Many Labs 5: Replication of Van Dijk, Van Kleef, Steinel, & Van Beest (2008). A social functional approach to emotions in bargaining

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Abstract

As part of the Many Labs 5 project, we ran a replication of Van Dijk, Van Kleef, Steinel, & Van Beest's (2008) study "A social functional approach to emotions in bargaining: When communicating anger pays and when it backfires," which examined the effect of emotions in negotiations. Van Dijk et al. (2008) report that when the consequences of rejection were low, subjects offered fewer chips to angry bargaining partners when compared to happy partners. In the current study, we ran this replication under three protocols: the protocol used in the Replication Project (2015), a revised protocol, and an online protocol.

Keywords: replication, ML5, ultimatum

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Introduction

Negotiation is a crucial aspect of many major decisions, spanning policy, medicine, education, and business. Due to the integral role that negotiation plays in these large-scale, as well as small-scale, decisions, a wealth of research has explored the possible aspects of negotiation that can influence the outcome. Some examples of previously studied predictors of negotiation outcomes include positive affect (Carnevale & Isen, 1986), gender (Mazei et al., 2015), time pressure (Stuhlmacher & Champagne, 2000), and physical appearance (Solnick & Schweitzer, 1999) to name a few.

Emotion has long been studied as an important predictor for negotiation outcomes (Olekalns & Druckman, 2014). A large body of research has found negotiating partners who express anger are more successful than those who express happiness (Van Kleef, De Dreu, Manstead, & others, 2004). Van Dijk, Van Kleef, Steinel, & Van Beest's (2008) study "A social functional approach to emotions in bargaining: When communicating anger pays and when it backfires" examined this effect of expressed emotion in negotiation further by manipulating the structure of the negotiation itself. In Experiment 3, Van Dijk et al. (2008) report that when the consequences of rejection are low, subjects actually offered fewer chips to angry bargaining partners than to happy partners (Van Dijk, Van Kleef, Steinel, & Van Beest, 2008).

Van Dijk et al. (2008) was included in a large-scale reproducibility study by the Center for Open Science (Open Science Collaboration and others, 2015). The goal of this project was to assess the reliability of the statistical findings reported in high-profile psychology papers. For each paper, a single key statistical result was selected as the target for replication. Note that it is rare for the theoretical claims advanced in a psychology paper to depend solely on a single statistical result. Thus, this project was not designed to

provide a holistic assessment of the robustness of the key *theoretical claims* in each of the original papers. Rather, it was designed to provide a holistic assessment of the robustness of key *statistical findings* across a representative sample of high-profile papers.

In the case of the Van Dijk et al. (2008) paper, the replication team selected the above-mentioned finding that when the consequences of rejection were low, subjects offered fewer chips to angry bargainers than happy bargainers ($F(1,99) = 16.62$, $p < 0.0001$). This statistical finding was clearly identified by Van Dijk et al. (2008) as a key result, and it was highlighted in the paper's abstract. However, it failed to replicate: they reported no significant difference between the offers in the happy and angry conditions with reported effects in the opposite direction of Van Dijk et al. (2008).

There were several methodological differences in the RP:P replication and the original study. Van Dijk et al. (2008) limited their sample to students with no psychology or economics background, prior participation in behavioral experiments, or knowledge of the other participants. The RP:P replication did not enforce these subject restrictions. In the original study, participants completed the study individually in separated rooms, where they could not hear or see other participants. In the RP:P replication, participants were situated in the same room with partial partitioning, so that participants could hear, but not see, each other. One possible explanation for these divergent results are differences in the exclusion criteria and testing environments. These factors are potentially theoretically relevant moderators to the observed effect. In addition, one could argue that the exclusion criteria and testing environment in the RP:P replication might have threatened the credibility of the cover story and the simulated interaction. Both the theoretical and methodological considerations speak to the necessity of our replication study.

The current study aims to investigate these possibilities by running three different protocols across eight different sites: (1) a replication of the replication protocol used by the Replication Project (2015), (2) a revised, peer-reviewed protocol intended to most

closely match the original Van Dijk et al. (2008) study, and (3) an online version of the revised protocol.

Disclosures

Methodology and analyses were preregistered on the Open Science Framework (<https://osf.io/b2sgw/>). All materials, data, and code will be available on the Open Science Framework (link: <https://osf.io/f6n27/>). We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. Testing was conducted with the approval of an Institutional Review Board. In addition, the research was conducted in accordance with the Declaration of Helsinki, which requires preregistration before data collection begins. The authors declare that they have no conflicts of interest with respect to the authorship or the publication of this article. LS and JKH conducted the analyses and drafted the manuscript. Because the editorial decision to use the results-blind review process was made after data collection was completed, LS and JKH were not blind to the data during drafting. All authors contributed to data collection and revising the manuscript. This project was supported by a grant from the Association for Psychological Science and from Arnold Ventures.

Methods

Subject Demographics. A total of 1013 people initially participated across our three replication protocols. No subjects were excluded from the RP:P protocol, but based on the pre-registered exclusion criteria, we excluded a total of 157 (57%) subjects in the revised protocol and a total of 193 (64%) subjects in the online protocol. Across those two protocols, 15 failed the manipulation check, 337 expressed doubt that their partner was real, 13 knew at least two other subjects well, and 20 expressed knowledge about the ultimatum game. Note that we do not explicitly exclude subjects that had previous coursework in psychology or economics or had participated in behavioral experiments in the past because our recruitment strategy was designed to screen out these subjects in the

beginning. However, we still consider the effect of all exclusion criteria in the preliminary analyses below.

In addition, data from six subjects was unusable: three because no other subjects showed up for the testing time, and three because the software crashed.

After applying these pre-registered exclusion criteria, 663 subjects were included in the analyses (mean age = 22.26 years; SD = 5.93). 436 subjects (mean age = 20.54 years; SD = 2.84) were run under the original replication protocol at several sites. 119 subjects (mean age = 20.88 years; SD = 2.68) were run under the revised protocol. Finally, 108 subjects (mean age = 30.70 years; SD = 9.50) were run under the Online Protocol.

Note that we present the main analyses without any exclusions whatsoever (including for failed manipulation checks) in the supplementary materials. These results were consistent with the primary confirmatory analyses even when including all participants.

Materials

The materials were identical at all testing sites and in all protocols. In order to ensure this consistency, all sites and protocols used a software package that we created to run on all modern Web browsers, therefore ensuring that all sites were able to use the software. Stimuli were hosted and data were stored on the gameswithwords.org Web servers.

The original materials from Van Dijk et al. (2008) were translated into English, Spanish, German, Hungarian, and Polish (based on the language of the testing site) and programmed into an online format through gameswithwords.org. Each site and protocol used the same materials on the same online format, differing only by language.

At the start of the instructions, the subjects were informed that they would participate in a study on bargaining and that they were paired with one of the other subjects, who will be referred to as Y (the participants are always assigned to be “X”).

They then saw a message that they were connecting to another participant. After this, subjects were informed that before the bargaining would start, they would answer some questions about how they view bargaining. For this purpose, subjects were presented with six general statements, and they had to indicate on a 5-point scale to what extent they agreed or disagreed with the statements. Example statements included “Strategy is important in negotiations,” and “In negotiations I quickly try to reach agreement.” It was only after answering these questions that subjects learned that their answers would be sent to their bargaining partner. The fact that answers were sent to the opponent was explained by pointing out that in reality people often have some information about the other party in a negotiation.

After explaining the bargaining situation, the manipulation of the recipient’s emotion was induced. Subjects learned that the recipient had typed a reaction after reading the subject’s six answers to the bargaining statements. It was stressed that when the recipient typed the reaction, he or she did not think that the typed reaction would be sent back to the subject (cf. Van Kleef et al., 2004). This was done to ensure that the subjects trusted that the typed emotion was genuine (rather than being a strategic message). In the angry condition, subjects read, “I’ve read what X typed and it makes me angry!!” In the happy condition, subjects read, “I’ve read what X typed and it makes me happy!!” Note that we edited the translations of the Dutch to make them more natural in American English (e.g., the original translation of the first statement was “I’ve read what X typed and I must say I am angry about it!”).

After this manipulation, all subjects learned that they would bargain with their partner over the distribution of 100 chips; 1 chip was said to be worth \$0.10 (or the equivalent in local currency). In all conditions, subjects learned that they would make an offer to Y by indicating how they wanted the 100 chips to be allocated. If Y agreed to the division, the chips would be distributed accordingly. Subjects learned that if the recipient

turned down the division, the division would be reduced by 10% (thus establishing low consequences of rejection). Note that all participants received instructions for low consequences of rejection, and we did not include high consequences of rejection in this replication. Subsequently, subjects made their offer to the recipient by typing on the keyboard.

There were also some manipulation checks. Subjects were asked to rate the extent to which the recipient was angry and to what extent the recipient was happy (on a 1-7 Likert scale). Subjects then rated how much X and Y affect the eventual distribution of chips on a 7-point Likert scale (1 = X could have more impact, 7 = Y could have more impact). Subjects were also asked what would happen if the recipient rejected the offer (the offer would be reduced by 10%).

Subjects were also asked to rate their own anger and happiness and how likely the recipient would accept the offer, on a 7-point Likert scale (1 = very unlikely, 7 = very likely). They answered to what extent the recipient having the possibility to reject their offer affected their decision, on a 7-point Likert scale (1 = absolutely not, 7 = absolutely). Subjects were asked, “How many chips do you think Y should be offered to have him/her accept the offer?” Finally, subjects answered some questions about the identity of their bargaining partner (male, female, or computer?), previous psychology and economics courses, participation in prior behavioral experiments, familiarity with other participants, and demographics.

Procedures

Procedures differ by protocol; they diverge on the exclusion criteria and the testing environments.

For the replication of the RP:P protocol, four people participated at the same time. The testing environment may have allowed for subjects to hear each other, but they were

not able to see one another. Thus, adjacent rooms with the door open or cubicles in the same room that are not fully enclosed were appropriate. Participants were led to a computer and consented. In a web browser, they used the materials described above to complete the study individually.

For the revised, peer-reviewed protocol, four (or six or eight) people participated at the same time. We waited for at least two subjects to arrive and immediately led them to separate cubicles or rooms, instructing them to wait until all the subjects had arrived, and then shutting the door. The cubicles or rooms were private, with closed doors. It should not have been possible to see or hear other subjects from inside. The doors to the cubicles/rooms were visible from the subject arrival area, providing additional evidence to the subjects that there were indeed other subjects. Once the subject was in his/her cubicles or rooms, the door was shut. Note that since they were seated asynchronously, it was not necessary to have a confederate to replace no-shows. Once all subjects had arrived, they individually signed the consent form. They were informed that there were three (or five or seven) other subjects at the same time.

For the online protocol at FernUniversität in Hagen and Crowdfunder, subjects completed the study online. They received a link to the study website, where they followed the study instructions on their own. At FernUniversität in Hagen, subjects could start the study at any time after receiving a link to the study, but their access to the website was limited to certain time points during the day. This was to avoid a subject accessing the website at a point in the night when he or she would not believe that somebody was up and participating at the same time. Other than this time restriction, the environment was relatively uncontrolled. On Crowdfunder, subjects could start the study at any point after receiving a link to the study, and therefore the study environment was uncontrolled.

The original authors stressed that subjects should not all be seated at the same time, and also that they should not be seated strictly one at a time. No further clarification was

available. In consultation with the editor, we arrived at the following protocol: The experimenters only began seating once at least two subjects had arrived. Note that this consideration did not apply to the online protocols.

For the differences in the procedures across protocols, see Table 1.

Testing Sites

The three protocols were run across a total of eight testing sites. See Table 2 for which protocols were run at each testing site.

Results

Preliminary Analyses

As preliminary analyses, we conducted a series of manipulation checks, which were included in our pre-registered analysis plan. If these manipulation checks fail, the main analyses may not be interpretable.

First, we used a binomial regression to analyze the effect of previous psychology courses, economics courses, behavioral experiments, protocol, and their interactions on being excluded. We implemented these analyses in R using the lme4 package, ver. 1.1-12 (Bates, Mächler, Bolker, & Walker, 2015). These analyses included all 1013 subjects. We expected to see a main effect of protocol, such that subjects in the revised and online protocols were significantly more likely to be excluded than subjects in the replication of the RP:P protocol. We observed a pattern that was consistent with that prediction (AIC: 817 vs. 1092 for models with and without effect of protocol, respectively).¹ These results align with our prediction that the exclusion criteria in the revised and online protocols

¹ Throughout this paper, for regressions with continuous or two-level factors, we assess significance using Wald's z . For factors with more than two levels, we use model-comparison with Akaike Information Coefficients (Akaike, 1974).

resulted in a greater number of excluded participants than in the RP:P protocol, which did not have any exclusion criteria. Model comparison provided very slight evidence for interactions of Protocol with number of previous experiments (AIC: 816.5 vs. 816.9) and with number of previous Psychology courses (also AIC: 816.5 vs. 816.9). Generally, such a small difference in AIC is not considered meaningful. No other effects or interactions were significant.

Then, we conducted the same between-subjects manipulation checks as the original Van Dijk et al. (2008) study. These analyses included only subjects who were not excluded. An independent samples t-test was conducted to compare the perceived anger in the angry and happy conditions. We expected that there would be a significant difference, such that people in the angry condition reported significantly higher perceived rates of anger ($M = 5.26$, $SD = 1.93$) than people in the happy condition ($M = 1.50$, $SD = 1.27$; $t(522.66) = 29.23$, $p = < e-05$). This pattern of results confirms that the participants recognized the manipulation of anger. An independent samples t-test was also conducted to compare the perceived happiness in the angry and happy conditions. We expected a significant difference, such that people in the angry condition reported significantly lower perceived rates of happiness ($M = 2.06$, $SD = 1.67$) than people in the happy condition ($M = 6.47$, $SD = 1.11$; $t(528.56) = -39.48$, $p = < e-05$). This pattern of results confirms that the participants recognized the manipulation of happiness.

Main Analyses

The main effect of interest was the effect of expressed emotion (angry vs. happy) on the number of coins that participants made as their initial offer to their bargaining partner. Van Dijk et al. (2008) originally found that emotion was a significant predictor of the subjects' initial offer to the other player when there were low consequences of rejection. They found that subjects offered less to the angry recipient ($M = 32.56$, $SD = 16.31$) than to the happy recipient ($M = 45.21$, $SD = 9.03$), showing that perceived emotion in

negotiation does affect a subject's offer.

Table 3 shows the means and standard deviations for Van Dijk et al.'s original study, the original RP:P replication, and our three protocols (RP:P replication, peer-reviewed, and online).

We used mixed-effects regression for our primary analyses, rather than ANOVA (as used in the original paper), because such regressions are robust to unbalanced designs and allow for more appropriate random-effects structures (Baayen, 2008). In order to determine the best regression model to test this effect in our data, we first ran a step-wise linear regression, starting first with the predictors of emotion, protocol, and testing site (university). Based on the results of this step-wise regression, we use a mixed effects regression model that considers the main effects of emotion and protocol and estimates the random intercept of testing site. Using this regression model, a successful replication would find a main effect of emotion, such that expressed happiness predicts a higher initial offer than expressed anger. We replicated the significant effect of emotion: Expressed happiness predicts a higher initial offer than expressed anger ($b = 3.78$, $SE = 1.61$, Wald's $z = 2.35$, $p = .019$).

We also determined the effect of protocol in this model. The main effect of protocol was significant ($AIC = 6078$ v. 6084 for models with or without the main effect of Protocol, respectively), such that initial offers were highest for the peer-reviewed protocol (44.55 , $SD = 15.00$), slightly lower for the online protocol (43.31 , $SD = 25.01$), and lowest for the RP:P replication (40.00 , $SD = 20.70$).

The stepwise regression described above did not license testing an interaction between protocol and emotion type. However, because this interaction was of core interest to this project, we ran an additional model adding this interaction term. There was a significant interaction effect ($AIC = 6072$ v. 6078 for models with and without the

interaction), such that the online protocol showed the smallest effect of emotion and the revised replication protocol showed the largest (Table 3). Crucially, however, the critical effect of emotion was not significantly different between the RP:P replication and either the peer-reviewed protocol or the online protocol (Table 4).

We additionally used a mixed effects regression with emotion as the only predictor and the random intercept of testing site. We ran this model on each of the protocols separately. A successful replication would find that expressed happiness significantly predicted a higher initial offer in each protocol and collapsed across protocols. Table 5 shows the results from these analyses.

Follow-up analyses

Since such a large proportion of our subjects indicated that they thought their partner was a computer, we were interested in the pattern of results if we did not include this as part of the exclusion criteria in the second protocol. This question – which was not included in the original study – may have retroactively caused subjects to doubt the validity of their partner. Alternatively, subjects who were stingy in bargaining may have been motivated to claim they thought their partner was a computer.

Therefore, we decided to run follow-up analyses that were not included in our pre-registration. We changed the exclusion criteria in the revised protocols to not include expressing doubt that their partner was not real. We again ran mixed effects models with the main effect of emotion and random intercept of testing site (Tables 6 and 7). These results suggest that excluding subjects who believed their bargaining partner was a computer had little effect on the overall results. Interestingly, this is counter to the original authors' suspicion that the RP:P replication failed due to such subjects. In the Supplementary Material, we show that removing all exclusions similarly has little effect on the pattern of results.

Discussion

In this paper, we assess the replicability of a single key statistical result from Van Dijk et al. (2008): that when the consequences of rejection are low, expressing anger results in a lower offer from a negotiation partner. The current study follows on a prior, failed replication (Open Science Collaboration and others, 2015). We conducted three replications: one using (roughly) the same protocol as that used in the prior replication (the “RP:P Replication”); a protocol that was revised to better reflect Van Dijk et al.’s original protocol, and which went through peer review prior to use (the “Peer-reviewed” protocol), and; a variant of the peer-reviewed protocol, modified to be suitable for running over the Internet.

The overarching question addressed by the Many Labs 5 project is whether peer-reviewed replication protocols are more likely to result in successful replication. Our study provides at best limited evidence for this claim. Although only the peer-reviewed protocol provided statistically significant support for the original claim, the effect was in the same direction in all three cases. Critically, the effect was not statistically larger for the peer-reviewed protocol relative to the RP:P replication.

Interestingly, most of the differences introduced into the peer-reviewed protocol involved procedures intended to ensure subject naivete and willingness to believe they were interacting with a live partner. However, these procedures seem to have had little if any effect. For example, as we showed above, the pattern of the results are the same whether subjects who saw through the deception are included or not. For more detailed analysis of specific suspected modulators (e.g., prior exposure to psychology research), see Supplementary Materials. While certainly we cannot say that peer review would never identify flaws in a replication protocol, in this case peer review focused on features that ultimately made little difference.

However, this lack of an effect of peer review should not be over-interpreted. We tested the efficacy of one set of peer reviewers at one journal in improving the replication protocol designed by one set of researchers for one experiment. That is, the apparent fact that our peer reviewers did not identify a significant flaw in our protocol does not mean that other peer reviewers would not have detected such a flaw, or that flaws would not be detected in other protocols by ourselves or other researchers. Moreover, our total number of subjects may be large relative to the standards of the field, but it is modest relative to the demands of statistics. The fact that we did not find a large effect of peer review does not mean that a larger study would not find a small effect.

What does this mean for the original effect of interest? Across five experiments conducted by three independent research teams, expressing positive emotion resulted in a more generous negotiation offer in four out of five experiments – significantly so in two of them. This is consistent with there being at least a small effect in the predicted direction in at least some contexts. We find little evidence for a large effect that is robust to context.

Indeed, our data suggest that the effect of expressing anger during negotiation is far more modest than originally reported. Collapsing across our three experiments, initial offers were only 10% higher for partners who had expressed happiness than those who expressed anger. This is only a quarter the size of what Van Dijk et al. (2008) reported (39%). Note that this is despite the fact that we used a number of quality-control measures not employed by the original authors, resulting in large numbers of exclusions. Without those exclusions, our measured effect is only 5% – or about one ninth of what Van Dijk and colleagues observed (see Supplementary Materials). The result is slightly better if we focus only on the peer-reviewed protocol, where the effect is 19% with exclusions and 9% without. We emphasize effect size because this effect is one where effect size has direct practical implications. We leave it to other researchers – and negotiators – to determine whether a 5% difference in initial offer is important. It is certainly less important than a 39% effect.

An important limitation on this conclusion is that across the five studies, we only tested one method of expressing anger and one expressing happiness. Other methods – particularly more dramatic expressions of affect – might have larger effects. They might have effects in the opposite direction as what we observed. Further research would be required.

Note that because our study was designed to test replicability, it necessarily leaves other questions open as well. In particular, we are unable to fully evaluate some of the design decisions made by the original authors. For instance, in keeping with the instructions of the original authors, while all subjects were informed as to the number of simultaneously-tested subjects, they personally observed variable numbers of other subjects (depending on exactly when they and the other subjects arrived). Unfortunately, it is not known what the distribution of subject-subject exposure was in the original study, and thus it is likely that the distribution in ours is different. This could matter in a number of ways. First, it could affect how willing subjects were to believe that they were negotiating with a live individual. Second, it meant that some of the subjects knew who some of their potential partners were, which could affect how they responded to the negotiation (note that by design, subjects always had some uncertainty as to who their partner was). The fact that the results were (non-significantly) weakest for the online protocol could support the claim that seeing other participants is important for realism. Conversely, we find mixed results as to whether familiarity with the other subjects interacts with the effect of interest (for the peer-reviewed protocol, the more other subjects one knew, the smaller the effect; however, for the RP:P replication, the interaction was not significant). Thus, while the impact of physical co-presence of the subjects does not appear to have been sufficient to qualitatively affect the results of the present study, it is possible that smaller quantitative effects are present. Further research would be needed.

Finallky, we emphasize that the current study does not test all the statistical findings

in Van Dijk et al (2008). As such, we cannot provide a holistic assessment of the broader theoretical claims made by those authors.

	Original (van Dijk 2008)	Original RP:P	RP:P Replication	Peer-Reviewed Replication	Online Replication
Subject Recruitment	Subject recruitment is unreported.	Using a university participant pool but were not "advanced students of psychology or economics."	Using a university participant pool but were not "advanced students of psychology or economics."	Did not use university subject pool and specifically recruited freshmen, who by definition are less likely to have taken psychology and economics.	FernUniversität Hagen: recruited through a) a general online forum for psychology students; b) the forum of the introductory class; and c) the so called "virtual lab," which is an official university website for studies on which all university studies are posted; CrowdFlower: posted as a job on CrowdFlower
Exclusion Criteria	Tried to avoid participation of subjects with prior experience with psychology, economics, or previous experiments, or those who knew other participants. It is not clear how experience and familiarity with other participants is operationalized.	The authors "made efforts to recruit presumably hypothesis-naïve participants" and "aimed to exclude advanced students of psychology or economics." It is unclear how these exclusion criteria were operationalized.	No additional exclusion criteria	Exclusion criteria include: Knowledge of the ultimatum game; Expressing doubt that their partner is real; Knowing other participants; Answering the manipulation check question incorrectly.	Exclusion criteria include: Knowledge of the ultimatum game; Expressing doubt that their partner is real; Knowing other participants; Answering the manipulation check question incorrectly.
Sample	103 participants (22 males, 81 females; mean age = 20.8 years)	83 participants (27 males and 56 females; mean age=24.5)	410 participants (158 males, 250 females, 2 other; mean age = 21)	245 participants (65 males, 177 females; mean age = 21); after exclusion: 106 participants (34 males, 72 females; mean age = 21)	301 participants (165 males, 135 females; mean age = 32); after exclusion: 108 participants (61 males, 47 females; mean age = 31)
Size of testing group	Groups of 8	Groups of 4	Groups of 4, 6, or 8; confederates were available to substitute for missing subjects if necessary.	Groups of 4, 6, or 8; confederates were available to substitute for missing subjects if necessary.	Individual on personal computer
Testing Environment	A room with 8 cubicles that closed in the back	A room with 4 cubicles that were open in the back	A room with 4 (or 6 or 8) cubicles that were open in the back	A room with 4 (or 6 or 8) cubicles or smaller rooms that closed in the back	Varied environments
Procedures	Subjects wrote their offer by hand on a sheet of paper, allegedly to be given to their fellow player, before also typing it into the keyboard.	The offer was made only on a computer	The offer was made only on a computer	The offer was made only on a computer	The offer was made only on a computer
Design	2 (recipient's emotion: angry vs. happy) x 2 (consequences of rejection: low vs. high) between-participants factorial ANOVA design	2 (recipient's emotion: angry vs. happy) x 2 (consequences of rejection: low vs. high) between-participants factorial ANOVA design	2 (recipient's emotion: angry vs. happy) x 1 (consequences of rejection: low) between-participants factorial ANOVA design	2 (recipient's emotion: angry vs. happy) x 1 (consequences of rejection: low) between-participants factorial ANOVA design	2 (recipient's emotion: angry vs. happy) x 1 (consequences of rejection: low) between-participants factorial ANOVA design
Universities	Leiden University	University of Vienna	Eotvos University, Boston College, Maria Curie-Skłodowska University, Universidad de los Andes, Wharton, Georg-August-Universität Göttingen	Boston College, Universidad de los Andes, Georg-August-Universität Göttingen, and Maria Curie-Skłodowska University.	FernUniversität Hagen, Milestone Institute
Software	unreported	Open Seame 2.9 (Mathiór et al., 2012)	Web-based software shared across site universities	Web-based software shared across site universities	Web-based software shared across site universities

Table 1

Differences in methodology across protocols

Table 2

Protocols run at each testing site

<u>Testing Site</u>	<u>Protocols Run</u>
Boston College	RP:P; revised
Eotvos Lorand University	RP:P
FernUniversität in Hagen	Online
University of Goettingen	RP:P; revised
Maria Curie-Sklodowska University	RP:P; revised
Milestone Institute	Online
Universidad de los Andes	RP:P; revised
Wharton School	RP:P

Table 3

Initial Offer by Emotion Condition Across Protocols

Protocol	Happy		Angry		Difference	
	M	SD	M	SD	M	Cohen's d
Original Van Dijk	45.21	9.03	32.56	16.31	-12.65	-0.96
Original RP:P	36.20	17.45	37.60	16.62	1.40	0.08
RP:P Replication	41.93	20.29	38.73	20.68	-3.20	-0.16
Peer-reviewed	46.40	11.67	38.98	21.23	-7.42	-0.48
Online	44.60	21.07	42.07	28.43	-2.53	-0.10
Many Labs Omnibus	43.32	18.90	39.35	22.26	-3.97	-0.19

^a Effect of emotion (angry vs. happy) on initial offer across all protocols: original Van Dijk et al. (2008) study, the original RP:P study, our RP:P replication, our peer-reviewed replication, and our online replication.

Table 4

Interaction of Emotion and Protocol on Initial Offer

	<i>Dependent variable:</i>
	offer
Constant	38.727 t = 27.569***
emotionhappy	3.196 t = 1.624
ProtoPeerReview	0.241 t = 0.069
ProtoOnline	3.339 t = 1.073
emotionhappy:ProtoPeerReview	4.225 t = 0.955
emotionhappy:ProtoOnline	-0.661 t = -0.150
Observations	663
Log Likelihood	-2,931.538

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 5

Results from regression analyses (main effect of emotion and random intercept of testing site) for each protocol.

	<i>Dependent variable:</i>			
	offer			
	RP:P	Peer-reviewed	Online	Omnibus
	(1)	(2)	(3)	(4)
Constant	38.677	38.976	42.073	39.314
	t = 26.107***	t = 15.983***	t = 12.436***	t = 32.523***
emotionhappy	3.179	7.422	2.531	3.973
	t = 1.622	t = 2.464**	t = 0.524	t = 2.485**
Observations	436	119	108	663
Log Likelihood	-1,931.638	-491.594	-495.980	-2,941.739

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 6

Initial Offer by Emotion Condition Across Protocols

Protocol	Happy		Angry		Difference	
	M	SD	M	SD	M	Cohen's d
Original Van Dijk	45.21	9.03	32.56	16.31	-12.65	-0.96
Original RP:P	36.20	17.45	37.60	16.62	1.40	0.08
RP:P Replication	41.93	20.29	38.73	20.68	-3.20	-0.16
Peer-reviewed	43.10	15.49	38.39	20.42	-4.71	-0.26
Online	42.39	20.03	42.94	23.79	0.55	0.02
Many Labs Omnibus	42.38	19.00	39.87	21.61	-2.51	-0.12

^a Effect of emotion (angry vs. happy) on initial offer across all protocols, including subjects who believed they were interacting with a computer.

Table 7

Results from regression analyses (main effect of emotion and random intercept of testing site) for each protocol, including subjects who beleived their partner was a computer.

<i>Dependent variable:</i>				
	offer			
	RP:P	Peer-reviewed	Online	Omnibus
	(1)	(2)	(3)	(4)
Constant	38.677	38.016	42.707	39.452
	t = 26.107***	t = 19.065***	t = 18.197***	t = 34.436***
emotionhappy	3.179	4.724	-0.443	2.536
	t = 1.622	t = 2.133**	t = -0.168	t = 1.957*
Observations	436	263	279	978
Log Likelihood	-1,931.638	-1,129.988	-1,254.287	-4,330.024

Note:

*p<0.1; **p<0.05; ***p<0.01

Supplementary material

Secondary analyses

In our pre-registered secondary analyses, we ran a series of mixed effect regression equations (same structure as the mixed effects described above with the random intercept of testing site) examining the main effects of emotion and subject familiarity, perceived identity of the partner, and previous psychology courses, economics courses, and behavioral experiments, as well as their interactions. We broke up these analyses by protocol (RP:P replication and revised replication protocol). We do not include the online protocol in these secondary analyses.

For the RP:P replication protocol, we found that the more psychology courses the subject had taken, the smaller the critical effect of emotion ($b = -0.46$, $SE = 0.23$, Wald's $z = -2.06$, $p = .039$). Exploratory follow-up analyses suggest that this effect was driven by a five subjects who listed implausible numbers of prior courses (between 40 and 100 each). Removing these subjects eliminated the effect ($b = -1.03$, $SE = 0.72$, Wald's $z = -1.42$, $p = .15$). None of the other variables of interest interacted significantly with emotion.

For the peer-reviewed replication protocol, the more other subjects the participant knew, the smaller the effect of emotion ($b = -5.84$, $SE = 2.03$, Wald's $z = -2.88$, $p = .004$). None of the other variables of interest interacted significantly with emotion. Note that for obvious reasons, these analyses were done without excluding subjects who believed their partner was a computer.

When we run a mixed effect regression model on all of our protocols and the original RP:P replication, we find that anger has a negative effect on offer ($b = -3.69$, $SE = 1.54$, Wald's $z = -2.40$, $p = .016$). This is a reasonable measure of the effect, since we know there wasn't any publication bias in the replications.

Table S1

Mixed Effects Regression Model on Perceived Likelihood That The Other Would Accept

<i>Dependent variable:</i>	
Perceived Likelihood that Y Will Accept	
emotionhappy	0.786*** (0.168)
Protocol2	−0.157 (0.311)
Protocol3	0.235 (0.343)
emotionhappy:Protocol2	0.796** (0.379)
emotionhappy:Protocol3	0.118 (0.381)
Constant	4.048*** (0.157)
Observations	663
Log Likelihood	−1,319.010

Note: *p<0.1; **p<0.05; ***p<0.01

Supplementary Analyses

Subjects answered how likely it was that their partner would accept their offer. We used a mixed effects model with the main effects of emotion and Protocol and the interaction with an estimation of the random intercept of testing site (Table S1). We found that emotion was a significant predictor of perceived likelihood that the recipient would accept the subject's initial offer. Subjects were more likely to believe their partner would accept the offer if they received a happy response ($M = 5.08$, $SD = 1.64$) verses an angry response ($M = 4.12$, $SD = 1.92$). The interaction of emotion and protocol was negligible (AIC: 2654.0 vs. 2654.2 for models with or without the interaction, respectively).

We also ran a mixed effects model on the number of chips that a subject thought they

Table S2

Mixed Effects Regression Model on Perceived Limit of Other Participant

	<i>Dependent variable:</i>
	Estimated Limit of Acceptance
emotionhappy	−1.382 (1.590)
Protocol2	1.148 (2.917)
Protocol3	0.339 (3.082)
emotionhappy:Protocol2	1.400 (3.581)
emotionhappy:Protocol3	3.500 (3.591)
Constant	47.888*** (1.408)
Observations	663
Log Likelihood	−2,793.758
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

would need to offer in order for the recipient to accept the offer (Table S2). We considered the main effects of emotion, protocol, and the interaction between the two and the random intercept of testing site. Our results showed that none of these factors were predictors for perceived limit of acceptance.

Emotion was a significant predictor for self-rating emotion. Those who were presented with the angry condition ($N = 311$) were more likely to self-report as angry ($M = 3.23$, $SD = 1.83$) than those in the happy condition ($M = 1.44$, $SD = 1.23$). The interaction with Protocol was significant (AIC: 2463 vs. 2465). In addition, those in the happy condition ($N = 352$) were more likely to self-report as happy ($M = 6.04$, $SD = 1.31$) than those in the angry condition ($M = 2.46$, $SD = 1.63$). The interaction with Protocol

Table S3

Mixed Effects Regression Model on Self-Rating of Anger

	<i>Dependent variable:</i>
	Self Report Anger
emotionhappy	−1.546*** (0.145)
Protocol2	0.613** (0.270)
Protocol3	0.360 (0.316)
emotionhappy:Protocol2	−0.690** (0.328)
emotionhappy:Protocol3	−0.728** (0.329)
Constant	3.119*** (0.146)
Observations	663
Log Likelihood	−1,223.328
Akaike Inf. Crit.	2,462.655
Bayesian Inf. Crit.	2,498.629

Note: *p<0.1; **p<0.05; ***p<0.01

was significant (AIC: 2405 vs. 2408).

Intent-To-Treat Analyses

An anonymous reviewer requested that we additionally analyze data from all subjects, whether they saw through the deception or not. These analyses are based on 1013 subjects (436 in the RP:P protocol, 276 in the revised protocol, and 301 in the online protocol). We find the same qualitative results as those reported in the main paper, though this time the effect of emotion is not significant in the omnibus analysis (Tables S5 and S6).

Table S4

Mixed Effects Regression Model on Self-Rating of Happiness

	<i>Dependent variable:</i>
	Self Report Happiness
emotionhappy	3.353*** (0.139)
Protocol2	−0.230 (0.257)
Protocol3	−0.414 (0.281)
emotionhappy:Protocol2	0.580* (0.314)
emotionhappy:Protocol3	0.759** (0.315)
Constant	2.562*** (0.129)
Observations	663
Log Likelihood	−1,194.637
Akaike Inf. Crit.	2,405.273
Bayesian Inf. Crit.	2,441.247

Note:

*p<0.1; **p<0.05; ***p<0.01

Table S5

Intent-to-Treat: Initial Offer by Emotion Condition Across Protocols, without Exclusions

Protocol	Happy		Angry		Difference	
	M	SD	M	SD	M	Cohen's d
Original Van Dijk	45.21	9.03	32.56	16.31	-12.65	-0.96
Original RP:P	36.20	17.45	37.60	16.62	1.40	-0.08
RP:P Replication	41.93	20.29	38.73	20.68	-3.20	-0.16
Peer-reviewed	43.14	15.42	39.54	20.94	-3.61	-0.20
Online	41.77	20.23	42.74	23.24	0.97	0.04
Many Labs Omnibus	42.22	19.02	40.18	21.59	-2.04	-0.10

^a Effect of emotion (angry vs. happy) on initial offer across all protocols, without exclusions.

Table S6

Intent-to-treat analyses: Results from regression analyses (main effect of emotion and random intercept of testing site) for each protocol, with no exclusions.

<i>Dependent variable:</i>				
	offer			
	RP:P	Peer-reviewed	Online	Omnibus
	(1)	(2)	(3)	(4)
Constant	38.677	38.016	42.707	39.883
	t = 26.107***	t = 19.065***	t = 18.197***	t = 37.824***
emotionhappy	3.179	4.724	-0.443	2.050
	t = 1.622	t = 2.133**	t = -0.168	t = 1.607
Observations	436	263	279	1,013
Log Likelihood	-1,931.638	-1,129.988	-1,254.287	-4,486.405

Note:

*p<0.1; **p<0.05; ***p<0.01

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