# Online Appendix for How Gender Affects the Efficacy of Discussion as an Information Shortcut

**Contents**

# 1 Appendix 1: Details, Main Experiment

## 1.1 Instructions to Participants

Thank you for participating in today's experiment. I will be reading from a script to ensure that every session of this experiment receives the same instructions. This script is placed in front of you; you may refer to it during the experiment.

Feel free to ask questions if you require clarification. These instructions explain the nature of today's experiment as well as how to navigate the computer interface you will be working with. We ask that you please refrain from talking or looking at the monitors of other participants during the experiment. If you have a question or a problem, please raise your hand and one of us will come to you.

In the instructions that follow, all earnings are denominated in tokens. At the end of the experiment, your earnings in tokens will be translated into dollars at the rate of (200 tokens equals one Euro/100 tokens equals one dollar). You will receive your earnings plus your (5 Euro/7 dollar) show-up fee. We will pay you in cash at the end of the experiment.

The experiment takes place in two parts with each part lasting multiple periods. You will be paid based on two randomly chosen periods in each part. Each period will consist of a contest between two computer generated candidates, Candidate A and Candidate B. Each candidate holds a position on a seven point scale. You will also be assigned a position on the seven point scale. Your pay in each period is determined by the absolute distance between your point on the scale and the winning candidate's point on the scale. The closer you are to the winning candidate the more money you will earn for that period.

Please turn to your computer screens. We have prepared several demonstration screens to help you get familiar with the actual screens you will see during the experi-

ment.

### 1.2 Part One: No Social Communication

*SCREEN ONE*: On left side of every screen, you will see a table displaying what you will be paid depending on the distance between you and the winning candidate. As you can see, if you hold the same position as the winning candidate, you will receive 400 tokens. As the distance between you and the winning candidate increases, you will earn less money.

The first screen you see in each period will be similar to this. The position of Candidate A will be displayed on the left. The position of Candidate B will be on the right. Candidate A's position is always between 1 and 5. Candidate B's position is always somewhere between 3 and 7. In this example, Candidate A has a position of 1 and Candidate B has a position of 6. As it says in the middle of the screen, you have a position of 4. Hence, you are three places away from Candidate A and two places away from Candidate B. Thus, Candidate A would pay you 250 tokens and Candidate B would pay you 300 tokens.

You are asked which candidate would you prefer-Candidate A or Candidate B. Please, select one of the two candidates and then click OK.

*SCREEN TWO*: The second screen of every period will remind you of the candidate positions and who you chose. On this screen, we ask if you want to pay 25 tokens to cast a vote. You have been grouped with six of your fellow participants. Each participant has a unique position on the seven point scale. If you pay the 25 tokens to vote, then your vote will count in the election.

The candidate who receives the most votes wins the election and all seven participants are paid based on that candidate's position. If the election results in a tie, then the winning candidate will be chosen at random with each candidate equally likely to

be chosen-remember, it can end in a tie because, while there are seven people in the group, some people may choose not to vote leaving an even number of voters.

Decide whether or not you want to vote and then click OK.

*SCREEN THREE*: On this screen, the results for this period are revealed. It tells you how much you were paid for the election and then if you paid to vote, it reveals your total payoff. When you are ready, please press OK to continue.

*SCREEN FOUR*: The first screen displayed what it is like when both candidates' positions are known. But you will not always know the candidates' positions. Please, look at this screen. As before, candidate A's position is on the left. But now there are three positions shown for Candidate B. Sometimes, you will know one of the candidate's positions, but the other candidate's position will be uncertain. In this case, Candidate B's position is equally likely to be any of the three positions listed. Candidate B could hold any position from five to seven. Your position for this example is four. So, while you know Candidate A will pay you 250 tokens, Candidate B could pay you 350 tokens, 300 tokens, or 250 tokens. All possibilities are equally likely.

Also, in some periods, you will be uncertain about both candidates' positions. In this case, you will see three possible positions listed for both candidates with all three positions equally likely.

All participants in a group have the same information about the candidates. Please, click OK to continue.

*SCREEN FIVE*: We would like to review some main elements of the experiment.

- First, candidate A's position is always somewhere between 1 and 5 and candidate B's position is always somewhere between 3 and 7.
- Second, you have a position on that same seven point scale.
- Third, there are seven participants in each group. Each participant has a unique

position on the seven point scale.

- Fourth, every participant is paid based on the absolute distance between the winning candidate's position and their own position on the seven point scale. If you pay to vote, then your payoff will be total to your earnings based on the winning candidate minus the 25 tokens you paid to vote.

This part of the experiment will consist of ten periods just like this. You will be paid based on two randomly chosen periods.

This concludes the demonstration screens. We are now ready to begin the actual experiment. The candidate positions and your position could be different in the actual experiment. We ask that you follow the rules of the experiment. Anyone who violates the rules may be asked to leave the experiment with only the 5 Euro show up fee. Are there any questions before we start?

### 1.3 Part Two: The Main Experiment

*SCREEN ONE*: We are about to begin the second part of the experiment. In this part of the experiment, some participants will have no information about the candidate's position on the first screen. Either 3 or 4 participants will not see the signals about the candidate positions as in the first period. Rather they will see a screen that looks like this. This screen tells you the probability that those positions will be drawn for each candidate. As you can see, Candidate A's position is still somewhere between 1 and 5 and Candidate B's position is always between 3 and 7. For Candidate A a position of 3 is most likely, while for Candidate B a position of 5 is most likely.

You are asked which candidate you prefer and how confident you are in that choice. You will not be forced to vote for the candidate you choose on this screen. Pick a candidate, state how confident you are in that choice, and press OK.

*SCREEN TWO*: For the participants who do not receive information about the candidates' positions, they will receive recommendations from participants who are informed. This is what the screen looks like if you are an informed participant who has been asked to send information.

You are told the position of the participant that you are sending a recommendation to. You are asked which candidate that participant should vote for and you are asked how confident you are in that recommendation.

You can say anything you wish. And if you are sending information to multiple uninformed participants, you do not have to provide the same recommendation. If you are an informed participant, you may be asked to provide information to zero, one, or two uninformed participants.

Please, enter a recommendation and then click OK.

*SCREEN THREE*: This is the screen that you will see if you are an uninformed subject receiving information.

As before, you are asked which candidate you prefer. Again, you will first choose a candidate, then decide whether or not you want to pay 25 tokens to vote for that candidate. The candidate who receives the most votes wins the election and all seven participants are paid based on that candidates' position. If the election results in a tie, then the winning candidate will be chosen at random with both candidates equally likely.

This part of the experiment will consist of fifteen periods like this. Again you will be paid based on two randomly chosen periods.

We are about to begin Part Two of the experiment. Are there are any questions before we start?

Press OK. And we will begin.

### 1.4 Part Three: Post-experiment Survey

We would like you to answer a few questions about yourself. After answering these questions, we will show your total earnings for the experiment and then we ask you to sit in your seat until we call your name so that we can pay you.

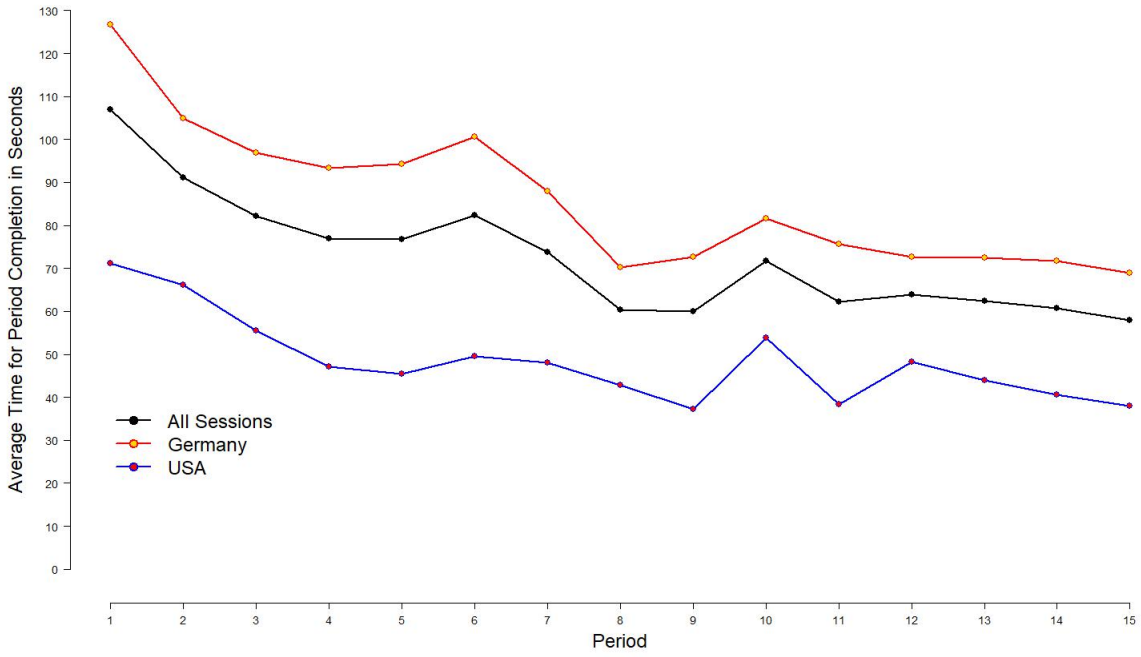
### 1.5 Candidate Positions and Probilities

To determine the candidate positions, the computer randomly draws among the following ranges of possible positions: 1,2,3, 2,3,4, and 3,4,5 for A; 3,4,5, 4,5,6, and 5,6,7 for B. These ranges are the possible positions subjects are shown if the candidate's position is ambiguous – as we explain in the "Signals from Candidates" section. The actual candidate positions were randomly chosen from within the chosen range with all positions equally likely to be the choice. The extreme ranges were chosen with a .4 probability and the middle range was chosen with a .2 probability. Without this distribution, extreme positions would be very rarely chosen for the candidates relative to more moderate positions. This procedure yields the following probability for each position for A and B: (A) 1=.133, 2=.2, 3=.333 4=.2, 5=.133; (B) 3=.133, 4=.20, 5=.333, 6=.20, 7=.133. *All* subjects know these probabilities.

## 2 Appendix 2: Timing of Periods

Figure 1 presents the mean time a period lasted for the German and American subjects. This is calculated by adding together the maximum time it took a subject to click OK on each screen in a particular "election".

Figure 1: Mean time to complete a period.



## 3 Appendix 3: Conflict Values

The logit model predicting *Correct Choice* utilizes as an independent variable *Ex-Ante Conflict*. *Ex-Ante Conflict* measures the probability that the sender and the receiver will prefer different candidates. If either sender or receiver is indifferent, then the sender and receiver are not in conflict. *Ex-Ante Conflict* increases as the distance between sender and receiver increases, but it does so non-linearly. The table below displays the *Ex-Ante Conflict* values for all possible sender-receiver pairs.

| | | Receiver | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Sender | 1 | — | .000 | .069 | .336 | .703 | .837 | .854 |
| | 2 | .000 | — | .052 | .319 | .686 | .821 | .837 |
| | 3 | .069 | .052 | — | .184 | .551 | .686 | .703 |
| | 4 | .336 | .319 | .184 | — | .184 | .319 | .336 |
| | 5 | .703 | .686 | .551 | .184 | — | .052 | .069 |
| | 6 | .837 | .821 | .686 | .319 | .052 | — | .000 |
| | 7 | .854 | .837 | .703 | .336 | .069 | .000 | — |

## 4 Appendix 4: Gender Differences in Truthful Signals and Paying to Vote

Figure 2 looks at gender difference in the probability that a subject will send a truthful signal as well as the probability that the subject will pay to vote.

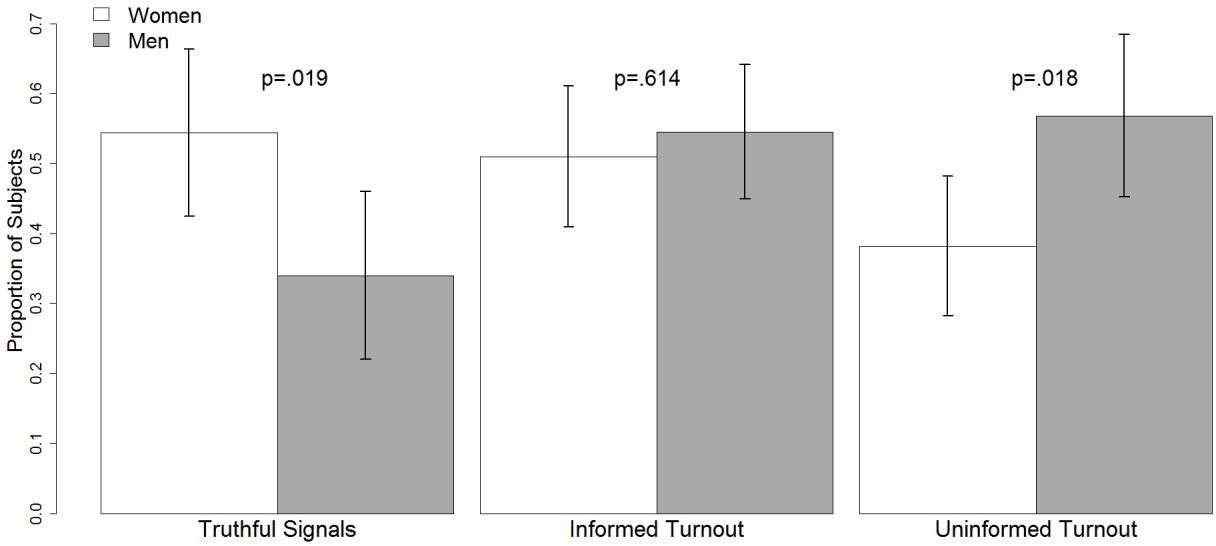
To determine whether a sender's signal was truthful, we took the following steps. First, we calculate who the receiver should probably vote for based on the information that the sender saw.[1] We then compare the sender's recommendation to the receiver's likely correct choice. If the sender recommends the likely correct choice, then the sender is coded as having sent a truthful signal. If the sender does not recommend the likely correct choice, then the sender is coded as having lied. If a sender would believe the receiver was indifferent based on the signals, the sender is coded as having sent a truthful signal regardless of which candidate the sender recommended. We then exclude all instances in which the sender and receiver would have preferred the same candidate based on the sender's information. In those cases, the sender likely was not lying, but miscalculated who one of them should favor.

In the figure, the white bars are women while the dark bars are men. As the figure shows, when a women sender preferred a different candidate than the receiver, she sent an honest signal 54% of the time. Men sent truthful signals only 34% of the time. Further, a third of women never lied compared to only 15% of men. At the same time, 49% of men lied in every instance where they had an incentive to lie. Only 21% of women lied in every instance. As women lied less frequently when they were senders, it is possible that is why they trusted signals more frequently when they were receivers.

For turnout, we split the sample between the informed and uninformed. In many cases, informed subjects should know whether it is worth it to spend the 25 cents to

[1]Recall that some candidates provided ambiguous signals. For this reason, a sender could send a truthful signal based on the information he or she saw, but it could provide an incorrect recommendation.

Figure 2: Truthful signals and paying to vote by gender.




*Lines represent 95% confidence intervals with standard errors adjusted for clustering on subjects.*

vote. Uninformed subjects need to rely on the signals they receive and the ex-ante probability that turning out is rational–the more extreme their position, the more likely it is that they should turnout to vote. The middle bars of the figure show that, when subjects were informed, women were less likely to vote, but that gender difference is not statistically discernible. When subjects are uninformed, however, the difference between men and women is much larger. Uninformed men paid to vote 57% of the time. Uninformed women were twenty percentage points less likely to vote. Therefore, uninformed women may have been less confident about what they should do than uninformed men and this is why they used social information when making a candidate choice.

## 5 Appendix 5: "Correct" Choices Model

The following model is used to produce Figure 4 in the main text.

Table 1: Predicting correct choice by *Woman Receiver* and *Ex-Ante Conflict*.

| | Coef. | Z-Value |
|---|---|---|
| Woman Receiver | 0.691 | 1.64 |
| Ex-Ante Conflict | 0.583 | 1.13 |
| Woman X Conflict | -2.184 | -2.96 |
| Germany | 0.117 | 0.49 |
| Period | -0.014 | -0.65 |
| Constant | 1.453 | 4.29 |
| N (Subjects) | 740 (98) | |
| AIC | 717.10 | |

*Logit models with standard errors adjusted to account for clustering on subjects. Dependent variable coded 1 if subject chose a candidate who offers a larger payoff or the subject is indifferent and coded 0 if the subject chose a candidate who offers a smaller payoff.*

## 6 Appendix 6: Final Decision and Heuristic Information

In this appendix we follow Ahn, Huckfeldt, and Ryan (2014) and compare subject decisions to decisions made using heuristics derived from simple cheap-talk communication models (Chapter 5) as well as pre-social communication benchmarks (Chapter 7). We also take into account the experimental design that allows subjects to abstain: subjects do not have to pay to vote for the candidate they choose.

We make two important simplifying assumptions. First, we assume that subjects act as if they are pivotal. Second, we assume that if the voter abstains, then the winner is determined randomly with each candidate having an equal chance of winning.

We consider what Ahn et al. (2014) call a "credible messenger" heuristic (p. 104). That is, the receiver will vote according to a sender's suggestion if the level of *Ex-Ante Conflict* between sender and receiver is less than .5. Otherwise, the receiver will vote according to their prior belief. The exception is voters at position 4 who abstain because that should provide a better payoff on average than voting.

We also consider what occurs if the receivers ignore social messages and take the action that has the highest expected payoff: receivers at positions 1, 2, and 3 vote for candidate A; receivers at positions 5, 6, and 7 vote for candidate B; receivers at position 4 do not pay to vote. The ex-ante expected payoffs are available at the end of this section.

### 6.1 Results

The dependent variables in Table 2 compare the payoff receivers would get from the decision they made to the payoff they would receive from following one of these decision rules. A positive value indicates the receiver's decision would lead to a better payoff than the decision rules. A negative value indicates the receiver would have been

better off following the decision rule. A value of 0 indicates that the decision rule and the action lead to the same payoff–more than 60% of cases for both variables have a value of 0. Values of the *Credible Messenger* decision rule variable range from -200 to 300 with a mean of -4.6. Values of the *Ignore Signal* decision rule variable ranges from -200 to 100 with a mean of -8.5.

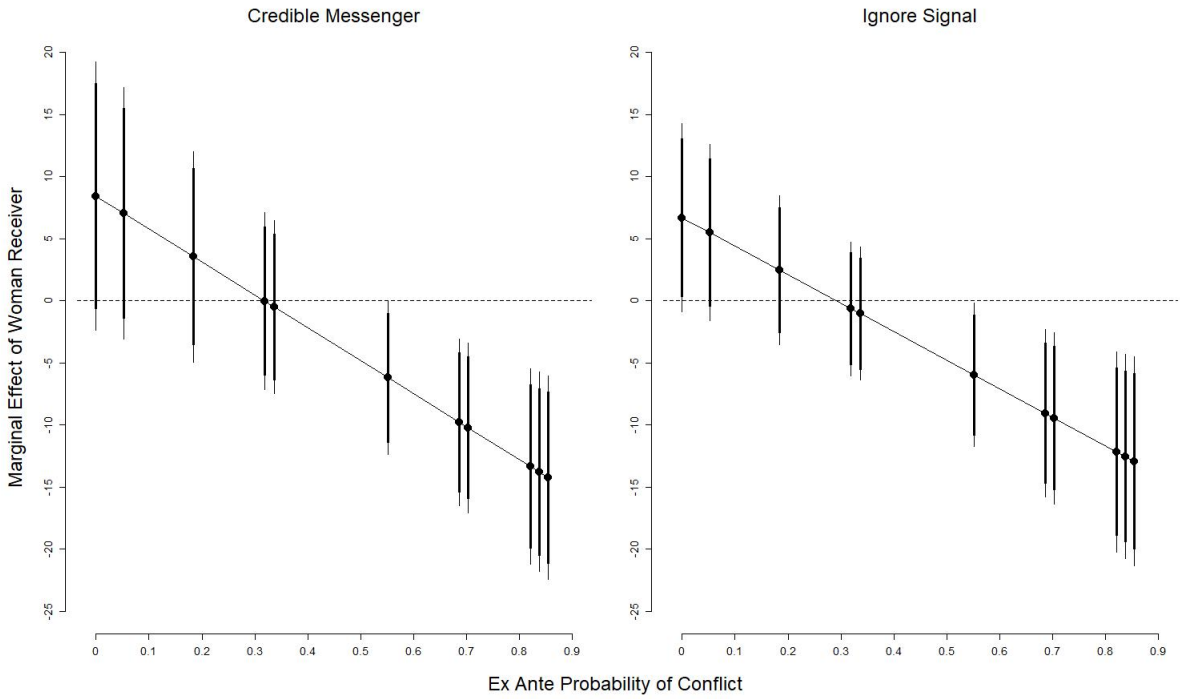
Table 2: Comparing payoff from receiver final decisions to different possible decision rules.

| | Credible Messenger | | Ignore Signal | |
|---|---|---|---|---|
| | Coef. | Z-Value | Coef. | Z-Value |
| Woman Receiver | 8.431 | 1.53 | 6.696 | 1.73 |
| Ex-Ante Conflict | -8.443 | -1.35 | 2.784 | 0.67 |
| Woman X Conflict | -26.541 | -3.11 | -22.974 | -3.21 |
| Germany | 1.386 | 0.42 | -0.387 | -0.13 |
| Period | -0.105 | -0.31 | 0.262 | 0.83 |
| Constant | 2.502 | 0.43 | -9.014 | -2.41 |
| N (Subjects) | 740 (98) | | 740 (98) | |
| $R^2$ | .04 | | .02 | |

*O.L.S. models with standard errors adjusted to to account for clustering on subjects. Dependent variable is the difference between the payoff the receiver would receive from his or her actual decision and the payoff the receiver would receiver from the decision rule. We assume the receiver is pivotal.*

We use the same independent variables as in Table 2 in the main text, but in this case we use O.L.S. regression. Again because the key variable is an interaction effect, we plot the marginal effect of the *Woman Receiver* variable at different levels of *Ex-Ante Conflict*. The left side of Figure 3 show the results of the *Credible Messenger* model. We find that the effect of *Woman Receiver* is negative and statistically significant for levels of *Ex-Ante Conflict* above about .5. This result is in accord with *H2b*. When we look at the right side of Figure 3, the *Ignore Signal* model, we see results that align with both *H2a* and *H2b*. Women's decisions lead to better payoffs when *Ex-Ante Conflict* equals 0, but men's decisions lead to better payoffs when *Ex-Ante Conflict* is greater than .5.

Figure 3: The conditional effect of gender on the value of final decisions.

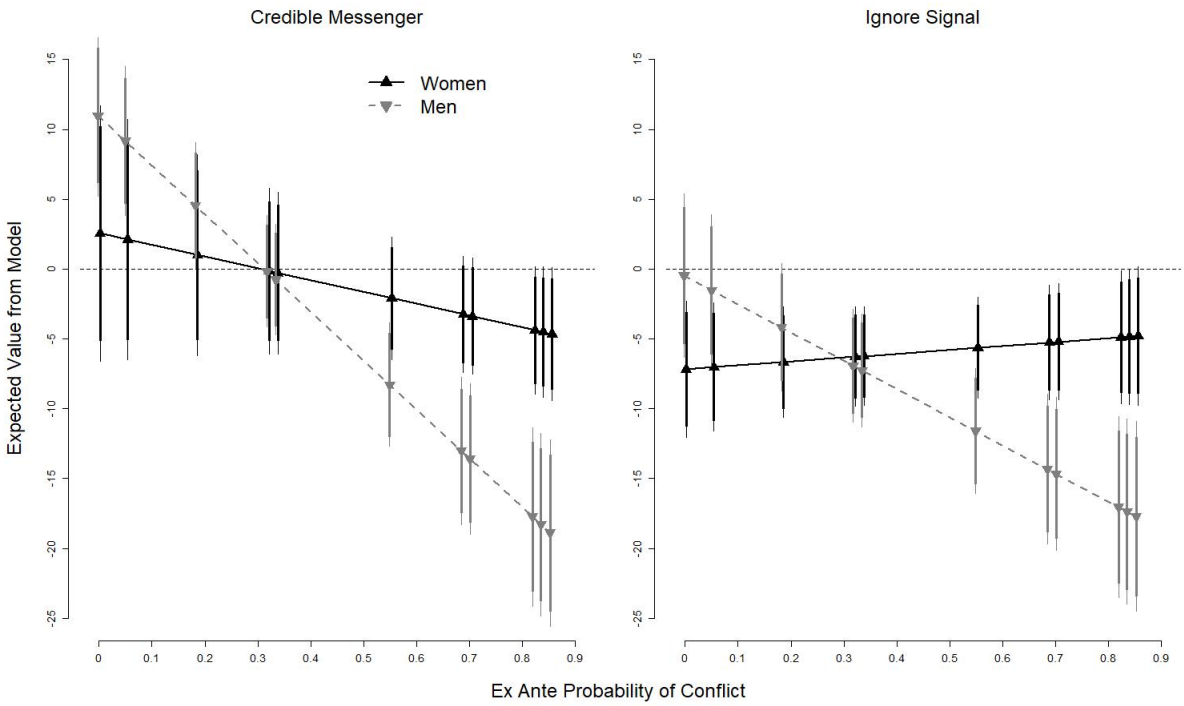



*Marginal effects calculated based on estimates in Table 2. Error bars represent 95% confidence intervals.*

In Figure 4, we plot the expected values for men and women in both models. In the *Credible Messenger* model, the confidence interval for men's expected values overlaps with 0 except at the highest levels of *Ex-Ante Conflict* where it is negative. Women have a positive expected value for values of *Ex-Ante Conflict* below .2 and negative expected values for values of *Ex-Ante Conflict* above .5. For the *Ignore Signal* model, the expected value for both men and women are always negative, but the confidence interval for women overlaps with 0 at the lowest levels of *Ex-Ante Conflict*.

Both models tell the same story as we saw with the "correct" voting measure. When *Ex-Ante Conflict* is low women use credible signals to update beliefs and make better decisions than men. When *Ex-Ante Conflict* is high, however, women update

Figure 4: Expected difference in payoffs between final decisions and different possible decision rules.




*Expected values calculated based on estimates in Table 2. Error bars represent 95% confidence intervals.*

beliefs using signals that they should ignore leaving them worse off than male receivers. Hence, gender affects the efficacy of social communication as an aid for uninformed voters in our experiment.

### Ex-Ante Expected Payoffs

To calculate the expected payoffs, we assume the subject is a pivotal voter. We determine the payoff of voting for Candidate A, voting for Candidate B, or abstaining for all possible candidate positions. If the subject abstains, we take the mean of the payoffs offered by Candidate A and Candidate B since the winner will be randomly chosen.

We then multiple that payoff by the probability that candidate position pair occurs–the probabilities of candidate position pairs is in Table 3. Finally, we sum all of those values to determine the expected payoff for a given vote decision prior to any private or social information. The expected payoffs are available in Table 4.[2]

Table 3: The probability of each possible candidate position pair.

| | | Candidate A | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Candidate B | 3 | 0.018 | 0.027 | 0.044 | 0.027 | 0.018 |
| | 4 | 0.027 | 0.040 | 0.067 | 0.040 | 0.027 |
| | 5 | 0.044 | 0.067 | 0.111 | 0.067 | 0.044 |
| | 6 | 0.027 | 0.040 | 0.067 | 0.040 | 0.027 |
| | 7 | 0.018 | 0.027 | 0.044 | 0.027 | 0.018 |

Table 4: The expected payoff for different decisions by subject position.

| | Vote for A | Vote for B | Abstain |
|---|---|---|---|
| 1 | 275.00 | 175.00 | 250.00 |
| 2 | 311.67 | 225.00 | 293.33 |
| 3 | 328.89 | 275.00 | 326.67 |
| 4 | 311.67 | 311.67 | 336.67 |
| 5 | 275.00 | 328.89 | 326.67 |
| 6 | 225.00 | 311.67 | 293.33 |
| 7 | 175.00 | 275.00 | 250.00 |

[2]The expected values for more extreme subject positions are lower because extreme candidate positions are less likely. This is because we randomly choose a range of three possible candidate positions and then choose a position within that range with equal probability.

## 7 Appendix 7: Are Women Trying to Benefit Others?

There is an alternative explanation for women's incorrect choices. It is possible that women receivers follow their sender's signals more frequently because women are more pro-social (for a review, see Croson and Gneezy, 2009). That is, the women may simply choose the candidate they believe will benefit the most subjects and thus they select the candidate they believe will help their discussion partner. If men vote "correctly" more frequently, that may simply be the result of men behaving more selfishly. The existing research is mixed, however, with regards to which gender is more pro-social. For example, in a meta-analysis, Eagly and Crowley (1986) note that most studies found that men were more helpful to strangers. When it comes to helping friends and family, women are more helpful.

In this study, we can explore whether women behaved more pro-socially by looking at the decisions women make when they are informed. Informed voters should be able to tell which candidate the majority of subjects will probably prefer – though not with certainty due to the uncertain positions of the candidates. When we examine the choices of informed voters, though, women do not appear more pro-social and may even be *less* pro-social than men. When informed, women select the candidate that will benefit the majority of subjects 72% of the time while men do so 77% of the time ($t = 1.62$, $p = .107$). Hence, it appears that women are not engaging in altruistic decision-making, which would suggest that women are being *misled* rather than altruistic when voting for their discussion partner's favored candidate rather than their own.

## 8 Appendix 8: German Sample

Alongside our American sample, we were given an opportunity – via a visiting invitation from [UNIVERSITY] – to run our study in Germany. We believe that the addition of the German sample provides an important check on our results. Given our interest in gender differences, Germany provides a potentially more conservative environment. Eagly (2018) argues that observing women leaders (especially those who achieved success "against all odds") is more likely to lead to change in the socialization of gender. Given that socialization is pivotal to our theoretic arguments, this is an important point.

The German participants in our study were recruited via HRoot recruitment system (Bock, Baetge and Nicklisch, 2014). The recruitment notified participants that the study would be in English, and, indeed, HRoot, though developed in Germany at [UNIVERSITY] is in English. We note that, per information shared with us by lab managers at [UNIVERSITY] we were not the first scholars to run studies in English in this particular lab. Moreover, the German participants perform better than American participants when they are fully informed – suggesting that there was not a language problem.

In all analyses we control for the difference in countries.

## 9 Appendix 9: Gender Differences in Another Study

To demonstrate that the gender differences we observe in this study are not just the result of the particular design or a one time occurrence, we replicate the results of another study. Ryan (2011) shares many of the same elements of this paper's study. It is an incentivized group experiment in which nine subjects are choosing between two computer-generated candidates offering uncertain payoffs. Subjects state an initial preference prior to social communication and then make a final choice after social communication. Instead of positions on an abstract scale, voters and candidates are

placed in parties. Also, subjects participate in social communication–both as senders and receivers–regardless of their information levels. Subjects are randomly assigned to receive information from three other subjects. All other details are in a subsection following this discussion.[3]

The experiment proceeds in the following stages.

- **Stage 1** (Private Information Stage): Each subject receives private information about the payoffs each candidate offers. They make estimates of the candidates' payoffs. We use the estimates to figure out their vote preference prior to social information.

- **Stage 2** (First Social Information Stage): Subjects send messages about the size of the payoffs the candidates offer. They update their estimates of the payoffs.

- **Stage 3** (Second Social Information Stage): Subjects send messages about the size of the payoffs the candidates offer. They update their estimates of the payoffs.

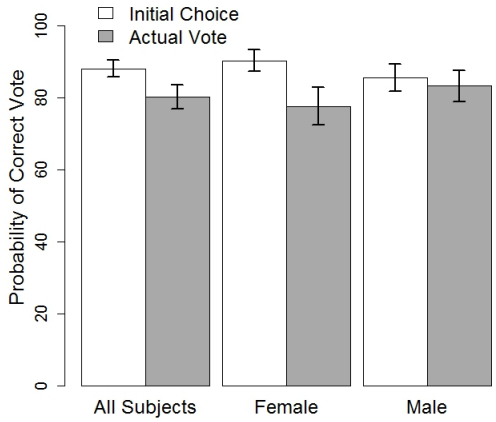
- **Stage 4** (Voting and Payoffs): Each of the nine subjects then votes for a candidate, and the candidate with the most votes is declared the winner. Subjects are then paid based on the payoffs offered by the candidate who receives the most votes.

A key conclusion of Ryan (2011) is "within-subjects results cast doubt on the efficacy of political discussion.... Informed subjects... were hurt by social information" (p. 762-763). In Figure 5, we analyze the data to see if this conclusion extends to all subjects or only applies to women. In the figure, the white bars represent the proportion

[3]Subjects were either assigned to be "partisans" or "independents". Subjects had differing levels of information about the payoffs from the computer-generated candidates, including some subjects with no information. Here, we only analyze subjects who are partisans with at least some information. There are not enough observations to analyze the other subject subsets in Ryan (2011).

of the subject's initial choices that were correct. The dark bars represent the proportion of the subject's actual votes that were correct. The first pair of bars is for all subjects, the next pair is for women, and the last for men.

Figure 5: Correct choices before and after social communication in Ryan (2011) for women and men.




*Error bars represent 95% confidence intervals.*

In this experiment, 88% of the initial choices informed partisans made prior to social communication were correct. After social communication, the percentage of correct votes dropped to 80%. This result is why Ryan (2011) states that political discussion is ineffective as an information shortcut. The other bars show, however, that this conclusion only holds among women. Among men, there is almost no difference between the likelihood of a correct vote with or without social communication. Among women, there is a thirteen percentage point drop in the likelihood of a correct vote following social communication. Social communication is often mentioned as a useful information shortcut, but the women in both studies would have been better off *ignoring* what they were told.

In this reanalysis, we do not see any situations in which women are more likely to vote correctly than men. This difference from our main study is likely due to design differences. The subjects have more information in this experiment and because of this, a larger percentage of initial choices were correct. Hence, even with the larger sample size, there are even fewer instances where subjects' choices needed correction.

## 9.1 Details of Ryan (2011) Experiment

Our reanalysis of the experiment in Ryan (2011) relied on the replication data posted on the author's website. The experiment utilized 135 undergraduate students as subjects. The subjects received a ten dollar show up fee plus whatever earnings they accrued during the experiment. Both the main experiment and Ryan's experiment were programmed using zTree (Fischbacher 2007). We summarize some major design elements in the next section with details in the following sections.

**Candidates**

- Adams: a computer generated candidate of Party A
- Bates: a computer generated candidate of Party B
  - Each candidate's global benefit ($G_c$)-an amount provided to all subjects if the candidate is elected-is independently drawn from a uniform distribution bound by 20 and 100 ECUs.

### 9.1.1 Subjects

- Nine subjects: three members of Party A, three members of Party B, three independents.

- Partisan subjects-but not independents-receive a partisan bonus if the candidate from their party wins and a penalty if the candidate from their party loses. The magnitude of each partisan subject's bonus/penalty is independently drawn from a uniform distribution bound by 10 and 20 ECUs, and is known by that subject.

### 9.1.2 Stages of the Experiment

- Stage 1: Receipt of Private Information. Subjects receive private information and estimate candidates' global benefits.
  - Subjects are assigned 0, 1, 2, 3 or 4 pieces of information.
  - Each piece of information includes an assertion about the global benefit provided by each candidate.
- Stage 2: Exchange of Social Information. Each subject conveys social information-an assertion about each candidate's global benefit ($G_c$)-to three other subjects.
  - Subjects do not need to provide identical or accurate assertions.
- Stage 3. Re-Estimation of Benefits. Subjects are reminded of their previous estimate of each candidate's global benefit, and asked to re-estimate these benefits.
- Stage 4: Second Exchange of Social Information. Subjects convey social information to the same three subjects as in Stage 2.
- Stage 5: Final Estimation of Benefits. Subjects are reminded of their previous estimate of each candidate's global benefit, and asked to offer a final estimate of these benefits.
- Stage 6: Voting. Subjects are reminded of their final estimate and then vote for their preferred candidate.

- Stage 7: Awarding of Payoffs Based on Election. Votes are tallied to determine the winning candidate, and payoffs are awarded based on the election outcome. Global benefit levels of both candidates are revealed to all subjects.

Subjects begin another round at stage 1. Subject information sharing networks, partisan affiliations, party bonuses/penalties, and information levels remain the same each round, but new candidate global benefits are drawn each round.

### 9.1.3 Experimental Details

*Parties and Candidates* The experimental design randomly assigns subjects to two parties-A and B. Subjects attempt to determine the benefits offered by computer generated "candidates" of the parties-Adams and Bates, respectively-in a mock election. Nine subjects are used in each experimental session. Three are members of party A, three are members of party B, and three are independents. In our reanalysis, we only look at the vote choices of the 90 subjects who are assigned to be partisans. The 45 independents were too small of sample size to adequately determine if there were gender differences.

*Global Benefits (Valence Benefits)* Much like candidates in a real election, the candidates offer subjects two types of benefits. First, candidates provide a global benefit that is the same for all subjects. This global benefit can be conceived as the benefit a candidate provides on valence issues. The global benefit provided by each candidate, denoted $G_c$ (i.e., $G_A$ for Adams and $G_B$ for Bates), is independently and randomly drawn from a uniform distribution with a lower bound of 20 Experimental Currency Units (ECUs) and an upper bound of 100 ECUs. At the end of each experimental round, each subject is awarded the global benefit provided by the winning candidate. New global benefits are drawn each experimental round.

*Party Pay (Positional Benefits)* In addition to these global benefits, subjects in par-

ties A and B receive either a party bonus or penalty depending on the outcome of the election. These are akin to the benefits candidates provide on positional issues. If Adams wins the election, members of party A receive a bonus while B partisans receive a penalty - vice versa if Bates wins the election. The magnitude of both an individual's partisan bonus and her partisan penalty is randomly drawn from a uniform distribution with a minimum of 10 ECUs and a maximum of 20 ECUs. This randomly manipulates the partisan strength of the subjects. Subjects are members of the same party and have the same partisan strength in every round.

On average, subjects in party A are better off if Adams is elected and subjects in party B are better off if Bates is elected because of the partisan bonuses and penalties, while independents are indifferent between Adams and Bates. Each subject is aware of the distribution from which each candidate's global benefit is drawn, and of his party payoff, but does not know any candidate's global benefit in a particular election. To determine this, subjects must rely on private information they are provided and social information they receive from their fellow subjects.

*Private Information* Each group of nine subjects is randomly assigned to one of five different information treatments described in the table below. Each treatment is defined by the number of "pieces of information" given to subjects. Each piece of information includes an assertion about the global benefit provided by each candidate, c, drawn from a uniform distribution bounded at $G_c - 25$ and $G_c + 25$. For example, if the global benefit of Adams is 50 ECUs, then subjects can receive claims about $G_A$ ranging from 25 to 75. Thus, on average, the private information received by subjects reflects candidates' true global benefits, but the information is noisy.

**Information Treatments**

| | Amount of Information Received | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | A1 | A2 | A3 | I4 | I5 | I6 | B7 | B8 | B9 |
| #1 | 1 | 0 | 0 | 2 | 1 | 3 | 4 | 3 | 2 |
| #2 | 4 | 0 | 3 | 2 | 3 | 1 | 1 | 2 | 0 |
| #3 | 0 | 4 | 1 | 3 | 1 | 2 | 2 | 0 | 3 |
| #4 | 1 | 3 | 3 | 0 | 4 | 0 | 2 | 1 | 2 |
| #5 | 3 | 2 | 2 | 4 | 0 | 0 | 1 | 3 | 1 |

In each treatment, one subject receives four pieces of information. The other eight subjects are evenly divided over the four remaining information levels (i.e., three pieces, two pieces, one piece, or no pieces). The information treatment table displays the amount of information a subject receives in each of the treatments. In the table, subjects are identified by their party and a unique participant identification number (1 though 9).

After receiving private information, each subject is asked to estimate the global benefit that each candidate provides. These estimates measure subjects' beliefs prior to social communication.

*First Round of Social Information* Next, each subject sends a message conveying information about the candidates to three other subjects: one from party A, one from party B, and one independent. Each message takes the form of an assertion about the global benefit of each candidate. Subjects are told that they do not have to make identical assertions to each subject, but they are not encouraged to misrepresent their beliefs. Subjects may make assertions strategically, however, because they know the private information level and partisanship of each subject.

Subjects receive social information from the networks listed in the table below.

These networks are combined with varying information levels to place subjects into several network "treatments" in which the partisan makeup and the information level of the subjects in the network are manipulated. Networks in this experiment take on one of three types: heterogeneous, homogeneous A, and homogeneous B. In heterogeneous networks, there is one member of each party and one independent. In homogeneous networks, there are two members of either party A or party B and an independent. Partisan subjects, therefore, may receive messages from a majority of likeminded subjects, a heterogeneous network, or a network without any subjects who share their biases. The networks providing information may also be well informed (all subjects have three or four pieces of information), poorly informed (all subjects have no information or one piece of information), or something in between.

**Social Information Networks**

| | Alters are senders | | | |
|---|---|---|---|---|
| Recipient | Alter 1 | Alter 2 | Alter 3 | Network Type |
| A1 | A2 | I4 | B9 | Heterogeneous |
| A2 | A1 | A3 | I5 | Homogeneous A (in-group) |
| A3 | I6 | B7 | B8 | Homogeneous B (out-group) |
| I4 | A2 | A3 | I5 | Homogeneous A (out-group) |
| I5 | I6 | B7 | B9 | Homogeneous B (out-group) |
| I6 | A1 | I4 | B8 | Heterogeneous |
| B7 | I4 | B8 | B9 | Homogeneous B (in-group) |
| B8 | A1 | A3 | I5 | Homogeneous A (out-group) |
| B9 | A2 | I6 | B7 | Heterogeneous |

After receiving this social information, subjects are reminded of their previous estimates of Adams's and Bates's global benefits, thus permitting subjects to update

their estimates based on the social information they have just received. Then subjects are asked to estimate candidate positions again.

*Second Round of Social Information* Subjects convey new assertions about candidates' global benefits to the same three subjects to whom they previously provided information. This allows individuals to incorporate information they received through social communication in addition to the private information they initially received. Subjects are reminded of their previous estimates of global benefits and asked to make a final estimate of the benefit each candidate provides.

*Voting and Payoffs* After making this final estimate, subjects vote for their preferred candidate. The outcome of the election is revealed to the subjects, as is the true global benefit of each candidate. The global benefit of the winning candidate is awarded to each subject (partisan or independent). In addition, each partisan of the winning candidate is awarded her previously-establish partisan bonus, and similarly, each partisan of the losing candidate is docked his penalty amount. Subjects then participate in a new campaign with new, randomly-drawn, candidate benefits. The subjects' parties, partisan pay, information levels, and networks remain the same throughout the experiment. Subjects participate in as many elections as they can complete within one hour.

**Cited in Appendix**

Ahn, T.K., Robert Huckfeldt and John Barry Ryan. 2014. *Experts, Activists, and Interdependent Citizens: Are Electorates Self-Educating?* New York: Cambridge University Press.

Bock, Olaf, Ingmar Baetge and Andreas Nicklisch. 2014. "hroot: Hamburg registration and organization online tool." *European Economic Review* 71:117–120.

Croson, Rachel and Uri Gneezy. 2009. "Gender Differences in Preferences." *Journal of Economic Literature* 47(2):448–474.

Eagly, Alice H. 2018. "Some Leaders Come From Nowhere: Their Success is Uneven." *Journal of Social Issues* 74(1):184–196.

Eagly, Alice H. and Maureen Crowley. 1986. "Gender and helping behavior: A meta-analytic review of the social psychological literature." *Psychological Bulletin* 100(3):283–308.

Ryan, John Barry. 2011. "Social Networks as a Shortcut to Correct Voting." *American Journal of Political Science* 55(4):753–766.