Experimental economics

Lecture 7: Conducting the experiment

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References:

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Setting Up an Experimental Laboratory

- The basic arrangement of a laboratory consists of a series of computer workstations for the subjects and a workstation for the experimenter who manages and conducts the experiment. There are two aspects which must be taken into account here and which are to a certain extent contradictory.

- On the one hand, it is necessary for the experimenter to be able to monitor the subjects of the experiment, for example, to prevent unwanted communication. On the other hand, it is important to avoid as far as possible the subjects feeling that they are under observation.

- Every laboratory needs at least two types of software. One that can be used to program the experiments so that they can be run over a computer network, and one that can be used for the purpose of administration and recruitment of the subjects.

- z-Tree has become the global standard for experiment programming. The tool was developed by Urs Fischbacher and has been updated and further developed for many years. z-Tree offers the possibility to program almost any experiment in a relatively simple way. Since it is precisely adapted to the needs of experimental economic research, it mainly contains elements that are frequently used there. This has the advantage that z-Tree is relatively streamlined and therefore easy to learn. The program is available for free and it is well documented.

- In addition to the programming of experiments, laboratories need professional recruitment and supervision of subjects if these laboratories are to conduct experiments on a regular basis. Programs are also available for this purpose. ORSEE, developed by Ben Greiner,5 played a similar role to z-Tree for quite some time. In contrast to the programming of the experiments, when it comes to the recruitment software it is not so important that many laboratories choose the same program, since the recruitment always takes place locally.

- This makes it a little easier for newcomers and is probably the reason why HROOT has in the meantime become a strong competitor for ORSEE. Both solutions have a similar scope of services. With the aid of the recruitment software, it is possible to manage all the potential subjects online. People who would like to participate in experiments can register for the database online. The most important characteristics of the respective person are recorded in the database. In addition to demographic data, this includes above all information on the experiments in which a particular person has already participated. It is very important to know this because, as a rule, researchers are interested in people who have not yet had any experience with the planned experimental setup. Sometimes, however, it is desirable to invite precisely those people who have already participated in a similar experiment to the laboratory.

Choosing the Design and the Treatments

- The choice of the experimental design depends on the specific research question to be answered by the experiment. Once this question has been formulated, the experiment must be designed in such a way that it produces data that make it possible to decide how the research question can be answered. Ideally, this is achieved by deriving hypotheses from the research question. The hypotheses can then be either confirmed or rejected on the basis of the experimental data. Formulating hypotheses thus serves, above all, the purpose of determining the experimental design.

- All those who are conducting an experiment should also ask themselves what information is being provided by the data generated in the experiment. On the basis of this information, are they really in a position to decide whether or not a hypothesis should be rejected and whether it can be clearly separated from other hypotheses? Only if these questions can be answered with “yes” is the design tailored to the research question.

- When formulating the research question, it is not only the creativity of the researcher that is decisive, but also a thorough investigation of the scientific world. Experimental research is directly related to economic theory. It is therefore also important to ascertain whether there are models in the literature that are relevant to the research question under consideration.

- For economists, this question is of particular significance because there is a reference point of sorts for the interpretation of experimental results that can rarely be avoided: What is the prediction that can be derived from rational (and self-interested) behavior? In order to be able to answer this question, a suitable model is required. Either this already exists in the theoretical literature or it needs to be developed and solved.

- The situation is somewhat different when we are dealing with an experiment in which it is already clear that rational and self-interested behavior does not provide any useful predictions. This leaves us with two possibilities. Either we have a model that deviates from these assumptions and tries to organize the experimental findings, or we limit ourselves to a purely exploratory study that tries to gain information about individual behavior that might help to find an explanation for what happens in the experiment, for example, by using hypotheses from psychology.

Choosing the Design and the Treatments

- When it comes to the specific design of the experiment, the key question is what needs to be controlled and how this should be achieved in each individual case. Basically there are four things that can (and should) be controlled.

- Preferences, Motives, Attitudes: When analyzing behavioral motives that deviate from pure payoff maximization, it is important to realize that such motives cannot be observed directly. This means that their existence can only be concluded if they lead to deviations from payoff-maximizing behavior. This is an important point to consider when designing the experiment. If it is to be possible to deduce certain behavioral motives from the subjects' behavior, then the monetary incentives must be set in such a way that a specific motive can be deduced as clearly as possible from the deviations from purely selfish behavior.

- Constraints under which decisions are to be made: there are two important areas that can be designed in practically every experiment: first, the payoff conditions and, second, the information that the subjects receive.

- The manner of presentation (the frame): every experimenter must realize that it really is necessary to make an active choice, because there is no such thing as an experiment without a frame. The second issue to be settled is whether one prefers as neutral a presentation of the decision problem as possible or whether the aim is to approximate a frame as it is actually found in the real world

- Experience and prior knowledge of the subjects of the experiment: People's prior knowledge or experience can systematically influence their behavior. If these factors are not controlled, there is a risk of having selection effects in the experiment and these should be avoided if possible. If in one treatment mainly economists participate and in another, mostly humanities students, this can lead to a difference that looks like an treatment effect, but which in reality can have other causes. Also, wehther or not subjects had an experience with a similar experiment (or laboratory experiment in general) can make a difference.

- Finally a decision must be made as to whether a within-subject or between-subject design is to be used. Also, it is necessary to determine whether the data provided by the experiment will conform to the statistical requirements that must be fulfilled for a meaningful analysis.

Creating the Instructions

- The subjects need to be informed about the course of the experiment and this is done with the help of instructions given to them.

- Of course, there is no authoritative standard text, but in our experience it has proved useful to introduce the instructions by briefly informing the subjects in the experiment that they can earn money through their participation and whether it depends both on their own actions and those of other subjects in the experiment how much money they are paid in the end. It should also be emphasized that leaving the workstation and talking to other subjects during the experiment is prohibited.

- If the experiment involves communication between the subjects, this must of course be explained separately. How to get the experimenter's attention to ask questions, how long the experiment takes, whether there is a show-up fee and – if the experiment consists of several parts – how many parts the experiment has and how these parts are related are also typically explained in the instructions.

- After this general information has been provided, it is time to describe the experimental design. It is important that this is done in such a way that every subject understands exactly what decision he has to make and what consequences this decision has for him and eventually for the other players.

- However, a caveat needs to be made in this connection. Particularly in experiments in which learning behavior is to be investigated, it is sometimes necessary not to tell the subjects everything that will happen. If they knew everything, there would be nothing left to learn. It must nonetheless be ensured that the subjects do not receive untrue information.

- Instructions should be as simple as possible and not too long. The longer the text, the more likely the subjects will not read it to the end.

Writing the Plan of Procedure

- Once the instructions are written, it may prove useful to create a plan of procedure for the experiment. This is particularly the case when the different sessions and treatments are not always carried out by the same people.

- A plan of procedure is essential to ensure that all the experiments proceed in exactly the same way. This plan should describe as precisely as possible what is to happen during the experiment.

- This begins with the subjects entering the laboratory. Should they be admitted individually or as a group? What measures must be taken to maintain anonymity? How are the instructions distributed or read aloud? What is the procedure for responding to questions from the subjects?

- It is vital that the plan of procedure describes all these details so that each and every person who conducts the experiment knows exactly what to do, how to do and when to do it, from the admission of the subjects to the final payment of the payoffs of the experiment.

- Creating a plan of procedure has another advantage: it facilitates the replication of the experiment.

The Pilot Experiment

- Once the plan of procedure has been drawn up and all the detailed issues described in it have been addressed, the experiment could in principle commence. But before doing so, it is often wise to run a pilot experiment. The purpose of such a pilot is to check whether everything runs exactly as imagined. An important point here, of course, is the software or the specific program that was written to conduct the experiment. Does it perform under realistic conditions – even if the users make mistakes while entering their data (as subjects sometimes do)? It is much more unpleasant to discover an error during the actual experiment than during a pilot experiment.

- If the pilot experiment is to be used purely for testing the processes and the software, it can be run with people who know that it is a pilot experiment. If, however, the aim is to gather valid data in the pilot experiment, there should be no deviation from the actual experiment when selecting the subjects, i.e. the same recruitment method and the same number of subjects must be used. Furthermore, the payoffs need to be real and equal to the payoffs of the planned experiment.

- In addition to the software, the instructions should also be thoroughly checked in a pilot experiment. After the experiment, the subjects can be informed that they were involved in a pilot experiment and asked how easy it was for them to understand the instructions and how well they understood them.

- After the completion of a pilot experiment and the evaluation of its results, the question arises as to how to deal with the data that was obtained. If the subjects were selected and paid off as they would be in the experiment, if everything ran smoothly and if no changes to the design or the way the experiment was carried out were necessary, there is nothing against integrating the data into the data set of the experiment. The pilot experiment therefore does not differ in any way from the other sessions in which the experiment is conducted.

Recruiting the Subjects

- Before an experiment can be carried out, it is essential to confirm that suitable subjects are available. Recruitment is relatively easy if it is limited to students as subjects. Ideally, the university administration is cooperative and allows the laboratory, for example, to write to first-year students by email informing them of the laboratory, the possibilities of earning money and the registration procedure. If there is no possibility to send electronic mail to the potential subjects, it is necessary to take the more difficult path and go through the lecture theaters to introduce the laboratory.

- If the recruitment was successful, the laboratory possesses a pool of potential subjects for selecting those to be invited after the pilot experiment. The criteria used to do this can be very diverse, but it is crucial that they always take into account a principle that must be observed when inviting subjects: selection bias is to be avoided.

- For this purpose, it is necessary, for example, for the subjects to be randomly assigned to the different experimental treatments. The software used for the invitations is designed to do this, using a random selection procedure to choose the people to be invited for each treatment.

- It is advisable always to invite a few people as substitutes, who only participate in the experiment if registered subjects do not show up. When inviting the subjects, it is important to inform them that they may act as a substitute and will therefore only be used if necessary. It is also important that the substitutes are paid for showing up, even if they are not used.

Conducting an Experiment

- Once the pilot experiment has been evaluated, all the necessary design adjustments have been made and enough subjects have registered for the experiment, the actual experiment can proceed. The first step, of course, is to get the subjects into the laboratory.

- The question of how the subjects actually get into the laboratory depends largely on the specific experiment. The issue to decide here is how to manage the required level of anonymity between the subjects. If it is essential that the subjects have no opportunity to identify themselves, then it makes little sense to invite them all to the laboratory together. In such cases, a somewhat more complex procedure is required.

- If the anonymity of the subjects is not an important aspect of the experiment, the complicated process of fetching the subjects can be dispensed with and they can simply be sent to a location near the laboratory. This can be a separate room or a corridor. Once everyone is gathered, the substitutes find out whether they can participate or go home after receiving their compensation.

- Two tasks then follow. First, the names of the subjects are checked so that after the experiment the names of those who took part in the experiment and of those who may have been absent without an excuse can be entered in the subject database. The second task is to assign the subjects to the various roles. In most experiments, there are different roles: buyers or sellers, proposers or receivers and so on.

- Although it is not uncommon for there to be only one role, for example in the provision of public goods, the experiment is still run in several groups, so the groups have to be made up. It makes good sense to combine the two tasks. When the names are checked, the subjects draw “lots” that randomly assign them to a role or group. A well-organized laboratory holds suitable objects, such as table tennis balls, wooden balls or the like, that can be used as lots.

- Drawing lots for roles and group memberships ensures that the assignment is randomized, which is extremely important in order to avoid selection effects. At the same time, identification numbers can be drawn with the lots. Obviously, this has to be done in such a way that the experimenter cannot see the identification number. When making decisions in the experiment, the subjects can then enter their number instead of their name. This increases the anonymity of the decisions.

Conducting an Experiment

- There is no set rule as to how the instructions are to be communicated to the subjects. However, it is recommended to first hand them out in writing, printed on a sheet of paper (not online), and then, if possible, read them out loud.

- Reading the text aloud almost always has the effect that the subjects simultaneously read the text on their sheets, thus ensuring that they have read it to the end. If the instructions are not read aloud, this effect is lost and the experimenter can only assume that everyone actually has read everything to the end.

- If all subjects are in the same laboratory room and no special arrangements to ensure anonymity have to be made and if all subjects participate in the same treatment, there is no reason why they should not be called together as a group and the instructions read out. However, reading out instructions should be as homogeneous as possible across sessions and treatments (i.e. ideally the same experimenter should be involved).

- Once all subjects have read the instructions, they should have the opportunity to ask questions. It is better not to have these questions asked publicly, but privately, i.e. in a conversation between the subject and the experimenter.

Conducting an Experiment

- Once all the decisions have been made and the experiment is over, it is time for the payments to be made to the subjects. Before this can happen, there is occasionally a problem that we would like to discuss briefly. The behavior of the subjects can vary greatly, and this may also manifest itself in the fact that the individual participants in the experiment solve the decision problems at very different speeds. This in turn may mean that individual subjects finish the experiment much earlier than others. What is the best way to handle this?

- If the payment does not depend on the speed at which decisions are made, but only on the decisions themselves, then the earlier one leaves the laboratory, the higher the hourly rate of pay. This creates strong incentives to make decisions as quickly as possible. However, this is not in the interest of the experimenter, because speed can easily be at the expense of care. Subjects should think carefully and very precisely about their decisions and not hastily. Therefore, it should not pay off to be faster than the other subjects in the experiment.

- There is another compelling reason for not making payment until everyone is finished. If somebody were to be paid off while the experiment is in progress, it would inevitably lead to those who are not yet finished being disturbed and having the feeling that they have to hurry, because others can already leave. This should be avoided at all costs. The subjects do not need to know how quickly the other subjects perform their tasks and restlessness in the laboratory is inherently not good for an experiment.

- Once all the subjects have completed the experiment, payment can be made. Ideally, payment should not be made in the same room as the experiment. If this cannot be avoided, it should at least be ensured that the anonymity of the payment is otherwise secured.

Case study

Russo-Ukrainian war fake news: the effect of debunking vs. prebunking

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Insittute for Financial Policy - Richard Priesol, Paulína Jalakšová

Motivation

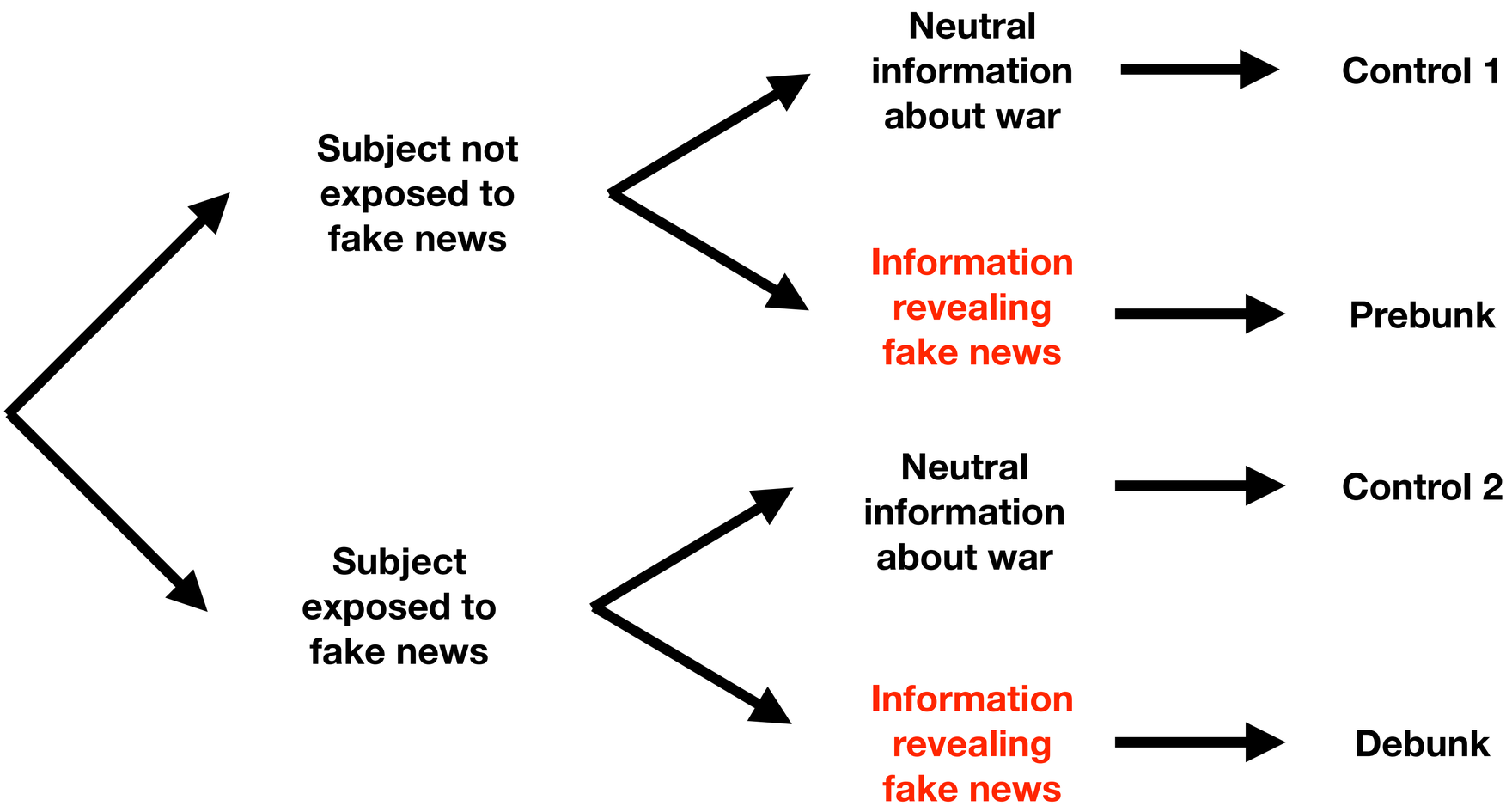
- Russian invasion to Ukraine came with a wave of fake news intended to lower the trust in the motives and actions of Ukraine and Western countries.

- It is therefore essential to search for interventions that could reduce beliefs in such fake news.

- The goal of this research is to compare the effectiveness of Debunking vs Prebunking.

- We manipulate the timing at which the arguments against fake news are presented - either **after** the subject is already exposed to fake news (**debunking**) or **before** it (**prebunking**)

Treatments


Subject not exposed to fake news
Subject exposed to fake news
Neutral information about war
Information revealing fake news
Neutral information about war
Information revealing fake news
Control 1
Prebunk
Control 2
Debunk

Hypotheses

- Debunking intervention significantly lowers the trust in Russo-Ukrainian war fake news compared to no intervention.
- Prebunking intervention significantly lowers the trust in Russo-Ukrainian war fake news compared to no intervention.
- Debunking intervention yields significantly stronger effect compared to prebunking intervention.

Experimental design

- Pre-test + Post-test design
- Laborarory experiment on student sample (N=220) with 2 sessions, 2 weeks apart
- Survey on representative sample (N=925) with meaurements approximately 30-40 minutes apart

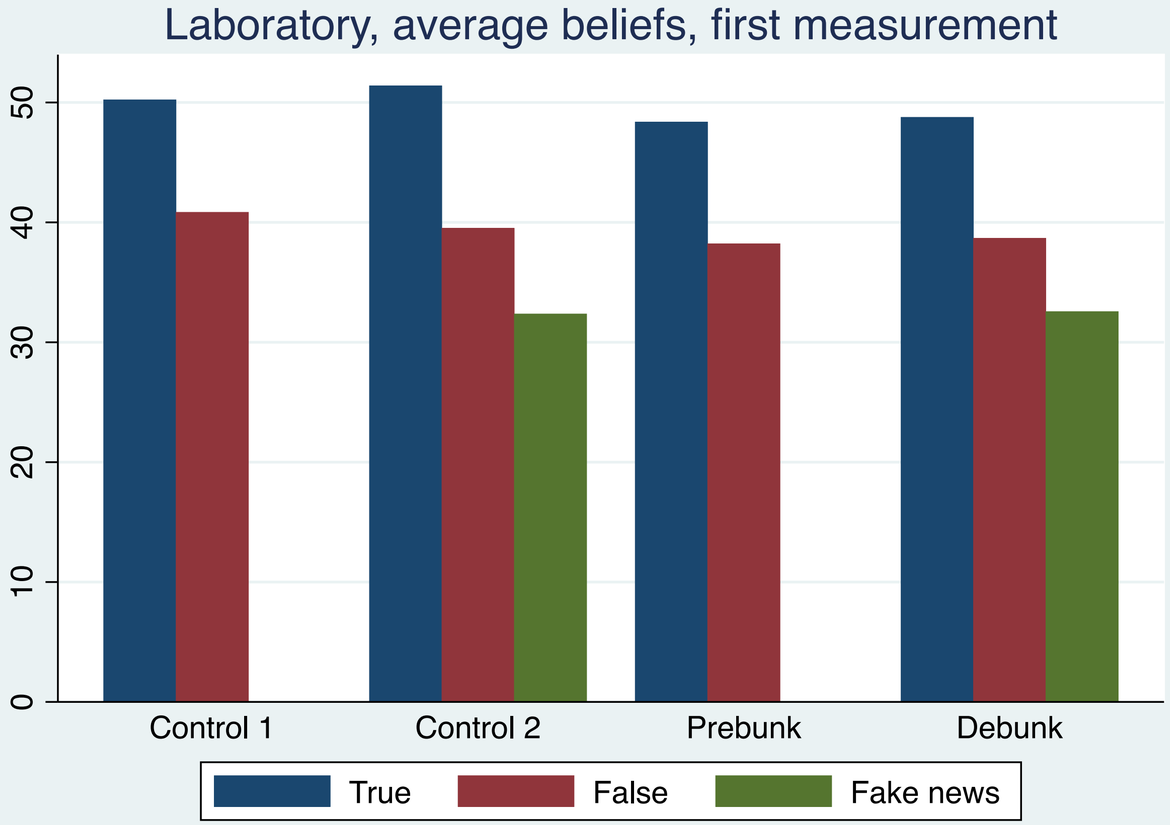
Treatment	Survey 1	Intervention text (within Survey 1)	Survey 2	Other measures
Control 1	10 true information 5 false information	Neutral information about war	10 true information 5 false information 5 fake news	· Indication of whether the participant was exposed to those 5 fake news outside of experiment · Demographics, CRT, etc. · Attituted towards war, Russia, Ukraine, West
Control 2	10 true information 5 false information 5 fake news	Neutral information about war	10 true information 5 false information 5 fake news	
Prebunk	10 true information 5 false information	Information revealing fake news	10 true information 5 false information 5 fake news	
Debunk	10 true information 5 false information 5 fake news	Information revealing fake news	10 true information 5 false information 5 fake news	

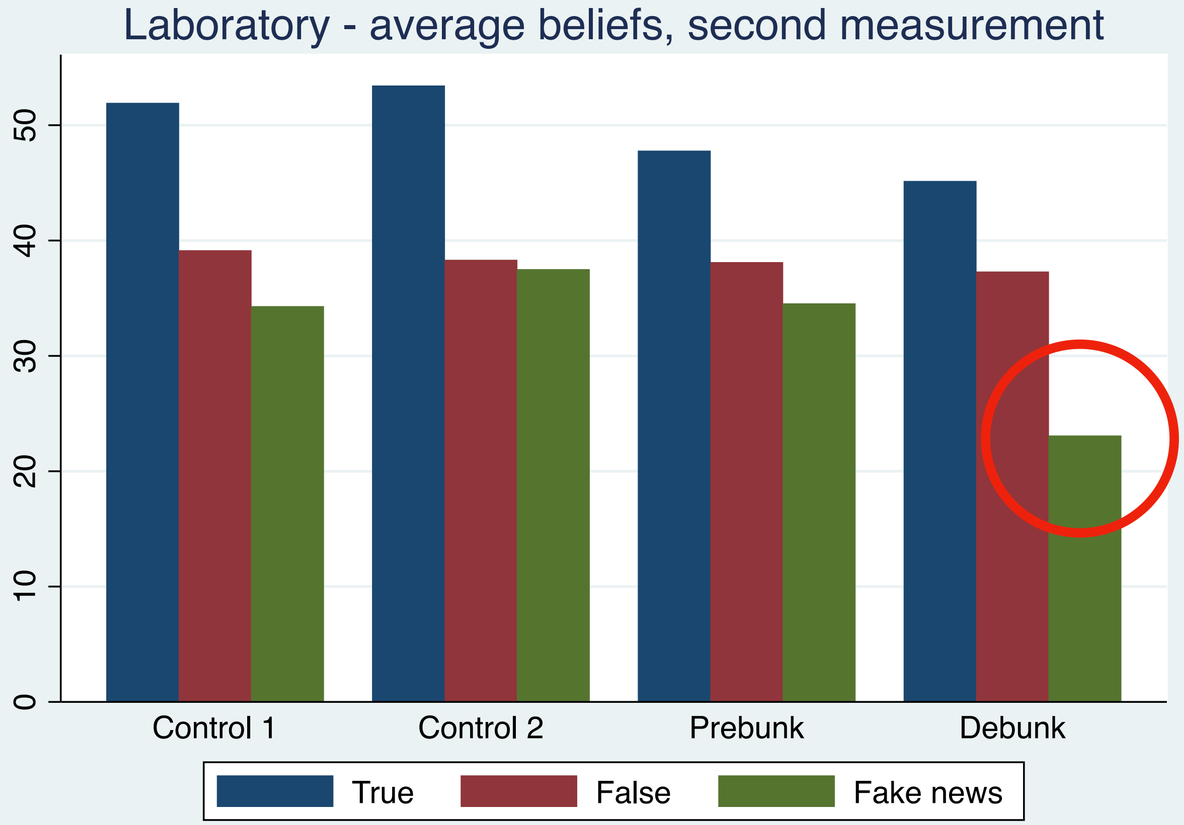
Descriptive statistics (Lab)

	Female	Age	CRT	UKR fan	RUS fan
Control 1 (N=55)	71%	22 (1)	1.5	82%	5%
Control 2 (N=45)	47%	23 (4)	1.7	73%	4%
Prebunk (N=60)	57%	22 (1)	1.6	87%	0%
Debunk (N=60)	50%	22 (2)	2.0	85%	3%

	Blames west	Blames RUS	Blames UKR	Follows news	Avoids news
Control 1 (N=55)	22%	89%	24%	11%	49%
Control 2 (N=45)	16%	87%	13%	16%	36%
Prebunk (N=60)	25%	95%	22%	17%	43%
Debunk (N=60)	15%	92%	10%	35%	47%

Results (Lab)

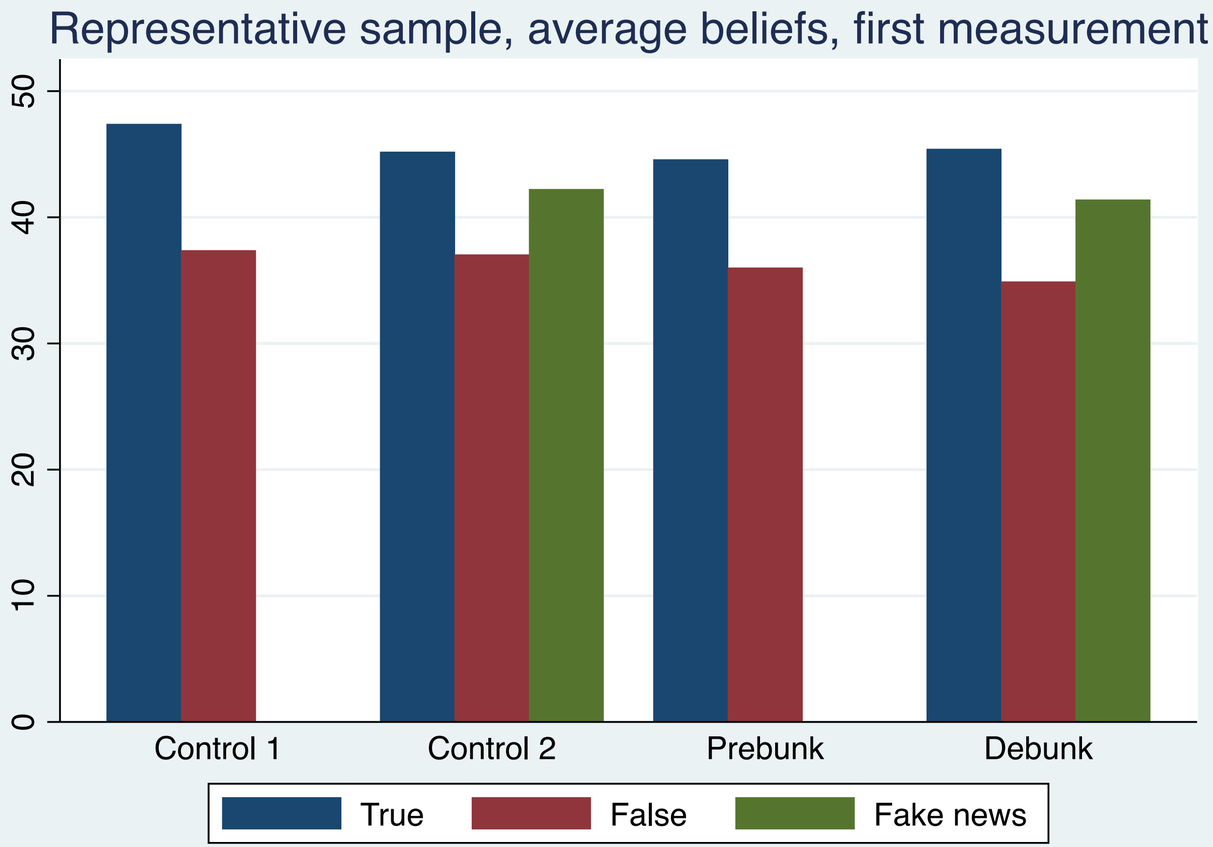

Laboratory, average beliefs, first measurement
0
10
20
30
40
50
Control 1
Control 2
Prebunk
Debunk
True
False
Fake news

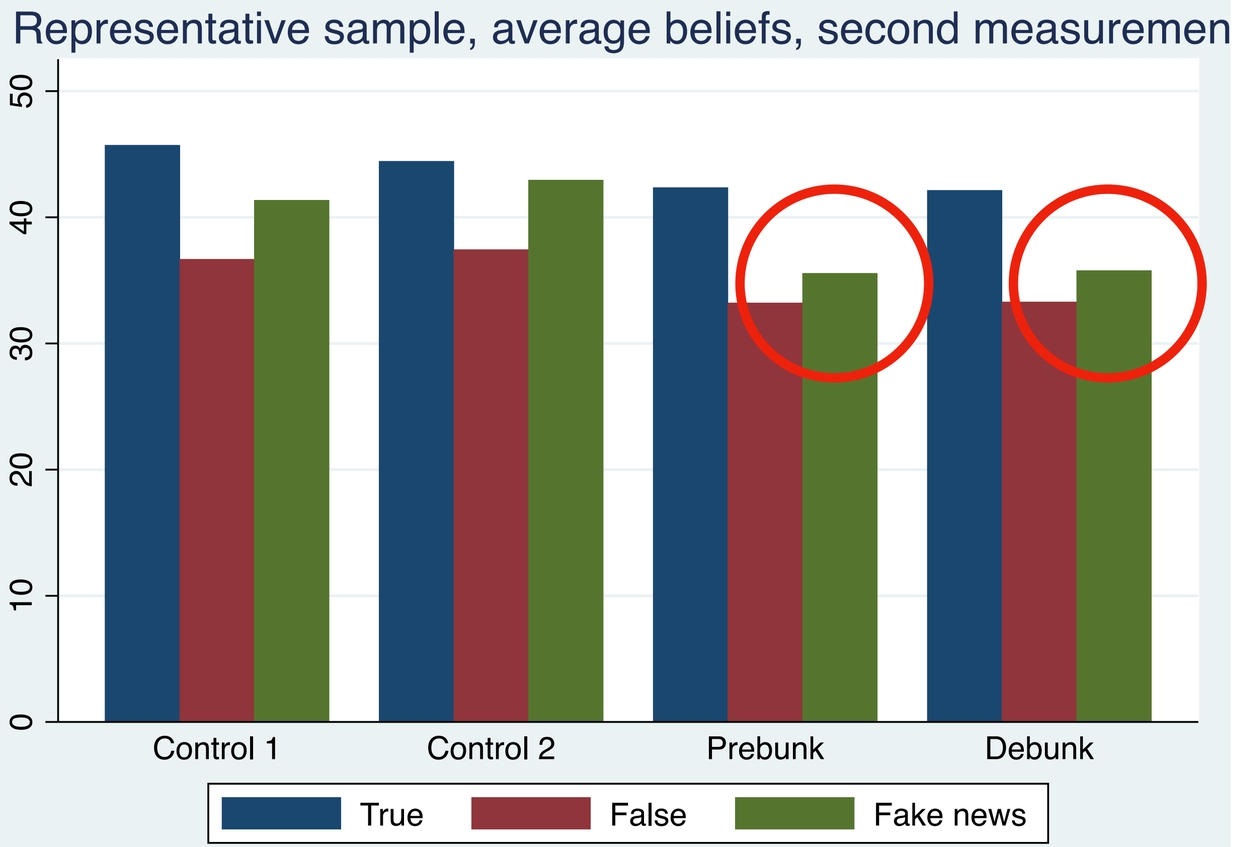

Laboratory - average beliefs, second measurement
0
10
20
30
40
50
Control 1
Control 2
Prebunk
Debunk
True
False
Fake news

Lab results - trust in war-related information (mean, SD)

	True 1	True 2	T1=T2?	False 1	False 2	F1=F2?	Fake news 1	Fake news 2	FN1=FN2?
Control 1 (N=55)	50 (15)	52 (14)	YES	41 (13)	39 (14)	YES		34 (14)	
Control 2 (N=45)	51 (12)	53 (13)	YES	40 (16)	38 (13)	YES	32 (16)	37 (17)	**NO**
Prebunk (N=60)	48 (16)	48 (16)	YES	38 (13)	38 (14)	YES		35 (17)	
Debunk (N=60)	49 (14)	45 (16)	YES	39 (13)	37 (14)	YES	33 (17)	23 (20)	**NO**
Statistics (ANOVA, Mann-Whitney, t-test)	Not significant	**Debunk weakly significant**		Not significant	Not significant		Not significant	**Debunk significant**	
Cross comparison	True > False > Fake								
	True 2 > False 2 > Fake 2								

Results (representative sample)





Effects of interventions

Laboratory			
	(1)	(2)	(3)
	True	False	Fake news
First measurement	0.65***	0.49***	
	(0.06)	(0.08)	
Prebunk	-3.36	-0.32	1.61
	(1.81)	(1.86)	(2.97)
Debunk	-6.73**	-0.08	-11.89**
	(2.13)	(1.90)	(3.84)
Second answer			4.58
			(3.20)
Beliefs controls	YES	YES	YES
Demographics controls	YES	YES	YES
Constant	40.48***	36.18***	68.50***
	(11.54)	(8.59)	(11.75)
N	220	220	220
R2	0.51	0.30	0.19

Representative sample			
	(1)	(2)	(3)
	True	False	Fake news
First measurement	0.87***	0.78***	
	(0.02)	(0.03)	
Prebunk	-1.12	-2.79**	-4.18*
	(0.87)	(0.91)	(1.72)
Debunk	-2.15*	-1.87*	-5.33**
	(0.94)	(0.89)	(1.73)
Second answer			1.27
			(1.73)
Beliefs controls	YES	YES	YES
Demographics controls	YES	YES	YES
Constant	4.90	9.40***	35.82***
	(2.65)	(2.67)	(3.68)
N	925	925	925
R2	0.66	0.59	0.30

Representative sample

Representative sample - all			
	(1)	(2)	(3)
	True	False	Fake news
First measurement	0.87***	0.78***	
	(0.02)	(0.03)	
Prebunk	-1.12	-2.79**	-4.18*
	(0.87)	(0.91)	(1.72)
Debunk	-2.15*	-1.87*	-5.33**
	(0.94)	(0.89)	(1.73)
Second answer			1.27
			(1.73)
Beliefs controls	YES	YES	YES
Demographics controls	YES	YES	YES
Constant	4.90	9.40***	35.82***
	(2.65)	(2.67)	(3.68)
N	925	925	925
R2	0.66	0.59	0.30

Representative sample - read intervention			
	(1)	(2)	(3)
	True	False	Fake news
First measurement	0.86***	0.80***	
	(0.03)	(0.03)	
Prebunk	-0.75	-2.65*	-5.65**
	(1.20)	(1.22)	(2.16)
Debunk	-3.86**	-2.08	-7.84***
	(1.34)	(1.20)	(2.26)
Second answer			1.77
			(2.10)
Beliefs controls	YES	YES	YES
Demographics controls	YES	YES	YES
Constant	12.52**	15.08***	41.40***
	(3.93)	(3.92)	(4.93)
N	476	476	476
R2	0.64	0.59	0.41

Individual fake news (Lab)

	(1)	(2)	(3)	(4)	(5)
	Dezinfo 1	Dezinfo 2	Dezinfo 3	Dezinfo 4	Dezinfo 5
Met outside	-8.45**	0.10	-3.83	0.34	2.70
	(3.96)	(5.03)	(7.71)	(4.36)	(3.64)
Second elicitation	-2.31	1.43	3.87	4.71	8.08*
	(5.40)	(6.44)	(6.36)	(4.69)	(4.64)
Prebunk	-8.41*	-2.78	3.41	2.89	7.92*
	(4.77)	(5.96)	(5.90)	(4.72)	(4.26)
Debunk	-16.58***	-15.28**	-21.75***	-12.46***	-3.89
	(5.64)	(7.00)	(6.62)	(4.48)	(5.30)
Constant	56.89***	43.25***	36.66***	22.68***	12.59***
	(3.63)	(4.30)	(3.98)	(3.26)	(2.72)
N	220	220	220	220	220

Limitations and next steps

	Laboratory data	Survey data
Pros	• Attention • Control • 2 week gap between measurements	• Representative sample
Cons	• Small sample • non-representative sample	• Attrition • Inattention • Gap between measurements only in minutes

- Current idea
  - Run a third study, on representative sample, same design, but
  - Measurements 2 weeks apart
  - Participant forced to stay on a screen with intervention text for some time, text will be presented line by line
  - Additional measures: reading comprehension, feelings of threat, CRT, political cynism, status anxiety, susceptibility to fake news, polarisation