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Considerations of the proximate mechanisms and ultimate functions of disgust will improve our understanding of cleansing effects

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Abstract

To understand the consequences of cleansing, Lee and Schwarz favor a grounded procedures perspective over recently-developed disgust theory. We believe that this position stems from three errors: (1) interpreting cleansing effects as broader than they are; (2) not detailing the proximate mechanisms underlying disgust; and (3) not detailing adaptive function versus system byproducts when developing the grounded procedures perspective.

Lee and Schwarz (hereafter L&S) argue that recent developments in the science of disgust are unable to explain the consequences of cleansing, which putatively range from decreased condemnation of people who eat their dead pets (Schnall et al., 2008) to increased risk taking (Xu et al., 2012). This conclusion is premature, partially due to limitations in the empirical evidence presented by L&S. For example, the unpublished meta-analysis of cleansing effects described in the target article relies upon trim-and-fill and fail-safe N to correct for publication bias. Given that these methods can drastically inflate Type I error rates (Becker, 2005; Carter et al., 2019), we are skeptical that the broad “domain general” effects of cleansing that motivated the grounded procedures proposal exist.

Nevertheless, cleansing surely has *some* consequences, such as increasing comfort with eating with one’s hands, especially if they were recently soiled. Although such consequences might seem too obvious to require either investigation or explanation, simplicity of felt experience and alignment with intuition often belie the complexity of underlying proximate mechanisms and the functions they serve (Cosmides & Tooby, 1994). L&S’s dismissal of disgust can serve as an example of the pitfalls of overlooking such complexities.

L&S cursorily describe disgust as “elicited by physically dirty stimuli or morally inappropriate behavior,” begging the question of how objects are categorized as ‘dirty’ and behaviors as ‘inappropriate.’ And, despite L&S’s endorsement of Tinbergen’s approach, this description overlooks both disgust’s function and its mechanistic underpinnings. Such an oversight is unfortunate given the bevy of relevant work exploring how aspects of human psychology, including *pathogen* disgust, function to neutralize infectious microbes and macroparasites – a task similar to that fulfilled by cleansing (Curtis et al., 2011; Hart, 1990; Kupfer & Fessler, 2018; Murray & Schaller, 2016; Oaten et al., 2009). Some of this work has paid especially close attention

to proximate mechanisms, arguing that the circuitry underlying pathogen disgust executes pathogen-avoidance functions by regulating physical contact (Lieberman & Patrick, 2018; Tybur, et al., 2013; Tybur & Lieberman, 2016). According to this proposal, pathogen presence is estimated via sensory mechanisms (e.g., olfactory, visual, tactile) that have evolved to treat certain features as cues to pathogens. Estimates of pathogen presence are integrated with other information informing contact benefits, which can be specific to a social target (e.g., Are they your baby? A close friend? An enemy? A sexual partner?) or a current state (e.g., Are you in physical combat? Are you sexually aroused?). Then, estimates of the fitness value of contact feed into pathogen-neutralizing behavioral programs, with outputs including the felt experience of disgust and its corresponding facial movements and proximal avoidance.

Inspired by this type of finer-grain approach, research has demonstrated that considerations of disgust's function and underlying proximate mechanisms can help inform topics ranging from political sentiments (e.g., Billingsley et al., 2018) to psychopathology (e.g., Tybur et al., in press) to social exclusion (e.g., Oaten et al., 2011). A similar approach might contribute to our understanding of cleansing. For instance, cleansing should update estimates of hand contamination after contact with bodily wastes, fomites, or other people, and hence the likelihood of transferring pathogens to the eyes, mouth, and other vulnerable points of entry. It might also update witnesses' estimates of a cleanser's infectiousness (cf. Ackerman et al., 2018). Anticipating such effects on witnesses might in turn influence subsequent cleanser behavior in a number of ways, many of which seem superficially unrelated to disgust.

Note that, like most evolutionary psychology research programs, the work on disgust described above seeks to better understand proximate mechanisms by first considering function - one of Tinbergen's other three questions. That said, not every behavioral phenomenon is the

functional output of an adaptation, and many discoveries have followed from hypotheses that phenomena are byproducts of adaptations. Consider the seemingly automatic and mandatory racial encoding revealed by decades of social psychology research in the late 20th century. Kurzban and colleagues (2001) suggested that such encoding is unlikely to arise from adaptations that have evolved to detect race, because interactions between members of different races have occurred only very recently in human evolutionary history. Instead, they proposed (and demonstrated) that racial encoding is a byproduct of mechanisms that appear to serve a different function: detecting and tracking coalitions and alliances. Byproducts can similarly emerge from pathogen-avoidance adaptations. For instance, recent evidence suggests that tryphobia, the aversion to clusters of holes or bumps (e.g., on lotus flowers or honeycombs), might be a byproduct of anti-pathogen adaptations (Kupfer & Le, 2018). Myriad consequences of cleansing could also reflect byproducts of pathogen-neutralizing adaptations.

To be clear, we do not believe that considerations of adaptations and byproducts are necessary for all research programs. Indeed, many lines of inquiry within the social and behavioral sciences do not aim to carve nature at its joints, but rather aim to describe and catalogue phenomena or test the effectiveness of interventions. Problems arise, however, when surface features are relied upon to support (or dismiss) theoretical claims about our evolved human nature. We see L&S's account of grounded procedures as including such problems; it does not address the function of the effects of cleansing, nor does it consider whether such effects might arise as byproducts, perhaps of pathogen-avoidance adaptations.

Hypotheses generated by evolutionary scientists have long been pejoratively described as just-so stories, analogous to Rudyard Kipling's fanciful tale of the elephant getting its long trunk after a crocodile's bit and pulled on its nose. Naturally, some evolutionary hypotheses are implausible.

But Tinbergen's suggestion to consider not only proximate mechanisms, but also ontogeny, phylogeny, and function, provides us with an approach for discriminating between promising hypotheses and unlikely ones. Based on the empirical evidence forwarded in the target article and the lack of specification of function (or phylogeny or ontogeny), we're inclined to categorize grounded procedures as the latter. Future work on the effects of cleansing would benefit from more thoroughly incorporating the burgeoning literature on pathogen-avoidance adaptations, their proximate mechanisms, and their byproducts.

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Conflicts of interest

None

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