

Replication of

Analytic Thinking Promotes Religious Disbelief

by Gervais, W. M. / Norenzayan, A. (2012)

in: Science, 336, pp. 493–496

Replication Authors:

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In a priming experiment with Canadian undergraduates, Gervais and Norenzayan (2012) randomly-assigned participants to one of two conditions before assessing their belief in God. In the Analytic-prime condition, participants viewed 4 pictures of Rodin's *The Thinker*, while participants in the Control condition viewed 4 pictures of Myron's *Discobolus*. Compared to the control condition, participants in the analytic-prime condition reported lower levels of belief in God. The paper included 5 studies. Study 1 is a correlational study, studies 2–4 primed analytic thinking, through images (study 2), or through a scrambled-sentence task (studies 3–4), and study 5 used disfluent fonts to increase analytic thought. Study 2 is the first study in the paper reporting experimental treatment effects, so it was selected for replication.

Hypothesis to replicate and bet on:

Priming analytic thinking via images of “The Thinker” increases religious disbelief compared to viewing control images of a visually similar artwork; a *t*-test, $p < 0.05$ using a two-tailed test.

Original test statistics: $N = 57$ (31 in Control condition, 26 in Disbelief condition); Control belief in god (100-pt scale): $M = 61.55$, $SD = 35.68$; Disbelief: $M = 41.42$, $SD = 31.47$; $t(55) = 2.24$; $p = 0.029$ (reported as $p = 0.03$).

Power Analysis and Criteria for Replication: First Data Collection

The original sample size was 62 observations, with 5 dropped from main analyses due to suspicion of the manipulation (all 5 in the disbelief condition). Final sample size was 57, and the standardized effect size measured as r was 0.289. To have 90% power to detect 75% of the original effect size, a sample size of 224 is required (after exclusion criteria have been met). The criteria for replication is an effect in the same direction as the original study and a p -value < 0.05 (two-sided test).

Power Analysis and Criteria for Replication: Second Data Collection

If the original result is not replicated in the first data collection, a second data collection of 290 additional individuals (after inclusion criteria have been met) will be carried out so that the total sample size is 514 (after inclusion criteria have been met). If a second data collection is carried out, it will be tested if the original result replicates in the pooled sample of the first and second data collection.

To have 90% power to detect 50% of the original effect size, a sample size of 514 is re-

quired; i.e. a sample size of 290 in the second data collection to have a sample size of 514 in total for the first and second data collection pooled. The criteria for replication is an effect in the same direction as the original and a p -value < 0.05 (two-sided test) in the pooled data.

Sample

The sample size in the first data collection will consist of 224 individuals from the Charlottesville, Virginia community. Participants will be recruited on grounds at the University of Virginia or from popular community locations in Charlottesville such as the downtown pedestrian mall. Participants will be compensated \$5 directly by the experimenter, or will be recruited from the University of Virginia participant pool for research credit.

If the original result is not replicated in the first data collection (two-sided p -value < 0.05 in the original direction), a second data collection of 290 additional individuals from the same population will be carried out so that the total sample size is 514.

Materials

We will run the original Qualtrics script used in the original study, provided to us by the original authors. This script will incorporate the original questions and 8 photographs, as well as the same measure of belief in God [100-point scale, anchored at 0 = God definitely does not exist; and 100 = God definitely exists]. Materials are based on page 4 of the Supplementary Information. The experiment will be in English as in the original study.

Procedure

We will follow the procedure described in the original article. The following summary of the experimental procedure is based on

page 494 of the main article, page 4 of the Supplementary Information, and direct feedback provided by the original authors.

Participants will sit in front of a computer that delivers fully-automated instructions. Participants will be randomly assigned by the computer into either the Analytic or Control conditions. In both conditions, participants will be instructed to view 4 slightly different images of a sculpture; in the Analytic condition, they will see 4 images of Rodin's The Thinker, while in the Control condition, they will see 4 images of the Discobolus of Myron. Instructions will tell participants to spend at least 30 seconds looking at each image before moving on to the rest of the experiment. Once finished with the images, participants will be sent to an ostensibly separate task, where they fill out demographic information including the main DV. The main DV is to rate their belief in God, from 0 (God definitely does not exist) to 100 (God definitely exists). Following a filler task, participants will complete a funneled debrief to check for suspicion that the two parts of the experiment were somehow connected.

Analysis

The analysis will be performed exactly as in the original article. First, anyone expressing suspicion in the debriefing that the two parts of the experiment were really connected will be dropped from the analysis. Questions for the suspicion check in the funneled debriefing have been provided by the original authors. No other exclusion rules were identified in the original study, so we will include all other participants that respond to the dependent variable. On the remaining sample, condition differences on the belief-in-God DV are analyzed using a two-tailed t -test.

The results will first be estimated based on the first data collection. If the original result

is replicated in the first data collection (a two-sided p -value < 0.05 in the same direction as the original study), the second data collection will not be carried out. If the original result is not replicated in the first data collection, a second data collection will be carried out. The above statistical test will then be estimated for the pooled sample of the first and second data collection to test if the original result replicated (a two-sided p -value < 0.05 in the same direction as the original study).

Differences from Original Study

The replication procedure is identical to that of the original study, with some unavoidable deviations. The replication will be performed between September 2016 and September 2017 in Charlottesville, Virginia, whereas the data in the original study was carried out at the University of British Columbia, during the 2009–2010 school year (as indicated by the original authors). As such, as in all replications, the sample, recruiting, and setting are different from the original study. There are no claims in the original article that suggest that these deviations are material for the tested effects. Nevertheless, we have sought review before conducting the replication to confirm.

The original paper contains five studies: for the replication the focus is only on study 2 fol-

lowing the project protocol to select the first study in the paper reporting treatment effects.

Replication Results for the First Data Collection (90% power to detect 75% of the original effect size)

[To be added when replication experiments have been completed.]

Replication Results for the First and Second Data Collection Pooled (90% power to detect 50% of the original effect size)

[To be added when replication experiments have been completed.]

Unplanned Protocol Deviations

[To be added when replication experiments have been completed.]

Discussion

[To be added when replication experiments have been completed.]

References

Gervais, W. M. / Norenzayan, A. (2012): *Analytic Thinking Promotes Religious Disbelief*, *Science*, 336, pp. 493–496.