Supplemental Materials for Wisneski and Skitka

Moralization Through Moral Shock: Exploring Emotional Antecedents to Moral Conviction

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High Awareness Emotion Pilot Study

High Awareness Emotion Pilot Study Method

Participants. One hundred and seven undergraduates from the University of Illinois at Chicago participated in the pilot in partial fulfillment of their course credit in introductory psychology.

Procedure. Participants were randomly assigned to one of the four sets of stimuli. When they arrived at the lab, participants were seated at individual cubicles and told that they were going to be shown a set of images and then asked a series of questions about those images. Participants were then presented with the six images for 500 milliseconds (ms) each, in a random order. During this presentation phase of the study, participants were told that they were only to watch the images as they appeared on the screen and that they did not need to press any of the buttons on the computer or use the computer mouse. Once the images finished appearing on the screen, participants completed a set of questions measuring their emotional reaction to the set of stimuli. Because of the potentially disturbing content of some of the stimuli, participants were given the opportunity to play a few minutes of a popular and engrossing computer game to restore their positive mood after they completed the emotion measures. After they had finished playing the computer game, participants were thanked for their participation and debriefed.

Emotion measures. Participants were asked to report the extent to which the set of images made them feel each of ten different emotions including disgust, anger, sadness, anxiety, guilt, embarrassment, fear, shame, hope, and happiness. The emotions were presented to the participants in a random order. For each, participants answered using a 5-point scale with point labels *not at all, slightly, moderately, much,* and *very much.*

High Awareness Emotion Pilot Study Results

Results from the pilot study revealed that the stimuli elicited an acceptable pattern of emotional reactions from the participants. To examine how the stimuli affected participants' self-reported emotions, we ran a series of one-way analyses of variance (ANOVA) with stimulus content (abortion, animal rights, primary disgust, or neutral) as the independent variable and each of the emotions as the dependent variables.

A main effect of stimulus content was found for eight of the ten emotions. The stimuli did not elicit different levels of anxiety or hope, F's $(3, 103) = 1.90$ and 1.25, ns, respectively. For each of the other emotions experienced differently as a function of stimulus content, Tukey post-hoc tests compared each of the four conditions. Table S1 shows the means and follow-up test results for each emotion broken down by stimulus type. Most importantly, all the experimental stimuli elicited significantly more disgust than the neutral stimuli, and did not statistically differ in elicited disgust.

The experimental stimuli did, however, differ in terms of the other emotions they elicited besides disgust. First, the primary disgust condition elicited more embarrassment and less happiness relative to the neutral stimulus, although the effect sizes in both these cases were quite small. In general, however, the results indicated that the primary disgust condition elicited a fairly "pure" disgust reaction, uncontaminated by other discrete emotions. Second, the abortion and animal rights images elicited more anger and sadness than the primary disgust and neutral images. The animal rights images also tended to elicit more guilt than the other images. That said, the dominant emotion elicited across all experimental stimuli was disgust.

In sum, the pilot study demonstrated that the stimuli chosen for the current study elicited an acceptable pattern of emotions from participants. The neutral images elicited little or no

emotional reaction. The primary disgust stimuli elicited an almost pure disgust reaction. Finally, the abortion and animal rights images tended to elicit somewhat more complex emotional reactions than pure disgust, that is, they also elicited some anger and sadness, but disgust was still the primary emotional reaction to these images. These stimulus sets allowed us to determine whether other emotions are also needed in addition to disgust to imbue an attitude with strong moral conviction, but attitude relevance is unconfounded with complexity (e.g., the abortion pictures may be emotionally more complex than the pure disgust pictures, but are not relevant when testing its effects on people's moral convictions about animal rights). Furthermore, given some have argued that people tend more often to experience blends of emotions in everyday life (Polivy, 1981; Zelensky & Larson, 2000), the more mixed emotions aroused by the abortion and animal rights stimuli may provide a more accurate test of how attitudes are moralized in the real world.

Table S1

Average Self-Reported Level of Emotion for each Type of Stimulus Content Condition

	Stimulus Condition			
Emotion	Abortion	Animal Rights	Primary Disgust	Neutral
Disgust	4.00[a]	3.85[a]	4.10[a]	1.00[b]
Anger	3.54[a]	2.90[a]	1.52[b]	1.00[b]
Sad	4.31[a]	3.58[a]	1.90[b]	1.15[b]
Guilt	1.69[b]	2.54[a]	1.38[b]	1.00[b]
Anxious	2.08[a]	2.02[a]	1.72[a]	1.31[a]
Embarrassed	1.62[a,b]	1.65[a,b]	1.90[a]	1.00[b]
Fear	1.92[a]	2.46[a]	2.17[a,b]	1.08[b]
Shame	1.85[a,b]	2.60[a]	1.79[a,b]	1.08[b]
Happy	1.00[b]	1.04[b]	1.07[b]	1.38[a]
Hopeful	1.23[a]	1.31[a]	1.03[a]	1.38[a]

Note. Common superscripts denote statistically equal means between each set of images for each emotion (e.g. across the columns) at the $p < .05$ level.

Low Awareness Emotion Pilot Study

Low Awareness Emotion Pilot Study Method

Participants. Sixty-six undergraduates from Saint Peter's University participated in the pilot in partial fulfillment of their course credit in introductory psychology.

Procedure. Participants completed the study on individual computers in groups of no more than five. Participants were told that they would be making rating of a series of 12 abstract

paintings. Specifically, they were asked to determine, as best they could, what emotion (disgust, anger, happiness, contentment, or none) they thought the artist was trying to convey in each painting. Prior to rating each painting, participants were presented with one of the images from Study 1 for the same duration (14ms) as in the "low awareness" condition. The presentation of the images in the pilot, however, differed from the presentation of the images in Study 1 in two ways. First, pilot participants were shown only images whereas main study participants were shown both images and a series of neutral words. Second, pilot study participants were presented with a fixation cross for 500 ms prior to each image presentation to ensure that they were focusing on the screen where the image would be shown. (Participants in Study 1 were likely focused on the screen to determine whether they were flashed an image or a word). Following the fixation cross, the same mask used in Study 1 appeared on the screen for 500ms before the image appeared on the screen. The image was then followed by the mask for an additional 500ms. Once the mask disappeared, participants were shown one of twelve abstract black and white paintings and were asked to indicate the emotion that they thought the artist was trying to convey in the painting. Participants were only able to select one emotion. For all participants, the first six images they were shown were from the control condition of Study 1. Following these six control images, participants were randomly shown one of the three sets of six experimental images from Study 1 (i.e., abortion relevant, animal rights relevant, pure disgust). This design allowed for participants to act as their own controls, thus increasing our statistical power.

Low Awareness Emotion Pilot Study Results

Participants exposed to disgusting images outside of conscious awareness chose disgust as the emotion conveyed in the abstract paintings more often than when they were shown the neutral control images. More specifically, a 2(Condition: Control, experimental) by 3(Disgust

content: Abortion, animal rights, pure disgust) mixed-model ANOVA revealed a main effect of condition, $F(1, 63) = 4.03$, $p = .049$, $\hat{\omega}^2 = .023$. Participants thought the paintings conveyed disgust more often after subliminal exposure to the disgust images ($M = 14.65\%$, $SD = 12.91$, 95% CI [11.98, 18.24]) than after subliminal exposure to control images used in Studies 1 ($M = 10.86\%$, $SD = 11.13$, 95% CI [8.06, 13.55]). Disgust content (abortion, animal rights, etc.) did not affect the percentage of paintings participants believed were meant to convey disgust, $F(2, 63) = 1.21$, $p = .306$, $\hat{\omega}^2 = .003$, and the condition effect was not significantly qualified by disgust content, $F(2, 63) = 2.84$, $p = .066$, $\hat{\omega}^2 = .028$. In sum, this pilot study provides evidence that the disgust images presented in the "low awareness" condition of Study 1 produced a detectable disgust response relative to the control images.

Frequencies of Abortion Supports and Opponents for Each Study

Table S2 below shows the overall breakdown of support and opposition across the two studies. Both studies had sufficient numbers in each group to detect any moderating effects of attitude stance. Study 2, however, shows slightly more imbalance in the number of supporters versus opponents than Study 1. That said, given the simplified design of Study 2, even 59 opponents should allow for sufficient power to detect any differences between the two groups. The only group that appears too small to include in an analysis by themselves is those who "neither support nor oppose" the abortion. Thus, the "Neither" group was not included in any analyses looking at supporters or opponents by themselves, or in the analyses where attitude stance is used as a moderator.

Table S2

Overall frequencies for each study.

	Study 1		Study 2	
	N	Percent	*N*	Percent
Support (Pro-choice)	202	43.7%	91	53.2%
Oppose (Pro-life)	206	44.6%	59	34.5%
Neither support nor oppose	54	11.7%	21	12.3%
Total	*462*	*100%*	*171*	*100%*

Analyses for Both Studies Without Control Variables

Study 1 Analysis Without Controls

Analyses from Study 1 without controlling for attitude importance or extremity still found the significant two-way content by awareness interaction reported in the main paper (see Table S3). However, we now also find a marginally significant main effect of stimulus content. Follow-up analyses for the marginal stimulus content main effect comparing each condition to the control group find that the moral conviction of participants who saw Animal Rights images ($M = 3.42$, $SD = 1.00$, 95% CI [3.23, 3.60]) was marginally lower than those who saw neutral images ($M = 3.66$, $SD = 1.09$, 95% CI [3.48, 3.84]), $F(1, 454) = 3.47$, $p = .06$, $\hat{\omega}^2 = .005$. Neither of the other groups differed from the control group, Fs$(1, 454) < 1$.

This marginal main effect, however, was qualified by a significant content by awareness interaction. Furthermore, follow-up analyses for this two-way interaction revealed that it was slightly different than the one observed in the results not controlling for attitude importance and extremity. Specifically, the simple stimulus content main effect was significant for the low awareness participants, $F(3, 454) = 3.71$, $p = .01$, $\hat{\omega}^2 = .017$, and marginally significant for the high awareness participants, $F(3, 454) = 2.27$, $p = .08$, $\hat{\omega}^2 = .008$. Follow-up comparisons for the simple stimulus content main effect at low awareness revealed a significant *reduction* in moral conviction in participants shown abortion images ($M = 3.45$, $SD = 0.90$, 95% CI [3.18, 3.73]), $F(1, 454) = 3.74$, $p = .05$, $\hat{\omega}^2 = .006$, or Animal Rights images ($M = 3.45$, $SD = 0.99$, 95% CI [3.18, 3.71]), $F(1, 454) = 4.01$, $p = .05$, $\hat{\omega}^2 = .006$, relative to control participants ($M = 3.81$, $SD = 1.06$, 95% CI [3.57, 4.05]). Moral conviction for participants shown the pure disgust images outside of conscious awareness did not differ from control, $F(1, 454) < 1$. Follow-up analyses for the marginally significant simple main effect of stimulus content for high awareness participants showed a pattern of results comparable to those found when the control variables were included in the analysis. There was a marginally significant increase in moral conviction among participants shown abortion related images ($M = 3.86$, $SD = 0.99$, 95% CI [3.59, 4.13]) at conscious levels of awareness compared to participant shown neutral images ($M = 3.51$, $SD = 1.13$, 95% CI [3.23, 3.79]), $F(1, 454) = 3.13$, $p = .08$, $\hat{\omega}^2 = .004$. The moral conviction of participants shown either Animal Rights ($M = 3.38$, $SD = 1.02$, 95% CI [3.13, 3.63]) or pure disgust ($M = 3.55$, $SD = 1.01$, 95% CI [3.30, 3.80]) images at conscious levels of awareness did not significantly differ from control participants, $Fs(1, 454) < 1$.

In summary, the primary result presented in the original manuscript of an increase in moral conviction, relative to control, among participants shown abortion related images at

conscious levels of awareness remains mostly unchanged by the inclusion or removal of the control variables (attitude importance and extremity). It is important to note, however, that removal of the controls causes this effect to drop to marginal significance. Furthermore, although some effects in the model without the statistical control variables were significant (e.g., the main effect of stimulus content and the simple main effect of stimulus content among participants in the low awareness group), these effects vanish when controlling for measures of attitude strength. Thus, these results are likely due more to changes in the overall strength of the attitude rather than changes that are specific to moral conviction. The increase in moral conviction among participants shown abortion images at the high level of awareness, however, remains largely unchanged when the attitude strength control variables are included. This finding supports our conclusion that this "moral shock" effect reflects attitude moralization rather than general attitude strengthening among this group of participants.

Table S3

Study 1 Main analyses with and without controls.

	With Controls[1]			Without Controls		
	F	p	$\hat{\omega}^2$	F	p	$\hat{\omega}^2$
Stimulus awareness	0.00	.99	.000	1.04	.31	.000
Stimulus content	0.87	.46	.000	2.48	.06	.009
Awareness by Content	3.43	.02	.011	3.60	.01	.016

[1] – This is the analysis that we reported for Study 1 in the main paper

Study 2 Analysis Without Controls

Rerunning the Study 2 analysis without controlling for attitude importance or extremity reveals the same pattern of results as observed when including these controls (see Table S4). Again, we find a main effect of stimulus content, $F(1, 168) = 5.25$, $p = .006$, $\hat{\omega}^2 = .047$. Participants shown the abortion images reported higher moral conviction ($M = 3.81$, $SD = 0.93$, 95% CI [3.58, 4.04]) than control participants ($M = 3.35$, $SD = 0.93$, 95% CI [3.12, 5.57]), $F(1, 168) = 7.84$, $p = .006$, $\hat{\omega}^2 = .076$. The moral conviction reported by participants shown the new harm-relevant IAPS disgust images ($M = 3.34$, $SD = 0.78$, 95% CI [3.11, 3.58]) did not differ control, $F(1, 168) < 1$.

Table S4

Study 2 Main analyses with and without controls.

	With Controls[1]			Without Controls		
	F	p	$\hat{\omega}^2$	F	p	$\hat{\omega}^2$
Stimulus content	3.93	.02	.028	5.25	.006	.047

[1] – This is the analysis that we reported for Study 2 in the main paper

Analyses Testing for Moderation by Attitude Stance

Study 1 Moderation by Attitude Stance

Following our initial tests of the intuition and conscious cognition hypotheses above, we also tested whether our effects were moderated by participants' stance on the issue of abortion. Given that the images used were taken from those commonly used in pro-life protests, it is possible that they may have had different effects depending on whether they were consistent or inconsistent with participants' attitude on the issue. Thus, we ran a 4 (Stimulus content) X 2 (Stimulus awareness) X 2(Abortion stance: Support, oppose) ANCOVA again predicting participants' moral conviction on abortion. Because of the small number of people who reported that they feel uncertain on the issue of abortion ($N = 54$ out of 462), these participants were removed from this analysis.

The results revealed that, although removing the uncertain participants appeared to reduce our power to detect some effects, including attitude stance as a moderator did not substantially alter the general pattern of findings. Critically, the two-way stimulus content by awareness interaction that was reported in the initial ANCOVA remained significant, $F(3, 390) = 2.74$, $p = .04$, $\hat{\omega}^2 = .009$, and was not moderated by attitude stance, $F(3, 390) = 0.11$, $p = .95$, but

other results indicated that the effects of the stimulus condition on moral conviction (and in particular, the effects of the abortion stimuli relative to control) were stronger for abortion supporters than for abortion opponents. Specifically, we found a main effect of attitude stance, $F(1, 390) = 4.07$, $p = .04$, $\hat{\omega}^2 = .005$, such that abortion opponents reported slightly higher moral conviction ($M = 3.76$, $SD = 0.88$, 95% CI [3.64, 3.88]) than supporters ($M = 3.58$, $SD = 0.88$, 95% CI [3.46, 3.70]). We also found a significant two-way attitude stance by stimulus content interaction, $F(3, 390) = 3.16$, $p = .02$, $\hat{\omega}^2 = .011$. The simple main effect of stimulus content on abortion moral conviction was non-significant among abortion opponents, $F(3, 390) = 1.20$, $p = .31$, and was marginally significant for supporters, $F(3, 390) = 2.42$, $p = .07$, $\hat{\omega}^2 = .007$. Follow-up simple comparisons for the marginal effect of stimulus content for supporters found that, relative to the control group ($M = 3.33$, $SD = 1.06$, 95% CI [3.11, 3.56]), higher moral conviction was reported by participants shown abortion related images ($M = 3.67$, $SD = 0.87$, 95% CI [3.42, 3.91]), $F(1, 390) = 3.87$, $p = .05$, $\hat{\omega}^2 = .005$, and those shown the pure disgust images ($M = 3.78$, $SD = 1.04$, 95% CI [3.52, 4.05]), $F(1, 390) = 6.32$, $p = .01$, $\hat{\omega}^2 = .009$. The moral conviction for participants shown the animal rights related images ($M = 3.55$, $SD = 0.99$, 95% CI [3.31, 3.78]) did not differ from control, $F(1, 390) = 1.70$, $p = .19$.

These additional analyses demonstrate that the stimulus content by awareness interaction found in the initial moralization analyses was not moderated by participants' abortion stance. That said, these analyses also highlight some interesting possible differences between pro-life and pro-choice participants. Pro-life participants appear to have moralized the issue of abortion to a slightly greater degree than did pro-choice participants. Furthermore, we also found that the simple main effect of stimulus content was marginally significant for pro-choice participants such that they reported higher moral conviction (relative to control) after seeing either the

abortion related or the pure disgust images. No such effects, however, were found for pro-life participants. These results provide some evidence for the possibility that the effect of our manipulation differed for pro-life versus pro-choice participants. However, such a conclusion would be premature given the fact that attitude stance did not moderate the key two-way stimulus content by awareness interaction found in the initial analyses.

Study 2 Moderation by Attitude Stance

Similar to Study 1, few participants reported feeling "uncertain" on the issue of abortion ($N = 21$ out of 171, see Table S2). Crossing these participants with our three level stimulus content manipulation would yield cell sizes of fewer than 10. Thus, we excluded these participants from this analysis. The resulting analysis was a 3 (Stimulus content) X 2(Abortion stance: Support, oppose) ANCOVA predicting moral conviction and controlling for attitude importance and extremity.

The results testing for moderation by attitude stance were similar to those found in Study 1. Specifically, we found a significant main effect of attitude stance, $F(1, 142) = 16.09, p < .01$, $\hat{\omega}^2 = .071$, such that abortion opponents reported higher moral conviction ($M = 3.83, SD = 0.76$, 95% CI [3.63, 4.04]) than abortion supporters ($M = 3.30, SD = 0.91$, 95% CI [3.15, 3.46]). The main effect of stimulus content found in the analysis reported in the main paper also remained significant, $F(2, 142) = 3.47, p = .03, \hat{\omega}^2 = .023$. Participants shown abortion related images reported higher moral conviction ($M = 3.80, SD = 0.93$, 95% CI [3.59, 4.01]) than those in the control condition ($M = 3.49, SD = 0.95$, 95% CI [3.28, 3.71]), $F(1, 142) = 4.15, p = .04, \hat{\omega}^2 = .014$. Those shown the IAPS images reported equally strong moral conviction ($M = 3.41, SD = 0.77$, 95% CI [3.17, 3.65]) as control participants, $F(1, 142) = 0.23, p = .91$. These main effects, however, were qualified by a significant abortion stance by stimulus content interaction, $F(2,$

142) = 3.70, $p = .03$, $\hat{\omega}^2 = .026$. Similar to Study 1, we found stronger effects for abortion supporters than we do for opponents. Follow-up analyses found a significant simple main effect of stimulus content for abortion supporters, $F(2, 142) = 5.02$, $p = .01$, $\hat{\omega}^2 = .038$, but not opponents, $F(2, 142) = 2.11$, $p = .13$. Among supporters, those shown abortion images reported higher moral conviction ($M = 3.62$, $SD = 1.01$, 95% CI [3.35, 3.90]) than those shown neutral images ($M = 2.98$, $SD = 0.87$, 95% CI [2.69, 3.27]), $F(1, 142) = 10.03$, $p = .002$, $\hat{\omega}^2 = .085$. The moral conviction of participants shown the IAPS pictures ($M = 3.31$, $SD = 0.77$, 95% CI [3.04, 3.58]), however, did not differ from control, $F(1, 142) = 2.81$, $p = .20$.

<h3 style="text-align:center">Analyses Predicting Participant Attitude Stance</h3>

Study 1 Predicting Attitude Stance

One possible way for us to make the argument that what we are studying is distinct from judgments of moral wrongness is to see whether our manipulations cause people to report greater opposition to abortion. To test this, we ran a 2(Stimulus awareness) by 4(Stimulus content) ANOVA predicting the continuous measure of participants' attitude on abortion. Attitude importance and extremity were not included as control variables in this analysis. Results showed that our manipulations did not affect participants' attitude on abortion (see Table S5 for the results).

Table S5

Study 1 Analyses predicting bipolar support/opposition to abortion (higher numbers indicate greater opposition, 4 = neither support nor oppose). Attitude importance and extremity control variables were not included in this analysis.

	F	p	$\hat{\omega}^2$
Stimulus awareness	.06	.81	.000
Stimulus content	1.10	.35	.001
Awareness by Content	1.98	.12	.006

Higher numbers indicate greater opposition, 4 = neither support nor oppose

Study 2 Predicting Attitude Stance

Analyses predicting the bipolar measure of participants' abortion attitude stance again provided evidence that our results are independent of previous studies showing the effect of emotion on moral judgment (e.g., Schnall, Haidt, Clore, & Jordan, 2008). A one-way ANOVA including stimulus content to predict participants' attitude stance failed to yield a significant effect (see Table S6).

Table S6

Study 2 Analyses predicting bipolar support/opposition to abortion (higher numbers indicate greater opposition, 4 = neither support nor oppose). Attitude importance and extremity control variables were not included in this analysis.

	F	p	$\hat{\omega}^2$
Stimulus content	1.63	.20	.007