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Stereotypes, Ingroup Emotions and the Inner Predictive Machinery of Testimony

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Abstract
The reductionist/anti-reductionist debate about testimonial justification (and knowledge) can be taken to collapse into a controversy about two kinds of underlying monitoring mechanism. The nature and structure of this mechanism remains an enigma in the debate. We suggest that the underlying monitoring mechanism amounts to emotion-based stereotyping. Our main argument in favor of the stereotype hypothesis about testimonial monitoring is that the underlying psychological mechanism responsible for testimonial monitoring has several conditions to satisfy. Each of these conditions is satisfied by our "hot" stereotypical capacities. Intergroup emotions play a key role here. Intergroup emotions inform the agent about which candidate stereotype is better suited to the current situation. Emotions serve as evidence that makes a certain stereotype and its particular profile of features more or less expected.

Keywords Testimony · Stereotypes · Intergroup emotions · Predictive processing · Situated conceptualization

1 Introduction

Emotions have a major impact on our mental life. They permeate all sorts of behaviors. However, the influence that emotions have on certain domains seems rather marginal. On many other occasions, however, emotional processes shape the complex interplay between minds and their physical and social environment. In this respect, discussions about the nature of knowledge and its many dimensions have typically been articulated in overly "cold", intellectualistic terms. We think that this strategy fails to capture epistemic phenomena in the social domain.

This might sound puzzling. As folk wisdom has it, emotions interfere with the rational capacities that allow good epistemic practices. However, we claim that the epistemic practice of testimony (among others) in the social domain is deeply shaped by emotion. And this should be so, epistemically speaking. It works. More precisely, we claim that (intergroup) emotions attune us to epistemic situations by calibrating our use of stereotypes. Certainly, the practice of stereotyping in the social domain is usually regarded as a barrier to proper epistemic practices. However, this need not be so.

We propose that stereotyping accounts for testimonial monitoring, as the latter is understood in the debate between reductionism and anti-reductionism about testimonial justification and knowledge. Our main argument in favor of the stereotype hypothesis is that the underlying psychological mechanism responsible for testimonial monitoring must satisfy certain conditions. We show that these conditions are satisfied by our "hot" stereotypical capacities. Emotions play a key role here. Emotions inform the agent about which candidate stereotype best suits the current situation. More precisely, we suggest that, in testimonial contexts,

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intergroup emotions function as highly weighted evidence that needs to be explained by competing hypotheses about social groups (e.g. stereotypes). Thus, in testimonial situations, intergroup emotions contribute toward making a certain stereotype more or less expected.

In Sect. 2, we briefly present the reductionist/anti-reductionist debate about whether we need positive reasons for testimonial justification and knowledge. The main moral that we extract from this debate is that both sides propose a mechanism—a testimonial monitoring mechanism—which is supposedly able to evaluate the acceptability of a piece of testimony. Then, in Sect. 3, we suggest that the mechanism in question consists of a process of stereotyping. We understand stereotyping as a specific form of (predictive) social categorization. After all, stereotypes are social categories. In Sect. 4, we propose that social categorization is "hot". Intergroup emotions attune us to situations, so that an accurate stereotype is selected over competing ones. Emotions serve as evidence that makes a certain stereotype more or less expected. In Sect. 5, we show that the inferential processes of hypothesis selection involved in stereotyping exhibit the properties that make sense of the general epistemic requirements of testimonial monitoring.

2 The Reductionist/Anti-Reductionist Debate on Testimony

Testimony is a fundamental source of knowledge in the social domain. Although there is consensus on the idea that testimonial beliefs carry typical epistemic properties (justification, knowledge, etc.), there is disagreement about the conditions that these beliefs must satisfy in order to carry such properties.

Two prominent sides in this debate, identified by Coady (1973) as *reductionists* and *anti-reductionists*, have proposed incompatible sets of conditions for characterizing testimonial justification and knowledge. Reductionists, whose views can be traced back to Hume's philosophy of testimony, state that testimonial justification and knowledge depend on basic evidence or reasons (e.g. perception, memory, or inference). In this sense, a hearer cannot take for granted the testimony of a speaker without having good reasons in favor of the speaker's trustworthiness and reliability. On the other hand, anti-reductionists, whose ideas have evolved from Reid's common-sense philosophy, claim that testimonial justification and knowledge are basic epistemic phenomena, subject to an acceptability presumption that is as legitimate as all other basic sources of justification and knowledge.

A fundamental aspect of the debate revolves around the *positive reason thesis* (Lackey 2008, p. 144). This is the reductionist idea that a hearer needs sufficient positive reasons in favor of a received testimony in order to justifiably accept it. Anti-reductionists deny the positive reason thesis and propose a presumptive right that entitles the hearer to accept the speaker's testimony, without specific evidence in favor of her reliability or trustworthiness (Coady 1992, p. 145).

2.1 Sophisticated Anti-Reductionism

Part of the anti-reductionist agenda consists in unpacking the specific conditions that constitute this *presumptive right*. One condition that is generally accepted is a *no undefeated defeater* condition. According to this condition, a hearer can justifiably accept a piece of testimony only if she has no undefeated reasons against the testimony that she receives and evaluates. However, even if this condition is satisfied, a hearer could be incapable of properly responding to potential evidence that would undermine the acceptability of the testimony. In this case, the *no undefeated defeater* condition is not enough to warrant testimonial justification or knowledge. This is because the hearer cannot discriminate between appropriate and inappropriate testimonies at all. The presumptive right requires, therefore, an additional condition. This additional condition is that the hearer is appropriately responsive to testimony. This responsiveness is conferred by some sort of monitoring mechanism that is able to grant counterfactual sensitivity to relevant pieces of counterevidence (see Henderson & Goldberg 2006, pp. 610-615; Goldberg 2007, pp. 164-171). Henderson and Goldberg (2006 pp. 615-616) develop this hypothesis by claiming that a hearer needs only a "passive monitoring" of the testimony in order to acquire justification or knowledge (see Kusch 2002, pp. 26-27). Passive monitoring is understood as a sub-personal mechanism that grants attentional signals and motivates appropriate responses when signs of unreliability are salient in a testimonial interaction. This kind of monitoring is supposed to be analogous to other psychological monitoring mechanisms of human cognition, such as automatic pain signals. Pain is, in this sense, a passive monitoring mechanism that has the function of signaling tissue damage and causing a motor response.

2.2 Objections to Reductionism

Anti-reductionists, as may be expected, do not limit their defense to proposing a mechanism-based explanation of the presumptive right; they also raise several objections to reductionism. In a nutshell, anti-reductionists claim that the reductionist view of testimony is cognitively, phenomenologically, and epistemically implausible.

First, anti-reductionists claim that, if positive reasons are necessary for testimonial justification, then these reasons should allow us to assess the competence and trustworthiness of the speaker, the coherency and seriousness of the utterance, and the influence of the social context, among other factors. However, this presumed cognitive effort needed to map and produce reasons that support each of these testimonial domains seems unrealistic given our normal cognitive capacities.

Secondly, any such process of searching for positive reasons is inconsistent with our intuitive phenomenological experience. It simply doesn't seem that we look for any positive reasons in ordinary testimonial exchanges.

Finally, the vast majority of the testimonies that we receive do not seem to satisfy the positive reason condition. Therefore, if needed, this condition implies that the vast majority of our testimonial beliefs are unjustified and, therefore, cannot produce testimonial knowledge. However, given the importance of testimony in our epistemic lives, this consequence seems to collapse reductionism into some kind of unattractive skepticism.

2.3 Sophisticated Reductionism

Elisabeth Fricker (1994, pp. 155-156; 2004, p. 116; 2006, p. 624) replies to the objections above by elaborating on the reductionist view. She defends a view that also proposes a monitoring mechanism that is compatible with the positive reason thesis. The idea is roughly that a hearer receives the speaker's testimony in an epistemic "presumption of innocence". However, she acquires justification only when she monitors the relevant domain of the testimony (speaker, utterance, and context) and she does not find any suspicious feature that defeats the initial presumption.

Unlike Henderson and Goldberg (2006, pp. 615-616), Fricker (2006, p. 624) proposes that "active monitoring" is necessary for granting testimonial justification and knowledge (see Kusch 2002, pp. 26-27). Active monitoring is characterized as a sustained activity—not necessarily conscious, but at least retrievable *ex post* at the personal level—in which the hearer *looks for* clues of unreliability in the speaker, the utterance, or the context. This kind of activity is identified as a process of sustained attention or vigilance (Parasuraman et al. 2000; Fortenbaugh et al. 2017), in which the agent deploys attentional resources and some degree of selective control, expecting certain environmental cues more than others as she navigates her niche. A driver who watches the road waiting for the next road sign is, in this sense, a case of active monitoring.

The active monitoring claim offers a minimalistic version of the positive reason thesis. It allows us to deal with the anti-reductionist accusation of excessive cognitive, phenomenological and epistemic requirements of traditional reductionism, because: (1) the presence of monitoring mechanisms can be implemented sub-personally (Koriat & Levy-Sadot 2000); and (2) there is evidence that there are monitoring mechanisms present in non-human animals, specifically in tasks involving uncertainty (see Beran et al. 2009; Smith et al. 2013; Smith et al. 2014; Carruthers 2014). (However, notice that the notion of monitoring at play is rather minimal. That is, it does not require the online engagement of costly explicit executive mechanisms.)

2.4 The Problem of Children's Testimonial Knowledge

Besides the reductionist/anti-reductionist disagreement about the active/passive nature of the testimonial monitoring mechanism, the debate also faces a significant and recalcitrant problem: how can children acquire testimonial knowledge?

In order to argue against the positive reason thesis, anti-reductionists typically exploit the fact that children can have testimonial knowledge. The argument goes roughly like this:

(1) Children cannot have positive reasons in favor of any particular testimony.
(2) Children have testimonial knowledge.
(3) *Therefore*, it is not necessary to have positive reasons in favor of some particular testimony in order to have testimonial knowledge.

However, as Lackey correctly highlights (2008, p. 209), children's inability to have positive reasons (premise 1) is grounded in their presumed inability to have reasons *simpliciter*. However, if children cannot have reasons at all, then they cannot have reasons against any particular testimony (or defeaters) either. Therefore, the argument against reductionism extends the problem of children's testimonial knowledge to the anti-reductionist thesis, given that children cannot satisfy the basic condition that the hearer must be properly sensitive to defeaters.

Having highlighted this dead-end in the debate, Lackey (2008, pp. 216-220) advances an empirical solution to the problem of children's testimonial knowledge. On the basis of experimental research on child psychology (Pea 1982; Koenig & Echols 2003; Koenig et al. 2004; Koenig & Harris 2005), she shows that children's capacities to have and manipulate reasons has been unfairly discredited. Research shows that in conditions of relatively explicit false or incompetent testimony, children quickly discriminate between reliable and unreliable witnesses. The general conclusion is that children are capable of monitoring testimonies and

forming standards that tag and classify witnesses in some simple testimonial tasks. Certainly, children's standards may be less articulated and reliable than those of a normal adult. However, as with other cognitive tasks in the social domain, it is expected that exposure and training should lead to a decent rate of learning optimization. Either way, a less articulated and accurate standard is a standard nonetheless. Therefore, children are capable of having and manipulating reasons to some degree.

2.5 Stereotype and Testimony

The reductionist/anti-reductionist debate described above can be simplified as one disjunctive statement: *in order to obtain testimonial justification and/or knowledge, a hearer must either: (i) monitor her testimonial interactions passively (anti-reductionism); or (ii) monitor her testimonial interactions actively (reductionism).*

Both sides of the debate put forward these theses—(i) and (ii) above—in order to dodge accusations of excessive cognitive, phenomenological and epistemic sophistication, as well as the problem of children's testimonial knowledge. Our aim in this article is not to resolve this controversy, but rather to investigate which kind of mechanism is responsible for the complex functions of testimonial monitoring that both sides advance as a key hypothesis about our epistemic machinery.

The development of the reductionist/anti-reductionist debate suggests that this enigmatic testimonial monitoring mechanism must at least satisfy the following conditions. (1) It must track social properties and events, in the sense that it must enable the agent to detect, categorize, and navigate relevant social properties and events—such as group membership, expected codes of behavior, social rank, etc. (2) It must be responsive to social inputs, in the sense that relevant social properties and events must reliably trigger the functioning of the monitoring mechanism in question. (3) It must be sufficiently versatile to encode different classes of informational inputs—such as speakers, utterances, context, etc. (4) It must be a stable cognitive resource. (5) It must be able to operate automatically and sub-personally. (6) It must be present in children. And (7) it must be reliable.

To date, the nature of such a mechanism remains obscure. We propose that the emotion-based capacity of stereotyping satisfactorily accounts for conditions (1)-(7). This proposal is relevant because if correct, it suggests an avenue of research that can contribute towards clarifying the nature of the underlying process of testimonial practices. In this way, new empirical results could illuminate and eventually transform the reductionist/anti-reductionist debate in social epistemology.

3 Stereotypes and Prediction

The idea that stereotypes are one of the main psychological heuristics that a hearer needs to implement in order to properly receive a piece of testimony can be traced back to Miranda Fricker's influential work (2007, p. 32). However, social epistemologists have not yet systematically theorized about the properties that make stereotyping one of the main candidate mental processes for accounting for testimonial monitoring.

It is important to note that stereotypes are often conflated with negative implicit attitudes, such as implicit biases. However, this need not be so. Stereotypes are representations about categories of groups in the social domain. That is to say, stereotypes can be taken to be "mental pictures" of social groups (Lippmann 1922). In this sense, stereotypes are concepts or category representations: social "knowledge"[1] structures that are used in categorization tasks (see Stangor 2009). As such, stereotypes encode features that are characteristic of social groups (or their members). Initial characterizations considered these features to be typically negative, given the fact that the use of stereotypes becomes particularly salient when their encoded features are negative—as with *lazy* (e.g. Allport 1954). However, simpler characterizations have prevailed. Here we stick to the more recent simpler characterization.

3.1 Social Categorization and the Predictive Brain

As we commented above, stereotypes are "knowledge" structures employed for social categorization. Now, current trends in cognitive science converge on the view that the brain is a prediction machine. This view is known as the *predictive processing* framework (PP) (Clark 2013, 2016; Hohwy 2013). Thus, stereotype use is best seen as a predictive phenomenon. In fact, recent approaches to situated categorization are articulated in line with key principles of PP (e.g. Barsalou 2009, 2011, 2016; Wilson-Mendenhall & Barsalou 2016).

We think that this view of categorization, as applied to social categories, has the resources to account for the monitoring mechanism discussed above. As we present the basics and some other aspects of PP and predictive situated categorization, it will become clear that this is so. Interestingly, if our proposal is on track, emotions are a key part of the story. If this turns out to be the case, then discussions in social epistemology on the nature of testimony require us to

[1] We use "knowledge" with quotation marks to refer to representations in general (as it is typically used in cognitive science); and we use knowledge without quotation marks to refer to the normative sense that this term has in epistemology.

discuss the epistemic properties implied by competing theories of emotion. Let's get down to business.

The architecture posited by PP describes the rich, hierarchically organized interplay between higher-level sensory expectations (top-down driven "knowledge") and lower-level sensory data (Clark 2013, 2016; Hohwy 2013). In a nutshell, in the PP framework, the brain uses its learned "knowledge" about the regularities of the environment in order to actively generate, from the top down, predictions about the incoming sensory data that the environment constantly triggers in its sensory periphery. All this to reduce its *prediction error*—i.e. the discrepancy between its expectations and the actual incoming data at the level below. In this respect, and for expository purposes, the brain can be seen as a practicing scientist actively attempting to determine the (hidden) causes that best predict the data she collects. Now, as she actively gathers samples, the reliability of the data she collects also needs to be estimated—i.e. in PP jargon, the *precision* and *dynamics* of the input must also be inferred.

Imagine that light reflected by a bird triggers visual activity in early regions of processing. This activity is ambiguous between its causes in the world. Let's assume that the visual system is considering two hypotheses that are very similar in terms of their likelihood. The hypothesis that a bird is likely to be causing the incoming data, and the hypothesis that a distant airplane is causing this data. Let's also assume that the environmental conditions are optimal (it isn't cloudy or anything like that), so the data is estimated to be high in terms of its *precision*. Let us say that given context and background "knowledge", the bird hypothesis exhibits a higher anterior probability than the airplane hypothesis. So the data expected for this winning hypothesis, which now exhibits higher posterior probability, is generated from the top down in real-time, minimizing precision-weighted prediction error. The percept of a bird is thus formed.

3.2 Predictive Situated Conceptualization

Barsalou (2009, 2011, 2016) has offered an account of categorization along predictive lines: the *situated conceptualization* account of category representations (or concepts). Categorization, just like percept formation, functions predictively in a Bayesian manner. As Wilson-Mendenhall and Barsalou remark, "The purpose of concepts […] is prediction—going beyond the information that is present to *infer* what will happen next and to shift the biological system in ways appropriate to the situation" (2016, p. 548).

Particularly relevant for this article is the view of *categorical inference* that emerges from the situated conceptualization account. Roughly, categorical inferences are the inferences that we draw from representations of categories. For example, inferring that a bird might sing from stored "knowledge" about the category BIRD[2]. Roughly, the idea is the following. Category representations are commonly taken to be structured by (or made out of) other representations or *features*. For example, the category BIRD is structured by other representations, such as *eats worms*, *flies*, *has feathers*, *sings*, etc.

Features are typically selected and learned through exposure and training (Barsalou 2009; Barrett & Bar 2009). As the agent encounters instances of birds in the world, the dynamics of the relevant sensorimotor states (encoded features) that consistently co-occur during her worldly interaction with birds are stored. High-level expectations about birds are thus formed.

In the situated conceptualization account, categorical inferences function predictively in top-down fashion through the generation of the expected features (e.g. *eats worms*, *flies*, etc.) of the activated category (e.g. BIRD). This occurs through pattern completion—i.e. by re-enacting the dynamics of stored sensorimotor states (encoded features). This stored "knowledge" becomes *priors* (*beliefs*) about which features to expect, given the hypothesis that there is a bird outside. Then, in order to guide adaptive behavior, once a certain category is activated, stored "knowledge" about categories allows the generation of predictions or "educated guesses about what might occur next" (Barsalou 2009, p. 1284). For example, once the category BIRD is activated, it can be inferred via pattern completion that it might next eat a worm and then take flight.

Crucially, embodied categorizations give agents a better grip of their environments by being tailored to the situation at hand (Barsalou 2016). This means that, given that each situation demands different sorts of skillful adaptive responses, the expected subset of features activated during categorical inference are uniquely suited to the current agent's context (Wilson-Mendenhall et al. 2011).

This has important consequences for social categories. Imagine that the category PUNK is activated, so that cascades of categorical inferences begin to unfold. For the sake of the example, let us suppose that the category PUNK is constituted by the features: *rebellious*, *anarchist*, *impulsive*, *strident*, *energetic*, *non-conformist*, and *music lover*. The idea is that a certain situation—e.g. being amidst a loud political demonstration—might make the presence of only a subset of these features more likely—e.g. *rebellious*, *impulsive*, *strident*. In turn, another kind of situation—e.g. an informal chat at the faculty of liberal arts—might make the features *music-lover* and *non-conformist* more likely.

It is at this juncture that emotions are key. How is it that one category hypothesis is preferred over another

[2] We follow the convention of using small caps to refer to representations of categories, and we use italics to refer to their features.

competing category hypothesis? And similarly, once a category hypothesis is selected, how does one profile (or subset) of its expected features come to be preferred over another profile of its expected features? In the case of social categories about groups—i.e. stereotypes—we hold that emotions, particularly *intergroup emotions*, play a key role in this respect.

4 Intergroup Emotion and Stereotypes

We suggest that emotions play a key role in calibrating our stereotypes as we navigate our epistemic social space. Stereotyping is "hot". Emotions attune us to situations so that an accurate stereotype—and profile of expected features—is selected over competing ones. More precisely, intergroup emotions serve as evidence that makes a certain stereotype and its particular profile of features more or less expected. Does this person count as a punk or as a biker? Is this punk a non-conformist music lover, or instead an aggressive anarchist? Emotions hold the key.

4.1 Emotions and Situated Conceptualization

Views that emphasize the importance of emotion for social knowledge typically favor *basic emotion* approaches (Ray et al. 2014; Halperin 2014). According to the latter, emotions are affect programs that coordinate low-level appraisals of relevance with stereotyped output mechanisms (see Barrett 2006). We'll take another route. We take emotions to be (typically) fast sub-personal categorizations of *core affect*—i.e. valence plus activation (Barrett et al. 2015). Very roughly, on this sort of view, embodied "knowledge" about emotion is used to categorize, and partially shape, an evolving positive or negative bodily feeling (Wilson-Mendenhall et al. 2011; Wilson-Mendenhall & Barsalou 2016). For instance, the emotion of anger is an affective state that has been categorized (together with the whole situation) by the embodied concept ANGER.

Interestingly, Barrett's view of emotion explicitly embraces Barsalou's account of categorization and categorical inference (Barrett 2006; Barrett, Wilson-Mendenhall & Barsalou 2015), together with key principles of PP (Barrett 2015; Wilson-Mendenhall & Barsalou 2016). In a nutshell, Barrett holds that the emotion categories that are key for emotion generation amount to Barsalou's embodied category representations and that the latter operate in line with key architectural principles of PP (Barsalou 2009, 2011, 2016; Barrett 2006; Barrett, Wilson-Mendenhall & Barsalou 2015).

Emotions, then, are situated conceptualizations. On this view, in line with the view of predictive categorical inference discussed above (Barsalou 2009), once an emotion category is activated, it generates a subset of expected features from the top down, via pattern completion. For instance, once the anger hypothesis is selected, features such as *increased voice volume*, *attacking*, and *energy outburst* become highly expected. This resulting cascade of sensorimotor expectations constrain perception and action, so that the agent flexibly navigates the emotional situation in real-time (Wilson-Mendenhall et al. 2011).

4.2 Intergroup Emotion

There are different kinds of emotions. We think that among the many kinds of emotion, one is particularly relevant for the discussion at hand, namely, *intergroup emotions* (see e.g. Mackie et al. 2016). Research is already beginning to show strong links between different intergroup emotions and distinct stereotypes (see e.g. Ray et al. 2014). We thus think that to better understand the epistemic practice of stereotyping, we should focus especially on intergroup emotions.

What are intergroup emotions? It is commonly maintained that emotions are individuated by certain characteristic *formal objects* (Kenny 1963) or *core relational themes* (Lazarus 1991). For example, an emotion counts as *anger* if it has *a demeaning offence against me or mine* as its formal object. Intergroup emotions—also referred to as "group-based emotions" (Niedenthal & Brauer 2012)—can be characterized as emotions that include an identitary aspect in their formal object. For example, in the case of *intergroup anger*, its formal object is arguably *a demeaning offence against my group* (or against a group member qua *group* member). Intergroup emotions can be characterized in this way because they are "emotions that arise when people identify with a social group and respond emotionally to events or objects that impinge on the group" (Smith & Mackie 2018, p. 412). In other words, intergroup emotions are emotions in which the portion of the self that emerges from group identification—the "identitary self"—is particularly salient (Tajfel 1978; Turner et al. 1987). Thus events that are appraised as relevant to the "identitary self" trigger intergroup emotions.

Now, in situations in which our social identity is at stake, we tend to see ourselves as interchangeable group members, rather than as unique, irreplaceable individuals (Oakes, Haslam & Turner 1994). Therefore, intergroup emotions can be experienced even though the individual who has them is not directly affected by the emotionally significant situation. In the case of intergroup emotions, the emotionally significant situations are those that arise in cases in which comparison or competition between groups takes place (Smith & Mackie 2018). In this sort of situation, we act in the world as group members, not as mere individuals—notice

that the epistemic practice of testimony abounds in this kind of situation. For instance, cases of intergroup emotions include *intergroup fear*. A case of intergroup fear would, for instance, be the experience that a feminist has upon learning that a foreign country has withdrawn its recognition of equality rights. Another example would be the *intergroup pride* that a patriot experiences when she comes to know that a scientist of her country has made an important discovery[3].

How do intergroup emotions operate? Generally speaking, intergroup emotions are emotions like any other emotion, functionally and mechanistically. Therefore they should operate in broadly the same manner in which regular individual emotions operate. As Smith and Mackie remark,

> group-based emotions can be understood and analyzed in the same way as any others—by using theories of emotions in general […] intergroup emotions are generally similar to individual level emotions in the ways they are experienced; the effects they have on cognitive, perceptual, and motor processes; and so forth […]. (Smith & Mackie 2018, p. 413)

Therefore the above discussion on situated categorization straightforwardly applies to intergroup emotions. Likewise intergroup emotions should also have the epistemic properties that individual emotions uncontroversially have. For instance, emotions can be justified (see Deonna & Teroni 2012). One sense in which an emotion can be said to be justified is when the emotion experienced has a *formal object* that fits the actual properties of the situation. Intergroup emotions are then justified when their *social formal object* fits the situation in which they emerge. Consider, for instance, the *intergroup guilt* that a political party member experiences when she finds out that a party colleague has been involved in a corruption scandal. Her intergroup guilt is (un)justified when the latter event does (not) in fact instantiate *a transgression of a moral norm*—the formal object of guilt.

4.3 Stereotype Hypothesis Selection and Intergroup Emotions as Evidence

We propose that intergroup emotions play a key role in stereotype hypothesis selection. Intergroup emotions serve as evidence that needs to be explained by competing social-category hypotheses.

As an epistemic agent navigates their social space, distinct stereotype hypotheses are already competing to explain the evolving array of incoming data at different levels of the cortical hierarchy (Koller & Friedman 2009). The social space is rich with data. Evidence must be weighted. Emotions are not just one more piece of evidence. They are highly weighted streams of sensory data at high levels of processing (Pezzulo 2013; Seth 2015). Therefore, they should have significant weight in Bayesian hypothesis selection. Emotions are thus in a privileged position to shift the balance between competing stereotype hypotheses.

Interoceptive information is particularly relevant here, for at least two reasons. First, interoceptive information provides the (core) affective, bodily aspect of emotion (Barrett 2006)—interoception is what makes emotions "hot".

Secondly and more importantly, as we saw above, in Bayesian PP schemes, incoming data is always weighted in terms of its *precision*. Precision estimation functions as a metarepresentational construct that monitors the reliability of incoming data. Now, interoception tracks physiological variables that are essential for homeostasis maintenance (Seth 2015). This implies that in most cases, interoceptive data is highly weighted in terms of its precision, so it has significant influence on inference (see Pezzulo 2013; Seth 2013). Emotion models integrate all sorts of sensorimotor features in the form of sensory expectations. However, since interoceptive data tends to have high precision, emotions are multimodal states in which the interoceptive aspect exhibits comparatively higher "volume".

We hold that this is key for stereotype hypothesis selection. As stereotype hypotheses compete to further guide perception and action via categorical inferences, emotions alter the balance between otherwise equally likely competing stereotype hypotheses. As Pezzulo (2013) puts it, if you are watching a horror movie and you hear a window squeaking, the unlikely hypothesis that there is a thief becomes a plausible perceptual hypothesis insofar as it accounts for both the incoming auditory signals and the highly weighted fear that you begin to feel. The same should apply to stereotype hypothesis selection. Stereotyping is "hot". Emotions attune us to our epistemic social space so that an accurate stereotype—and profile of expected features—is selected over competing ones.

The general idea, then, is that intergroup emotions facilitate the implementation of stereotypes, which play an important epistemic role in the justified acceptance of a piece of testimony. Consider the following example. In several parts of the world (like Russia, Central America and Japan) some characteristic tattoos imply criminal activity, and the people that have them are typically associated with some outlaw organization, and are easily recognizable as such. Let's say that a hearer receives a piece of testimony from a criminal-looking tattooed speaker and that she—the hearer—can properly process the salient social cue from the speaker. In our model the hearer has several

[3] Importantly, intergroup emotions should not be confused then with shared emotions (Gilbert 2002) nor with collective emotions (Huebner 2011).

candidate stereotype hypotheses that are already competing to categorize the speaker and calibrate her testimonial evaluation (the speaker might be a tattooed hipster, a tattooed sailor, a tattooed criminal, and so on). A key piece of evidence for selecting one stereotype hypothesis over the competing ones, we claim, will be the presence of some characteristic intergroup emotion. Consider then the case in which a hearer is approaching a corner and glimpses a tattooed man walking towards her. Milliseconds later, as she sees herself as part of non-criminal society, the emotion of intergroup fear begins to unfold. As the man walks closer to her, her first visual gist starts to become visually richer. Now the social category CRIMINAL best explains both the data that the situation triggers and her highly precision-weighted feelings. Expected features begin to unfold via pattern completion—e.g. *violence*, *deceiver*, *free-rider*, etc. That is, intergroup fear facilitates the selection of the CRIMINAL stereotype hypothesis, and sets the testimonial standards for the interaction. Note that this kind of negative stereotype does not imply that the hearer will simply reject the speaker's testimony. Rather the testimonial acceptance criterion will strongly depend on the context of the speaker's utterances. For example, if the criminal-looking speaker states that he has committed a crime, the hearer has good epistemic grounds to believe his testimony; whereas if the speaker states that he is collecting money for the boy scouts, his testimony now appears harder to accept without further evidence.

Certainly, it is also plausible to think that there is an emotion-stereotype-emotion loop. Stereotypes can arguably influence emotion generation too, which then informationally feeds back to stereotype hypothesis selection (together with its particular profile of expected features). However, in this article, we emphasize the first stream of influence: emotions as evidence that influences stereotype hypothesis selection. We prefer this route not only because this stream of influence nicely fits with existing Bayesian PP schemes (Pezzulo 2013), but also because emotion onset arguably tends to occur milliseconds earlier than stereotype onset (see Barrett & Bar 2009; Eimer & Holmes 2007; Palermo & Rhodes 2007; Vuilleumier & Pourtois 2007; Yang et al. 2020).

5 The Epistemology of Testimony and Predictive Social Categorization

Stereotyping looks like a fine candidate for the monitoring processes invoked by both reductionists and anti-reductionists. Recall that the monitoring mechanism advanced by both sides in this debate must satisfy the following conditions: (1) it must track social properties; (2) it must be responsive to social inputs; (3) it must be sufficiently versatile to associate different kinds of inputs (e.g. speakers, utterances, context, etc.); (4) it must be a stable cognitive resource; (5) it must be able to perform automatically and sub-personally; (6) it must be implemented by children; and (7) it must be reliable.

Conditions (1) and (2) are straightforwardly met. Condition (1) states that the monitoring mechanism in question must track social properties, in the sense that it must allow the agent to detect, categorize, and navigate relevant social properties and events—such as group membership, expected codes of behavior, social rank, etc. It is uncontroversial that *stereotype representations track social properties*. They are precisely *representations* of such properties.

In a similar vein, condition (2) states that the monitoring processes at stake must be responsive to social informational inputs, in the sense that relevant social properties and events must reliably trigger the functioning of the monitoring mechanism in question. In this respect, note that insofar as stereotypes are representations of categories—social categories—they share the properties that representations of categories typically have. For example, they are updated via exposure and training (Barsalou 2016; Wilson-Mendenhall et al. 2011). If categories were not responsive to their instances, they simply could not be updated in this sense (see also Moskowitz et al 1999; Sechrist & Stangor 2001). Categories also reduce processing load as they simplify the ever-evolving array of incoming stimuli by grouping them into "similar" and "not-similar". Stereotype representations, insofar as they are categories, classify the social events and properties that they track into similarity classes (see also Taijfel 1969; Hinton 2017). This could not be the case if categories were not reliably triggered by social properties and events. In fact, according to influential theories of content, categories have the content they have precisely because of this responsiveness (e.g. Dretske 1995; Prinz 2002). Roughly, the idea is that PUNK represents punks in the world in virtue of the fact that punks causally co-vary with PUNK in a reliable way, and have the function (by evolutionary or learning history) of doing so. Therefore, *stereotypes are responsive to social inputs*.

Interestingly, as Wilson-Mendenhall and colleagues emphasize, categories are activated against the contextual background of whole situations. They are *situated* categorizations (see also Barsalou 2009):

> Concepts are rarely represented in a vacuum. When the concept for car becomes active, it is not represented in isolation, floating in space, but is instead represented in a meaningful background situation […]. A car, for example, might be represented in a garage,

> parking lot, or gas station, or on a dirt road or highway. (Wilson-Mendenhall et al. 2011, p. 1107)

In fact, stereotypes efficiently group together different kinds of features (including contextual ones) into categories (Judd & Park 1993, p. 110). Then, as categorical inference unfolds, contextual aspects are also expected. For example, the activation of the "hooligan" stereotype arguably comes with various background expectations: sports images, stadium food, fan chants, etc. This accounts, in principle, for how the distinct relevant dimensions that constitute a testimonial interaction—e.g. speakers, utterances, and contexts—can be clustered into one category, namely, the social category of stereotypes. Therefore, condition (3) above obtains: *stereotypes are sufficiently versatile to associate different kinds of informational inputs*.

Moreover, *stereotypes are implemented by children*: condition (6) (Killen et al. 2001; Corenblum 2003; Lai et al. 2016). And they are *a stable cognitive resource*: condition (4). Stereotypes have a stable structure of fixation and activation (Bordens & Horowits 2008, p. 108), which is consistent with the stability required for constituting a functional testimonial standard for monitoring. Therefore condition (4) is met.

Stereotypes are able to perform automatically and sub-personally: condition (5). The PP Bayesian scheme of stereotype hypothesis selection presented above describes sub-personal machinery. Predictive inferences are automatic "unconscious inferences" (Helmholz 1860/1962). Stereotypes do not need to be activated or consciously accessed by the agent, and they generally operate without voluntary control or awareness (see also Bodenhausen et al. 2009; Devine & Sharp 2009; Blair 2002; Wittenbrink et al. 2001). Thus condition (5) is met.

Condition (7) states that the testimonial monitoring mechanism must be reliable. Is the suggested stereotyping process reliable? The tight connection between stereotypes, prejudice, and discrimination is, without a doubt, part of the received view in social psychology. Stereotypes are, on this view, inaccurate (Alport 1954/1979), biased (Tajfel 1969), and unfair (Lippmann 1922). However, this framework has been widely and systematically disputed in the recent specialized literature (see Lee et al. 1995; Jussim 2012). Certainly, some stereotypes are inaccurate, biased and unfair. After all, in this respect, some environments offer very little from which we may learn. However, the vast majority of stereotypical inference has proven to be empirically accurate (Ottati & Lee 1995). The misclassification of our stereotypical judgments as systematically inaccurate seems to follow a more general pattern observed in studies of cognitive biases. In these studies, the experimental conditions tend to emphasize their dysfunctionality. However, when they are tested in more realistic conditions, many of these biases morph into functional heuristics that enhance cognitive performance (see Smith & Kida 1991).

Interestingly, the mechanisms we discussed above that are involved in stereotype hypothesis selection share the properties that make, for example, "model-free" learning systems reliable to an important extent (Brownstein 2016). First, stereotype categories are *learned* and *updated* by reducing prediction error over time. This sort of constraint makes Bayesian inference about incoming data reliable to an important extent (Hohwy 2013). Secondly, stereotype categories should be credited with some epistemic authority, insofar as their workings have the properties that, for example, Seligman et al. (2013) identify in systems that should uncontroversially be granted epistemic authority. In fact, the process of stereotype hypothesis selection suggested above exhibits these properties:

> First, these systems enable agents to learn from experience, given some prior expectation or bias. Second, they enable prior expectations to be overcome by experience over time, through the "washing out" of priors. Third, they are set up such that expected values will, in principle, converge on the "real" frequencies found in the environment, so that agents really do come to be attuned to the world. And fourth, they adapt to variance when frequencies found in the environment change, enabling relatively successful decision-making in both familiar and relatively novel contexts. (Brownstein 2016, p. 302)

Predictive models have the above properties, and promising new trends in categorical inference and hypothesis selection are based on such models (Barsalou 2009; Pezzulo 2013, p. 7). They thus have epistemic authority, or at least *defeasible authority* (Brownstein 2016). *Stereotypes are reliable*: condition (7) is met.

It could be argued that the fact that emotions influence stereotype hypothesis selection makes this process unreliable. After all, the argument goes, emotions are irrational. We have no space to address this worry here. However, we may recall from the above discussion that emotions can be justified. It is plausible to hold that justified intergroup emotions shift the balance of stereotype hypothesis selection in favor of accurate stereotypes, while unjustified intergroup emotions shift the balance of stereotype hypothesis selection in favor of inaccurate stereotypes.

6 5. Conclusions

The reductionist/anti-reductionist debate about testimonial justification (and knowledge) can be taken to collapse into a controversy about two kinds of underlying monitoring mechanisms: passive and active. However, the nature and structure of these mechanisms remains an enigma in the debate, as it has not yet been thoroughly discussed. We submit that no matter which kind of monitoring best defines testimonial justification and knowledge, the underlying monitoring mechanism is stereotyping.

Our main argument in favor of the stereotype hypothesis about testimonial monitoring is that the underlying psychological mechanism responsible for testimonial monitoring must satisfy several conditions. Each of these conditions is satisfied by our "hot" stereotypical capacities. Intergroup emotions play a key role here. Intergroup emotions inform the agent about which candidate stereotype is best suited to the current situation. Our emotions serve as evidence that makes a certain stereotype and its particular profile of features more or less expected.

Finally, we believe that the stereotype hypothesis can be developed as an empirical research program that is able to solve the reductionist/anti-reductionist controversy. In fact, we believe that "hot" stereotypes are relevant to other important discussions in social epistemology, such as *peer disagreement* (given the need to accurately identify inferior and superior epistemic peers) and *argumentation* (given the rhetorical and dialectical need to accurately classify a target audience). There is plenty of room for hot mechanisms to morph the debate in social epistemology into unexpected shapes.

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References

Allport G (1954/1979) The Nature of Prejudice.Addison-Wesley: Reading, MA

Barrett L (2006) Emotions as natural kinds? Perspect Psychol Sci 1:28–58

Barrett L, Bar M (2009) See it with feeling: affective predictions during object perception. Philosophical Trans Royal Soc B: Biol Sci 364(1521):1325–1334

Barrett L, Russell J (eds) (2015) The psychological construction of emotion. Guilford, New York

Barrett L, Wilson-Mendenhall C, Barsalou L (2015) The conceptual act theory: A road map. In Barrett LF, Russell JA (Eds.), The psychological construction of emotion. New York: Guilford: pp. 83–110

Barsalou L (1999) Perceptual symbol systems. Behav Brain Sci 22:577–660

Barsalou L (2009) Simulation, situated conceptualization, and inference. Philosophical Trans Royal Soc London: Biol Sci 364:1281–1289

Barsalou L (2011) Integrating Bayesian analysis and mechanistic theories in grounded cognition. Behav Brain Sci 34:191–192

Barsalou L (2016) Situated conceptualization: Theory and applications. In: Coello Y, Fischer M (eds) Foundations of embodied cognition Volume 1: Perceptual and emotional embodiment. Psychology Press, East Sussex, UK, pp 11–37

Brownstein M (2016) Implicit Attitudes, Social Learning, and Moral Credibility. In Kiverstein J (Ed.) The Routledge Handbook on Philosophy of the Social Mind (pp. 314–335). New York: Routledge.

Beran M, Coutinho M, Couchman J, Boomer J, Washburn D, Smith J (2009) Metacognition in Animals. In: Larson C (ed) Metacognition: New Research Developments. Nova Science Publishers, Inc, New York. pp.23–41

Blair I (2002) The Malleability of Automatic Stereotypes and Prejudice. Personality and Social Psychology Review 6(3):242–261

Bordens K, Horowitz I (2008) Social psychology, 3th edn. Freeload Press, Saint Paul, MN

Bodenhausen GV, Todd AR, Richeson JA (2009) Controlling prejudice and stereotyping: Antecedents, mechanisms, and contexts. In: TD Nelson (Ed.), Handbook of prejudice, stereotyping, and discrimination (pp. 111–135). Psychology Press.

Carruthers P (2014) Two Concepts of Metacognition. Journal of Comparative Psychology Vol. 128; N°2: 138–139

Clark A (2013) Whatever next? Predictive brains, situated agents, and the future of cognitive science. Behav Brain Sci 36(3):181–204

Clark A (2016) Surfing Uncertainty. Oxford University Press, Oxford

Coady C (1973) Testimony and Observation. Am Philos Q 10:149–155

Coady (1992) Testimony: A Philosophical Study. Clarendon Press, Oxford

Corenblum B (2003) What children remember about ingroup and outgroup peers: Effects of stereotypes on children's processing of information about group members. J Exp Child Psychol 86:32–66

Deonna J, Teroni F (2012) The Emotions: A Philosophical Introduction. Routledge, London

Devine P, Sharp L (2009) Automaticity and Control in Stereotyping and Prejudice. In: Nelson T, Ed (eds) Handbook of Prejudice, Stereotyping, and Discrimination. Psychology Press, New York, pp 61–82

Dretske F (1995) Naturalizing the Mind. Bradford Books / MIT Press, Cambridge, MA

Eimer M, Holmes A (2007) Event-related brain potential correlates of emotional face processing. Neuropsychologia 45:15–31

Fortenbaugh F, DeGutis J, Esterman M (2017) Recent theoretical, neural, and clinical advances in sustained attention research. Ann N Y Acad Sci 1396(1):70–91

Fricker E (1994) Against Gullibility. In: Matilal K, Chakrabarti A (eds) Knowing from Words. Kluwer Academic Publishers, Dordrecht, pp 125–161

Fricker E (2004) Testimony: Knowing through Being Told. In: Niniluoto I, Sintonen M, Wolenski J (eds) Handbook of Epistemology. Kluwer Academic Publishers. pp.109–130

Fricker E (2006) Varieties of Anti-Reductionism About Testimony: A to and Testimony Reply Goldberg and Henderson. Philosophy Phenomenological Research. LXXII,No. 3, May

Fricker M (2007) Epistemic Injustice. Oxford University Press, Oxford

Friston K (2009) The free-energy principle: a rough guide to the brain?. Trends in CognitiveSciences 13(7):293–301

Gilbert M (2002) Collective guilt and collective guilt feelings. J Ethics: Int Philosophical Rev 6(2):115–143

Goldberg S, Henderson D (2006) Monitoring and Anti-Reductionism in the Epistemology of Testimony. Philos Phenomenol Res 72:600–617

Goldberg S (2007) Anti-Individualism: Mind and Language, Knowledge and Justification. Cambridge University Press, Cambridge
Halperin E (2014) Collective emotions and emotion regulation in intractable conflicts. In: Scheve C, Salmela M (eds) Collective Emotions. Oxford University Press, New York, pp 281–298
Helmholtz H (1860/1962) Handbuch der physiologischen optik (JPC Southall, Ed., English trans, Vol. 3), Dover, New York
Hoemann K, Devlin M, Barrett L (2020) Comment: Emotions are abstract, conceptual categories that are learned by a predicting brain. Emotion Review. 12(4): 253–255. DOI: https://doi.org/10.1177/1754073919897296
Hohwy J (2013) The predictive mind. Oxford University Press, Oxford
Huebner B (2011) Genuinely collective emotions. Eur J Philos Sci 1(1):89–118
Jussim L (2012) Social perception and social reality: Why accuracy dominates bias and self-fulfilling prophecy. Oxford University Press, Oxford
Judd CM, Park B (1993) Definition and assessment of accuracy in social stereotypes. Psychological Review 100(1): 109–128. https://doi.org/10.1037/0033-295X.100.1.109
Kenny A (1963) Action, emotion and will. Routledge & Kegan Paul, London
Kiefer M, Barsalou L (2013) Grounding the human conceptual system in perception, action, and internal states. In: Prinz W, Beisert M, Herwig A (eds) Action science: Foundations of an emerging discipline. MIT Press, Cambridge, MA, pp 381–407
Killen M, Stangor C (2001) Children's Social Reasoning about Inclusion and Exclusion in Gender and Race Peer Group Contexts. Child Dev 72:174–186
Koenig M, Clément F, Harris P (2004) Trust in Testimony: Children's Use of True and False Statements. Psychol Sci 15:694–698
Koenig M, Echols C (2003) Infant's Understanding of False Labeling Events: The Referential Roles of Words and the Speakers who Use them. Cognition 87:179–208
Koenig M, Harris P (2005) Preschoolers Mistrust Ignorant and Inaccurate Speakers. Child Dev 76:1261–1277
Kok P, Rahnev D, Jehee J, Lau H, De Lange F (2011) Attention reverses the effect of prediction in silencing sensory signals. Cereb Cortex 22(9):2197–2206
Koller D, Friedman N (2009) Probabilistic graphical models: Principles and techniques. MIT Press, Cambridge, MA
Koriat A, Levy-Sadot R (2000) Conscious and unconscious metacognition: A rejoinder. Conscious Cogn 9(2):193–202
Kusch M (2002) Knowledge by Agreement: The Programme of Communitarian Epistemology. Oxford University Press, Oxford
Lackey J (2008) Learning from Words: Testimony as Source of Knowledge. Oxford University Press, Oxford
Lazarus R (1991) Emotion and adaptation. Oxford University Press, New York
Lee Y, Jussim L, McCauley C (eds) (1995) Stereotype accuracy: Toward appreciating group differences. American Psychological Association, Washington DC
Lippmann W (1922) Public Opinion. Harcourt-Brace, New York
Lai CK, Skinner AL, Cooley E, Murrar S, Brauer M, Devos T, Calanchini J, Xiao YJ, Pedram C, Marshburn CK, Simon S, Blanchar JC, Joy-Gaba JA, Conway J, Redford L, Klein RA, Roussos G, Schellhaas FMH, Burns M, Hu X, McLean MC, Axt JR, Asgari S, Schmidt K, Rubinstein R, Marini M, Rubichi S, Shin J-EL, Nosek BA, (2016) Reducing implicit racial preferences: II. Intervention effectiveness across time. Journal of Experimental Psychology: General 145(8): 1001–1016. https://doi.org/10.1037/xge0000179
Mackie D, Maitner A, Smith E (2016) Intergroup emotions theory. In: Nelson T (ed) Handbook of prejudice, stereotyping, and discrimination. Psychology Press, New York, pp 149–174
Mackie D, Maitner A, Smith E (2016) Intergroup emotions theory. In: Nelson T (ed) Handbook of prejudice, stereotyping, and discrimination. Psychology Press, New York, pp 149–174
Moskowitz GB, Gollwitzer PM, Wasel W, Schaal B (1999) Preconscious control of stereotype activation through chronic egalitarian goals. Journal of Personality and Social Psychology 77(1): 167–184. https://doi.org/10.1037/0022-3514.77.1.167
Niedenthal P, Brauer M (2012) Social Functionality of Human Emotion. Annual review of psychology 63: 259–85. https://doi.org/10.1146/annurev.psych.121208.131605
Niedenthal P, Barsalou L, Winkielman P, Krauth-Gruber S, Ric F (2005) Embodiment in attitudes, social perception, and emotion. Personality and Social Psychology Review 9:184–211
Ottati V, Lee Y (1995) Accuracy: A neglected component of stereotype research. In: Lee Y, Jussim L & McCauley C (Eds.), Stereotype accuracy: Toward appreciating group differences American Psychological Association, Washington DC: pp. 29–59
Oakes PJ, Haslam SA, Turner JC (1994) Stereotyping and social reality. Blackwell Publishing.
Palermo R, Rhodes G (2007) Are you always on my mind? A review of how face perception and attention interact. Neuropsychologia 45:75–92
Parasuraman R, Warm J, See J (1998) Brain Systems of Vigilance. In: Parasuraman R, Ed (eds) The Attentive Brain. MIT Press, Cambridge. pp.221–256.
Pea R (1982) Origins of Verbal Logic: Spontaneous Denials by Two- and Three-year-old. J Child Lang 9:597–626
Pezzulo G (2012) An active inference view of cognitive control. Front Theoretical Philosophical Psychol 3:478
Pezzulo G (2013) Why do you fear the bogeyman? An embodied predictive coding model of perceptual inference. Cogn Affect Behav Neurosci 14(3):902–911
Prinz J (2002) Furnishing the Mind: Concepts and Their Perceptual Basis. MIT Press, Cambridge, MA
Ray D, Mackie D, Smith E (2014) Intergroup emotion: Self-categorization, emotion, and the regulation of intergroup conflict. In: von Scheve C, Salmeda M (eds) Collective Emotions. Oxford University Press, Oxford, pp 235–250
Seligman M, Railton P, Baumeister R, Sripada C (2013) Navigating into the future or driven by the past. Perspect Psychol Sci 8(2):119–141
Seth A (2013) Interoceptive inference, emotion, and the embodied self. Trends in Cognitive Science 17(11):565–573
Seth A (2015) The cybernetic Bayesian brain: from interoceptive inference to sensorimotor contingencies. In: Metzinger T, Windt J (Eds), Open MIND 9–24. MIND group, Frankfurt: pp.9–24
Stangor C (2009) The study of stereotyping, prejudice, and discrimination within social psychology: A quick history of theory and research. In TD Nelson (Ed.), Handbook of prejudice, stereotyping, and discrimination. Psychology Press, pp 1–22
Seth A, Friston K (2016) Active interoceptive inference and the emotional brain. Philosophical Trans Royal Soc B: Biol Sci 371(1708):20160007
Smith ER, Mackie DM (2018) Intergroup emotions. In LF Barrett, MW Lewis & JM Haviland-Jon (Eds.), Handbook of emotions (4th ed., pp. 412–423). New York: Guilford.
Sechrist GB, Stangor C (2001) Perceived consensus influences intergroup behavior and stereotype accessibility. Journal of Personality and Social Psychology 80(4): 645–654. https://doi.org/10.1037/0022-3514.80.4.645
Smith J, Coutinho M, Church B, Beran M (2013) Executive attentional uncertainty responses by rhesus macaques (Macaca mulatta). Journal of Experimental Psychology, General N°142: 458–475
Smith J, Couchman J, Beran M (2014) Animal metacognition: A tale of two comparative psychologies. J Comp Psychol 128:115–131

Smith J, Kida T (1991) Heuristics and biases: Expertise and task realism in auditing. Psychol Bull 109(3):472–489

Tajfel H (1969) Cognitive aspects of prejudice. J Soc Issues 25(4):79–93

Vuilleumier P, Pourtois G (2007) Distributed and interactive brain mechanisms during emotion face perception: evidence from functional neuroimaging. Neuropsychologia 45:174–194

Wilson-Mendenhall C, Barret R, Simmons W, Barsalou L (2011) Grounding emotion in situated conceptualization. Neuropsychologia 49:1105–1127

Wilson-Mendenhall C, Barsalou L (2016) A fundamental role for conceptual processing in emotion. In: L Barrett M, Lewis, Haviland-Jones J (eds) Handbook of Emotions, 4th edn. Guilford Press, New York, pp 547–563

Wittenbrink B, Judd C, Park B (2001) Evaluative versus Conceptual Judgments in Automatic Stereotyping and Prejudice. J Exp Soc Psychol 37 3:244–252

Yang Y, White K, Fan X, Xu Q, Chen Q (2020) Differences in Explicit Stereotype Activation among Social Groups Based on the Stereotype Content Model: Behavioral and Electrophysiological Evidence in Chinese Sample. Brain Sci 10(12):1001