Perspectives on Psychological Science
2016, Vol. 11(3) 330–332

DOI: 10.1177/1745691616635615
pps.sagepub.com

Gray & Schein's (2016) Objections Are Theoretically and Statistically Faulty

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We reported evidence that many U.S. opponents of genetically modified organisms (GMOs) are moral absolutists, and that GMO opposition is associated with disgust. In their response, Gray and Schein (GS, 2016, this issue) claim that "there is no evidence for moral absolutism in [our] data" (p. 325) and that risk judgments account for "30 times more variance" (p. 325) than disgust. Both these claims are false.

Moral Absolutism and Harm

GS's central theoretical claim is that, according to our view, "people cannot base their moral judgments [about GMOs] on harm" (p. 326). This reflects a fundamental misunderstanding of what we mean by "moral absolutism." We draw our definition of moral absolutism from the extensive literature on protected and sacred values, which defines these values not by the absence of perceived harm but rather by trade-off resistance (see, e.g., Baron & Ritov, 2009; Baron & Spranca, 1997; Ritov & Baron, 1999; Tetlock, 2003). People with a sacred value for natural environments, for example, see harming them as so objectionable that they are unwilling to do so at any price. This precludes comparisons or trade-offs between sacred and secular values, which means that people will be insensitive to consequentialist considerations when sacred values are at stake (Tetlock, 2003). This is precisely the reaction many of us have to GS's "legalized child prostitution" example (p. 326), which, in fact, is quite similar to examples previously examined in the literature (e.g., "letting a family sell their daughter in a bride auction," "forcing women to be sterilized because they are retarded"; Baron & Spranca, 1997). No one would argue that people think these practices are harmless, but research does show that people often think they are bad enough that they ought to be prohibited no matter what. This is the sense in which we are using "moral absolutism." Thus, the fact that people think GMOs are harmful, or that harm perceptions explain variance in GMO attitudes, is not at all inconsistent with our account.

GS are right, however, that we think that many people's attitudes about GMOs are not based solely on perceived risks (which is how GS operationalize harm). But, as we will show, this contention is supported by our data—and by GS's own reanalyses of it.

GS's Reanalyses

GS report analyses of how well disgust and risk judgments predict (a) policy preferences and (b) moral opposition to genetic modification (GM). The latter analysis is the most obviously flawed, so we discuss it first.

Disgust and moral absolutism

GS claim that disgust does not distinguish moral from nonmoral opposition as well as risk judgments do, but here they make a very strange decision that invalidates their analyses. GS model the difference between two categories—GM supporters and opponents—using binary logistic regressions. But this combines moral and nonmoral opposition into a single category! People may oppose GM for any number of pragmatic reasons: uncertainty about risk, dislike of industrial-scale agriculture, distrust of large corporations, and many others. There is no justification for treating all opposition as moral, which is what GS do here. If we run a very similar model but correct for their error by comparing absolutist and nonabsolutist opponents, we get quite different conclusions. Including standardized risk and standardized disgust as predictors in a binomial logistic regression, we find disgust and risk significantly change the odds of being an absolutist (as opposed to nonabsolutist) opponent ($b_{disgust} = .53, p < .001; b_{risk} = .30, p = .015$). Disgust's relative weight[1] is 2.7 times that of risk. Including anger in

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the model changes estimates very little; disgust still has 2 times the relative weight of risk.

Disgust and policy preferences

GS conduct several analyses in which they regress preferences for regulation on perceived risk, disgust, and anger; these are the basis for their claim that "perceived risk/harm" accounts for 24–30 times more variance than disgust. The fact that risk perceptions explain variance in GMO attitudes is neither surprising nor inconsistent with our account, but GS's numbers are off. GS compute their estimates by comparing beta weights for disgust and risk, but squared standardized betas only give accurate estimates of variance explained if predictors are uncorrelated (Johnson, 2000). When predictors are correlated, a portion of the explained variance can be attributed to either variable (i.e., "common variance"). In these cases, standard beta weights often produce biased estimates by falsely exaggerating the importance of the variable most highly correlated with the outcome (Johnson, 2000). GS's analysis does exactly this, attributing nearly all common variance to risk, which is how they arrive at their "24 times" figure (p. 326). Doing the correct analysis gives very different results. A relative weight analysis—one method of ascertaining contributions to variance explained after correcting for inter-correlations between predictors—estimates that 8% can be attributed to disgust and 30% to risk, or a ratio of 3.75 (Tonidandel & LeBreton, 2014). Even after including anger, the relative variance accounted for by risk is only 5.4 times greater than that of disgust.

GS then estimate the same model on only absolutist GM opponents and find that "disgust [is] not even significant" among absolutist opponents (this model is also the basis for their Fig. 1). However, these conclusions are based on an inappropriate model that dramatically reduces statistical power. GS select only 366 of the original 803 participants and include anger in the model, even though it does not predict policy preferences and is correlated with disgust. (In fact, Gray has recently argued strongly against covarying anger when examining disgust; see Cameron, Lindquist, & Gray, 2015.)

A more appropriate model—which drops anger, includes the full sample, and assesses moderation using interaction terms with a dummy variable (1 if absolutist opponent, 0 if not)—shows very different results. There is a significant effect of disgust ($b^* = .13$, $p = .006$), which is not moderated by absolute opposition ($b^* = -.05$, $p > .25$). Thus the claim that disgust is not significant for absolutist opponents appears to be due to the reduced sample size (and therefore reduced power), when one analyzes absolutist opponents only—not to any moderation effect.

This model also shows a significant effect of risk ($b^* = .45$, $p < .001$), which is moderated by absolute opposition ($b^* = .09$, $p = .014$), such that risk is more strongly predictive of policy preferences for absolutist moral opponents. However, contrary to what GS claim, this is not inconsistent with our account. In their research on moral coherence, Liu and Ditto (2013) found the *greatest* consistency between moral evaluations and factual beliefs among people high in moral conviction, likely because these individuals were most motivated to bring the facts into line with their beliefs (see also Kahan et al., 2012; Taber & Lodge, 2006).

Risk judgments resulting from prior moral beliefs

As the moral coherence research shows, moral beliefs can have downstream consequences for factual beliefs. In the current case, people with preexisting objections to GM may be motivated to emphasize the risks and minimize the benefits of GM food (Costa-Font & Mossialos, 2007; Scholderer & Frewer, 2003). These risk–benefit beliefs may then influence other attitudes, such as support for regulation. This correspondence between preexisting beliefs and risk–benefit judgments is predicted by a large body of work on confirmation bias (Nickerson, 1998), affect in risk judgment (Finucane, Alhakami, Slovic, & Johnson, 2000), and motivated reasoning (Kunda, 1990).

We test this causal path in the model shown in Figure 1. In our original article, this model was described briefly in the General Discussion and fully in the supplemental materials. Preexisting negative intuitions regarding GM (operationalized here as disgust reactions to GM consumption and disgust sensitivity) may lead to desire for regulation partly via beliefs about risks. This model shows substantial direct and indirect effects of felt disgust on desire for regulation, as well as a significant indirect effect of disgust sensitivity. Note that this is just a more complete version of the mediation analyses reported by GS, which they tout as undermining the role of disgust. In fact, their analyses, and ours, support a role of disgust in policy preferences.

An Aside on Dolphins

GS raise a number of criticisms of our dolphin-killing scenario. Some are interesting suggestions for future research, but none undermine the conclusion we draw in our article, which is that disgust is not simply a downstream consequence of the perceived violation of any moral value.

Conclusion

GS make strong claims: We show "no evidence for moral absolutism" and "no evidence for a special link between

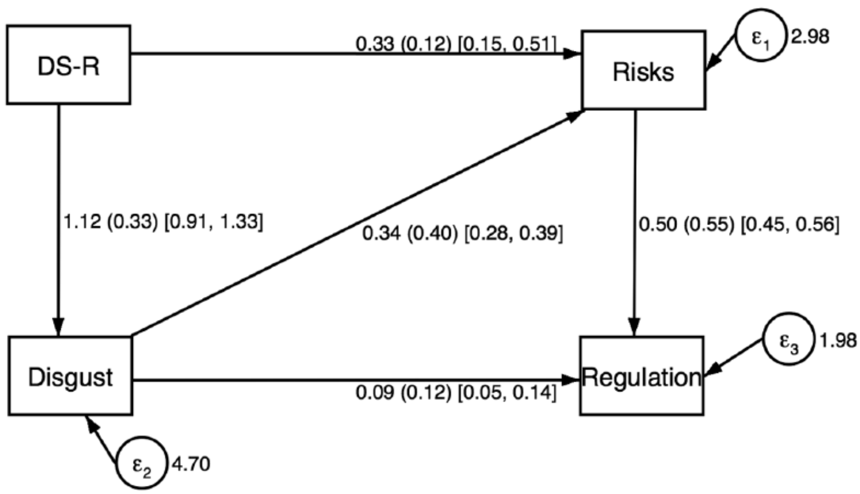

Fig. 1. Path model showing relationships between disgust sensitivity, disgust at consumption of genetically modified food, GM risk perceptions, and desire to regulate GM. Unstandardized parameter estimates are displayed first; standardized estimates are in parentheses; 95% CIs of the unstandardized estimates are in brackets.

disgust and moral judgments of GMOs." Their objections, however, are not persuasive. GS are mistaken about what we believe, and their reanalyses of our data are either undermined by clear errors or support our account. We stand by our original conclusions: Many GMO opponents in the U.S. are absolutists, and opposition to GMOs is associated with disgust.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Note

1. Relative weight estimates contribution to variance explained after correcting for intercorrelations between predictors (Tonidandel & LeBreton, 2014).

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