The Neural Origins of Superficial and Individuated Judgments About Ingroup and Outgroup Members

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Abstract: We often form impressions of others based on superficial information, such as a mere glimpse of their face. Given the opportunity to get to know someone, however, our judgments are allowed to become more individuated. The neural origins of these two types of social judgment remain unknown. We used functional magnetic resonance imaging to dissociate the neural mechanisms underlying superficial and individuated judgments. Given behavioral evidence demonstrating impairments in individuating others outside one's racial group, we additionally examined whether these neural mechanisms are race-selective. Superficial judgments recruited the amygdala. Individuated judgments engaged a cortical network implicated in mentalizing and theory of mind. One component of this mentalizing network showed selectivity to individuated judgments, but exclusively for targets of one's own race. The findings reveal the distinct—and race-selective—neural bases of our everyday superficial and individuated judgments of others. *Hum Brain Mapp 31:150–159, 2010.*   © **2009 Wiley-Liss, Inc.**

Key words: fMRI; social judgment; face perception; amygdala; individuation; mentalizing; theory of mind

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INTRODUCTION

In just a blink of an eye, people readily and rapidly judge others. Such superficial judgments rely on meaningful inferences based on the most minimal information, provided by, for instance, the mere appearance of another's face. Sometimes, these superficial judgments can be quite accurate and predictive of important real-world outcomes [e.g., Rule and Ambady, 2008]. How the human brain deciphers characteristics about others in just a blink of an eye, however, remains largely unknown.

In contrast to superficial judgments, individuated judgments of others are based on more personalized knowledge. Whereas superficial judgments rely on face information and the social category knowledge extracted from it (e.g., gender, race, age), individuated judgments rely on a person's idiosyncratic attributes and qualities [Ambady et al., 2000; Brewer, 1988; Fiske and Neuberg, 1990]. Consequently, individuated judgments involve perceiving another person as a unique social entity ("Evan likes fighting; he must be aggressive") rather than merely a member of a social category ("Evan is male; he must be aggressive"). These two types of social judgment have long been argued to recruit distinct cognitive operations, as they differentially affect memory retrieval and involve different degrees of nonconscious and conscious processing [Macrae and Bodenhausen, 2000]. For instance, superficial judgments have been shown to involve primarily automatic processes that require few cognitive resources. They are relatively impervious to practice, fatigue, and incentives, and people are generally unaware as to how they make these judgments [Ambady et al., 2000]. In

contrast, individuated judgments tend to involve conscious and controllable processes that tax resources. They are affected by processing demands, incentives, instructions, and personal motivations.

Decades of behavioral studies have charted the diverging outcomes of superficial and individuated judgments and explored their distinct processing [Ambady et al., 2000; Macrae and Bodenhausen, 2000]. The neural origins of these two types of social judgment, however, have remained unknown. Here we tease apart the distinct brain mechanisms that give rise to the superficial judgments and individuated judgments frequently made in our dealings with others.

Prior research implicates the amygdala as a likely candidate to participate in superficial judgments. The amygdala responds to nonverbal face information [Adolphs, 2002] and shows correlated activity with trustworthiness judgments from the face [Winston et al., 2002]. Moreover, the amygdala plays a necessary role in decoding implicit social signals—signals that are the basis of superficial judgments. For instance, amygdala lesion patients are unable to interpret intentions and emotions from simulated movements of geometric shapes readily understood by normals [Heberlein and Adolphs, 2004]. An important facilitator of social behavior, the amygdala may be involved in interpreting the social significance of nonverbal stimuli [Adolphs and Spezio, 2006; Emery and Amaral, 2000] and providing nonconscious evaluations of the current social environment [Cunningham and Zelazo, 2007; Cunningham et al., 2004]. Because superficial judgments require primarily nonconscious assessments of others by way of nonverbal information, we hypothesized that such judgments would recruit the amygdala.

Individuation has long been theorized to bring about more reflective and deliberate social reasoning processes, relying on more detailed mental representations of others [Brewer, 1988; Fiske and Neuberg, 1990; Macrae and Bodenhausen, 2000]. A separately studied phenomenon is marked by surprisingly similar qualities. Mentalizing or theory of mind (ToM) generally refers to humans' ability to explain or predict other people's behavior by way of reading, reasoning, and representing their independent mental states [Gallagher and Frith, 2003]. Underlying mentalizing/ToM is thus the mental representation of a target's mind ["decoupled" from reality; Gallagher and Frith, 2003], which similarly underlies the phenomenon of individuation, encouraging more enhanced mental representations of others [Fiske and Neuberg, 1990]. Moreover, whereas mentalizing/ToM require social reasoning, so do individuated judgments. It is possible, therefore, that individuated judgments and mentalizing/ToM may share common processes, and that the neural mechanisms involved in individuated judgments may be the same that are involved in mentalizing/ToM [e.g., Frith, 2007; Gallagher and Frith, 2003; Saxe et al., 2004].

We also sought to determine whether a target's racial group membership might modulate activity in regions mediating social judgments. Behavioral findings have shown that people judge members of the ingroup (e.g., same-race individuals) differently than those of the outgroup (e.g., other-race individuals). Specifically, people do not individuate outgroup members as readily as ingroup members [Linville and Fischer, 1998; Ostrom et al., 1993; Wilder, 1978]. This reduced individuation of the outgroup replicates across a variety of groups, including race, age, nationality, religion, profession, college major, and sorority-fraternity affiliations [Linville and Fischer, 1998] and has been linked with important behavioral consequences such as intergroup conflict and outgroup discrimination [Wilder, 1978]. To assess how this reduced individuation of the outgroup is represented neurally, we additionally tested whether any brain regions selectively involved in individuated judgments would show diminished activity when judging the outgroup relative to the ingroup.

To dissociate the neural mechanisms underlying superficial and individuated judgments, and additionally assess their race-selectivity, we developed a novel "social encounter" task (see Fig. 1) and measured blood oxygenation-level-dependent (BOLD) signals using event-related functional magnetic resonance imaging (fMRI).

MATERIALS AND METHODS

Participants

Sixteen right-handed healthy White volunteers (eight males) between 18 and 23 years of age were recruited. All participants provided written informed consent and were paid for participation.

Experimental Procedures

Participants engaged in a "social encounter" task (see Fig. 1), consisting of 24 encounters. Participants were instructed that they would "meet" 24 people and make a series of judgments about their personality. These 24 encounters fulfilled a 2 (judgment: superficial or individuated) × 2 (race: White or Black target) within-subject design. Thus, within an encounter, participants made either: (i) superficial judgments of a White target, (ii) superficial judgments of a Black target, (iii) individuated judgments of a White target, or (iv) individuated judgments of a Black target.

Consistent with prior work [Brewer, 1988; Fiske and Neuberg, 1990], superficial and individuated judgments were manipulated by varying the information available. Within each encounter, five unique segments of information were presented one at a time for 5 s. In individuated encounters, information was comprised of person-descriptive sentences, allowing participants to individuate the target (e.g., "He promised not to smoke in his apartment since his roommate was trying to quit."). In superficial encounters, this information was nondescriptive (e.g., "Alaska is the largest state in the U.S."), preventing participants from
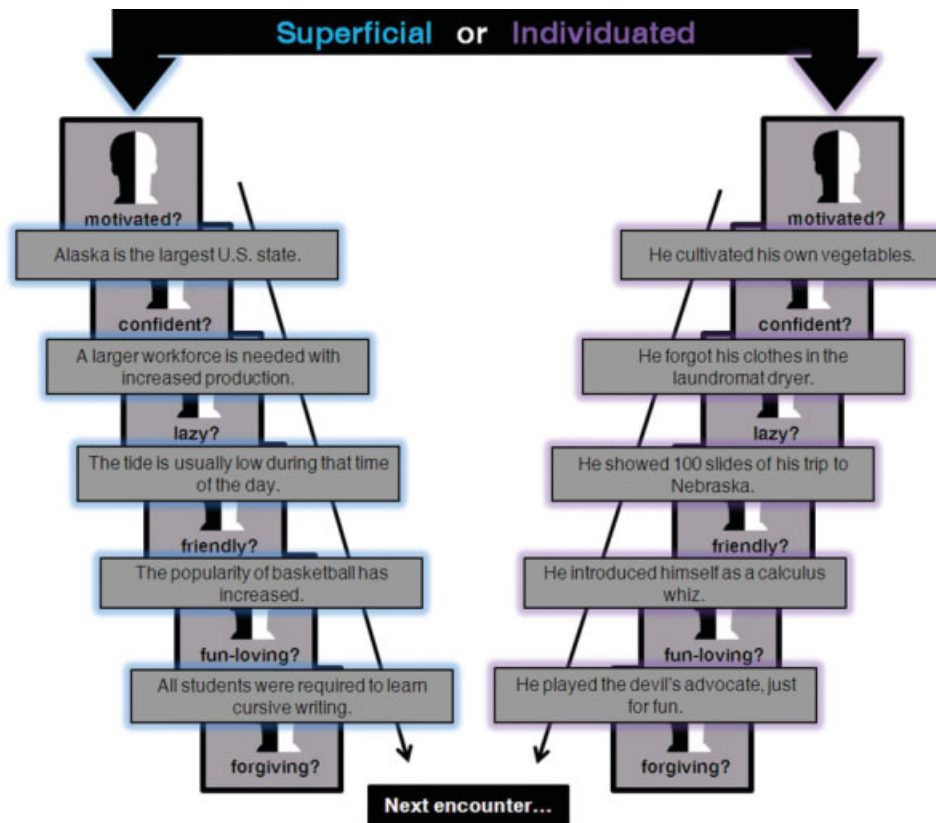
Figure 1.

Examples of a superficial and individuated encounter. On six occasions, given 3 s, participants made a unique personality judgment about the target in the present social encounter with his face displayed on the screen (either a White or Black male), indicating "yes" or "no" by key-press. Between each of the judgments, an information segment was presented alone for 5 s. In superficial encounters, information segments were not person-descriptive. In individuated encounters, these were personalized and meaningful, describing unique attributes and qualities about a target. Thus, although the same judgments were made across individuated and superficial encounters, participants either were given the opportunity to individuate the target (individuated encounters) or not given the opportunity to individuate the target (superficial encounters), which forced participants to repeatedly make superficial judgments. Following every judgment event (3 s) and every information event (5 s) was a variable inter-stimulus-interval (2,000–4,000 ms), displaying a fixation cross. [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com.]

individuating the target and forcing them to make superficial judgments. Before the first sentence and following each of the subsequent sentences within an encounter, participants were presented with the target's face (either a White or Black male) and prompted to make a unique judgment about the target's personality with 3 s to answer "yes" or "no" by key-press. Judgments were cued by displaying a trait and a question mark (e.g., "confident?"). Faces were of neutral affect, grayscaled, and standardized for brightness, contrast, and size. Personality judgments were diverse: confident, motivated, fun-loving, forgiving, nosy, nature-loving, intelligent, finicky, friendly, dishonest, lazy, irresponsible, cultured, boring, aggressive, activist, clumsy, and considerate.

To maximize the efficiency of event-related BOLD signal estimation, every judgment event and information event was followed by a variable inter-stimulus-interval (2,000–4,000 ms), during which a fixation cross was presented. At the end of each encounter, a fixation cross proceeded for 4 s.

To ensure that superficial and individuated judgments were equally ambiguous, information presented within an individuated encounter never directly pertained to any of the traits that participants judged within that encounter. Every segment of individuating information was developed in previous research to reliably convey one of the traits that were judged throughout this experiment [Uleman et al., 1996]. For example, "He forgot his clothes in the laundry" has specifically been shown to trigger an inference of "clumsy." We thus ensured that none of the sentences conveyed any of the traits judged within the same encounter. By providing social information that

allowed a target to be individuated without giving information that directly conveyed one of the traits being judged, we were able to carefully manipulate individuation.

Four counterbalanced sets were used to control for the presentation order of social encounters, as well as the assignment of targets (race and individual faces) to the superficial and individuated conditions and the assignment of particular information segments within these encounters. None of the sentences or faces repeated within each set, and no judgment or information segment repeated within the same encounter.

The sentences presented in the individuated encounters (60 sentences) and the superficial encounters (60 sentences) were pretested ($n = 10$) for valence and arousal by obtaining explicit ratings (1 = "extremely negative" to 8 = "extremely positive"; 1 = "not at all intense/arousing" to 8 = "extremely intense/arousing"). The stimuli did not significantly differ between the individuated encounters and superficial encounters for either valence [$M_{individuated}$ = 4.78, SE = 0.15; $M_{superficial}$ = 4.84, SE = 0.10; $t(58)$ = 0.32, $P > 0.1$], or arousal [$M_{individuated}$ = 3.69, SE = 0.09; $M_{superficial}$ = 3.53, SE = 0.13; $t(58)$ = 1.03, $P > 0.1$]. Because the assignment of White and Black faces to specific individuated and superficial encounters was counterbalanced across participants (see above), the four within-subject conditions [2 (judgment type) × 2 (race)] did not reliably differ from one another with respect to the valence or arousal of the information stimuli presented.

Imaging and Data Analysis

Participants were scanned using a Siemens 3T Tim Trio scanner. Anatomical images were acquired using a T1-weighted protocol (256 × 256 matrix, 128 1.33-mm sagittal slices). Functional images were acquired using a single-shot gradient echo EPI sequence (TR = 2,000 ms, TE = 30 ms). Thirty-two interleaved oblique-axial slices (3.125 × 3.125 × 5 mm voxels; slice gap = 1 mm) parallel to the AC-PC line were obtained. Analysis of the imaging data was conducted using BrainVoyagerQX (Brain Innovation, Maastricht, Netherlands). Functional imaging data preprocessing included 3D motion correction, slice scan time correction (sinc interpolation), spatial smoothing using a 3D Gaussian filter (7-mm FWHM), and voxel-wise linear detrending and high-pass filtering of frequencies (above three cycles per time course). Structural and functional data of each participant were transformed to Talairach stereotaxic space.

Each participant's BOLD responses corresponding with individual conditions occurring across the task were modeled in an event-related design as boxcar functions convolved with a two-gamma hemodynamic response function. Judgment regressors comprised the time period before button response (maximum: 3,000 ms) during which participants made a superficial or individuated judgment. For group-level whole-brain analyses, first-level general linear model (GLM) analyses conducted on individual participants' fMRI signal were submitted to a second-level random-effects GLM analysis, treating participants as a random factor. Unless otherwise specified, for whole-brain analyses, we controlled for multiple statistical testing of voxels within the entire brain, maintaining an experiment-wide alpha of 0.001 by using a voxelwise threshold of $P < 0.001$ (for the individuated > superficial contrast) or $P < 0.0005$ (for the judgment × race analysis) and a cluster extent of at least 10 contiguous functional voxels. The number of contiguous voxels needed to maintain the experiment-wide alpha was empirically determined by a Monte Carlo simulation, accounting for spatial correlations between BOLD signal changes in neighboring voxels.

RESULTS

We examined whether individuated and superficial judgments were associated with different patterns of neural activity by comparing the event-related BOLD signal associated with individuated judgments to that associated with superficial judgments. Importantly, because we inspected BOLD signals when making superficial or individuated judgments (and not signals during the presentation of information), these analyses reflect neural differences only in making superficial versus individuated judgments rather than differences in the encoding of individuating versus nonindividuating information.

Given an a priori hypothesis of the amygdala's involvement in superficial judgments, we defined a region of interest (ROI), the bilateral amygdala, using anatomical landmarks in each individual participant. These participant-specific ROIs had an average volume size of 6,425 mm^3 (SE = 284 mm^3; min. = 4,305 mm^3; max. = 8,460 mm^3). We extracted parameter estimates (beta values) of the mean activation averaged across all voxels within these participant-specific ROIs for each predictor (superficial and individuated conditions). As predicted, the bilateral amygdala exhibited significantly stronger BOLD responses during superficial judgments relative to individuated judgments, $t(15)$ = 3.16, $P < 0.01$. Individual maps of amygdala activity from several representative subjects (first-level GLM analyses) are depicted in Figure 2A and mean beta values for the superficial and individuated conditions appear in Figure 2B. To verify that these results were restricted to the amygdala, we examined the possibility that other regions may have shown selective responses to superficial judgments by conducting a superficial > individuated contrast with a whole-brain analysis. However, even at a very liberal threshold ($P < 0.05$, uncorrected), only the bilateral amygdala (left: x, y, z = −20, −1, −17, 852 mm^3, t = 2.30; right: x, y, z = 13, −8, −18, 713 mm^3, t = 3.25), converging with our ROI analysis, and one other region in right inferior temporal cortex (x, y, z = 28, 0,
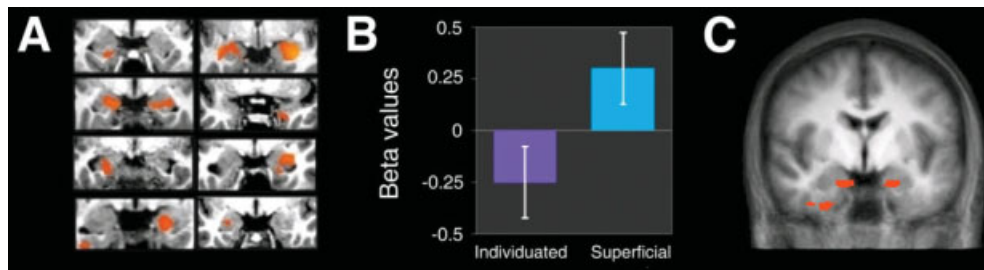
Figure 2.

BOLD responses selective to superficial judgments. (**A**) Individual maps depicting bilateral amygdala activity elicited by a superficial > individuated contrast in several representative subjects (individual first-level GLM analyses). (**B**) Mean beta values for the superficial and individuated conditions in the amygdala ROI analysis. (**C**) BOLD responses selective to superficial judgments in an exploratory whole-brain analysis of a superficial > individuated contrast at a liberal threshold ($P < 0.05$, uncorrected), revealing only the bilateral amygdala and one other region in right inferior temporal cortex. [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com.]
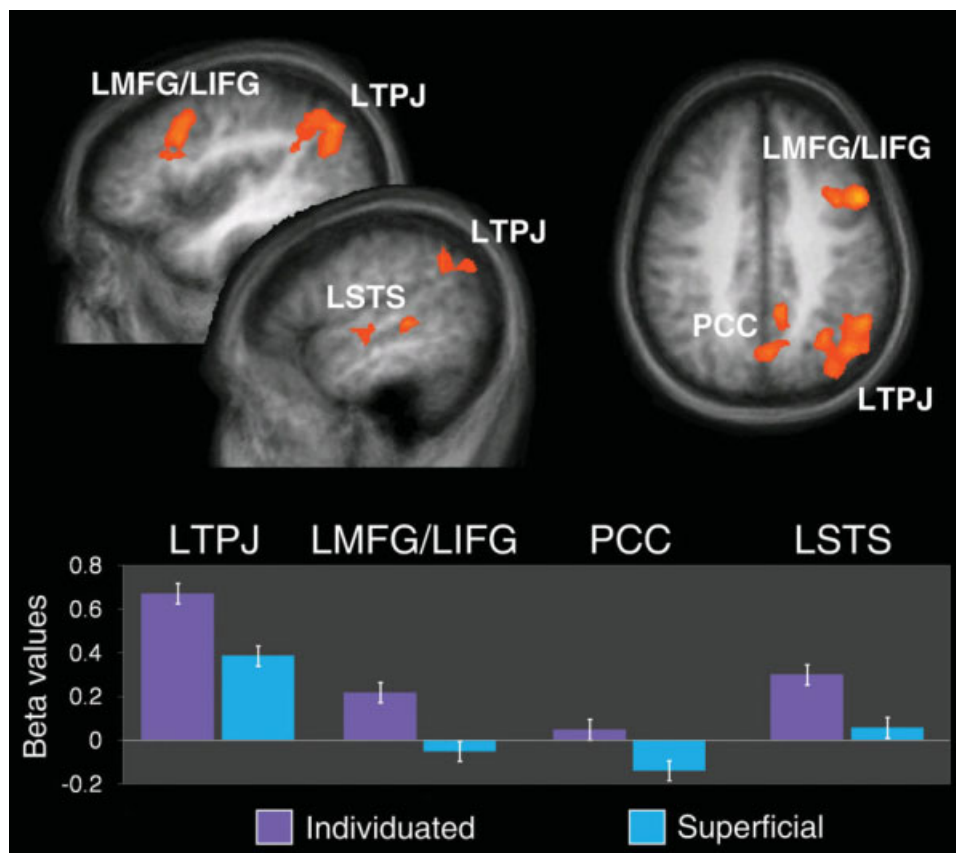

Figure 3.

BOLD responses selective to individuated judgments. Individuated > superficial contrast using a whole-brain analysis ($P < 0.001$, corrected), eliciting regions implicated in mentalizing/ToM including the LTPJ, LMFG/LIFG, PCC, and LSTS. Refer to Table I for details. [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com.]

TABLE I. Regions of activation elicited by the individuated > superficial contrast in a whole-brain analysis

Region	Side	x	y	z	t	mm^3
Temporoparietal junction	L	−42	−61	35	5.79	5765
Middle frontal gyrus	L	−37	11	40	6.68	3894
Inferior frontal gyrus	L	−45	13	23	5.03	305
Posterior cingulate cortex	M	−8	−49	38	5.39	454
Posterior cingulate cortex	M	−1	−68	35	5.27	876
Superior temporal sulcus	L	−55	−12	0	4.96	687
Superior temporal sulcus	L	−49	−34	4	5.63	826
Lingual gyrus	M	−9	−86	−14	6.27	1,106

$P < 0.001$, corrected.
M, medial; L, left; R, right.

−32, 1,043 mm^3, $t = 3.16$), implicated in global face processing [Sams et al., 1997], emerged from this analysis (Fig. 2C).

To identify which brain regions were selectively engaged for making individuated judgments, we examined the individuated > superficial contrast using a whole-brain analysis ($P < 0.001$, corrected). This revealed a distributed network of activation (Fig. 3; Table I) associated with mentalizing/ToM [Fletcher et al., 1995; Frith, 2007; Gallagher and Frith, 2003; Saxe et al., 2004] including the left temporoparietal junction (LTPJ), left superior temporal sulcus (LSTS), the posterior cingulate cortex (PCC), and the left middle frontal gyrus (LMFG) extending into the left inferior frontal gyrus (LIFG). Figure 3 depicts the mean beta values for the superficial and individuated predictors extracted from each of these regions.

To assess whether any brain regions showed selectivity for individuated judgments, but differently for a White versus a Black target, we conducted a whole-brain ANOVA, testing a judgment × race effect ($P < 0.001$, corrected). The only region revealed by this analysis was a

localized area of the anterior rostral medial prefrontal cortex (arMPFC), on the ventral border with the orbital MPFC [see Amodio and Frith, 2006 for functional divisions of the MPFC]: $x, y, z = −13, 42, 2$, 304 mm^3, $F = 42.92$ (Fig. 4A). To specify the nature of this differential selectivity, beta values were extracted for each predictor, and difference scores [individuated—superficial] were calculated by subtracting beta values for the superficial condition from beta values for the individuated condition, separately for White and Black targets: thus, the higher the score, the greater selectivity for individuated judgments. One-sample t tests comparing these difference scores to zero revealed that the arMPFC was selective to individuated judgments when the target was White [$t(15) = 2.55$, $P < 0.05$]; when the target was Black, however, this selectivity vanished [$t(15) = 0.13$, $P > 0.1$; Fig. 4B]. Consistent with this result, in a prior study, BOLD signals in an overlapping region ($x, y, z = −2, 48, −7$) were reduced when mentalizing about extreme outgroup members (e.g., drug addicts and the homeless) relative to other group members [Harris and Fiske, 2006; Fig. 4C].
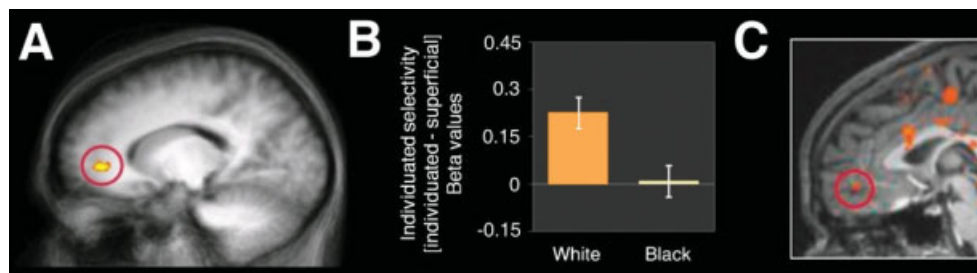

Figure 4.

Brain regions demonstrating a judgment × race effect. (**A**) Whole-brain analysis of a judgment × race effect, ($P < 0.001$, corrected), revealing arMPFC responses denoted by red circle. (**B**) Individuated selectivity refers to BOLD signal difference scores that were calculated as [individuated—superficial], separately for White and Black targets. Positive scores indicate greater selectivity for individuated judgments. White targets: individuated selectivity is significant [one-sample t test comparing difference scores to zero; $t(15) = 2.55$, $P < 0.05$]. Black targets: individuated selectivity is not significant [one-sample t test com-

paring difference scores to zero; $t(15) = 0.13$, $P > 0.1$]. (**C**) An overlapping region of the arMPFC denoted by red circle ($x, y, z = −2, 48, −7$) previously reported to show reduced response when mentalizing about extreme outgroup members (e.g., drug addicts and the homeless; panel C reproduced with permission: Dehumanizing the lowest of the low: Neuroimaging responses to extreme outgroups. Harris LT, Fiske ST. Psychol Sci 17:847–853. Copyright © 2006 Association for Psychological Science). [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com.]

Lastly, we examined whether judgment type (superficial or individuated) or target's race (White or Black) influenced participants' judgment reaction times by submitting these to a repeated-measures ANOVA. This analysis yielded no main effects, but did yield a significant interaction, $F(1, 15) = 4.79$, $P = 0.05$. For White targets, individuated judgments ($M = 1854$ ms, $SE = 64$ ms) were slightly quicker than superficial judgments ($M = 1898$ ms, $SE = 65$ ms), $t(15) = 2.56$, $P < 0.05$, whereas for Black targets, there was no reliable difference between individuated judgments (1898 ms, $SE = 62$ ms) and superficial judgments ($M = 1861$ ms, $SE = 59$ ms), $t(15) = 1.19$, $P > 0.1$. To ensure that these differences in reaction times between conditions did not spuriously produce the BOLD signals reported (e.g., that the relative difficulty of different conditions drove the effects reported above), we included a parametric predictor of trial-by-trial reaction times as a covariate in our GLM design matrix. This inclusion had a negligible effect on the fMRI results. Additionally, none of the regions of activation elicited by the fMRI analyses were predicted by reaction times (P's > 0.1), eliminating the possibility that reaction times confounded any of the fMRI results.

DISCUSSION

These results characterize the distinct brain mechanisms that give rise to everyday superficial and individuated judgments of others. Behavioral studies have long suggested that superficial judgments involve primarily nonconscious and automatic processing [Ambady et al., 2000]. Accordingly, here we report that the processing of a superficial judgment is routed via the amygdala, a neural region specialized for attention-independent and primarily automatic processing [LeDoux, 2007]. Beyond the amygdala, an exploratory analysis revealed that superficial judgments selectively recruited only one other region, the right inferior temporal cortex, an area involved in global visuospatial face processing [Sams et al., 1997]. This is likely because participants relied more on in-depth face processing and global patterns of the face to generate superficial judgments, as compared with individuated judgments, for which participants relied more on personalized knowledge. However, this region's participation in superficial judgments is only tentative given its detection at a relaxed threshold.

The amygdala is uniquely sensitive to nonverbal social information [Adolphs and Spezio, 2006] and the facial expressions of others [Adolphs, 2002], which form the basis of superficial judgments. Studies of nonhuman primates have long pointed to the amygdala as a major contributor to social communication and the perception of implicit social signals and social nonverbal displays [Adolphs and Spezio, 2006; Brothers, 1990; Emery and Amaral, 2000]. The basal and lateral amygdaloid nuclei may be particularly responsible for the interpretation of a stimulus' social significance and the transfer of information between visual perception and social cognition [Emery and Amaral, 2000]—an integration of information required for making superficial judg-

ments of others. This is consistent with evidence suggesting that the human amygdala triggers socially-relevant knowledge specifically in response to nonverbal social information [Adolphs and Spezio, 2006; Adolphs et al., 1998]. Even with visual stimuli that are not intrinsically social, such as moving geometric shapes, intact amygdalae are necessary to understand these shapes' social significance, such as the intentions and emotions communicated by their simulated nonverbal behavior [Heberlein and Adolphs, 2004]. Here we provide a novel demonstration that the amygdala participates in judging another's disposition from no more than a face, consistent with research across species highlighting the amygdala's importance for reading social interpretations from implicitly communicative superficial information [Adolphs, 2002; Adolphs and Spezio, 2006; Brothers, 1990; Emery and Amaral, 2000; Heberlein and Adolphs, 2004]. Specifically, we find that the amygdala is recruited to produce knowledge about other's internal characteristics from the most minimal superficial information (i.e., the face), at no acquaintance, thereby providing a neural correlate of our everyday superficial judgments of others.

An alternative interpretation of the amygdala's selectivity to superficial judgments could be that these stronger responses merely reflect that participants dispelled superficial judgments under greater uncertainty: whereas individuated judgments were contextualized by information related to the target, superficial judgments were contextualized by information unrelated to the target. Accordingly, this would have rendered superficial judgments more uncertain. Although this would be consistent with evidence for the amygdala's responsiveness to degrees of uncertainty during decision-making [Hsu et al., 2005], it is unlikely that uncertainty underlies the amygdala's selectivity to superficial judgments. Information presented during individuated encounters was designed in such a way as to allow participants to individuate the target and familiarize themselves with him while, importantly, not specifying information that was directly relevant for any of the judgments made within the same encounter. Thus, although information presented in individuated encounters provided participants with a context that allowed them to individuate the target, superficial and individuated judgments were equally uncertain, as no directly relevant information was provided to make either type of judgment. In both cases (superficial and individuated encounters), participants were asked to make similarly uncertain inferences about a target's personality: in superficial encounters, these had to be based primarily on superficial information, whereas in individuated encounters, these had to be based primarily on personalized information.

Given more than minimal information, individuated judgments engaged a mentalizing network comprised of the LTPJ, LMFG/LIFG, PCC, and LSTS. The bilateral TPJ has been argued to be a focal region for mentalizing/ToM, likely for its involvement in perspective-taking [Frith, 2007; Gallagher and Frith, 2003; Saxe and Wexler, 2005; Saxe et al., 2004]. The bilateral STS has been repeatedly

implicated in processes integral to mentalizing, such as understanding causality [Frith, 2007; Gallagher and Frith, 2003]. The LIFG is specifically involved in attributing personality traits [Heberlein and Saxe, 2005], which may relate to its broader role in mentalizing, consistent with studies reporting activations of the LIFG and also the LMFG during mentalizing/ToM tasks [e.g., Fletcher et al., 1995]. Some have argued that mentalizing processes mediated by the LIFG, a component of the mirror neuron system [Rizzolati and Craighero, 2004], may enable the understanding of others through simulation [i.e., "putting oneself in another's shoes"; Gallese and Goldman, 1998]. In a different vein, however, the LMFG/LIFG has long been known to be important for verbal working memory [Gabrieli et al., 1998], and two recent studies demonstrated the LMFG's and LIFG's selective engagement for representing social (rather than nonsocial) knowledge and abstract social concepts [Wood et al., 2003; Zahn et al., 2007]. These would suggest that the LMFG/LIFG's role in individuated judgments may correspond with an increased representation of social information (e.g., personalized details about others). As for the PCC, while its participation in mentalizing/ToM is clear [Fletcher et al., 1995], this region plays a broader role in self-relevant thought and the integration of self-referential information [Johnson et al., 2006]. Interestingly, recent evidence suggests the PCC may be involved in social outward-directed reflective thought [Johnson et al., 2002], a mode of thought theorized to accompany the process of individuation [Fiske and Neuberg, 1990].

Interestingly, whereas superficial judgments elicited signal increases in the amygdala, individuated judgments elicited signal decreases (see Fig. 2B). Such BOLD deactivations have been observed in a number of studies and interpretations can be difficult [Schulman et al., 2007]. Deactivation of the amygdala is commonly observed in tasks requiring high-level cognitive processing. For instance, the amygdala shows decreased responding when participants must use more deliberate processing in the context of a word generation task [Drevets and Raichle, 1995], when attentional demands are increased [Shulman et al., 1997], or when participants engage in reflective and introspective thinking [Drevets and Raichle, 1995]. Individuated judgments encourage this exact style of high-level cognitive processing, and this likely explains the amygdala's deactivation during individuated judgments.

It is notable that the TPJ and STS activations were lateralized to the left hemisphere considering that most mentalizing/ToM neuroimaging studies report either bilateral activations [Frith, 2007; Gallagher and Frith, 2003; Saxe et al., 2004] or activations restricted to the right hemisphere [Saxe and Wexler, 2005]. However, given that participants judged personality traits and not transient attributes, this is consistent with the theory that the left TPJ and STS may be more important for attributing others' enduring rather than transient characteristics [Saxe and Wexler, 2005] and some data supporting this [Heberlein

and Saxe, 2005]. Though these mentalizing regions have consistently been shown to support the reasoning and representation of others' intentions and transient mental states, their involvement in dispositional judgments is far less established. We provide new evidence that these mentalizing regions are involved in making individuated judgments about others' dispositions. Notably, this demonstrates a novel link between individuation and mentalizing, indicating that the particular reflective processing widely theorized to underlie individuated judgments [Brewer, 1988; Fiske and Neuberg, 1990; Macrae and Bodenhausen, 2000] is mediated by similar mechanisms involved in mentalizing about others' minds. This result empirically connects two phenomena heretofore unconnected, suggesting that mentalizing/ToM processes may underlie individuation.

When judging the ingroup (White targets), the arMPFC, an important region for mentalizing processes [Amodio and Frith, 2006; Frith, 2007; Gallagher and Frith, 2003], showed selective responses to individuated judgments, undistinguishable from other mentalizing regions. When judging the outgroup (Black targets), however, this selectivity disappeared.[1] This region's lack of selectivity for individuated judgments of outgroup members converges with behavioral evidence demonstrating a reduced individuation of the outgroup [Linville and Fischer, 1998]. This is consistent with the finding of reduced responding in the arMPFC when mentalizing about extreme outgroups [Harris and Fiske, 2006]. Mitchell et al. [2006] showed that a similar region of the arMPFC was activated to mentalize about others who were similar to participants relative to dissimilar. Given this region's participation in self-referential thought [Johnson et al., 2002], the authors suggest that self-knowledge is retrieved to mentalize about similar rather than dissimilar others, consistent with simulation accounts of understanding others [e.g., Adolphs, 2002; Gallese and Goldman, 1998]. If they speculate correctly, increased activity in the arMPFC for individuated judgments of White targets but not Black targets may indicate that more self-knowledge is accessed to infer internal characteristics about individuated others (relative to those who have not been individuated), but only when these others are of the ingroup. Future research could directly test this hypothesis.

In summary, given no more than a face, judging others can be a tricky task. Such superficial judgments must nonetheless allow for meaningful inferences based on minimal information. We find that such judgments are

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[1] We thank an anonymous reviewer for noting that our finding of the arMPFC's lack of selectivity for individuated judgments in the Black condition could potentially be due to a lack of statistical power or small number of trials. However, this is unlikely because there should have been comparable statistical power in both the White and Black conditions for detecting selective responses to individuated judgments and this selectivity was indeed found in the White condition.

processed via the amygdala. At greater acquaintance, however, the increased complexity of individuated judgments recruits a more elaborate neural network specialized in theorizing about others. This added complexity, however, comes with baggage. In making individuated judgments of those outside our social group, an important component of this mentalizing network, the arMPFC, appears to falter. Here we have revealed the distinct—and race-selective—neural origins of our everyday superficial and individuated judgments of others.

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