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Study Information

1. Title

    Testing conformity to descriptive norms in people with opposing beliefs: A replication study

2. Authors

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3. Description

    Our social group can have an influence on our choice of behavior. Although this is a well   known fact, the proper mechanisms behind it are not yet studied to their full extent. In their study from 2019, Pryor, C., Perfors, A., & Howe, P. D. (2019) investigated this influence, which we will replicate in order to examine their findings. Pryor et al (2019) tested the implications which the self-categorization theory makes about the effect of ingroup and outgroup norms on choice of behavior. This study will be a direct replication of their study.

    In the experiment, participants are divided into two groups. In group one, participants are presented with an ingroup descriptive norm only, while in group two, participants are presented with both an ingroup descriptive norm favoring some behavior and an outgroup descriptive norm favoring the other behavior.

4. Hypotheses
    4.1. Across groups, participants will favor the descriptive norm of their ingroup (descriptive norm effect).
    4.2. Compared to group one, where participants are presented with an ingroup descriptive norm only, the descriptive norm effect will be stronger in group two, where participants are presented with a different descriptive norm in their outgroup than in their ingroup.
    4.3. Alternative Hypothesis: Compared to group one, the descriptive norm effect will be weaker in group two, where participants are presented with a different descriptive norm in their outgroup than in their ingroup.

Design Plan

5. Study type

Experiment - The allocation to groups one and two as well as the specific information given during the trials will be randomized and assigned by the researchers.

6. Blinding

There was no blinding involved.

7. Is there any additional blinding in this study?

The real incentive and background of the study will not be disclosed to the participants. The provided background information will consist of a short statement claiming that the study explores people's behavior in regards to moral dilemmas. People are not informed about different conditions than the one they are presented with and no experimenters are needed during experiment completion, since the experiment is run automated in a web browser.

8. Study design

This study is structured as an experimental two factor (2 X 2 factor design) between-subject study with the following components:
The first independent variable is a two-level factor with the levels directly related to the trial condition (only ingroup information shown vs. both ingroup and outgroup information shown).
The second independent variable is also a two level factor indicating which behavior was allocated to the ingroup norm, with the two levels "calling the police" and "do nothing".
The dependent variable represents the choice of each participant to favor ingroup behavior.

9. Randomization

The entire group of participants is split in half. One group is told that 60% of their ingroup favored a certain action in a moral dilemma, while the other is told that 60% of their ingroup favored the opposite action.
These two groups are split again, with one group being shown an additional outgroup descriptive norm, saying that 85% of outgroup members chose the opposite stance than their ingroup.

In order to control for the order of two shown norms having an effect on the dependent variable, the order or appearance is randomized. All randomization will be simple and computer-generated as a coin flip.

Sampling Plan

10. Existing data

As of the date of submission of this research plan for preregistration, 6 pilot participants have tested a preliminary version of our experiment. Because of their feedback, an additional instruction page was added before the understanding check, in order to make the structure of the experiment more accessible. This data was additionally used to develop the analysis script, in particular the preprocessing pipeline. The data of these 6 people will not be included in the final analysis.

11. Explanation of existing data

The existing data will not be considered in the final analysis.

12. Data collection procedures

Data will be collected via an implementation of the experiment which is run in the browser of the participant. This implementation was built using the _magpie architecture (Franke, Ilieva, Ji, Rautenstrauch, 2021) and hosted on Netlify (Netlify, 2021). Participants will be recruited via the Cognitive Science student mailing list and the university website. Due to the limited resources, we will also ask personal contacts to participate in order to gather enough data, in order to finish the project for the university course. The collection of data should take roughly two weeks.

Therefore the population of participants is not restricted to but will mainly contain students of the University of Osnabrück. There will be no compensation for participants.

13. Sample size

The intended minimal sample size comes down to 40 participants. This number was determined by asking previous experimenters of similar studies about their final number of participants. 40 seems realistic.

14. Sample size rationale

The original study intended to recruit 600 participants based on a bootstrapped power analysis with data from a comparable experiment. For finding a significant result of the outgroup descriptive norm, they would have a power of 80%. Personnel for the replication is limited to the 4 authors, with limited resources as this study is conducted within the framework of a university course, therefore the intended sample size had to be cut down drastically.

Variables

15. Manipulated variables

    The main manipulation is that of the presented norms in combination with a moral dilemma. That is, we manipulate both; number and content of the shown norms, making the study a 2 (ingroup descriptive norm) X 2 (both norms shown) design. Firstly, we manipulate the behavior that is allocated to a participant's ingroup, making the variable ingroup descriptive norm a categorical 2-level factor with the levels "calling the police" and "do nothing".
    Secondly, we manipulate whether only a claim about the behavior of a participant's ingroup is shown or both a claim about the behavior of a participant's ingroup and their outgroup are shown. This variable is categorical with two levels.
    In addition, the ordering of norms is randomized to make up for any effects the order of appearance may have. These differences are not included in the analysis.

16. Measured variables

    For a distribution into ingroup and outgroup, participants have to choose one social issue most important to them out of nine possible issues. They are asked to indicate to which extent they agree with the statement on a 11-point Likert scale ranging from -5 (Strongly Disagree) to +5 (Strongly Agree).
    The most important variable will be the conformity of participants with either their ingroup or with the outgroup, measured by the choice of behavior in a moral dilemma situation. They have to indicate their behaviour on a 6-point Likert scale ranging from "Definitely call the police and report the robber" to " Definitely do nothing and leave the robber alone."
    There is an additional measure to control for a sense of identification with the determined ingroup, namely a single-item self-identification measure. Participants have to rate their agreement on a 7-point Likert scale ranging from 1 (fully disagree) to 7 (fully agree) with the statement "I identify with [ingroup description]" and "I identify with [outgroup description]" . The brackets will be replaced by the earlier determined ingroup and outgroup descriptions.
    The last measured variable is a test used to exclude data from participants who were not paying attention. It is a multiple-choice test with the question:

    Which of these options was true about the previous study described in the instructions?
    1. *Participants chose which action they prefered (correct)*
    2. *Due to a computer error, participants were not allocated equally to imagine performing the different actions (incorrect)*

3. *No data was saved during the experiment (incorrect)*
4. *The participants completed the experiment with their eyes closed (incorrect)*

17. Indices

No combination of variables will happen.

Analysis Plan

18. Statistical models

Like in the original paper, we will use a Bayesian version of ordinal logistic regression to test which of the two hypotheses; the self-categorization or the alternative hypotheses, explain the collected data better.

By modelling the two hypotheses, we can predict answers on the ordinal answer scale ranging from "Definitely call the police" (negative direction) to "Definitely do nothing" (positive direction) and thus, we can compute the posterior probability of the two models, given our collected data.

We will use this analysis to compute a Bayes Factor from the two hypotheses, indicating the relative evidence in favor of each hypothesis.

All analysis will be implemented in R, using the "Stan" package to model the hypotheses and the "Bridge Sampling package" to calculate the Bayes Factor, as the original authors did.

18.1. Models: Each of the two hypotheses will be modeled with the help of Bayesian ordinal logistic regression and include parameters representing the influence of behavior allocated to ingroup norm, whether both norms were shown and representing an outgroup norm which favor the opposite behavior from the ingroup norm on the choice of behavior, respectively. The priors for these parameters are directly taken from the original paper and differ between the models mainly in how the presentation of an outgroup norm influences the answer choice. Additionally, the self categorization model also includes an additional influence of the identification variable, which effectively can cancel out the influence of ingroup and outgroup norm. This identification is not considered in the alternative hypothesis and thus, its influence is not included in the alternative model.

The parameters for the two models representing the hypotheses are the following. The priors for the models were taken from the original study. An explanation of their origin can be found in Pryor et al (2019).

Self categorization model:
$$log_e(odds) = b_{in}I + b_{both}B + b_{out}I \times B$$

Alternative model:

$$log_e(odds) = b_{\text{in}} I \times ingroup\ agree + b_{\text{both}} B + b_{\text{out}} I \times B \times outgroup\ disagree$$

Table 1

List of equation variables and what they represent.

Equation variable	Represents
b_{in}	Influence of ingroup norm on behavior choice. Prior is a folded normal distribution with mean = 0.816 and SD = 0.5
b_{both}	Influence of showing both norms on behavior choice. Prior is a normal distribution with mean = 0 and SD = 0.5
b_{out}	Influence of showing outgroup norm that is opposite of ingroup norm. Prior for self categorization model is a half normal distribution with mean = 0 and SD = 0.5. Prior for alternative model is $\frac{-0.85}{0.6} b_{\text{in}}$
I	*Ingroup norm* variable from data. The levels are -1 ("call the police") and 1 ("do nothing")
B	*Both norms shown* variable from data. The levels are 0 (only ingroup norm shown) and 1 (both norms shown)
ingroup agree	*Identification* variable from data. The levels are 1 (participant identifies with ingroup) or 0 (participant does not identify with ingroup)
outgroup disagree	*Identification* variable from data. The levels are 1 (participant does not identify with outgroup) or 0 (participant identifies with outgroup)

18.2.   Effect sizes: In addition to the Bayesian analysis we will run a Frequentist ordinal logistic regression to ensure an exhaustive analysis. Through this, the effect

sizes of the variables above will be measured. The factors we are interested in will be whether the outgroup norm was presented or not and whether the ingroup norm favors reporting the robber or not. Significance will be measured with a two-tailed test with an alpha of 0.05.

19. Transformations

There will be a transformation of the single-item self-identification measure, which is measured through a 7-point Likert scale, into a binary value. There will be two variables: INGROUP AGREE, its value depending on whether participants agreed with the ingroup statement or not and OUTGROUP DISAGREE depending on the agreement with the outgroup statement.

20. Inference criteria

The criteria we will use to make inferences is the Bayes factor, produced through our Bayesian analysis. We will treat a Bayes factor below 1 as evidence in favour of self-categorization theory, while a Bayes factor over 1 will be treated as evidence in favour of our alternative hypothesis. We will interpret the Bayes Factors according to the scale proposed in a paper by Andraszewicz et al (2015) and compare our results to those of Pryor et al (2019).

21. Data exclusion

We will exclude any data of participants not passing the multiple-choice understanding check. An additional exclusion criterion is if participants chose the neutral opinion towards their chosen social issue, as we can not determine an ingroup.

22. Missing data

Data will only be saved if and only if the experiment is completed by the participant, otherwise it will be dismissed. Therefore, there is no possibility of missing data.

23. Exploratory analysis
    None

Other

24. As our experiment is a replication of Pryor et al (2019) please refer to their detailed description of the Bayesian analysis if any uncertainties arise. All parameters for the Bayesian analysis were taken from the description found here: https://osf.io/w7phc/.

References

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