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Short research note

Dude looks like a lady: Exploring the malleability of person categorization

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Abstract

Recent research has documented how single facial features can trigger person categorization. Questions remain, however, regarding the automaticity of the reported effects. Using a modified flanker paradigm, the current investigation explored the extent to which hair cues drive sex categorization when faces comprise task-irrelevant (i.e., unattended) stimuli. In three experiments, participants were required to classify target forenames by gender while ignoring irrelevant flanking faces with and without hair cues. When present, hair cues were either congruent or incongruent with prevailing cultural stereotypes. The results demonstrated the potency of category-specifying featural cues. First, flanker interference only emerged when critical hair cues were present (Experiment 1). Second, flankers with stereotype-incongruent hairstyles (e.g., men with long hair) facilitated access to information associated with the opposite sex (Experiment 2), even when the flankers were highly familiar celebrities (Experiment 3). The theoretical implications of these findings are considered.

Even the briefest of glances at a face is sufficient to furnish a wealth of useful information about an individual (e.g., identity, sex, emotional state). The ease with which this knowledge is acquired, however, obscures the inherent complexity of the person perception process. From sometimes subtle or impoverished visual cues, perceivers are capable of extracting detailed person knowledge (Bruce & Young, 1986; Haxby, Hoffman, & Gobbini, 2000, 2002; Zebrowitz, 1997). In exploring the processes that support this core social-cognitive ability, researchers have drawn an important distinction between two classes of facial information: configural (i.e., the position of facial features and the relational distance between them; Gauthier & Tarr, 1997; Moscovitch, Winocur, & Behormann, 1997) and featural (i.e., eyes, nose, mouth, hairstyle; Diamond & Carey, 1986; Rhodes, Tan, Brake, & Taylor, 1989). While an extensive literature has documented the importance of configural information to the process of person identification (Gauthier & Tarr, 1997; Moscovitch et al., 1997; Rhodes et al., 1989), recent work has demonstrated that person categorization can be triggered following the registration of critical category-specifying featural cues (e.g., Macrae & Martin, 2007; Martin & Macrae, 2007; Schyns, Bonnar, & Gosselin, 2002; Schyns & Oliva, 1999). Questions remain, however, regarding the precise psychological status (e.g., automaticity) of this effect (Macrae & Bodenhausen, 2000, 2001). In particular, just how potent are feature-based cues during person construal? The current investigation revisits this important theoretical issue.

Traditionally it was assumed that merely viewing a member of a particular group would result in the obligatory activation of associated stereotype-related knowledge in memory (e.g., Allport, 1954; Bargh, 1999). This viewpoint has been called into question however by studies which have shown the process to be conditional on a variety of factors, including perceivers' current goals (Macrae, Bodenhausen, Milne, Thorn, & Castelli, 1997; Ozgen, Sowden, Schyns, & Dauotis, 2005; Pendry & Macrae, 1996), attitudes (Lepore & Brown, 1997; Locke, MacLeod, & Walker, 1994) and

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expectations (Blair & Banaji, 1996). In addition to these perceiver-related factors, an emerging literature suggests that category activation following target exposure may also be contingent on the presence of feature-based cues that are diagnostic of category membership (Cloutier & Macrae, 2007; Cloutier, Mason, & Macrae, 2005; Macrae & Martin, 2007; Martin & Macrae, 2007). Person perception, like other forms of object categorization, appears to be bound to basic perceptual processes, with categorical judgments driven by the relative availability of diagnostic featural cues (Schyns et al., 2002; Schyns & Oliva, 1999). For example, while one can identify an individual's sex based on a range of internal facial features (e.g., eyebrow shape, cheekbones, stubble; Brown & Perrett, 1993; Burton, Bruce, & Dench, 1993), the most prominent indicator of sex is a person's hairstyle (Goshen-Gottstein & Ganel, 2000; Macrae & Martin, 2007; Martin & Macrae, 2007). Indeed, such is the influence of hairstyle and length as markers of sex, it has been commonplace for researchers investigating face processing to remove all hair cues from their experimental stimuli (Brown & Perrett, 1993; Burton et al., 1993; Goshen-Gottstein & Ganel, 2000). This methodological preference is unfortunate, however, as the presence of critical feature-based cues modulates the efficiency with which perceivers can explicitly categorize a target individual (Cloutier & Macrae, 2007; Cloutier et al., 2005; Martin & Macrae, 2007).

In addition to supporting overt categorization (Schyns et al., 2002), there is growing evidence to suggest that the mere presence of critical category-specifying cues is sufficient to activate categorical knowledge structures in memory (Macrae & Martin, 2007; Martin & Macrae, 2007). For example, recent semantic priming studies have demonstrated equivalent levels of category activation when both isolated hair cues (i.e., hair alone with internal face features removed) and intact faces (i.e., internal face features and hairstyle) are used as triggering primes (Macrae & Martin, 2007). Indeed, such is perceivers' reliance on hair cues to sex faces, when this feature is unavailable (e.g., cropped faces) category activation fails to occur (Martin & Macrae, 2007). Conversely, even when present in a highly degraded form, hair cues are capable of triggering category activation (Martin & Macrae, 2007). Taken together, these findings suggest that featural cues elicit category activation in an obligatory (i.e., automatic) manner (Bargh, 1999). But just how compelling is the evidence for this viewpoint?

While it has been reported that feature-based cues prompt the automatic activation of categorical representations, this line of inquiry has relied on a single experimental methodology—sequential semantic priming (Macrae & Martin, 2007; Martin & Macrae, 2007). Herein lies a potential problem. Although semantic priming has proved a useful tool in demonstrating social category activation, the idea that such activation is automatic is dependent on whether or not the task is free from controlled processing. There is, however, considerable evidence to suggest that semantic priming can occur via two distinct routes (Collins & Loftus, 1975; Neely, 1977, 1991; Posner & Snyder, 1975); automatic spreading activation and controlled attempts to relate the priming and target stimuli (Neely, 1977, 1991; Posner & Snyder, 1975). The possibility that controlled processing may contribute to category activation (as indexed via semantic priming) derives from the manner in which stimuli are presented to participants. While primes are notionally irrelevant (i.e., to-be-ignored) to the task that is to be undertaken on target stimuli, primes appear immediately before the target items, at the same spatial location, and crucially within the focus of visual attention (Bryden, 1961; Crovitz & Daves, 1962). While priming stimuli are therefore to-be-ignored, whether they can be classed as unattended is highly questionable. These paradigm-specific procedural features (i.e., attended though irrelevant primes) may encourage participants to anticipate the relationship between the priming and target stimuli across the experiment (Neely, 1977). As a result, it may be misleading to assume that category activation from centrally presented primes represents a truly automatic process (Macrae & Martin, 2007).

Given the potential limitations of sequential semantic priming as a measure of category activation, is there a more appropriate paradigm for assessing the automaticity of person categorization from facial cues? One possibility is to use a flanker task (Eriksen & Eriksen, 1974). In standard versions of this paradigm, participants are instructed to make a speeded response to a target stimulus (e.g., a forename) that is flanked by irrelevant (i.e., to-be-ignored) distractors (e.g., faces). As these distractors are either compatible or incompatible with the to-be-required response, flanker interference (i.e., slower responding on incompatible than compatible trials) provides an index of the extent to which irrelevant stimuli have been processed (see Brebner & Macrae, 2008). Crucially, in tasks employing this methodology, distractors are presented simultaneously with target items, in a distinct spatial location that is outside the focus of visual attention (i.e., to-be-ignored flankers are also unattended). As such, flanker interference provides evidence for the automatic appraisal of task-irrelevant stimuli (Beck & Lavie, 2005).

In our first experiment, we therefore explored the extent to which to-be-ignored facial distractors trigger flanker interference. Specifically, participants sexed forenames that were flanked by response-matching or response-mismatching faces. To investigate the importance of hair cues to the process of category activation, forenames were flanked by either

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intact (i.e., hair present) or cropped (i.e., hair absent) faces. We anticipated that automatic category activation would only be triggered by intact flankers (Cloutier & Macrae, 2007; Macrae & Martin, 2007; Martin & Macrae, 2007).

METHOD

Participants and Design

Sixteen undergraduates (10 female) from the University of Aberdeen completed the experiment for course credit. The experiment had a 2 (Face: intact or cropped) $\times$ 2 (Trial Type: matching or mismatching) repeated-measures design.

Stimulus Materials and Procedure

Participants arrived at the laboratory individually, were greeted by a female experimenter and seated facing a computer screen at a standard viewing distance of 57 cm (fixed by means of a chinrest). Participants were informed that they were to be presented with a series of target names (e.g., Amy, John) that they were to classify by gender as quickly and accurately as possible via a key press. It was also explained that the names would be flanked by irrelevant stimuli that were to-be-ignored (Jenkins, Lavie, & Driver, 2003).

The target stimuli consisted of 128 centrally presented forenames that were unambiguously male or female, ranging from 0.8 to 2.9 cm in width (0.8°–2.9° of visual angle). These target names were flanked by a facial distractor appearing either to the left or the right of the name on an equal number of occasions. Flanking images were centred at 5° of eccentricity in the experimental displays. The distractor stimuli comprised 64 greyscale images of unfamiliar faces (measuring 5.7° $\times$ 7.3° of visual angle), depicted in frontal pose displaying neutral facial expressions. Half of these images displayed faces with intact hair cues, while the remaining images displayed faces with the hair cues removed (i.e., cropped,

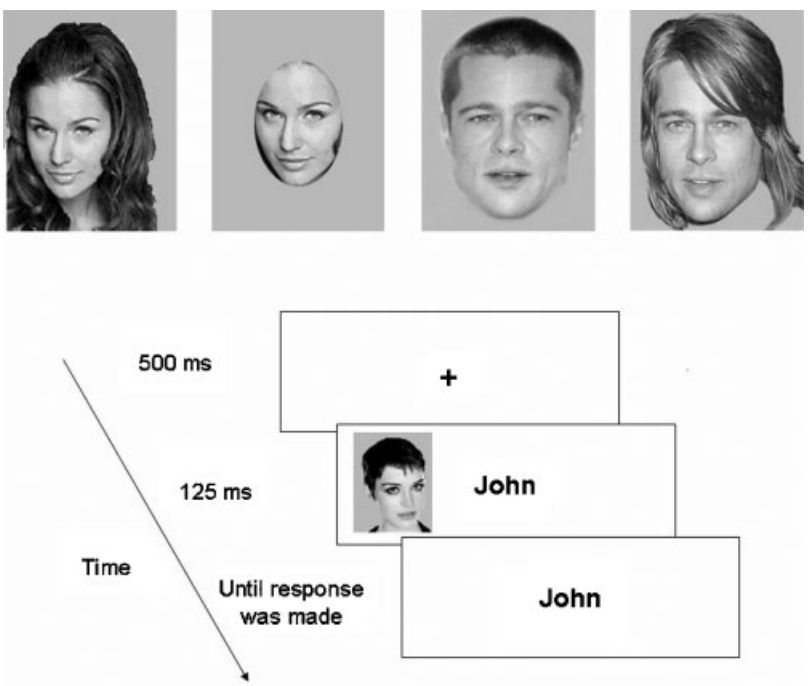

Figure 1. Examples of distractor stimuli (upper panel from left: intact-hair, cropped hair, stereotype-congruent hairstyle, stereotype-incongruent hairstyle), and a stimulus presentation sequence (lower panel) illustrating a mismatching trial where the distractor has a stereotype-incongruent hairstyle

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see Figure 1, upper panel). The same faces were presented across the two conditions, with the only difference being the presence or absence of hair cues.

Each trial comprised the central presentation of a fixation cross which remained on screen for 500 ms. This was followed by a display containing the target name and flanker stimulus that appeared for 125 ms. The flanking image then disappeared from the array, leaving only the target name on screen until a response was made (see Figure 1, lower panel). Participants completed two experimental blocks (each containing 64 trials), one in which the flanking images had intact hair cues, and another in which the hair cues were cropped. Critically, on half the trials in each block the sex of the distracting image matched the sex of the target name, while the sex of the flanker and the target mismatched on the remaining trials. Each distractor was presented twice, once on a matching trial and once on a mismatching trial. The order of trials within each block was randomized. Block order and response key mappings were counterbalanced across participants.

Results and Discussion

Trials on which errors were committed (5%) were excluded from the analysis. Median response times for the remaining data were calculated and submitted to a 2 (Face: intact or cropped) X 2 (Trial Type: matching or mismatching) repeated measures analysis of variance (ANOVA).[1] The analysis revealed a main effect of Trial Type [$F(1,15) = 9.51$, $p < .01$, $d = 0.80$], such that faster responses were made on matching than mismatching trials. Importantly, the analysis also revealed a Face X Trial Type interaction [$F(1,15) = 5.46$, $p < .05$, $d = 0.60$]. Simple effects analyses showed that while participants responded more quickly to matching than mismatching trials when the faces were presented with hair [$F(1,15) = 24.75$, $p < .001$, $d = 1.28$], no such effect emerged when the faces were cropped [$F(1,15) = .03$, *ns*, see Figure 2].[2]

The current results demonstrate that, when hair cues are unavailable, participants do not extract sex-related information from task-irrelevant faces in an obligatory manner. When, however, hair cues are present, flanker interference indexes the automatic activation of categorical knowledge (Bargh, 1999). Thus, as with sequential priming paradigms, flanker tasks only furnish evidence of automatic category activation when critical category-specifying facial cues are present (Macrae & Martin, 2007; Martin & Macrae, 2007). These findings underscore the automaticity of category activation following feature detection (Brebner & Macrae, 2008).

EXPERIMENT 2

Eliciting a Categorical Sex Change

Given the pivotal status of featural cues to the process of person categorization (Schyns et al., 2002; Schyns & Oliva, 1999), an interesting question emerges. Is it possible that these facial cues may sometimes lead person construal awry and

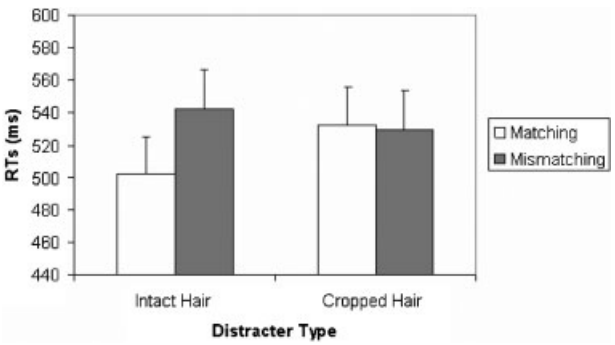

Figure 2. Median reaction times (ms) to classify target names flanked by distractor faces with and without hair

[1]Preliminary analysis revealed no effects of block order, consequently the data were collapsed across this factor.

[2]Analysis of the error data revealed only a Face × Trial Type interaction [$F(1,15) = 15.16$, $p < .001$, $d = 1.00$]. Simple effects analyses revealed no difference in the observed error rates on matching and mismatching trials when the faces had intact hair cues [$F(1,15) = 3.16$, *ns*; respective *M*s: 0.93 vs. 1.37%]; when however hair cues were cropped from the faces participants made more errors on matching than mismatching trials [$F(1,15) = 9.35$, $p < .01$, $d = 0.79$; respective *M*s: 1.61 vs. 0.78%].

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give rise to errant categorical judgments? Some recent research suggests that this may indeed be the case, at least under sub-optimal processing conditions. Macrae and Martin (2007), for example, presented male and female face primes with non-sex-typed hairstyles (i.e., males with long hair and females with short hair) for very brief presentation durations (i.e., 25 ms) and measured the accessibility of stereotypical knowledge. Instead of activating semantic knowledge associated with the veridical sex of the primes, faces triggered knowledge stereotypically associated with the available hair cues. Specifically, men with long hair facilitated access to female stereotypes, whereas women with short hair enhanced access to male stereotypical knowledge (i.e., reverse priming). When however participants had additional time to process the faces (i.e., 200 ms), conventional priming effects emerged. These findings demonstrate that when face processing is compromised, category-specifying cues can trigger errors in person construal. Again, however, this effect has only been demonstrated using a sequential semantic priming paradigm (Macrae & Martin, 2007), thus the generality of reverse priming from facial cues has yet to be established. Accordingly, we re-explored this issue in our second experiment using a flanker paradigm.

METHOD

Participants and Design

Sixteen undergraduates (9 female) participated in the experiment. The experiment had a 2 (Hairstyle: stereotype-congruent or stereotype-incongruent) X 2 (Trial Type: matching or mismatching) repeated-measures design.

Stimulus Materials and Procedure

The experimental procedure was identical to Experiment 1, with the following modifications. Each of the 64 facial distractors was presented with intact hair cues. Importantly, however, half of the faces were presented with stereotype-congruent hairstyles (i.e., males with short hair and females with long hair), while the remaining distractors were faces with stereotype-incongruent hairstyles (i.e., males with long hair and females with short hair). Adobe PhotoShop (version 8.0) was used to manipulate hair length on the faces and the same faces comprised the stereotype-congruent and stereotype-incongruent images. Participants completed two experimental blocks ($2 \times 64 = 128$ trials). On half the trials in each block the sex of the distracting image matched the sex of the target name, while the sex of the flanker and the target mismatched on the remaining trials. Each block comprised a mixture of all trial types to establish that the effects reported previously (i.e., Experiment 1) were not an artefact of a blocked-flanker design. Each distractor was presented twice, once on a matching trial and once on a mismatching trial. The order of trials within each block was randomized and the response key mappings were counterbalanced across participants.

Results and Discussion

Trials on which errors were committed (7%) were excluded from the analysis. Median response latencies for the remaining data were calculated and submitted to a 2 (Hairstyle: stereotype-congruent or stereotype-incongruent) $\times$ 2 (Trial Type: matching or mismatching) repeated-measures ANOVA. The analysis revealed a main effect of Trial Type [$F(1,15) = 6.67$, $p < .05$, $d = 0.67$], such that response latencies were slower on mismatching than matching trials. Importantly, there was also a significant Hairstyle $\times$ Trial Type interaction [$F(1,15) = 21.00$, $p < .001$, $d = 1.18$]. Simple effects analyses revealed that when the distractors had stereotype-congruent hairstyles, participants responded faster on matching than mismatching trials [$F(1,15) = 15.51$, $p < .001$, $d = 1.02$]. When however, the faces had stereotype-incongruent hairstyles, participants showed the opposite pattern of results, with slower response latencies on matching than mismatching trials [$F(1,15) = 12.23$, $p < .01$, $d = 0.90$, see Figure 3].[3]

[3]Analysis of the error data revealed only a main effect of hairstyle [$F(1,15) = 20.08$, $p < .001$, $d = 1.16$], such that more errors were made when the faces displayed stereotype-incongruent than stereotype-congruent hairstyles (respective *M*s: 5.37 vs. 1.85%).

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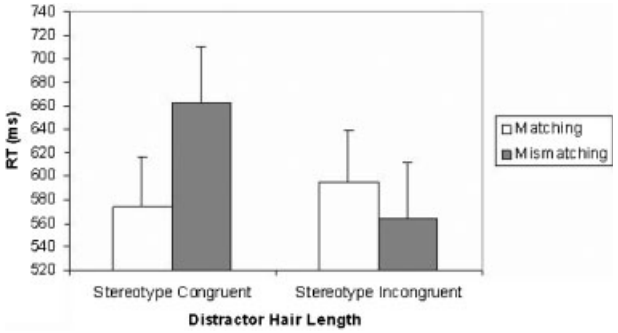

Figure 3. Median reaction times (ms) to classify target names as a function of distractor hair length

The results of Experiment 2 confirm that to-be-ignored distractor faces with stereotypic hairstyles produce standard flanker-interference effects. That is, male flankers slow down a female response and *vice versa*. When, however, flankers possess stereotype-incongruent hairstyles, reverse interference emerges (e.g., long-haired males slow down male responses and short-haired females slow down female responses). These results indicate that category activation is driven by the detection of hair cues rather than internal facial features. Extending previous work of this kind, the current findings demonstrate that hair cues can prompt errors of categorical construal even when faces comprise unattended, task-irrelevant stimuli.

EXPERIMENT 3

Celebrity Sex Changes

While feature-based information (e.g., hair cues) can evidently dominate the process of category activation, research to date has focused exclusively on the perception of unfamiliar faces (Macrae & Martin, 2007; Martin & Macrae, 2007; but see Quinn, Mason, & Macrae, in press). This then raises an interesting empirical question. Is it possible that featural cues can also lead category activation awry when the targets of interest are highly familiar individuals, such as celebrities, relatives or friends (Bruce & Young, 1986)? For example, would a short-cropped Britney Spears or a long-haired Brad Pitt trigger errant categorical responses? We explored this possibility in our final experiment.

METHOD

Participants and Design

Thirty undergraduates (26 female) participated in the experiment. The experiment had a 2 (Hairstyle: stereotype-congruent or stereotype-incongruent) $\times$ 2 (Trial Type: matching or mismatching) repeated-measures design.

Stimulus Materials and Procedure

The procedure was identical to Experiment 2, but with the following modification. Instead of unfamiliar faces, images of four celebrities (i.e., Orlando Bloom, Brad Pitt, Natalie Portman, Britney Spears) displaying both long and short hair comprised the flanking stimuli. Prior pilot testing indicated that these celebrities were highly familiar to participants. Participants completed 256 experimental trials. On half the trials the sex of the distracting image matched the sex of the

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target name, while the sex of the flanker and the target mismatched on the remaining trials. Each distractor was presented 16 times (i.e., 8 matching trials and 8 mismatching trials). The order of presentation of trials was randomized and the response key mappings were counterbalanced across participants.

Results and Discussion

Trials on which errors were committed (5%) were excluded from the analysis. Median response latencies for the remaining data were calculated and submitted to a 2 (Hairstyle: stereotype-congruent or stereotype-incongruent) × 2 (Trial Type: matching or mismatching) repeated-measures ANOVA. The analysis revealed a main effect of Trial Type [$F(1,29) = 6.27$, $p < .05$, $d = 0.46$], such that response latencies were slower on mismatching than matching trials. Importantly, there was also a significant Hairstyle × Trial Type interaction [$F(1,29) = 42.57$, $p < .001$, $d = 1.21$]. Simple effects analyses revealed that when the distractors had stereotype-congruent hairstyles, participants responded faster on matching than mismatching trials [$F(1,29) = 46.29$, $p < .001$, $d = 1.26$]. When however, the faces had stereotype-incongruent hairstyles, participants showed the opposite pattern of results, with slower response latencies on matching than mismatching trials [$F(1,29) = 4.75$, $p < .01$, $d = 0.40$, see Figure 4].[4]

These findings replicate the results obtained in Experiment 2. When celebrities displayed stereotypic hairstyles, a standard flanker-interference effect emerged (i.e., matching < mismatching). When, however, the targets were depicted with stereotype-incongruent hairstyles, a reverse flanker effect was observed (i.e., matching > mismatching). That is, the celebrities underwent a categorical sex change. These findings further underscore the importance of critical category-specifying featural cues during the person perception process (Blair, Chapleau, & Judd, 2005; Blair, Judd, & Chapleau, 2004; Blair, Judd, Sadler, & Jenkins, 2002; Livingston & Brewer, 2002; Locke, Macrae, & Eaton, 2005; Maddox & Gray, 2002). Even when presented as to-be-ignored peripheral flankers, hair cues can trigger errors of categorical construal for highly familiar targets.

GENERAL DISCUSSION

Recent research has highlighted the impact that category-specifying facial cues exert on the process of person construal (e.g., Cloutier & Macrae, 2007; Livingston & Brewer, 2002; Macrae & Martin, 2007; Martin & Macrae, 2007; Schyns et al., 2002; Schyns & Oliva, 1999). Extending this line of inquiry, the current findings demonstrated the automaticity of category activation following the registration of critical facial features. Even when faces were task irrelevant, unattended,

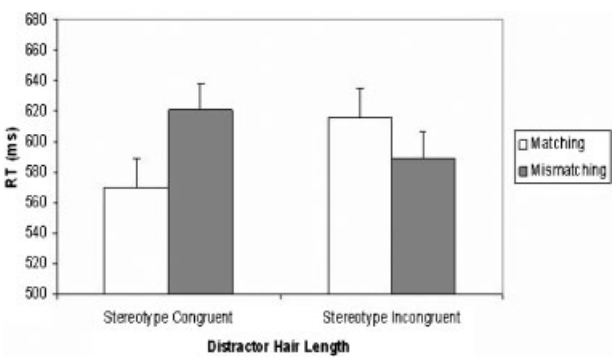

Figure 4. Median reaction times (ms) to classify target names as a function of distractor hair length

[4]Analysis of the error data yielded only a Hairstyle × Trial Type interaction [$F(1,29) = 10.79$ $p < .01$, $d = 0.61$]. Simple effects analyses revealed that participants made more errors on mismatching than matching trials when the faces displayed stereotype-congruent hairstyles [$F(1,29) = 13.35$, $p < .01$, $d = 0.68$; respective *M*s: 1.51 vs. 0.80%]. No significant difference emerged when the faces had stereotype-incongruent hairstyles [$F(1,29) = 1.99$, *ns*; respective *M*s: 1.41 vs. 1.15%].

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and fell outside the focus of visual attention (Brebner & Macrae, 2008), hair cues triggered the activation of categorical knowledge. The potency of hair cues was further revealed through the demonstration that stereotype-inconsistent hairstyles prompted errors of categorical construal (i.e., sex changes), even when the targets were highly familiar celebrities. Collectively, these findings emphasize the pivotal status of feature-based processing during person perception (Macrae & Bodenhausen, 2000, 2001).

One of the most vociferous debates in social cognition in recent years has centred on the automaticity of person categorization (Allport, 1954; Bargh, 1999; Blair, 2002; Macrae & Bodenhausen, 2000). While some researchers have argued that viewing a face leads inexorably to the activation of associated category-related knowledge in memory (see Bargh, 1999), others have opined that person categorization is conditional on myriad factors (see Blair, 2002; Macrae & Bodenhausen, 2000). Somewhat paradoxically, the current findings appear to lend support to each of these possibilities (see also Martin & Macrae, 2007). On the one hand, it appears that the mere presence of hair cues is sufficient to trigger category activation (i.e., *unconditional* automaticity), even when the activated categorical representation is inaccurate. On the other hand, however, when hair cues are absent, sex-category activation fails to occur (i.e., *conditional* automaticity). Thus, as a function of the availability of critical facial cues, category activation can be considered to be either an inevitable or conditional outcome of person registration (Macrae & Martin, 2007). How then does this observation speak to broader theoretical accounts of the person perception process (Bargh, 1999; Blair, 2002; Brewer, 1988; Fiske & Neuberg, 1990; Macrae & Bodenhausen, 2000)?

In considering the automaticity of category activation, attention should be directed to the perceptual operations that support the process of person construal (Macrae, Quinn, Mason, & Quadflieg, 2005; Quinn & Macrae, 2005). As noted elsewhere (see Cloutier & Macrae, 2007; Martin & Macrae, 2007), rather than characterizing category activation as inevitable mental outcome (Bargh, 1999; Brewer, 1988; Fiske & Neuberg, 1990), it may be more appropriate to restrict this description to the basic perceptual operations that extract feature-based information from faces (Liu, Harris, & Kanwisher, 2002; Mouchetant-Rostaing & Giard, 2003). Operating in an obligatory manner, these visual processes extract critical information from faces (e.g., gaze direction, hair cues), information that supports a range of person-related judgments, including sex categorization (Haxby et al., 2000, 2002). When, of course, these basic visual processes are unable to detect critical facial cues (as is the case with cropped faces), category activation fails to occur (Martin & Macrae, 2007). In other words, the automaticity of category activation rests on mandatory perceptual processes detecting the presence of category-specifying facial cues. Such feature-based accounts of person categorization provide a valuable insight into why categorical solutions frequently dominate the process of person construal (Macrae & Bodenhausen, 2000). Put simply, person categorization is a highly efficient perceptual process that simplifies the task of understanding others. Driven by the detection of salient facial cues, person categorization is highly resistant to manipulations that impair the quality of available visual inputs.

While the current results demonstrate the automaticity of category activation following the registration of critical facial cues (Macrae & Martin, 2007; Martin & Macrae, 2007)—a caveat is in order. Category activation was observed in a task context in which sex had been made salient. Thus, it is possible that the explicit instruction to categorize (by gender) forenames may have increased participants' sensitivity to other sex-relevant cues in the stimulus array, thereby triggering flanker interference. Elsewhere it has been demonstrated that, following the presentation of central facial primes, category activation is eliminated when participants have a perceptual (rather than conceptual) processing goal in place (see Macrae et al., 1997; Quinn & Macrae, 2005; Wheeler & Fiske, 2005). What this suggests is that prevailing task objectives (e.g., conceptual vs. perceptual) may also moderate the emergence of flanker interference. One useful task for future research will be to explore this possibility.

There is increasing evidence that multiple aspects of face perception, including determining the sex and identity of a person, are initially handled by a single processing system (Goshen-Gottstein & Ganel, 2000; Ganel & Goshen-Gottstein, 2002). If this is the case, why should we find that individual facial features exert a greater influence over automatic categorization than configural information? The answer to this question may lie in basic processing demands common to all aspects of visual perception. It is widely acknowledged that object categorization has a temporal dimension whereby the information extracted by the visual system shifts from coarse to fine-grained aspects of a stimulus (Marr, 1982). Applying this timeline to face processing, it is probable that because featural cues are typically perceptually salient (e.g., hairstyle as a cue for sex, skin-tone as a cue of race, wrinkles as a cue of age), they are extracted from the perceptual array at a very early stage in the visual processing stream (Liu et al., 2002; Mouchetant-Rostaing & Giard, 2003). Configural face information, on the other hand, requires relatively fine-grained analysis and as a consequence is extracted later in the

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processing stream (Bartlett & Searcy, 1993; Cloutier et al., 2005; Diamond & Carey, 1986; Farah, Tanaka, & Drain, 1995; Maurer, Le Grand, & Mondloch, 2002; Rhodes, Brake, & Atkinson, 1993; Searcy & Bartlett, 1996). This temporal difference in the manner in which information is extracted from faces may account for the dominance of featural information to the process of person categorization (Freeman, Ambady, Rule, & Johnson, 2008).

The noted efficiency with which we extract diagnostic featural information from faces, even when they are task-irrelevant and unattended, may give us greater insight into one of the most vexing questions in social psychology; why do we so often rely on categorical information rather than person-specific individuated knowledge? This relationship is often explained in terms of cognitive economy, whereby we rely on tapping existing semantic knowledge to guide our social understanding and interactions. The current results suggest this cognitive expedience may be maintained, in part, by comparable perceptual efficiency centring on the extraction of feature-based information from faces (Gauthier & Tarr, 1997; Moscovitch et al., 1997; Rhodes et al., 1989). It is possible, therefore, that fundamental differences in the efficiency with which featural and configural information are extracted from faces contributes to the dominance of categorical over individuated person perception (Macrae & Bodenhausen, 2000). If this is indeed the case, then it raises some important questions for extant models of person perception. Not least, are demonstrable individual differences in the propensity to process perceptual information in a featural or configural manner (e.g., Witkin, Oltman, Raskin, & Karp, 1971) mirrored by similar tendencies to view other people in a categorical or individuated mode?

Our understanding of other people is profoundly influenced by the ability to efficiently extract information from our most useful social cue—the face. What is clear from recent research is that all faces are not perceived equally. Instead, when we view a face, be it that of a highly familiar other or that of a total stranger, the nature of the resulting social-cognitive products are determined by the presence of specific diagnostic facial features and the constraints of basic visual perception.

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