Ethical Explanations

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Abstract

"Slavery ended in the United States because slavery is morally wrong." This explanation does not seem to fit the typical criteria for explaining an event, since it appeals to ethics rather than causal factors as the reason for this social change. But do people perceive these ethical claims as explanatory, and if so, why? In Study 1, we find that people accept ethical explanations for social change and that this is predicted by their meta-ethical beliefs in moral progress and moral objectivism, suggesting that they treat morality somewhat akin to a causal force. In Study 2, we find that people recognize this relationship between ethical explanations and meta-ethical commitments, using the former to make inferences about individuals' beliefs in moral progress and objectivism. Together these studies demonstrate that our moral commitments shape our judgments of explanations and that explanations shape our moral inferences about others.

Keywords: explanation; ethics; meta-ethics; moral progress; moral objectivism

Introduction

Why did slavery end in the United States? Imagine your friend explains that "slavery ended because slavery is morally wrong." Compare this with the explanation that "slavery ended because the Northern states, which were less economically dependent on slaves, won the Civil War." What differs between these two types of explanations? Is the former genuinely explanatory, even though it explains the occurrence of an event by appeal to an ethical claim, rather than causal factors? What would you assume about your friend's ethical beliefs if your friend gave this explanation?

Ethical explanations, such as "slavery ended because it is morally wrong," appeal to the morality of a practice as an explanation for social change. But it is not clear whether people deem these kinds of statements genuinely *explanatory*, or merely *evaluative* (akin to "slavery ended *and* slavery is morally wrong"). Explanations for events typically appeal to causal information or law-like generalizations, such as structural factors or natural laws (see, e.g., Woodward, 2003; Lombrozo & Carey, 2006; Lombrozo & Vasilyeva, 2017; Woodward, 2010). On the surface, ethical explanations do not fulfill these criteria, which has led to disagreement among philosophers over whether they are genuinely explanatory (Cohen, 1997; Brink, 1989; Leiter, 2001; Harman, 1977; Williams, 1985). This disagreement offers at least anecdotal evidence for individual variation in judgments about the status of ethical explanations. This variation makes ethical explanations a particularly informative test case for accounts of explanation. Across two studies, we investigate whether and why people judge ethical explanations explanatory (Study 1) and whether people use ethical explanations to draw inferences about others' ethical beliefs (Study 2).

Why might people view ethical explanations as explanatory? One possibility is that people view them as shorthand for ethical *belief* explanations, such as "slavery ended because people came to believe it was morally wrong." Another possibility is that if someone has particular meta-ethical commitments, an appeal to ethical truth does satisfy explanatory requirements. Two candidate beliefs are moral progress – believing that the world tends to morally improve – and moral objectivism – believing that some things are objectively morally right or wrong (Uttich, 2012). For someone who holds such beliefs, an ethical truth might be seen as playing an explanatory role akin to a directed, causal force. In Study 1, we consider whether ethical explanations are indeed judged explanatory, whether they are differentiated from ethical belief explanations, and whether variation in their endorsement is predicted by variation in beliefs concerning moral progress and moral objectivism.

If ethical explanations are associated with meta-ethical commitments to moral progress and objectivism, do people recognize this association and use it to make inferences about others? In other words, if your friend says that "slavery ended because it is morally wrong," are you likely to infer that your friend believes that moral progress occurs and that slavery is objectively immoral? Explanations clearly offer evidence about what the explanation-provider believes (e.g., whether P or Q will happen, whether x or y was the culprit), and such effects can be relatively subtle (Kirfel et al., 2021). To our knowledge, however, it is unknown whether the form of an explanation (e.g., ethical vs. non-ethical) can be used to infer the underlying commitments that would render that explanation explanatory. Therefore, in Study 2 we consider whether offering an ethical explanation in turn offers evidence about the meta-ethical beliefs of the explanation-provider. This is valuable not only as additional evidence for a link between ethical explanations and beliefs about moral progress and objectivism beliefs, but as a step towards understanding the communicative role of explanations: beyond their surface content, what is conveyed by the fact that an individual deems a claim explanatory?

Study 1

In Study 1, we hypothesized that people will accept ethical explanations as partially or fully explanatory and that people who more highly endorse moral objectivism and moral progress will be more likely to endorse ethical explanations. To test this, we asked participants to consider why some social change occurred or might occur, such as women gaining the right to vote or the abolition of the death penalty. We provided four possible explanations for this change, including one ethical explanation (which just cited the morality of the practice), one ethical belief explanation (which cited changes in the populations' moral beliefs as responsible for the change) and one poor, circular explanation (see Table 1). If people accept ethical explanations as at least somewhat explanatory, participants should rate the quality of ethical explanations higher than poor explanations.

In addition, we asked participants about their beliefs in moral progress and moral objectivism. If there is a relationship between these moral beliefs and willingness to endorse ethical explanations, we expect to see a correlation between moral belief ratings and ethical explanation ratings. Moreover, if moral belief ratings *do not* correlate with ethical belief explanation ratings, this would provide evidence that ethical explanations are not mere shorthand for ethical belief explanations – participants distinguish the two and they have differing relationships with moral beliefs.

Method

Participants Participants in Study 1 were 220 adults recruited via Prolific. Five additional respondents were excluded for failing an attention check. Participants were paid at a rate of $7.50 per hour, pro-rated to our 8-minute task. Participation in both studies was restricted to workers in the U.S. who had completed at least 100 prior tasks with a 95% approval rating. Both studies were pre-registered.[1]

Materials and Procedure All participants completed two tasks, an Explanation Rating Task and a Moral Beliefs Task, the order of which was counterbalanced.

Explanation Rating Task. In this task, participants were randomly assigned to consider one of four social changes: the abolition of slavery, women gaining the right to vote, the legalization of same-sex marriage, or the abolition of the death penalty. They were asked to consider why this social change occurred or might occur in the United States (e.g., "Why was slavery abolished in the United States?").

Participants rated the quality of four possible explanations for the social change, presented in a random order (see Table 1). One explanation was "non-ethical," citing sociohistorical facts (e.g., "Because the Northern states, which were less economically dependent on slaves, won the Civil War."). Another was an "ethical belief" explanation, citing a change in people's beliefs about the ethics of the practice ("Because people came to believe owning slaves was morally wrong."). Another was an "ethical" explanation, citing just the ethics of the practice ("Because slavery is morally wrong."). And finally, we included a "poor," or circular, explanation ("Because owning slaves was made illegal."). Participants rated how good each answer was on a scale from "1-Poor explanation" to "7-Good explanation" with a midpoint at "4-Average Explanation."

Table 1: The four explanations shown to participants who were asked, "Why was slavery abolished in the United States?".

Explanation type	Stimulus
Ethical	Because slavery is morally wrong.
Ethical belief	Because the Northern states, which were less economically dependent on slaves, won the Civil War.
Non-ethical	Because people came to believe owning slaves was morally wrong.
Poor	Because owning slaves was made illegal.

Moral Beliefs Task. In this task, participants answered three questions about their personal moral beliefs, presented in a random order.

For the moral progress question, participants rated the extent to which they agree that moral progress occurs ("Do you think that people will necessarily advance morally, ethically, and socially, or decline?"; adapted from Rutjens et al., 2016) on a sliding scale from -10 ("Decline") to 10 ("Advance").

For the moral objectivism disagreement question (adapted from Sarkissian et al., 2011), participants read a vignette in which a person similar to themselves disagrees with an imagined friend of the participant about whether slavery, denying women the ability to vote, denying same-sex couples the right to marry, or the death penalty (depending on their social change condition) is morally wrong. Participants rated the extent to which they think at least one person in the disagreement must be wrong, on a scale from 1 ("definitely disagree") to 7 ("definitely agree") with a midpoint at 4 ("neither agree nor disagree").

In the moral objectivism truth-aptness question (adapted from Goodwin & Darley, 2008), participants rated whether they believe the statement "[Slavery/Denying women the ability to vote/Denying same-sex couples the ability to marry/The death penalty] is morally wrong" is "true," "false," or "an opinion."

Finally, participants answered demographic questions before being debriefed and exiting the survey.

[1] Pre-registrations, data, and materials are available at https://osf.io/f9n3q/?view_only=96fe9613ab244cf4962dfa0de06d49aa.

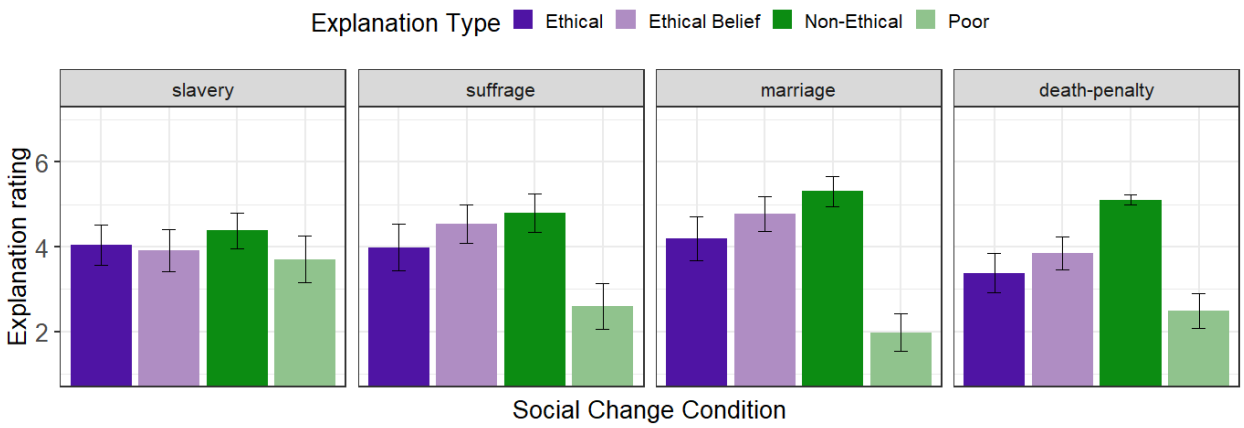

Figure 1: Ratings of the quality of ethical, ethical belief, non-ethical, and poor explanations across social change conditions. Error bars indicate 95%-CI.

Results

First, to test the hypothesis that participants will accept ethical explanations as partially or fully explanatory (i.e., endorsed more strongly than poor explanations), we performed a mixed ANOVA with explanation ratings as the dependent variable, explanation type (ethical, ethical belief, non-ethical, poor) as a within-subjects factor and social change (slavery, suffrage, marriage, death penalty) as a between-subjects factor (see Figure 1). We found a main effect of explanation type, $F(3,863)=67.77$, $p<.001$, such that ethical explanations ($M=3.90$, $SD=1.88$) were judged as significantly better than poor explanations ($M=2.69$, $SD=1.90$; $t(437)=6.70$, $p<.001$). Additionally, non-ethical explanations were judged as significantly better than all other explanation types ($ps<.001$) and poor explanations were judged as worse than all other types ($ps<.001$). The ANOVA also revealed a significant interaction, $F(9, 863)=6.04$, $p<.001$, reflecting variation across vignettes.

For moral progress beliefs, the final model retained moral progress rating, but not vignette or their interaction. Participants judged ethical explanations as significantly better when they endorsed moral progress beliefs ($\beta=0.06$, $p=.02$). For moral objectivism disagreement beliefs, the final model retained moral objectivism disagreement rating, but not vignette or their interaction. Participants judged ethical explanations as significantly better when they endorsed belief in moral objectivism as measured by the disagreement

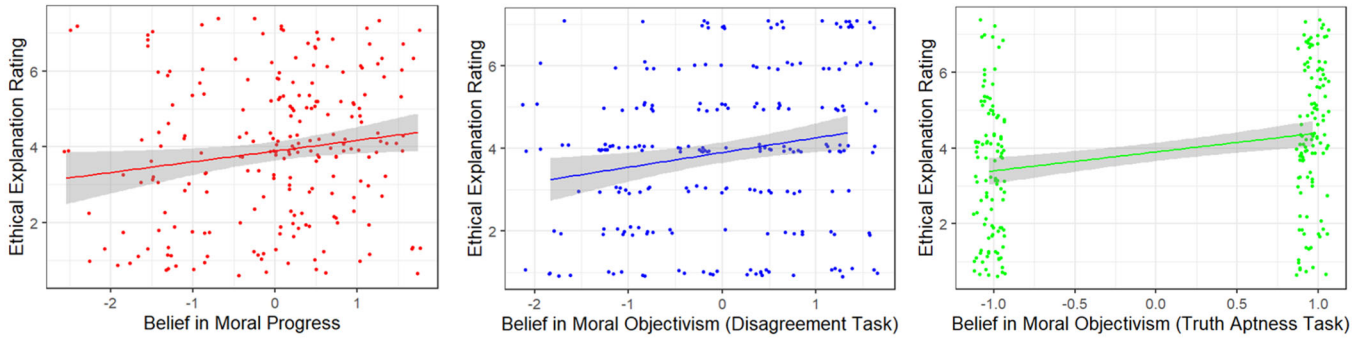

Figure 2: Correlations between ethical explanation rating and z-scored belief rating (for the truth aptness task, -1 corresponds to 'an opinion' and 1 corresponds to 'true' or 'false'). Error bars indicate standard error and values have been jittered.

Next, we tested whether participants who more highly endorse moral objectivism and moral progress are more likely to endorse ethical explanations. To test this, we ran three independent regressions, each treating ethical explanation rating as the dependent variable and one of the following as a predictor: moral progress rating, moral objectivism disagreement rating, or moral objectivism truth-aptness rating (with "true" and "false" collapsed to compare against "opinion"). We used a centered score for each of these predictors. Each regression also included vignette as a predictor. We then compared each model to a reduced model that excludes the relevant predictor, using likelihood ratio tests. Our hypothesis predicts that at least one objectivism measure and moral progress will be positive and significant predictors of ethical explanation score.

question ($\beta=0.29$, $p=.004$). Finally, for moral objectivism truth-aptness beliefs, the final model retained moral objectivism truth-aptness rating, vignette, and their interaction. In the final model, the only marginally significant predictor was truth aptness endorsement ($\beta=0.53$, $p=.059$), suggesting that participants judged ethical explanations as

significantly better when they endorsed belief in moral objectivism as measured by the truth-aptness question.

Finally, there were significant correlations between ethical explanation ratings and moral progress ratings (r=0.15, p=.026), moral objectivism disagreement ratings (r=0.19, p=.005), and moral objectivism truth-aptness ratings (r=0.29, p<.001; see Figure 2). But notably, ethical belief explanation ratings were not correlated with any moral belief ratings (r=-0.05, p=.40; r=0.07, p=.28; r=0.01 p=.14), suggesting that participants distinguish the two types of explanations. To confirm this difference between ethical and ethical belief explanations, we ran additional regressions predicting explanation ratings from each measure for both kinds of explanations; these analyses revealed significant interactions between explanation type and each predictor (moral progress: p=.03; moral objectivism disagreement, p=.04; moral objectivism truth-aptness, p=.02).

Discussion

The results from Study 1 suggest that people are willing to accept ethical explanations – explanations that simply appeal to the ethics of a practice – as explanations of why social change occurs. While our results showed that explanations which cite sociohistorical facts are considered the strongest, we also found that both ethical and ethical belief explanations are considered better than poor explanations.

Further, participants distinguish between the explanations that "slavery ended because it was morally wrong" and "slavery ended because people came to believe it was morally wrong." Only the former was related to whether the participant endorsed moral progress and moral objectivism. As such, this study suggests that believing that the world is morally improving and that there are objective moral truths are part of what makes ethical statements compelling explanations of social change.

Study 2

Study 1 found a reliable relationship between an individual's beliefs about moral progress and moral objectivism and their willingness to endorse an ethical explanation. In Study 2, we test whether people recognize this relationship; that is, whether people use the kinds of explanations that others provide to infer their moral beliefs. Specifically, we hypothesized that hearing an ethical explanation for why social change occurs (versus a non-ethical explanation that appeals to sociohistorical factors) makes people more likely to infer that the individual who offered the explanation believes in moral progress and believes in moral objectivism.

To test this, we introduced participants to a character who expresses an opinion on some potential social change, such as the banning of handgun ownership. Across participants, the character either provides an ethical explanation ("handgun ownership will eventually be made illegal because it is morally wrong to own handguns") or a non-ethical explanation ("[...] because social and economic pressures will lead to legislative changes that make it illegal"). Next, we explain the concepts of moral progress and moral objectivism and ask participants the extent to which they think the character holds each of these moral beliefs.

If people use the explanations that individuals provide to infer their moral beliefs, specifically reflecting the relationship between ethical explanation endorsement and moral progress and moral objectivism beliefs found in Study 1, then participants should rate the character higher on moral objectivism and moral progress when the character provides an ethical explanation.

Method

Participants Participants in Study 2 were 513 adults recruited via Prolific. Twelve additional respondents were excluded for failing an attention check. Participants were paid at a rate of $7.50 per hour, pro-rated to our 5-minute task.

Materials and Procedure Participants were randomly assigned to one of two explanation type conditions: ethical or non-ethical. Additionally, participants were randomly assigned to read about one of five potential social changes: the legalization of abortion, the abolishment of the death penalty, the banning of handgun ownership, the legalization of marijuana, or the legalization of physician-assisted suicide.

First, participants were introduced to a character who provides an explanation for why they believe a social change might occur. In the ethical explanation condition, the character explains that the social change will occur because the practice is morally wrong. For example, "One day, you meet someone from your town named James. You and James begin discussing the topic of the death penalty, and he tells you that he thinks the death penalty will eventually be made illegal because it is morally wrong to enact the death penalty."[2] In the non-ethical explanation condition, the character explains that the social change will occur because of non-moral societal factors (e.g., "[...] the death penalty will eventually be made illegal because social and economic pressures will lead to legislative changes that make it illegal.") After reading the explanation, participants were asked to summarize the character's view to ensure they read it carefully.

Second, in a random order, participants completed a moral progress inference question and a moral objectivism inference question. After the meaning of each term was explained, participants rated the extent to which they believe the character believes that moral progress occurs or that moral objectivism is true on a scale from 1 ("[character] definitely does not believe that moral progress occurs [that moral objectivism exists]") to 5 ("[character] definitely believes that moral progress occurs [that moral objectivism exists]"). We also asked participants to judge the character's moral position on the social change on a scale from 1 (e.g.,

[2]The names and pronouns of the characters were counterbalanced.

"[character] definitely believes that the death penalty is morally wrong") to 5 ("[character] definitely believes that the death penalty is morally right"). Finally, we asked participants to rate the character on a variety of traits (not reported here), and to provide their personal views on this topic following a similar scale (1-"I strongly believe the death penalty is morally wrong" to 5-"I strongly believe the death penalty is morally right").

Results

To determine whether inferences about someone's moral beliefs differ depending on whether this person provides an ethical or non-explanation for why social change might occur, we performed two between-subjects ANOVAs (see Figure 3).

The first ANOVA had moral progress inference ratings as the dependent variable and explanation type (ethical, non-ethical) and social change (abortion, death penalty, gun ownership, marijuana, physician-assisted suicide) as between-subjects factors. We found a main effect of explanation type, $F(1,502)=9.54$, $p=.002$, such that participants rated the character's belief in moral progress higher when the character gave an ethical explanation ($M=3.86$, $SD=0.96$) than a non-ethical explanation ($M=3.61$, $SD=0.99$; $t=2.94$, $p=.003$). We also found a main effect of social change, $F(4,502)=14.15$, $p<.001$, such that moral progress inference ratings were lowest in the abortion vignette ($ps<.001$) and highest in the death penalty vignette ($ps<.05$). We found no significant interaction.

The second ANOVA had moral objectivism inference ratings as the dependent variable and explanation type and social change as between-subjects factors. We found a main effect of explanation type, $F(1,503)=12.03$, $p<.001$, such that participants rated the character's belief in moral objectivism higher when the character gave an ethical explanation ($M=3.85$, $SD=0.91$) than a non-ethical explanation ($M=3.57$, $SD=0.95$; $t=3.45$, $p<.001$). We also found a main effect of social change, $F(4,503)=2.78$, $p=.03$, such that moral objectivism inference ratings were higher in the abortion and death penalty vignettes than in the marijuana vignette ($ps<.05$) and higher in the abortion vignette than in the physician-assisted suicide vignette ($p=.04$). We found no significant interaction.

Figure 3: Inferences about a character's belief in moral progress and moral objectivism when the character provides an ethical or non-ethical explanation for a social change. Error bars indicate 95%-CI.

Finally, we performed a between-subjects ANOVA to determine whether providing an ethical or non-ethical explanation affects the extent to which people infer that the character believes the change is morally good. The ANOVA had character's moral position inference as a dependent variable and explanation type and social change as between-subjects factors. Unsurprisingly, we found a main effect of explanation type, $F(1, 502)=206.18$, $p<.001$, such that participants were more likely to rate the character as morally against the practice (e.g., against the death penalty) when the character gave an ethical explanation ($M=1.30$, $SD=0.71$) than a non-ethical explanation ($M=2.34$, $SD=0.92$; $t=-14.30$, $p<.001$).

None of the reported results were moderated by participants' own views on the morality of the social practice under consideration.

Discussion

Study 2 built on Study 1 by showing that not only is there a relationship between endorsement of ethical explanations and belief in moral progress and moral objectivism, but that people recognize this relationship and use individuals' ethical explanations to infer moral beliefs. These results suggest that, for example, if someone explains that "handgun ownership will be made illegal because owning a handgun is morally wrong," others are more likely to infer that this person believes that the world will morally improve and that there are objective moral truths.

One limitation of this study is that conclusions rest on differences between the ethical explanation and socio-historical explanation conditions – as a result, we cannot confidently conclude that ethical explanations *elevate* inferences about moral progress and moral objectivism from their default values, versus the alternative or additional possibility that socio-historical explanations *depress* such inferences.

General Discussion

"Slavery ended in the United States because slavery is morally wrong." In this paper, we asked whether people judge these ethical explanations genuinely explanatory, whether their explanatory power relates to belief in moral progress and moral objectivism, and whether people recognize this relationship and use it to make inferences about others' moral commitments.

In Study 1, we compared participants' endorsement of ethical explanations for social change to their endorsement of ethical belief, non-ethical, and poor explanations for the same event. Participants judged ethical explanations as better than poor explanations, providing evidence that they are deemed at least somewhat explanatory. Additionally, we found that participants who reported higher beliefs in moral progress and moral objectivism were more likely to endorse ethical explanations, but not more likely to endorse ethical belief explanations. This provides evidence that perceiving morals as objectively true with a forward direction (that is, like a causal force) fulfills the criteria for deeming ethical

explanations explanatory. Moreover, it shows that ethical explanations are not mere shorthand for ethical belief explanations: explaining that "slavery ended because people came to believe it was morally wrong" meets the criteria to be explanatory without requiring these meta-ethical commitments. In sum, Study 1 demonstrated that people do sometimes judge ethical explanations genuinely explanatory and are likely to do so if they believe in moral progress and moral objectivism.

In Study 2, we presented a character who either gave an ethical or non-ethical explanation for a social change and asked participants to rate the extent to which the character believed in moral progress and moral objectivism. Participants gave higher ratings on both of these dependent variables when the character gave an ethical explanation than when the character gave a non-ethical explanation. This provides evidence that people use ethical explanations to make inferences about others' meta-ethical commitments.

These findings broaden our understanding of how people use and interpret explanations. Specifically, prior work has characterized explanations as explanatory when they appeal to causal information or generalizations (Woodward, 2003; Lombrozo & Carey, 2006; Lombrozo & Vasilyeva, 2017; Woodward, 2010). Ethical explanations do not appear to fit this characterization since, at least on the surface, they appeal to nothing more than an ethical claim. Explaining that "slavery ended because it was morally wrong" appears to contain no information about how or why slavery ended. However, if taken with the belief that slavery is objectively morally wrong and that the world progresses towards what is morally right, a picture of something akin to a causal force emerges. Thus, our moral commitments not only influence which explanations we prefer, but more surprisingly, determine whether or not we believe something is an explanation at all.

Alongside the contribution to our understanding of explanations, these findings also have practical importance. In conversations, we evidently use the explanations that others provide to make inferences about their moral commitments. This may be especially important when meeting someone new since we have little information to learn from. Our studies suggest that if you meet a colleague who says, "the death penalty will be abolished because it is morally wrong," you are more likely to think that she believes the death penalty is morally wrong. But you may *also* judge that she believes in moral progress and objectivism, even if you disagree with her moral position.

These findings introduce many interesting questions for future research. First, differences in the explanatory power of ethical explanations depend on individual variation in moral progress and objectivism beliefs. But where do these differences come from? When others provide ethical explanations, we infer their moral commitments – does repeated exposure to these explanations shape our own moral commitments? Future work can address whether the relationship between ethical explanations and moral commitments is cyclical, such that one increases the likelihood of the other and vice versa.

Second, we have provided evidence for our findings within the social changes that we tested. We chose the items in Study 1 for their widely acknowledged historical significance and we chose the items in Study 2 (those which were all possible future social changes) because approximately 40-60% of Americans support each change according to Pew Research Center. However, there was variation across social changes in both studies, which presents opportunity for future research to investigate whether these results generalize to other types of social change and why the results might not hold for some types of social change.

Third, these studies explored ethical explanations at the level of social change – it is possible, but not clear, whether people would endorse ethical explanations for individual-level actions. For example, if a friend returns a lost wallet, is saying he did it because "it was the right thing to do" genuinely explanatory (Uttich, 2012)? If so, is a belief in moral progress and objectivism still necessary, or are the criteria for explanatory power fulfilled in a different way? What inferences are made, if any, of those who explain a mundane action in terms of it being the "right thing to do"? We hope to address these possibilities in future work to better understand the use and interpretation of explanations.

While there are many ways to expand on this work, these studies take crucial first steps toward demonstrating that explanations need not fulfill explanatory criteria at a surface level; rather, moral commitments can supplement an ethical explanation such that people view it as explanatory without explicitly appealing to a causal force. Moreover, people recognize this, and use it to make inferences about others. Thus, "slavery ended because it was morally wrong" can be genuinely explanatory and used to evaluate others' moral commitments.

References

Brink, D. O. (1989). *Moral realism and the foundations of ethics*. Cambridge University Press.

Cohen, J. (1997). The arc of the moral universe. *Philosophy & Public Affairs, 26*(2), 91-134.

Everett, J. A., Faber, N. S., Savulescu, J., & Crockett, M. J. (2018). The costs of being consequentialist: Social inference from instrumental harm and impartial beneficence. *Journal of Experimental Social Psychology, 79*, 200-216.

Goodwin, G. P., & Darley, J. M. (2008). The psychology of meta-ethics: Exploring objectivism. *Cognition, 106*(3), 1339-1366.

Harman, G. (1977). Review of 'Linguistic behavior' by Jonathan Bennett. *Language*, 53, 417–24.

Kirfel, L., Icard, T., & Gerstenberg, T. (2021). Inference from explanation. *Journal of Experimental Psychology: General*.

Leiter, B. (2001). Moral facts and best explanations. *Social Philosophy and Policy, 18*(2), 79-101.

Lombrozo, T., & Carey, S. (2006). Functional explanation

and the function of explanation. *Cognition*, *99*, 167–204.
Lombrozo, T., & Vasilyeva, N. (2017). Causal explanation. *Oxford handbook of causal reasoning*, 415-432.
Rutjens, B. T., van Harreveld, F., van Der Pligt, J., van Elk, M., & Pyszczynski, T. (2016). A march to a better world?
Religiosity and the existential function of belief in social-moral progress. *The International Journal for the Psychology of Religion, 26*(1), 1-18.
Sarkissian, H., Park, J., Tien, D., Wright, J. C., & Knobe, J. (2011). Folk moral relativism. *Mind & Language, 26*(4), 482-505.
Uttich, K. T. (2012). *The Relationship between Social Cognition and Moral Reasoning.* Berkeley, CA: UC Berkeley Electronic Theses and Dissertations.
Williams, B. (1985). *Ethics and the limits of philosophy*. Cambridge, MA: Harvard University Press.
Woodward, J. (2003). *Making things happen: A theory of causal explanation.* Oxford, England: Oxford University Press.
Woodward, J. (2010). Scientific explanation. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*.