Appendix for Complex Disclosure

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A.1 Example of a report with maximum length (20)

8	-3	-1	1	-3
9	0	-4	-3	8
1	0	-7	-6	0
-1	4	-6	-1	6

A.2 Instructions used in the lab experiment

Welcome
You are about to participate in an experiment on decision-making, and you will be paid for your participation in cash at the end of the experiment. What you earn depends partly on your decisions, partly on the decisions of others, and partly on chance.

Please silence and put away your cellular phones now. The entire session will take place through your computer terminal. Please do not talk or in any way communicate with other participants during the session. We will start with a brief instruction period. During the instruction period you will be given a description of the main features of the experiment and will be shown how to use the computers. If you have any questions during this period, raise your hand and your question will be answered so everyone can hear.

Instructions
The experiment you are participating in consists of 30 rounds. At the end of the final round, you will be paid the total amount you have accumulated during the course of the session (in addition to the $5 show up fee). Everybody will be paid in private. You are under no obligation to tell others how much you earned.

The currency used during these 30 rounds is what we call "Experimental Currency Units" (ECU). For your final payment, your earnings during these 30 rounds will be converted into dollars at the ratio of 150:1 (150 ECU=$1). They will then be rounded up to the nearest (non-negative) dollar amount.

In the first round, you will be matched with one other person, and you are equally likely to be matched with any other person in the room. You will not know whom you are matched with, nor will the person who is matched with you. One of you will be assigned to be A Player and the other to be the B Player for that round. You are equally likely to be assigned to either role. In the second round, you will once again be randomly matched with one other person (most likely with a different person than in the first round) and randomly assigned a role, and this will be repeated until 30 rounds are complete.

In each round and for every pair, the computer program will generate a secret number that is randomly drawn from the set {1,2,3,4,5,6,7,8,9,10}. The computer will then send the secret number to the A Player.

After being presented with the secret number, the A Player then will choose a report "length", which can be anywhere between 1 and 20. The B Player will be presented with a string of numbers of this length, and this string of numbers will sum up to the secret number. The B Player cannot use scratch paper or a calculator for this calculation.
The string of numbers will not be chosen by the A Player. They will be determined by the computer, which will randomly draw numbers between -10 and +10 such that they add up to the secret number.

After receiving this report, the B Player will guess the value of the secret number. The B Player has 60 seconds to make a decision or a number from the set {1,2,3,4,5,6,7,8,9,10} will be randomly selected to be their guess for that round. The earnings of both players depend on the value of the secret number and the B Player's guess.

The specific earnings are shown in the table below. In each cell of the table, the payoff for the A Player is on the left, and the payoff for the B Player is on the right. As you can see from the table, the A Player earns more when the B Player makes a higher guess, and the B Player earns more when their guess is closer to the secret number.

Payoffs S, R	Secret number: 1	Secret number: 2	Secret number: 3	Secret number: 4	Secret number: 5	Secret number: 6	Secret number: 7	Secret number: 8	Secret number: 9	Secret number: 10
Guess: 1	-54,110	-54,102	-54,90	-54,75	-54,57	-54,38	-54,17	-54,-6	-54,-29	-54,-54
Guess: 2	-29,102	-29,110	-29,102	-29,90	-29,75	-29,57	-29,38	-29,17	-29,-6	-29,-29
Guess: 3	-6,90	-6,102	-6,110	-6,102	-6,90	-6,75	-6,57	-6,38	-6,17	-6,-6
Guess: 4	17,75	17,90	17,102	17,110	17,102	17,90	17,75	17,57	17,38	17,17
Guess: 5	38,57	38,75	38,90	38,102	38,110	38,102	38,90	38,75	38,57	38,38
Guess: 6	57,38	57,57	57,75	57,90	57,102	57,110	57,102	57,90	57,75	57,57
Guess: 7	75,17	75,38	75,57	75,75	75,90	75,102	75,110	75,102	75,90	75,75
Guess: 8	90,-6	90,17	90,38	90,57	90,75	90,90	90,102	90,110	90,102	90,90
Guess: 9	102,-29	102,-6	102,17	102,38	102,57	102,75	102,90	102,102	102,110	102,102
Guess: 10	110,-54	110,-29	110,-6	110,17	110,38	110,57	110,75	110,90	110,102	110,110

A.3 Non-parametric estimates of *G* and *G'*

Figure A1. Non-parametrically estimated distribution of additive error term (by whether assume that distribution is symmetric)

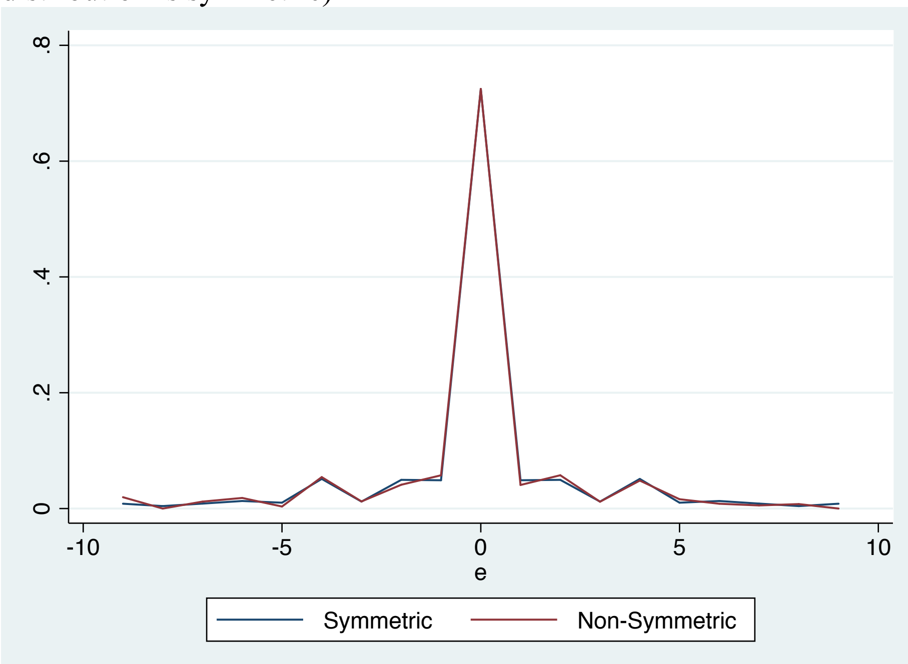
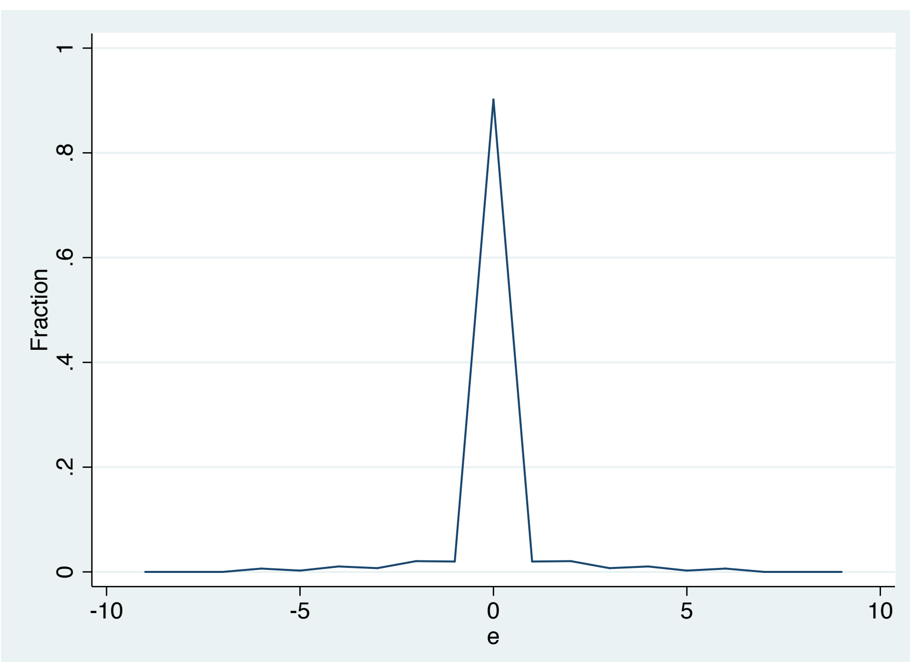


Figure A2. Non-parametrically estimated distribution of additive error term for subjects who answered more than 50% of questions correctly on math test



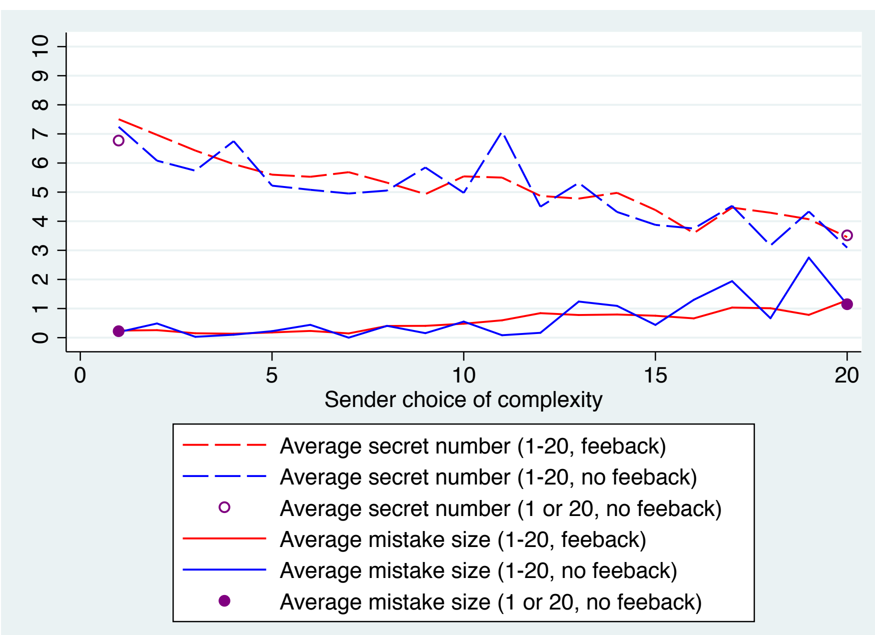
A.4 Results from the robustness treatments

We have two robustness treatments. “Robust 1” refers to sessions that maintain the random assignment of roles and the same set of complexity options (1, 2, …20) but do not provide round-by-round feedback to the subjects. Altogether, 66 subjects were assigned to this treatment over 5 sessions. “Robust 2” refers to sessions that also restrict sender choice of complexity to the two extremes (1 or 20). Similarly, 68 subjects were assigned to this treatment over 5 sessions.

Table A1 compares sender choice of complexity in the main sessions and these robustness sessions. All three types of sessions demonstrate similar monotonicity between secret number and choice of complexity: most senders choose high complexity for low states and low complexity for high states. This tendency is strongest in Robust 2, which makes sense because Robust 2 restricts sender choice to the extremes. A comparison between main sessions and Robust 1 suggests that feedback drives senders even more to the two extremes.

Table A2 and Figure A3 provide the comparison across treatments for receivers. The size of their mistakes is similar across the main and robustness sessions, and if anything, receiver mistakes (for high complexity) are slightly higher in Robust 2. Once again, this is not surprising given that Robust 2 pushes all complex reports to the extreme. However, the size of receiver mistakes at high complexity is not significantly different between the main sessions and either of the robustness sessions.

Figure A3: Average secret number and receiver mistake size (|guess – truth|) by sender choice of complexity (main and robustness sessions)



In short, we conclude that the patterns we observe in the main sessions are robust to changes in feedback design and the number of complexity options. The robustness to excluding feedback may not be surprising given subjects can still learn about the game by playing both roles, by observing the random realizations of secret numbers as a sender, by observing simple reports as receivers, and by reading complex reports as receivers.

A.5 Other possible explanations for receiver mistakes

Naivete and overconfidence are not the only behavioral biases that could potentially explain receiver guesses. For instance, subjects could be employing a heuristic that was well-suited for another setting, such as guessing a higher number when there are more numbers to sum. Alternatively, subjects could be falling prey to "wishful thinking" by believing that the secret number is higher because that would lead to socially better outcomes. Another possibility is that subjects are placed under a "cognitive load" when summing up numbers, which causes them to make mistakes in strategic inference.

Another potential explanation that has a long history in the behavioral economics literature is base rate neglect, which is documented in belief updating using a ball-and-urns task by Grether (1980) and Holt and Smith (2009). While many reasons for base rate neglect have been provided in the literature, one reason why base rate neglect could occur in our experiment is that subjects might focus entirely on the outcome of the summation task, which causes them to overlook the base rate (their prior beliefs) when making decisions. In explaining choice, base rate neglect operates very similarly to naivete, but differs in that it could explain why receivers act as if they have a uniform prior even if they have skeptical beliefs. We estimated a variant of our baseline model with overconfidence and a parameter for base rate neglect. That model has a similar likelihood to the one with just overconfidence and is actually worse at predicting the bias in mistakes. Together, this suggests that there is little room for base rate neglect if the overconfidence in the game is similar to what we observe in the math tests and impacts receiver guesses in the way we have specified.

A.6 Endogenous Attention and Response Times

In our model of receiver decision-making, receivers do not choose whether or not to receive a signal about the true state. In practice, receivers may incur a cost to receive this signal, so they may decide it is not worth obtaining the signal at all. As proposed by Caplin and Martin (2016), one way to evaluate the extensive margin of attention is by looking at response times. If subjects have spent almost no time in reaching a decision, it is likely that they were inattentive to the information required to make a decision.

Like the experiment of Caplin and Martin (2016) in which subjects choose among strings of numbers in an individual decision-making task, we find that those who do make quick decisions choose in line with their beliefs. For subjects who have response times of 33 seconds or less for high complexity (decisions in the 25th percentile of response times), we regress the receiver's guess on their stated beliefs of the average secret number. The coefficient is positive and substantial (0.3411) and is significant at the 1% level ($p<0.001$). This implies that subjects who make quick decisions – those who are intentionally inattentive to complex information – are not guessing wildly but are instead choosing in line with their prior beliefs.

However, we find that fewer subjects make "quick" decisions when reports are complex relative to Caplin and Martin (2016). They find that almost 40% of subjects choose in 8 seconds or less in their experiment, but in our experiment, just 1.6% of subjects facing high complexity choose in 8 seconds or less, and just 5.2% choose in 20 seconds or less.

Interestingly, the regression results in Table 7B show a *positive* correlation between time spent and the size of receiver mistakes. Combined with the evidence in the structural estimation, it seems that spending a long time on a complex report could make a receiver more likely to succumb to the biases of naivete or overconfidence.

Appendix References

Caplin, A., & Martin, D. (2016). The Dual-Process Drift Diffusion Model: Evidence from Response Times. *Economic Inquiry*, *54*(2), 1274-1282.

Grether, D. M. (1980). Bayes rule as a descriptive model: The representativeness heuristic. *Quarterly Journal of Economics*, *95*(3), 537-557.

Holt, C. A., & Smith, A. M. (2009). An update on Bayesian updating. *Journal of Economic Behavior & Organization, 69*(2), 125-134.

Table A1: Comparison of sender choices of complexity in main and robustness sessions

Main sessions: random role, complexity 1 to 20, round-by-round feedback
Robust 1: random role, complexity 1 to 20, no feedback
Robust 2: random role, complexity 1 or 20, no feedback

	Sender choice of complexity Mean values			High complexity (16-20) Fraction of choices			Low complexity (1-5) Fraction of choices		
Secret number	Main sessions	Robust 1	Robust 2	Main sessions	Robust 1	Robust 2	Main sessions	Robust 1	Robust 2
1	15.626	14.382	16.562	0.728	0.637	0.819	0.145	0.176	0.181
2	15.782	14.161	15.485	0.721	0.591	0.762	0.115	0.172	0.238
3	13.983	13.349	14.242	0.616	0.560	0.697	0.190	0.193	0.303
4	11.969	9.018	11.640	0.486	0.234	0.560	0.275	0.324	0.440
5	10.607	8.653	7.861	0.390	0.211	0.361	0.344	0.379	0.639
6	8.243	6.151	7.388	0.254	0.129	0.336	0.455	0.581	0.664
7	6.748	5.989	3.111	0.198	0.126	0.111	0.583	0.632	0.889
8	5.286	3.699	3.446	0.141	0.072	0.129	0.710	0.795	0.871
9	4.879	4.017	3.297	0.128	0.026	0.121	0.729	0.704	0.879
10	3.832	4.606	1.872	0.094	0.138	0.046	0.796	0.755	0.954
Total	9.728	8.490	8.544	0.378	0.276	0.397	0.432	0.464	0.603

Table A2: Comparison of mean receiver guesses in main and robustness sessions

Main sessions: random role, complexity 1 to 20, round-by-round feedback
Robust 1: random role, complexity 1 to 20, no feedback
Robust 2: random role, complexity 1 or 20, no feedback

	Receiver guess			Receiver mistake size (|guess-truth|)			Receiver guess if before time limit			Receiver mistake size (|guess-truth|) if before time limit		
Complexity	Main sessions	Robust 1	Robust 2	Main sessions	Robust 1	Robust 2	Main sessions	Robust 1	Robust 2	Main sessions	Robust 1	Robust 2
Low (1-5)	7.064	6.806	6.787	0.225	0.200	0.221	7.064	6.814	6.787	0.221	0.192	0.221
Medium (6-14)	5.344	5.171	.	0.469	0.508	.	5.354	5.156	.	0.434	0.496	.
High (16-20)	4.222	3.960	.	1.132	1.158	1.148	4.097	3.811	3.720	0.910	0.953	1.005
Total	5.664	5.595	5.625	0.614	0.544	0.589	5.668	5.588	5.625	0.509	0.472	0.518