, the current effects are a prototypical example of what can be termed unintended goal-dependent automaticity. Although goal-relevant attention was not directed to the faces in each of the reported experiments, participants were nevertheless required in Experiments 1 and 2 to classify a verbal item that was superimposed on each stimulus (de Fockert et al., 2001). In other words, a semantic processing goal was operating during the registration of the task-irrelevant faces (see also Macrae et al., 1997). In these cases, participants were unable to avoid the semantic meaning of the faces. When this goal was removed, however, participants showed no evidence of having processed the significance of the faces. The observed effects are therefore conditionally automatic in nature as they were elicited as an unintended consequence of a quite specific processing objective (Bargh, 1989, 1994). These findings are consistent with recent work that has demonstrated that mere exposure to a target is not sufficient to trigger person categorization. Quinn and Macrae (2005), for example, have shown that passive registration of faces does not elicit category activation (as indexed by repetition priming), although it does support person recognition. Only when perceivers have a conceptual processing goal in place does category activation occur, a finding that also emerges in the current investigation. Together these studies demonstrate both the ease with which person knowledge can be extracted from faces as well as the boundary conditions of this effect.

To be fair, however, our conclusion that meaningful person construal does not occur during perceptual analysis is based on the results of only a single chronometric measure of category activation. Although response latencies are the favored exploratory tool in social-cognitive investigations of person construal (Macrae & Bodenhausen, 2000), these measures are not without their limitations; response times may simply be too insensitive to detect category activation. Acknowledging this possibility, researchers have recently turned to electrophysiological measures of brain activity, such as event-related potentials and magnetoencephalography to investigate the neural components of person construal. Indeed, these neurophysiological investigations have suggested that early visual processing (e.g., 145–185 ms poststimulus onset) is attentive to differences in the sex, age, and race of social targets (e.g., Ito & Urland, 2003; Mouchetant-Rostaing & Giard, 2003; Mouchetant-Rostaing, Giard, Bentin, Aguera & Pernier, 2000). But do these neural events really index person categorization or might they simply reflect the perceptual extraction of featural information from faces? That is, do they reflect the assignment of target faces to meaningful social categories, or simply perceptual differentiation among the target faces? It is important to note that Liu, Harris, and Kanwisher (2002) have reported that what appears to be a face-selective cortical response (M100) occurring 100 ms poststimulus onset actually shows a stronger response to stimuli depicting face parts than entire facial configurations, thereby suggesting that these neural events index feature extraction rather than classification of the target face into some semantically meaningful category (see also Mouchetant-Rostaing & Giard, 2003). Together, this body of evidence suggests that early, task-independent visual processes extract featural information from faces, information that undoubtedly serves as the basis for—but should not be seen as

interchangeable with—subsequent target categorization (VanRullen & Thorpe, 2001).

### *Neural Substrates of Person Construal*

Following the structural encoding of a face, mechanisms dedicated to the extraction of different classes of person knowledge (e.g., sex, age, emotion, gaze direction) are believed to furnish their products to consciousness (or subsequent processing operations) in a mandatory manner (Bruce & Young, 1986; Burton et al., 1990). Moreover, this all takes place with impressive rapidity. Electrophysiological research has reported a face-specific evoked response potential component in occipitotemporal cortex, peaking around 170 ms (N170) poststimulus onset (Allison et al., 1994; Bentin et al., 1996). This neural event has been associated with the structural encoding of a face and precedes the extraction of person knowledge, a process that is supported by activity in a distributed network of neuroanatomical regions (George et al., 1999; Haxby et al., 2000, 2002; Hoffman & Haxby, 2000; Sergent, Ohta, & MacDonald, 1992).

Broadly speaking, the human face processing system comprises three bilateral regions in the occipitotemporal cortex (Haxby et al., 2000): the inferior occipital gyri; the lateral fusiform gyrus; and the superior temporal sulcus. These areas appear to be differentially engaged depending on the judgment that is undertaken on a face. For example, whereas the lateral fusiform gyrus appears to be involved in judgments of identity (Hoffman & Haxby, 2000; Kanwisher, McDermott, & Chun, 1997; McCarthy et al., 1997), the superior temporal sulcus is engaged in tasks that tap dynamic aspects of face processing, such as the detection of gaze direction (Hoffman & Haxby, 2000). Although research in functional brain imaging has yet to consider core aspects of social-cognitive functioning and person perception (but see Mason & Macrae, 2004; Mason, Banfield, & Macrae, 2004; Mitchell, Heatherton, & Macrae, 2002; Turk, Rosenblum, Gazzaniga, & Macrae, 2005), the extant literature on face processing does provide some potentially useful insights into the current behavioral effects—notably the issue of why facial inversion failed to impede the extraction of person knowledge from faces.

As was previously noted, inversion is typically associated with a decrement in recognition performance, an effect that is attributed to impaired configural processing under conditions of facial inversion (Diamond & Carey, 1986; Farah et al., 1995; Rhodes et al., 1993). That similar effects failed to emerge for the extraction of person knowledge is interesting for a number of reasons. First, it is possible that aspects of person knowledge (e.g., sex, emotion) are cued by isolated facial features (e.g., hairstyle, brow width), hence are resistant to the effects of inversion (Leder & Bruce, 1998; Prkachin, 2003; Searcy & Barlett, 1996). Second, although inversion impairs recognition accuracy, it does not reduce responding to chance levels (Collishaw & Hole, 2000). That is, perceivers are still able to identify familiar others even when they are presented in an inverted orientation.

Of relevance to the stability of person construal under conditions of facial inversion may be findings from the literature on the neuroimaging of face processing. As inversion impairs recognition performance, one might reasonably expect activity in face-responsive regions of the extrastriate cortex (Haxby et al., 2000) to

be attenuated when faces are presented in this orientation. As it turns out, however, the available evidence provides little support for this prediction (Aguirre, Singh, & D'Esposito, 1999; Haxby et al., 1999; Kanwisher, Tong, & Nakayama, 1998). Indeed, inversion prompts activity in the very same regions of the occipitotemporal cortex that respond to faces in an upright orientation (Haxby et al., 1999). Thus, the overall efficiency of person construal may be evidenced by the demonstration that inversion fails to impact basic neural operations that extract aspects of person knowledge from faces (see Haxby et al., 2000; Tarr & Gauthier, 2000). Operating in such a way, the benefits of the face processing system are obvious. If able to glean knowledge from faces under challenging circumstances, perceivers can continue to respond to others in a flexible and purposive manner.

### Conclusion

Negotiating the complex demands of everyday life relies on an ability to decode information that is present in the face. For example, having established that a person is female, smiling, and Nicole Kidman, one can quickly implement the desired behavioral response (e.g., ask for her autograph). Supporting this capacity is a processing system that is finely tuned to the task of extracting various aspects of person knowledge from available facial cues (Bruce & Young, 1986; Haxby et al., 2000, 2002). As demonstrated in the present investigation, people can readily determine the sex and identity of a target, even when this information is irrelevant to their current processing concerns and faces are presented in an ostensibly suboptimal orientation. Importantly, however, the generation of this information seemingly relies on the operation of a semantic processing goal. Given the potential importance of these findings for contemporary treatments of person perception (Brewer, 1988; Fiske & Neuberg, 1990), future work on this topic should strive to integrate the theoretical and empirical issues that lie at the intersection of social cognition and face processing (Brewer, 1988; Bruce & Young, 1986; Fiske & Neuberg, 1990). For example, is the extraction of person knowledge modulated by the specific type of social processing goal that is in place, the nature of one's prior experience with the stimuli, or the context in which faces are encountered? In addition, are the neural processes that subservise the extraction of person knowledge functionally dissociable from those that support object recognition and construal (Haxby et al., 2000; Tarr & Gauthier, 2000)? Answers to these questions will both highlight the pivotal status of the face in everyday life and integrate work in person perception with broader themes in the emerging field of social-cognitive neuroscience.

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### New Editors Appointed, 2007–2012

The Publications and Communications (P&C) Board of the American Psychological Association announces the appointment of three new editors for 6-year terms beginning in 2007. As of January 1, 2006, manuscripts should be directed as follows:

- *Journal of Experimental Psychology: Learning, Memory, and Cognition* ([www.apa.org/journals/xlm.html](http://www.apa.org/journals/xlm.html)), **Randi C. Martin, PhD**, Department of Psychology, MS-25, Rice University, P.O. Box 1892, Houston, TX 77251.
- *Professional Psychology: Research and Practice* ([www.apa.org/journals/pro.html](http://www.apa.org/journals/pro.html)), **Michael C. Roberts, PhD**, 2009 Dole Human Development Center, Clinical Child Psychology Program, Department of Applied Behavioral Science, Department of Psychology, 1000 Sunnyside Avenue, The University of Kansas, Lawrence, KS 66045.
- *Psychology, Public Policy, and Law* ([www.apa.org/journals/law.html](http://www.apa.org/journals/law.html)), **Steven Penrod, PhD**, John Jay College of Criminal Justice, 445 West 59th Street N2131, New York, NY 10019-1199.

**Electronic manuscript submission.** As of January 1, 2006, manuscripts should be submitted electronically through the journal's Manuscript Submission Portal (see the Web site listed above with each journal title).

Manuscript submission patterns make the precise date of completion of the 2006 volumes uncertain. Current editors, Michael E. J. Masson, PhD, Mary Beth Kenkel, PhD, and Jane Goodman-Delahunty, PhD, JD, respectively, will receive and consider manuscripts through December 31, 2005. Should 2006 volumes be completed before that date, manuscripts will be redirected to the new editors for consideration in 2007 volumes.

In addition, the P&C Board announces the appointment of **Thomas E. Joiner, PhD** (Department of Psychology, Florida State University, One University Way, Tallahassee, FL 32306-1270), as editor of the *Clinician's Research Digest* newsletter for 2007–2012.