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Social Influence and Position Effects

Marisa Hidalgo-Hidalgo
Universidad Pablo de Olavide

Natalia Jiménez
Universidad Pablo de Olavide & Middlesex University

Dunia López-Pintado
Universidad Pablo de Olavide

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Department of Economics

Social Influence and Position Effects*

Marisa Hidalgo-Hidalgo, Natalia Jiménez and Dunia López-Pintado†

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Abstract

Online search companies use a default ranking to present alternatives to consumers. The salience of an alternative can be described by its position in the presentation order and its popularity, derived from the opinion of others. We perform a lab experiment to study social influence and position effects in a stylized and controlled environment where alternatives have an objective value, common to all participants. Nevertheless, due to time constraints, finding the optimal choice is complex. We consider three different settings: (i) social influence is not present, (ii) social influence and the presentation order go in the same direction and, (iii) social influence is not aligned with the presentation order. We find that, although position effects are stronger than social influence (or popularity) effects for the searching behavior, social influence effects are more relevant for predicting the actual choice. We also find strong evidence of nonlinearity regarding both social influence and position effects. From an individual perspective, we obtain that those subjects who recognize their own errors or come from less wealthy families have a higher sensibility to social influence when it is reinforced by position, whereas overconfident and reflexive individuals are more influenceable when position and social influence are confronted. Interestingly, we do not find any gender effects.

Keywords: social influence, ranking, online searching, lab experiments.

JEL Classification Numbers: C91, D03, D81

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†Universidad Pablo de Olavide. Ctra. Utrera, Km. 1, 41013, Sevilla.

1 Introduction

Nowadays we witness an explosion in the use of Internet to seek for information or advice before proceeding with the purchase of almost any product or service, from health or car insurances to all kind of leisure-related products as restaurants, hotels, etc. There are several reasons behind this recent pattern. Among them we can think of a lost of trust on mass media together with the rapid expansion of online social networking sites (Mayer and Puller, 2009), recommender systems (Fleder and Hosanagar, 2009) and web-based communities (Godes and Mayzlin, 2008). Searching through such broad amount of information, however, has become more and more challenging. As a consequence, online intermediaries (e.g., Amazon, Yahoo, Expedia, etc.) have emerged offering individuals a simplified process. These intermediaries provide by default rankings which typically contain information about other individuals' opinions. This practice responds to the relevance of interpersonal or social influence effects in this context (Katz and Lazarsfeld, 1955, Cialdini, 2006). By social influence, we refer to the fact that a person's emotions, opinions or behaviors are affected by others.[1] Despite the underlying reason for why individuals follow the behavior of others, this phenomenon has implications that are relevant for a wide range of socioeconomic problems such as the diffusion of innovations, job market outcomes or criminality rates (see Jackson, 2008, and the literature cited within). In particular, determining to what extent individuals' choices depend on the observed popularity of the alternatives and their presentation order is relevant for understanding the optimal design of rankings.

In this paper, we experimentally analyze individual behavior under the presence of social influence in complex environments. More generally, our objective is to describe and quantify popularity (social influence) and position (presentation order) effects as well as to determine which effect is stronger in a highly controlled environment, in which all agents have aligned preferences. We also account for personal traits and provide an individual analysis of sensibility to both social influence and position, which could potentially help interpret collective judgments accurately and avoid social influence bias in the future (Muchnik et al. 2013).

[1]This phenomenon exhibits multiple social, psychological and economic origins (López-Pintado and Watts, 2008 and Fatas et al., 2018). Individuals can be susceptible to social influence to identify themselves with a group (Festinger et al., 1950), to avoid sanctions from non-conformity (Asch, 1953), in response to authority (Milgram, 1969), to benefit from coordinated action with others (Katz and Shapiro, 1985), or to infer inaccessible information about the state of the world (Benerjee, 1992).

We exploit the methodology of laboratory experiments by designing a specific environment, free of all external factors (except personal characteristics and attitudes of our experimental subjects), which allows us to reduce the attention solely to our aim of study. For this purpose, we consider a stylized setting where alternatives represent certain tasks and there is a *correct* order of them (i.e., objective payoffs are associated to the alternatives). In this way, we can assure that we know the true and common preferences of all participants. In particular, we are assuming that participants aim to maximize payoffs (which corresponds with solving a certain task). As participants' decisions in this experiment are not strategic, we believe that other kind of preferences would be very unlikely. The position of an alternative refers to the order in which the alternative appears in the screen (from top to bottom) which resembles the ranking commonly observed in real-world searching processes. The popularity of an alternative, represented by the number of stars associated to it, is based on what *other* participants chose in the same experiment. Furthermore, in order to make position and social influence relevant, subjects have limited time to analyze all alternatives and, thus, to decide which one is the best, the second best and so on.[2] Due mainly to these time constraints, discovering the objective payoff of an alternative is complex. Individual ability is measured through trial rounds prior to the experiment, whereas other personal characteristics and some socio-demographic variables are collected through a questionnaire at the end of the experiment.

We find that both social influence and position effects exist, although the first has a stronger impact on choices than the second. In particular, we obtain that subjects, in a context absent of social influence, tend to choose alternatives that have been analyzed more thoroughly. The presentation order determines what subjects choose but only because alternatives that are positioned higher are opened and analyzed more carefully (i.e., agents devote more time to them). In contexts where social influence is present, agents still tend to analyze the alternatives that are ranked higher in the presentation order regardless of whether they are more popular or not. Nevertheless, the popularity of an alternative, due to social influence, determines choices to a large extend. In fact, we find that, even alternatives that have not been analyzed can be chosen simply due to their high popularity. Interestingly, we also find evidence of nonlinearity effects, that is, increasing an alternative's ranking from second to first place (with respect to either its popularity or its position) is more effective than increasing it from the third to second place. From an

[2]This feature tries to capture the lack of time in real-life decisions where the number of alternatives is usually vast. Shurchkov (2012) and Kocher and Sutter (2006) also study the role of time constraints but in a context absent of social influence.

individual perspective, we find some evidence that (very) risk averse individuals as well as low skilled individuals analyze first the alternatives that are more popular. However, this does not translate into a higher selection of such alternatives for these type of agents. We obtain that those subjects who recognize their own errors as well as those coming from less wealthy families have a higher sensibility to social influence, but only when it is reinforced by position. Overconfident and reflexive individuals are more sensitive to social influence when position and social influence are confronted. None of the other individual characteristics collected (e.g., gender) play a significant role on behavior.

There is an abundant body of literature that analyzes how social influence shapes individual behavior and ultimately collective outcomes. Most of these previous studies use field data. For instance, an experiment on an online music market has been studied by Salganick et al. (2006). They eloquently show evidence of the unpredictably of the most successful songs in terms of downloads due to the snowball effect generated by social influence. Similarly, Cai et al. (2009) designed an experiment to explain the effect on consumer choices of explicitly showing in a restaurant menu their most popular dishes and try to disentangle between social influence and other framing effects. More recently, Ursu (2015) employs the first data set with experimental variation in the observed order of alternatives from the world's largest online travel agent (Expedia) to study the causal effect of rankings on consumer choices. Her main conclusion is that rankings affect what consumers search, but conditional on search, do not affect purchases. Muchnik et al. (2016) also analyze a large-scale randomized experiment on the effects that ratings have on social news aggregation. Among the related literature applying lab experiments, recently Fatas et al. (2018) test whether people's preferences change to become more alike to the behavior of their own group. In addition, Mavrodiev et al. (2013) study how the nature of the response crucially changes with the level of information aggregation about the answers of others.

Our paper contributes to the literature in several manners. First, by performing a lab experiment we avoid a series of problems common to field data, and in particular those derived from Internet-based experiments, that might prevent from clearly understanding the role of both social influence and position effects on individual decisions. Typically, the environment (external factors) prevailing in the moment of the decision is completely out of control for the researcher. For instance, if the decision is online, the experimenter does not know if individuals are taking the decision by their own or if they are influenced by friends or family, who may be with them at that moment. Also, the time devoted to the decision is out of the control of the designer in most field-experiments whereas it is fixed in a lab experiment. Another unsettled issue is that the preferred ranking of the alternatives (absent of social influence considerations) often differs between participants which may blur the analysis of the influence with respect to such individual reference point. The latter entails a big complexity in the study of position and social influence as independent effects. Finally, participants' characteristics, which may be relevant for their decisions, can be obtained in a lab experiment, but are difficult to properly collect in an online field experiment. In addition, we contribute to the works using lab experiments by studying a context where alternatives have an objective value, instead of evaluate subjective questions. Also, above mentioned papers focus on analyzing social influence for different types of questions or different information aggregation levels, whereas we concentrate on disentangling between social influence and position effects. Finally, a key ingredient of our experimental design is the fact that subjects have significant time constraints, an issue that is absent in their work.

The paper is organized as follows. In Section 2, we introduce the experimental design. In Section 3, we formally describe the main hypotheses, whereas in Section 4, we present the results. A brief discussion of the paper is presented in Section 5 which is followed by Appendices (A, B, C and D).

2 Experimental Design

2.1 The task

In the experiment subjects faced a task that consisted in obtaining the number of typos and misspellings in different texts of similar length. The value associated to a text coincided with its number of misspellings or typos. In particular, subjects confronted *three* texts each associated with a certain (objective) value. This value could be high (H, hereafter), medium (M) or low (L).[3] Furthermore, the texts appeared ranked in a computer screen and their content could be observed only after double clicking in their corresponding screen buttons which for simplicity were named from top to bottom as Text A, Text B or Text C. For example, if a participant clicked at B, then the corresponding text would appear occupying the whole screen. The participants had limited time (180 seconds) to read and analyze all three texts and within such time range they could open each text as many times and in any order as wished. Once the time was over, participants

[3]In the experiment all subjects faced the same three texts where H has a valuation of 12 (i.e., 12 misspellings or typos), M has a valuation of 9 and L has a valuation of 6.

were asked to provide a response which consisted of an order of such alternatives $\mathbf{r}$, where $\mathbf{r} \in \{ABC, BAC, ACB, BCA, CAB, CBA\}$.[4] The payoff function given to agents was expressed in ECUS (our experimental currency) and consisted of the following:

$$\Pi(\mathbf{r}) = 6v(r_1) + 3v(r_2) \tag{1}$$

where $v(r_i)$ is the value of the text placed in position i by the agent. Notice that the weight associated with the value of the alternative placed as first is twice the weight associated with the value of the alternative placed as second, whereas the last alternative is not relevant for payoffs. Therefore, if an agent had the ability and time to discover the values of the texts correctly then ordering them from highest to lowest value would be her optimal choice. We tried to make sure that all agents understood that payoffs given by (1) implied such optimal response [5]

2.2 Treatments

Two type of treatments were considered; those in which agents did not have information about the behavior of others, i.e., the *no-social influence treatments*, and those in which agents had *some* information about the behavior of others, i.e., the *social influence treatments*. The popularity of an alternative was introduced through stars accompanying each text. In particular, participants were informed in the instructions that the "three stars" corresponded with the choice selected most often as first by some other participants. The "two stars" corresponded with the second choice selected most often as first. And, finally, "one star" indicated that such alternative was selected as first the least often. A subset of the participants' decisions in the no-social influence treatments were used to construct

[4] The number of tasks is just three for simplicity in the analysis. Thus, we have provided important time constraints (as mentioned above 180 seconds) in order to make our approach comparable to settings with a larger number of tasks but more time to analyze them.

[5] We also included a calculus task to check the robustness of the results. This task consisted in finding the highest input in a matrix by computing the corresponding subtractions indicated in each cell. Half of the population started with the calculus tasks (i.e., analyzing three matrices) and continued with the reading tasks, whereas the other half did the tasks in the reverse order (see the Instructions in Appendix A). Nevertheless, these two tasks turned out to be not comparable. First, subjects' ability, collected through trial rounds prior to the experiment, was more homogeneous in the reading task than in the calculus one. In addition, the total number of alternatives analyzed was systematically larger in the calculus task which implies that subjects' decisions are not fully comparable even within the same treatment (these two arguments are explained in further detail and formally tested in Appendix B). Therefore, we focus here exclusively on the reading task.

the two different popularity orders used in the social influence treatments but neither of these orders correspond with the correct answer (i.e., the one maximizing payoffs).

We conducted six treatments, two of them to test position effects in isolation (i.e., the no-social influence treatments mentioned above), and four of them to test popularity effects and position effects jointly (i.e., the social influence treatments).

In the **first treatment** (**T1**) participants faced three alternatives (A, B and C) in a computer screen. The underlying presentation order was such that text M appeared in position A, text H in position B and text L in position C. This presentation order will be denoted by O_1 hereafter (see the upper part of Figure 1). The **second treatment (T2)** was the same as the first one except that the underlying presentation order was such that text H appeared in position A, text L in position B and text M in position C. This presentation order will be denoted by O_2 hereafter (see again Figure 1). Notice that these orders can be derived from a unique consecutive permutation of alternatives given the correct order; O_1 is a permutation of alternatives H and M, whereas O_2 is a permutation of alternatives M and L. Treatments **T1** and **T2** constitute the no-social influence treatments since here information about the behavior of others is not provided.

In the rest of the treatments, subjects observed the same alternatives with information about their popularity.[6] The social-influence treatments can be divided in two different cases. In the first case (treatments T3 and T4), the social influence order reinforced the observed order of alternatives (*Same* in Figure 1), whereas in the second case (treatments T5 and T6) the social influence order was different to the order of presentation (*Diff* in Figure 1). We use the last two treatments to compare social influence with position effects and determine which feature is more relevant. For instance, the **third treatment** (**T3**) was similar to T1 (presentation order O_1) but now agents observed through the stars that the first alternative was the most popular (three stars) whereas the third alternative was the least popular (one star). Then, the social influence went in the same direction as the position order. Likewise, the **fourth treatment** (**T4**) was similar to T2 (presentation order O_2). Therefore, in these treatments the social influence order reinforced the observed

[6]Our choices of popularity orders can be justified based on two sizable subsamples from the no-social influence treatments. The behavioral frequencies in these subsamples correspond with the information about *others* provided in the social-influence treatments. In particular, there exists a subsample of size 24 from treatment T1 for which the frequency of first choices corresponds with O_1. Also, there exists a 22 subsample from the treatment T2 for which the frequency of first choices corresponds with O_2. Subjects in the social influence treatments had no information about the sample size or characteristics of subjects from whom the behavior was being reported. This approach facilitates the subsequent analysis since it allows us to compare the results for two pre-established popularity orders.

order of alternatives which is why we refer to T3 and T4 as the Same treatments (see the central part of Figure 1).

Finally, the **fifth treatment** (**T5)** was similar to T1 but now agents observed the popularity of each alternative corresponding to the order O_2. In particular, the third alternative was presented as the most popular whereas the second alternative was presented as the least popular. In the same way, the **sixth treatment** (**T6)** was similar to T2 but now agents observed the popularity of each alternative corresponding to the order O_1. Therefore, in these last two treatments the social influence order did not reinforce the observed order or ranking of alternatives which is why we refer to T5 and T6 as the Diff treatments (see the bottom part of Figure 1).

In Figure 1 we summarize all treatments and illustrate the underlying value of the texts occupying each position (see the grey letters in the white squares).

Figure 1: Summary of the treatments

2.3 Procedures

A total of 340 subjects, 191 females and 149 males, participated in this study. Experiments were conducted in 19 sessions of 18 subjects, on average, each. All subjects were recruited from the undergraduate population of the University Pablo de Olavide (Sevilla). The experiment was programmed in z-Tree (Fischbacher, 2007). Subjects were recruited using ORSEE (Greiner, 2004) and earned around 8.61€ on average for an experiment that lasted, approximately, one hour. No one was allowed to participate in more than one session. According to the payoff function (1), their responses induced a payoff expressed in ECUS (our experimental currency) with an exchange rate of 20 ECUS = 1€ (see instructions in Appendix A).

At the end of the instructions and before starting the experiment, all subjects had to solve on trial similar tasks to the ones in the experiment in order to facilitate comprehension. In particular, they analyzed 2 texts. They had to provide the value (number of typos) of each text and there was no time limit. We use subjects' responses in these trials (both the number of correct answers and the time needed to complete the tasks) to proxy their ability.

2.4 Questionnaire

At the end of the experiment, subjects completed a questionnaire including the Cognitive Reflection Test (CRT hereafter, Frederick, 2005) and other socio-demographic questions. Regarding the socio-demographic characteristics, individuals were asked about their gender, family home ZIP code, etc. Using the ZIP code and the database "Personal Income of Spanish Municipalities and its distribution-2007" (Hortas-Rico and Onrubia, 2014), we are able to assign to each subject the mean and median personal income corresponding to her municipality. We consider these measures as proxies for individuals' family income. See Appendix C1 for a precise variable definition. In addition Table C1 there presents a summary statistics for all variables capturing individual's characteristics.

In order to elicit risk preferences we follow Charness et al. (2013) and Gneezy and Potters (1997).[7] A disadvantage of this method might be that it cannot distinguish between risk-loving and risk-neutral preferences. However, since risk-loving preferences appear to be relatively uncommon, and a fairly small fraction of participants choose to invest the entire amount of points (below 10%), the amount invested provides a good proxy for capturing attitudes toward risk.

We also gathered some self-assessed psychological measures using several questions regarding confidence (i.e., how they thought they had performed in the experiment compared to others), difficulty with recognizing errors and willingness to take risks. All these

[7]Here, subjects are compelled to assume they have an endowment of 10 euros. They are then asked to choose what part of this endowment (x) they would like to invest in a risky asset and how much to keep. The risky asset returns 2.5 times the amount invested with a probability of one-half and nothing with a probability of one-half. Participants keep the money that they do not invest (10-x). The amount invested is then used as the measure of risk preferences. As noted by Charness et al. (2013) for these parameters, risk-neutral (and, in turn, risk-loving) individuals should invest their entire endowment.

questions aim to capture different traits that might be associated to individuals' decisions in a context as the one proposed here. See again Appendix C1 for the exact wording of these questions.

Finally, individuals provide a self-assessed summary of their decision making process (see Table C2 in Appendix C1). Nevertheless, self-assessed measures could be biased by recall problems and subject to manipulation by students who might think they can benefit from suggesting specific personality traits (see Sternberg et al., 2000, among others). Therefore, we do not use this information in the analysis of the results and focus instead on the actual choices of individuals which we believe is more appropriate. Interestingly, we find a high correlation between what agents report they did in the experiment, and what they in fact did.[8]

3 The basic hypotheses

In this experiment, we can analyze separately the two different stages involved in the decision process. First, the searching behavior of agents and second, their final choice. For concreteness, the agents' searching behavior will be described by their "opening strategy" and the choice behavior by their "reply strategy". More specifically, we focus on the following two individual outcomes: (1) For the opening strategy, we consider the alternative opened first. The reason we have limited our attention to this alternative is that it is typically also the one in which agents spend more time and, thus, analyze more thoroughly;[9] (2) For the reply strategy, we consider the alternative selected as first in the response vector.[10]

[8] In particular, the correlation between choosing to place first in the response vector the most popular alternative and assessing having been influenced by the behavior of others was equal to 0.237, which is significant at a 1% level.

[9] In particular, in our experiment, on average 72% of the time given to subjects was spent on analyzing the alternative opened first. Moreover, the correlation between the alternative opened first, and the alternative in which subjects spend more time was also high (more than 80% in all treatments except in T2 where it was 50%).

[10] Recall that subject's response is a vector and not just a scalar. Nevertheless, we decided to focus our analysis on the first component of that vector for the following reasons. First, it is not straightforward to find an appropriate distance between vectors which may capture participants' decisions. The standard distance in this setting is the one proposed by Kemeny (1959). This distance implies that the two orders of presentation (O_1 and O_2) we propose here are somehow equivalent as they are both at a Kemeny distance of one to the correct vector. However, we do not observe similar individuals' responses when O_1 and O_2 are used (see the histograms for individuals' responses in Figure C1 in Appendix C2). In addition,

To formally express the hypotheses tested with our experiment, we introduce additional notation. An alternative in a ranking is characterized by two components in treatments T1 and T2 and three components in the remaining treatments. Let $a = (v, p)$ be an alternative in treatments T1 and T2, where $v \in \{1, 2, 3\}$ is the alternative's value and $p \in \{1, 2, 3\}$ is the alternative's position. Notice that 3 stands for the highest value or position (H or A, respectively), 2 for the intermediate value or position (M or B, respectively) and 1 for the lowest value or position (L or C, respectively). In the remaining treatments (i.e., the social-influence treatments), an alternative is characterized by three components $a = (v, p, s)$, where the first two correspond to the same information as in the no-social influence treatments (i.e., value and position), whereas component $s \in \{1, 2, 3\}$ is the alternative's number of stars ($\star$,$\star\star$ and $\star\star\star$, respectively).

Let $\textbf{prob}(\textbf{alt} = \textbf{a})$ be the probability (or frequency) of *selecting (opening or replying) as first* alternative **a**. In fact, given our particular design, a specific alternative (characterized by its two or three components in treatments without and with social influence, respectively) only appears in one of the six possible treatments. For example, alternative $(H, B, \star\star\star)$ (or numerically $(3, 2, 3)$) only appears in T6, whereas alternative $(M, A, \star\star\star)$ (or numerically $(2, 3, 3)$) only appears in T3.[11]

In what follows, we state simultaneously the hypotheses for the opening and reply behavior. Thus, "selecting an alternative" might correspond with opening it or replying (choosing) it as first depending on the case studied.

Hypothesis 1 (H1): We say that there are *social influence effects* if the probability of selecting (opening or replying) an alternative increases with its popularity (i.e., number of stars). Specifically,

$$H_1 : \textbf{prob}(\textbf{alt} =(v, p, s)) \text{ is increasing in } s \text{ for any given } v \text{ and } p$$

Hypothesis 2 (H2): We say that there are *position effects* if the probability of selecting (opening or replying) an alternative increases with its position. Specifically,

$$H_2 : \textbf{prob}(\textbf{alt} =(v, p)) \text{ is increasing in } p \text{ for any given } v \text{ in the no-social influence treatments}$$

a related problem while comparing individuals' responses arises when looking for statistical tests that compare distributions of vectors.

[11] Notice that the total number of alternatives tested in the no-social influence treatments in our experiment is 6 (out of a total of 9 potential cases), and 12 in the treatments with social influence (out of a total of 27 possible cases).

H_2 : $\mathbf{prob}(\mathbf{alt} = (v, p, s))$ is increasing in p for any given v and s in the social influence treatments

Hypothesis 3 (H3): We say that *social influence effects* are stronger than *position effects* if the following holds:

$$H_3 : \mathbf{prob}(\mathbf{alt} = (v, p, s)) > \mathbf{prob}(\mathbf{alt} = (v, \overline{p}, \overline{s})) \text{ if } \overline{p} = s > p = \overline{s} \text{ for any given } v$$

In words, if one compares two alternatives with equal value and where the position and number of stars are permuted, the alternative with the highest number of stars is selected more often. For instance, the probability of selecting alternative $(H, B, \star\star\star)$ should be higher than the probability of selecting alternative $(H, A, \star\star)$.[12]

4 Results

In this section, we describe the main results of the paper structured as follows. First, we present some summary statistics of agents' decisions to have a general overview of our findings. Second, we formally test the three hypotheses announced above. For this purpose, we compare the selection of alternatives (on average) in different treatments according to their popularity and position. Finally, we engage in several standard regression analysis to control for individual characteristics and thus, to test for the robustness of previous results. The regression analysis allows us to improve our understanding of how the searching process determines the response, as well as highlights which type of individuals are more sensitive to social influence. In line with our hypotheses, we focus on the alternative selected first (as the preferred one). From now on, and unless stated otherwise, we pool the data from the sessions where the text task was performed first and those sessions where it was performed after the calculus task. In order to assure that we can pool data from those treatments, we run a Mann-Whitney test for each treatment for the variables "alternative opened first" and "alternative selected first". Differences are never significant (minimum $p = 0.200$, two-tails) except for the second variable in T2 ($p = 0.003$, one-tail). We check this potential issue for T2 in the statistical analysis of the hypothesis subsection. In addition, our statistical significance for independent samples is measured by one-tailed non-parametric Mann-Whitney (M-W) statistics unless stated otherwise.

[12] In Table C3, Appendix C3, we also check for "value effects", i.e., whether an alternative with higher value, ceteris paribus, is selected more often than an alternative with lower value.

4.1 Summary statistics

In Figure 2, we report the descriptive statistics of participants' decisions for the no-social influence and social influence treatments (top and bottom graphs, respectively). In particular, in the left histograms (a and c) of the figure, we compute the frequency each of the three positions displayed in the computer screen (A, B and C) was opened first (Opening) for all treatments. It is clear that almost all subjects in all treatments opened first A, that is, the alternative in the first position in the screen. Nevertheless, in the treatments where popularity went in a different direction from the position order (T5 and T6), the frequency decreased significantly compared to the case where social influence was not present or aligned with position (T3 and T4).[13] Regarding the alternative opened first according to its popularity ($\star\star\star$, $\star\star$, $\star$), it can be observed that there is more heterogeneity in behavior in those treatments in which position is not aligned with popularity (i.e., T5 and T6). Notice that when the alternative is in the first position the higher its popularity, the higher the probability of opening it first. However, the alternative with three stars was rarely opened first. Thus, the popularity of the alternatives does not play a relevant role in the opening decision, whereas position still does. This finding will be formally tested in the next section.

Figure 2

With respect to the alternative replied as first (Reply), the histograms in the right part of Figure 2 display the results from the position perspective (A, B, C) for all treatments. In the treatments where popularity is not present, the alternative in the first position, A, is the most frequently chosen as first although the frequency has considerably decreased with respect to the opening decisions.[14] As expected, when social influence reinforces the position order (T3 and T4), results hold or are even stronger (than in T1 and T2) for the position effects (i.e., for choosing alternative A).[15] Nevertheless, when popularity goes in a different direction (T5 and T6), the frequency of the A alternative drops at least a 40% for both presentation orders (O_1 and O_2).[16]When the observed order is O_1 (T5) it seems

[13] Maximum $p-value = 0.001$ for T5 vs. (T1, T2 or T3); maximum $p-value = 0.034$ for T6 vs. (T1, T2 or T4).

[14] $p-value < 0.001$ for both T1 and T2, one-tailed Wilcoxon signed-rank test.

[15] $p-value = 0.045$ for T1 vs. T3, $p-value = 0.243$ (two-tailed test) for T2 vs. T4.

[16] $p-value < 0.001$ for T3 vs. T5, $p-value = 0.001$ for T4 vs. T6.

that the dominant criterion to select the first option is the popularity (stars) since the alternative with three stars is much more frequently chosen than the other two.[17] This is not the case when O_2 (T6) is observed. In this case, it seems that the conflict between the position and the social influence has not a clear winner since the frequency of the alternatives with three and two stars are selected with almost the same frequency.[18] A possible explanation may be that in O_1 the alternative with three stars is also the one with the highest value, while in O_2 the alternative with two stars has a higher value than the one with three stars. In summary, popularity seems to play a prominent role driving subject's choice but position is still relevant when social influence is not present.

In the next subsection, we describe social influence and position effects in a systematic way, testing formally the hypothesis stated in Section 3.

4.2 Social Influence and Position Effects

In this section, we follow the formulation of the hypotheses described in Section 3. Recall that, in order to test for social influence effects formally, we compare alternatives that are equal in all components except for their popularity. For example, as illustrated in column (2), Table 1 below, alternative (H, A, $\star\star\star$) is opened first with a frequency of 94%, whereas alternative (H, A, $\star\star$), which only differs from the former alternative in its popularity, is opened first with a frequency of 83% as illustrated in column (5). Such drop of 11% (see column (7)) is significant at a 1% level (p<0.001). If we compare the same two alternatives but with respect to the frequency of replies, we observe a drop of 29% for the alternative with lower popularity (see column (8) in Table 1), which is also highly significant.

Table 1

Overall there are strong popularity effects in four out of the six possible tests described both in the reply and opening behavior. We, therefore, claim the following:

Result 1: *(H1) There are social influence (popularity) effects both in the opening and reply behavior.*

[17] $p - value = 0.001$ for $\star\star\star$ vs. $\star\star$, $p - value = 0.010$ for $\star\star\star$ vs. $\star$, in T5.

[18] $p - value = 0.768$ for $\star\star\star$ vs. $\star\star$, in T6; two-tailed test.

It seems that the change from one to two stars has almost no effect on the opening and the reply behavior.[19] Thus, it is worth noting that social infuence effects are not linear since, an increase in popularity from two to three stars is significantly more effective than an increase from one to two stars.[20]

If we now analyze position effects, we can do so by evaluating it in isolation or in the presence of social influence (i.e., using the no-social influence or social influence treatments, respectively). Recall that, in order to test for position effects formally, we compare alternatives that are equal in all components except for their position.[21] As illustrated in Table 2 position effects are strongly significant with and without social influence for opening and reply. For example, column (3) shows that alternative (H, A) is replied as first with a frequency of 66%, whereas alternative (H, B), which only differs from the former alternative in its position, is replied as first with a frequency of 38% (see column (6)). Such drop of 28% (column (8)) is significant at a 1% level.

Table 2

Notice that there are strong position effects in two out of the three possible tests in the no-social influence treatments and in four out of the six possible tests in the social influence treatments, both for the opening and reply behavior. We therefore claim the following:

Result 2: *(H2) There are position effects both in the opening and reply behavior.*

Similarly to what occurs with social influence, position effects are not linear since they are significant when switching from position B to A, but never when switching form position C to B.[22]

[19]There is only one case where popularity reduces the frequency of selecting an alternative. This case corresponds with the comparison of the opening frequency of the alternative with value L and in position C with two and one star, respectively.

[20]A caveat in this argument is that while the values for the alternatives where the number of stars increases from two to three are either H or M, for the increase of popularity from one to two stars, the alternatives have always a value of L.

[21]We evaluated the tests considering two different treatments within T2; the case where the text task was performed before the calculus task and the reverse situation. We find roughly the same results as those obtained when these two treatments are pooled.

[22]Taking advantage of the no-social influence treatments, an alternative way of testing for social influ-

Next, we compare position and social influence effects analyzing the results from treatments where the popularity goes in a different direction than the position, that is, T5 and T6. Recall that, in order to test which effect is stronger we compare alternatives that have a higher position than popularity with alternatives with the reverse characteristics. As illustrated in Table 3 below, position effects are stronger than social influence effects for the opening behavior, whereas the reverse is true (although not always significant) for the reply behavior.

Table 3

For example, column (2) in Table 3 below shows that alternative (H, B, $\star\star\star$) is opened first with a frequency of 27%, whereas alternative (H, A, $\star$), which has a higher position but lower popularity than the former alternative, is opened first with a frequency of 83% (column (5)). Such an increase of 56% (column (7)) is significant at a 1% level. In this case, thus, position effects are more relevant than social influence effects in the opening behavior. Nevertheless, column (3) shows that alternative (M, C, $\star\star\star$) is replied as first with a frequency of 43%, whereas alternative (M, A, $\star$) is replied as first with a frequency of 26% (column (6)), which implies that in this case social influence effects are significantly larger (at a 5% level) than position effects in the reply behavior. We, therefore, claim the following:

Result 3: *(H3) Position effects are stronger than social influence effects for opening behavior (H3 does not hold), but social influence effects are stronger than position effects for reply behavior (H3 holds, but weakly).*

To summarize, in this section we obtain evidence of social influence effects in behavior, an aspect of human nature which has already been documented in previous work (see e.g., Salganick et al., 2006, Cai et al., 2009, Fatas et al., 2018). A novel feature of our approach is that we can test for position effects and in fact, we find that these are

ence could be to compare the results in the social influence treatments with those obtained in the no-social influence treatments. One would expect that an alternative with three stars (one star) would be selected more (less) often than the same alternative without any information about its popularity. Table 1 and the top panel of Table 2 can be used to investigate such comparisons. Notice that social influence effects (in this alternative version) exist in the response behavior, but it is less clear and typically negligible (or even opposite in sign) in the opening behavior.

relevant in both the searching behavior and the choice. In addition, a second contribution is that our design allow us to disentangle between social influence and position effects. Our preliminary findings show that position is more relevant regarding the searching behavior, but less important for predicting the actual choice, which depends more strongly on social influence. In what follows, we describe a regression model to analyze influenceability at an individual level, which is another contribution to the related literature. We also use this approach to provide a robustness check of our previous findings and to obtain a better understanding of the interaction between the individuals' searching process and the final decision.

4.3 Individual Influenceability

We now conduct a regression analysis to study some determinants of social influence on individual decisions (both in opening and reply). We focussed, therefore, on the treatments with social influence (i.e., T3-T6). We consider two types of "influenceability". The first one, labelled as *direct individual influenceability*, is defined as the probability of opening/replying first the most popular (three stars) alternative. That is, a characteristic is a determinant of direct individual influenceability if the likelihood of opening/replying the most popular alternative is higher for individuals with such characteristic. The second one, labelled as *indirect individual influenceability*, is defined as the increase in the probability of opening/replying first the alternative in position A due to a one star increase in its popularity. That is, we are considering as an indirect measure of social influence the effect of increasing the popularity only of the alternative in the first position.[23]

4.3.1 Direct Individual influenceability

Table 4 presents the overall marginal effects of three Ordinary Least Square (OLS hereafter) regressions where the dependent variable is the probability of opening first the most popular alternative (three stars).[24] We consider three different samples: *All* refers to all the observations from the social influence treatments (column 2), *Same* refers to those observations of the social influence treatments in which popularity is reinforced by position, i.e., T3 and T4 (column 3), and *Diff* refers to those observations of the social influence

[23] We could also study the choice of alternatives with two stars or one star (alternatively, B or C). The results of this extension of the model are relatively similar and thus, available upon request.

[24] We check the robustness of results by considering a probit model. Our findings, available upon request, are qualitatively the same as the ones presented here.

treatments in which popularity and position were different, i.e., T5 and T6 (column 4). We include as explanatory variables of the regression a wide set of individual characteristics, all of them collected from a questionnaire at the end of the experiment as described above, except for ability which was retrieved from the trial rounds. In particular, we focus on the *Female* dummy, *Ability* which is a dummy that measures the performance of the subject in the trial rounds, *Family income* which is a dummy with value 1 if the estimated income of an individual was above the 75 percentile and 0 otherwise, *Riskaverse* which is a dummy with value 1 if an individual investment was below 5 and 0 otherwise, *Overconfident* which is a dummy with value 1 if a subject erroneously thinks that her performance in the task was above or on the average and 0 otherwise, *Reflexive* which is a dummy with value 1 if the number of correct answers in the CRT test is at least 1 and 0 otherwise and *Arrogant* which is a dummy with value 1 if a subject recognizes her own mistakes and 0 otherwise (see Appendix C1 for further details on the definitions of the variables). We also include two treatment variables: *Text first,* which is a dummy with value 1 if a subject performed the text task before the calculus one in the experiment and, *Position of* $\star\star\star$ which accounts for the position of the most popular alternative. Note that the latter is not relevant in the regression *Same* since the alternative with three stars is always in position A. We also include as explanatory variables all the interactions between the *Position of* $\star\star\star$ and the individual characteristics. See Appendix D for additional details on the econometric model.

Here Table 4

Several results can be found in Table 4. First, regarding the individual characteristics, we find that overconfident subjects are more likely to open first the most popular alternative when social influence and position are confronted. The intuition is not straightforward here since when one believes that she is better than the others, why should one follow what the others did?. Results are different when social influences reinforces the position of the alternatives, since now, very risk averse individuals open first the most popular alternative. In addition, in line with previous test of Hypothesis 2, there are position effects in the opening behavior even when controlling for individual characteristics. In particular, we find that an increase in the position of the most popular alternative, increases the probability that individuals open it first by about 44%. Note that this percentage represents the increase of one position on average terms but the increase may not be linear.[25]

Table 5 presents the overall marginal effects of six OLS regressions where the dependent variable is the probability of selecting as first in the reply vector the most popular alternative in the previous three samples (*All*, *Same* and *Diff*). We include now two new explanatory variables. First, in line with the hypotheses we have tested previously, in addition to *Position of* ⋆⋆⋆ we also include the value of the most popular alternative, *Value of* ⋆⋆⋆. This variable is not included in the regression regarding the opening behavior as agents cannot infer the value of an alternative before opening it. In the last set of regressions (columns 5, 6 and 7) the individual opening behavior, *Open 1st* ⋆⋆⋆, is also considered as an explanatory variable in order to identify whether the opening behavior determines the final choice.[26]

Here Table 5

In both models considered, i.e., with and without taking into account the opening behavior (columns 5, 6 and 7 versus columns 2, 3 and 4) we find roughly the same results. When social influence is lined up with position (*Same*), wealthier subjects and those who do not recognize their mistakes are less likely to select as first the most popular alternative. In the case of confrontation between social influence and position (*Diff*), only reflection and overconfidence have a positive effect in the response behavior of the most popular alternative. Maybe due to the fact that reflexive individual believe more firmly in the wisdom of the crowd.[27]

[25] In fact, the increase in the opening probability from the third to the second position (from C to B) in our experiment is of 14%, while the increase from the second to the first (from B to A) is of 66%, that is almost 5 times more. See column 2 in Table 1.

[26] Observe that the individual opening behavior might not be an exogenous variable in this regression. To account for possible endogeneity problems in this variable, we estimate the effect of the opening behavior on response behavior following an Instrumental Variable approach. Results using this methodology can be found in Table D.1 in Appendix D. As can be observed, results are qualitatively the same as the ones provided in Table 5 above.

[27] There was an experiment in 1920 where professor Jack Treynor asked his students at Harvard University to guess the exact number of beans in a jar that held 850 beans. Although none of them gave the correct reply, the average response was 871. Only one out of the fifty six students gave a better guess than the average.

Evidence abounds that individuals exhibit risk averse behavior even for decision-making process in laboratory experiments (see, among others, Holt and Laury, 2002). However, whether risk aversion increases or decreases influenceable behavior is theoretically ambiguous. On one hand, it might be the case that more risk-averse individuals value less their own performance in the task (ranking of alternatives according to them) than aggregate performance (the "popularity" ranking provided), which can be interpreted as a summary of aggregate decisions. As a result, they will tend to follow the "popularity" ranking. On the other hand, it might also be the case that more risk-averse individuals value more their own performance than aggregate performance about which, in their view, there might be considerable uncertainty. If this is the case, then more risk-averse individuals are less sensible to social influence. The fact that we do not find that risk aversion plays a significant role in the final choice might be a consequence that both explanations are taking place simultaneously and thus they cancel out.

Notice that the difference between the first model (where *Open 1st* $\star\star\star$ is not considered) and the second one (where *Open 1st* $\star\star\star$ is considered) is that the position of the alternative with three stars, which is highly significant in the first model, is no longer relevant once the behavior is conditioned on having opened such alternative first. In summary, position effects are relevant for predicting actual behavior only through the opening strategy. Finally, results regarding the explanatory variable *Text first*, which is never significant for neither the opening nor the response behavior, confirms the results obtained in previous tests (see the introductory paragraph in the results section).

4.3.2 Indirect Individual influenceability

To measure indirect influenceability, we now conduct a regression analysis in which the dependent variable is the probability of opening/replying first alternative A. We include the same set of explanatory variables used for the previous regression except for *Position of* $\star\star\star$ which is now replaced by *Popularity of A* (number of stars of alternative A). As above mentioned, in order to compute indirect effects, we include as explanatory variables all the interactions between *Popularity of A* and each individual characteristic. For instance, let us assume that we want to investigate whether female's probability of selecting alternative A increases as this alternative has one additional star and whether or not that increase is larger than among males. To do so, we compute the popularity effect in both the female and the male subsamples, and, then, test the difference between those effects. Results are shown in Table 6 which presents the decomposition of popularity effects for each individual characteristic on opening (probability of opening first alternative A) and response (probability of selecting as first alternative A) behavior.

Here Table 6

The interpretation of the marginal effects in Table 6 is as follows: a positive (negative) estimated marginal effect means that individuals with that specific characteristic are influenceable in the popularity for opening/response decisions. For example, for males, an increase in one star implies an increase in the probability of opening first alternative A of about 9% whereas for females it is almost 15%. However, differences between both are not statistically significant (p-value equal to 0.298).[28] Observe that overconfident individuals as well as low ability individuals are more influenceable than the rest with respect to the opening behavior. The result of overconfident subjects is in line with the one of direct influenceability mentioned above. The effect of low ability has a clear intuition since less able individuals may be more prone to follow what others did. Shockingly, none of the individual characteristics considered have a significant indirect popularity effect on the response behavior, although, for instance, wealthier individuals are less influenceable than poorer ones (almost significantly).

4.4 Individual Position Sensitivity

Analogously to the previous analysis, we will consider two measures for the effect of the alternative's position on individuals decisions. The "direct position sensitivity" is defined as the probability of opening/replying first the alternative in the first position (A), while the "indirect position sensitivity" is defined as the increase in the probability of opening/selecting as first the most popular alternative (three stars) due to an increase of one unit in its position.

[28] Alternatively, in order to analyze whether female's probability of selecting alternative A increases more than among males when this alternative has a higher popularity, we could test whether the coefficient of the interaction *Popularity of* $A \times$ *Female* is significantly different from zero (again in a model where the dependent variable is the probability of selecting as first alternative A).

4.4.1 Direct individual position sensitivity

Table 7 presents the overall marginal effects of three OLS regressions where the dependent variable is the probability of opening first the alternative in the first position (A). As before, we consider three different samples (*All, Same* and *Diff*). The explanatory variables are the same as in Table 4 except that now, instead of the position of the most popular alternative (*Position of* $\star\star\star$), we consider the popularity of the alternative A (*Popularity of A*). Note that this variable is relevant only in the regressions *All* and *Diff* as for the individuals considered in the regression *Same* (column 3 in Table 7) the alternative in position A always has three stars.

Here Table 7

Notice that results in the *Same* column coincides in Table 4 and Table 7 given that the dependent variable coincides in these treatments by construction (alternative $\star\star\star=$ alternative A). Thus, as already mentioned, in those cases the only relevant characteristic is risk aversion which has a positive effect on the opening decisions of alternative A (or $\star\star\star$). We also observe that, opposite to influenceability results, overconfident subjects are less likely to be affected by the position on the opening behavior. This pattern is observed only in the case where social influence and position are confronted. Finally, and again in line with the previous test of Hypothesis 1, there are popularity effects in the opening behavior even when controlling for individual characteristics. In particular, we find that an increase of one star in the popularity of the A alternative, increases the probability that individuals open it first in about 12% (on average).

Next, we describe in Table 8 our results on position effects for response behavior. As before, we consider six OLS regressions as we consider two different set of explanatory variables; one in which the explanatory variable of *Open 1st A* is not present (columns 2 to 4) and another one in which we include it (columns 5 to 7).

Here Table 8

As can be observed, concerning individual characteristics, both models provide very similar results. That is, position effects are lower for wealthier subjects and those who do not recognize their own mistakes, only when social influence reinforces the position. In addition, less skilled individuals are more sensible to position when social influence and position are confronted. Finally, we also find additional support for Hypothesis 1 regarding the response behavior. In particular, an increase in one star in the popularity of the A alternative increases the probability of selecting it as first by around 23%. Interestingly, this effect does not vanish when we control for the opening behavior (columns 5 or 7). Hence, the popularity of an alternative affects the response behavior not only through the opening behavior (as it was the case in the analysis of influenceability) but it has an additional independent effect.[29]

4.4.2 Indirect individual position sensitivity

In line with the previous analysis on influenceability, we measure "indirect position effects" with the likelihood of opening/replying first the most popular alternative when its position increases by one unit. Recall that we consider as explanatory variables all the interactions between the position of the most popular alternative and each individual characteristic (in a model where the dependent variable is the probability of selecting as first the most popular alternative). Thus, Table 9 presents the decomposition of position effects for each individual characteristic on opening (probability of opening first the most popular alternative) and response (probability of replying as first the most popular alternative) behavior. As in Table 6, the interpretation of the marginal effects in this table is as follows: A significantly positive (or negative) estimated marginal effect means that individuals with that specific characteristic are sensible to position effects for opening/response decisions of the most popular alternative. The p-value determines whether the effects are significantly different according to the individual characteristics.[30]

Here Table 9

[29] Again, the explanatory variable *Text first* confirms the results obtained through the previous tests as this variable is never significant for explaining neither the opening nor the response behavior.

[30] Alternatively, recall from footnote 28 that in order to analyze whether female's probability of selecting the most popular alternative increases more than among males when this alternative has a higher position, we could test whether the coefficient of the interaction *Position of* $\star\star\star \times$ *Female* is significantly different from zero (again in a model where the dependent variable is the probability of selecting as first the most popular alternative).

Observe that for the opening behavior, none of the individual characteristics we consider are relevant for indirect position effects, while, regarding the response behavior, non-arrogant and less wealthy individuals are more sensitive to the position of the most popular alternative.

To conclude, we test whether or not social influence effects are stronger than position effects (recall Hypothesis 3 above) applying a different approach than in Section 4.2. To do so, we conduct a test with the coefficients of the explanatory variables *Popularity of A* and *Position of* $\star\star\star$ in the *All* regressions of Tables 4 and 7 for the opening behavior and in Tables 5 and 8 for the response behavior (once we include as explanatory variable the opening behavior). As expected, we find that position effects are statistically higher than popularity effects in the opening behavior ($p = 0.001$) but popularity effects are significantly larger than position effects in the response behavior ($p = 0.005$).

5 Concluding remarks

Social influence has attracted increasing attention in economic literature. In particular, observational learning where the behavior of individuals is influenced by the mere observation of other people's choices, is not only relevant for the theoretical understanding of a wide range of socioeconomic phenomena, but it can lead to important policy implications (e.g., launching an informational campaign about the popularity of an advantageous new technology). Despite its importance, to demonstrate that individuals' decisions are affected by the observation of others' choices is complicated due to standard identification problems (Manski, 1993). This paper aims to quantify the effects of social influence using a lab experiment. One of the novelties of our approach is that it compares the popularity of alternatives with another relevant feature which is the order in which alternatives are presented. Unlike related studies as, e.g., Ursu (2018), we study this problem in a context in which agents have homogeneous preferences towards the alternatives and face common time constraints. One of the main findings in Ursu (2018) is that rankings affect what consumers search, but conditional on search, do not affect purchases. In our context, however, popularity rankings do in fact affect choices, even when conditioning on search. An additional new aspect of our work is that we provide an individual analysis of influenceability focusing on characteristics such as, gender, ability, confidence, risk aversion, income level, among others.

We find that in the absence of information about the popularity of alternatives, the presentation order significantly induces choices, mainly because individuals tend to select the alternatives that have been carefully analyzed, and this is highly correlated with their position. In the presence of information about the popularity of the alternatives, we find that position effects are less significant for predicting the final choice, as they are overpassed by social influence effects. We also find strong evidence of nonlinearity regarding social influence and position effects (i.e., a one step increase of an alternative in the ranking is significantly more relevant when it moves from the second to first position than when it does from the third to the second position). We find that subjects who are overconfident, reflexive or recognize their own errors and come from less wealthy families, are more influenceable (this occurs for the first two types of individuals only when popularity is aligned with position, whereas for the last two only when popularity and position are confronted). Surprisingly, we find that other individual characteristics such as gender, ability and risk aversion play no significant role on choice.[31]

Our general findings suggest that a social planner may easily affect individuals' decisions through information campaigns that release popularity information about relevant alternatives from other groups of agents. This might be advantageous if the policy-maker wants to speed the adoption of a positive behavior, but it might also have pervasive consequences. For instance, social influence narrows the diversity of opinions to such an extent that it could undermine the wisdom of crowd effects (e.g., Lorenz et al. 2011).

To conclude, there are several directions in which our study could be extended. First, one could further investigate the connection between complexity and social influence. A natural way of taking this idea into consideration in our context would be to vary the time constraints provided to individuals so as to either complicate or simplify their decision process. Second, we have focussed on a rather homogeneous population (i.e., students from a Spanish university), but it could be interesting to increase the sample to account for larger differences in individual characteristics, in order to consider a wider range of ages, professions, nationalities and religions. Finally, the anonymity assumed in our social influence signals could be relaxed by providing information about the characteristics of those being observed.

[31] Recall that, very risk averse agents as well as low ability agents tend to open more often the most popular alternative, although this does not translate into the selection of such alternative with a higher probability.

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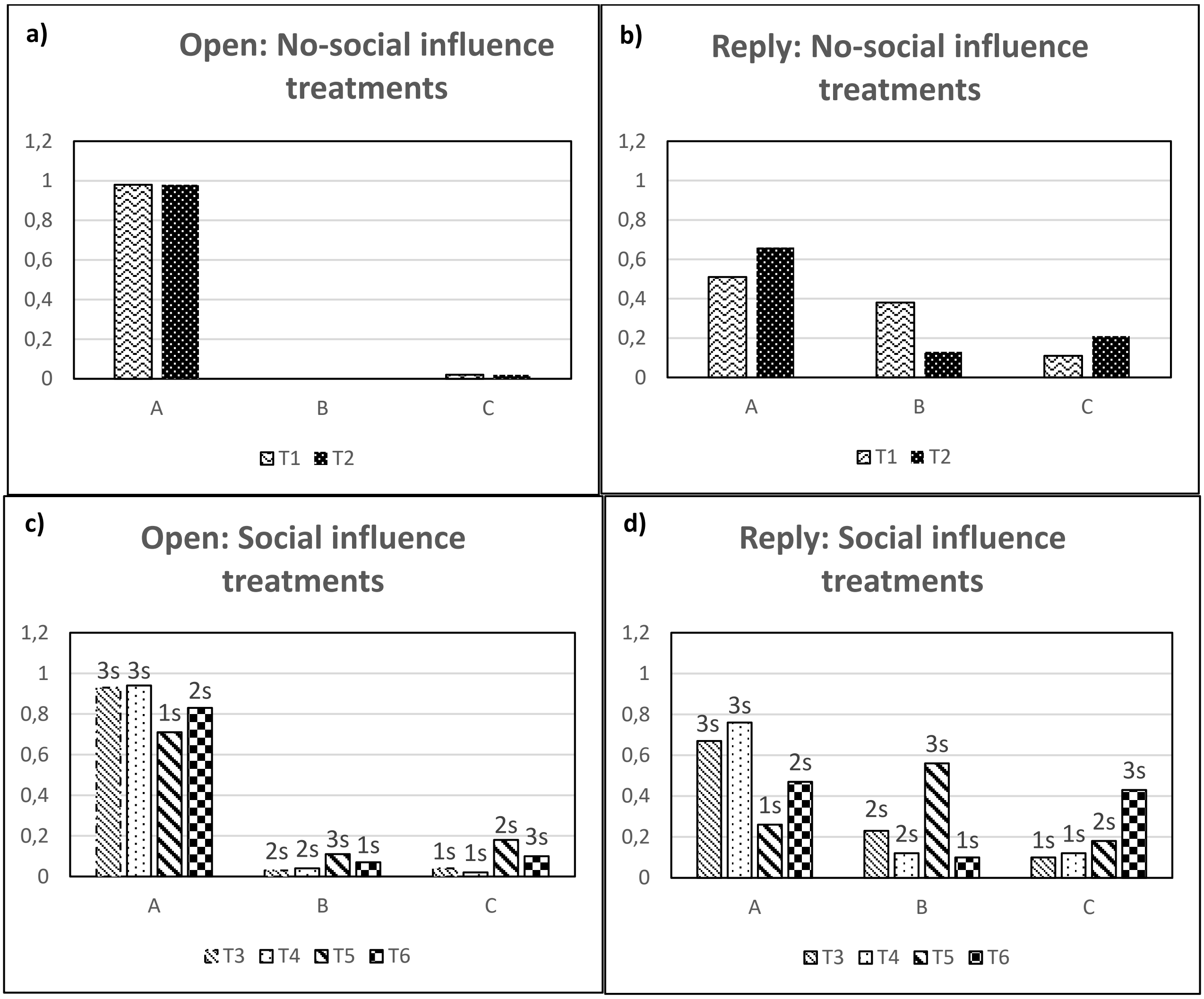
TABLES AND FIGURES

Figure 2: Descriptive statistics of participants' decisions



Note: Frequency of opening alternatives A, B or C in first place in the No-social influence treatments and the Social influence treatments (figures a and c, respectively). Frequency of choosing first in the reply vector alternatives A, B or C in the No-social influence treatments and the Social influence treatments (figures b and d, respectively). In the Social influence treatments, the value depicted on top of each bar indicates the number of stars of the alternative. That is, 3s=★★★, 2s=★★, and 1s=★.

Table 1: Social influence effects (hypothesis 1).

Alternative (1)	Opening (2)	Reply (3)	Alternative (4)	Opening (5)	Reply (6)	Diff Open (7)=(2)-(5)	Diff Reply (8)=(3)-(6)
(H,A,★★★)	.94	.76	(H,A,★★)	.83	.47	.11***	.29***
(M,A,★★★)	.93	.67	(M,A,★)	.71	.26	.22***	.41***
(L,B,★★)	.04	.12	(L,B,★)	.04	.1	.0	.02
(H,B,★★★)	.27	.56	(H,B,★★)	.0	.23	.27***	.33***
(M,C,★★★)	.13	.43	(M,C,★)	.02	.12	.11**	.31***
(L,C,★★)	.02	.18	(L,C,★)	.07	.11	-.05*	.07

Note: Mann-Whitney test to compare the frequency of opening or replying (in first place) alternatives with different popularities, * p<0.1, ** p<0.05, *** p<0.01

Table 2: Position effects (hypothesis 2)

Alternative (1)	Opening (2)	Reply (3)	Alternative (4)	Opening (5)	Reply (6)	Diff Open (7)=(2)-(5)	Diff Reply (8)=(3)-(6)
Non-social influence treatments							
(H,A)	.98	.66	(H,B)	.0	.38	.98***	.28***
(M,A)	.98	.51	(M,C)	.0	.21	.98***	.3***
(L,B)	.0	.13	(L,C)	.02	.11	-.02	.02
Social influence treatments							
(H,A,★★★)	.94	.76	(H,B,★★★)	.27	.56	.67***	.2***
(H,A,★★)	.83	.47	(H,B,★★)	.0	.23	.83***	.24***
(M,A,★★★)	.93	.67	(M,C,★★★)	.13	.43	.8***	.24***
(M,A,★)	.71	.26	(M,C,★)	.02	.12	.69***	.14**
(L,B,★★)	.04	.12	(L,C,★★)	.02	.18	.02	-.06
(L,B,★)	.04	.1	(L,C,★)	.07	.11	-.03	-.01

Note: Mann-Whitney test to compare the frequency of opening or replying (in first place) alternatives in different positions. *p<0.1, **p<0.05, ***p<0.01.

Table 3: Popularity versus Position effects (hypothesis 3).

Alternative (1)	Opening (2)	Reply (3)	Alternative (4)	Opening (5)	Reply (6)	Diff Open (7)=(2)-(4)	Diff Reply (8)=(3)-(6)
(H,B, ★★★)	.27	.56	(H,A, ★★)	.83	.47	-.56***	.09
(M,C, ★★★)	.13	.43	(M,A, ★)	.71	.26	-.58***	.17**
(L,C, ★★)	.02	.18	(L,B, ★)	.04	.1	-.02	.08

Note: Mann-Whitney test to compare the frequency of opening or replying (in first place) alternatives in different positions. *p<0.1, **p<0.05, ***p<0.01.

Table 4: Direct sensitivity to social influence on Open ★★★ (OLS)

VARIABLES	All	Same	Diff
Female	0.072	0.045	0.064
	(0.049)	(0.05)	(0.081)
Ability	-0.024	-0.052	-0.046
	(0.049)	(0.050)	(0.083)
Family income	0.003	0.004	0.041
	(0.047)	(0.047)	(0.079)
Risk averse	0.036	0.099**	-0.033
	(0.052)	(0.048)	(0.099)
Overconfident	0.256***	0.061	0.487**
	(0.092)	(0.087)	(0.187)
Reflexive	-0.019	0.058	-0.020
	(0.048)	(0.047)	(0.084)
Arrogant	0.015	-0.020	-0.030
	(0.053)	(0.053)	(0.09)
Position of ★★★	0.443***		0.169**
	(0.029)		(0.079)
Text First	-0.009	0.027	-0.031
	(0.047)	(0.046)	(0.081)
Observations	222	113	109

Note: "All" refers to observations in T3, T4, T5 and T6, "Same" refers to T3 and T4, and "Diff" refers to T5 and T6, Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Direct sensitivity to social influence: Reply ★★★ (OLS)

VARIABLES	All	Same	Diff	All	Same	Diff
Female	0.027	0.123	-0.071	0.018	0.119	-0.086
	(0.068)	(0.093)	(0.104)	(0.069)	(0.094)	(0.104)
Ability	0.058	-0.017	0.140	0.063	-0.012	0.143
	(0.069)	(0.095)	(0.108)	(0.069)	(0.096)	(0.108)
Family income	-0.062	-0.188**	0.066	-0.060	-0.188**	0.064
	(0.066)	(0.088)	(0.102)	(0.066)	(0.088)	(0.101)
Risk averse	0.038	0.048	0.103	0.033	0.039	0.108
	(0.072)	(0.089)	(0.124)	(0.072)	(0.092)	(0.123)
Overconfident	0.319**	0.121	0.656***	0.287**	0.115	0.563**
	(0.131)	(0.161)	(0.238)	(0.133)	(0.162)	(0.248)
Reflexive	0.114*	0.085	0.181*	0.116*	0.08	0.184*
	(0.067)	(0.088)	(0.109)	(0.067)	(0.089)	(0.108)
Arrogant	-0.054	-0.205**	0.120	-0.055	-0.203**	0.121
	(0.075)	(0.101)	(0.119)	(0.075)	(0.102)	(0.119)
Position of ★★★	0.135***		0.146	0.078		0.118
	(0.042)		(0.103)	(0.062)		(0.105)
Open 1st ★★★				0.125	0.092	0.171
				(0.10)	(0.181)	(0.132)
Value of ★★★	0.047	0.088		0.065	0.088	
	(0.070)	(0.089)		(0.071)	(0.089)	
Text First	-0.070	-0.073	-0.101	-0.069	-0.075	-0.097
	(0.066)	(0.086)	(0.105)	(0.065)	(0.087)	(0.105)
Observations	209	108	101	209	108	101

Note: All refers to observations in T3, T4, T5 and T6, Same refers to T3 and T4, and Diff refers to T5 and T6. Standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table 6: Indirect sensitivity to social influence: decomposition of individual characteristics

VARIABLES	Opening	Reply		Opening	Reply
Gender			**Overconfidence**		
Male	0.09**	0.209***	Non overconfident	0.092***	0.187***
	(0.041)	(0.059)		(0.029)	(0.043)
Female	0.149***	0.195***	Overconfident	0.475***	0.379**
	(0.039)	(0.057)		(0.122)	(0.172)
Difference test F-statistic	1.09 (p=0.298)	0.03 (p=0.863)		9.27 (p=0.003)	1.19 (p=0.277)
Ability			**Reflexive**		
Low ability	0.188***	0.166***	Non reflexive	0.107***	0.184***
	(0.040)	(0.060)		(0.041)	(0.060)
High ability	0.058	0.237***	Reflexive	0.136***	0.219***
	(0.040)	(0.057)		(0.038)	(0.056)
Difference test F-statistic	5.10 (p=0.025)	0.76 (p=0.386)		0.26 (p=0.611)	0.19 (p=0.66)
Family income			**Arrogance**		
Low income	0.117***	0.251***	Non-arrogant	0.132***	0.208***
	(0.039)	(0.056)		(0.032)	(0.048)
High income	0.127***	0.145**	Arrogant	0.095*	0.184**
	(0.040)	(0.058)		(0.057)	(0.082)
Difference test F-statistic	0.04 (p= 0.848)	1.91 (p=0.168)		0.33 (p=0.569)	0.03 (p=0.863)
Risk aversion					
Non risk-averse	0.068	0.210***			
	(0.051)	(0.07)			
Risk-averse	0.145***	0.198***			
	(0.034)	(0.051)			
Difference test F-statistic	1.57 (p=0.211)	0.02 (p=0.884)			
Observations	222	209		222	209

Note: Standard errors in parentheses. * p<0.1, **p<0.05, *** p<0.01

Table 7. Direct sensitivity to position: Open A (OLS)

VARIABLES	All	Same	Diff
Female	-0.003	0.045	-0.066
	(0.048)	(0.050)	(0.087)
Ability	-0.000	-0.052	0.068
	(0.049)	(0.050)	(0.090)
Family income	-0.024	0.004	-0.045
	(0.046)	(0.047)	(0.085)
Risk averse	0.035	0.099**	-0.025
	(0.051)	(0.048)	(0.107)
Overconfident	-0.190**	0.061	-0.459**
	(0.094)	(0.087)	(0.201)
Reflexive	0.027	0.058	0.002
	(0.047)	(0.047)	(0.091)
Arrogant	-0.005	-0.020	0.023
	(0.051)	(0.053)	(0.097)
Popularity of A	0.122***		0.150*
	(0.028)		(0.085)
Text First	0.022	0.027	0.013
	(0.046)	(0.046)	(0.087)
Observations	222	113	109

Note: All refers to observations in T3, T4, T5 and T6, Same refers to T3 and T4, and Diff refers to T5 and T6. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Direct sensitivity to position: Reply A (OLS)

VARIABLES	All	Same	Diff	All	Same	Diff
Female	0.069	0.123	0.039	0.073	0.119	0.063
	(0.067)	(0.093)	(0.10)	(0.066)	(0.094)	(0.098)
Ability	-0.094	-0.017	-0.159	-0.091	-0.012	-0.172*
	(0.068)	(0.096)	(0.103)	(0.067)	(0.096)	(0.101)
Family income	-0.137**	-0.188**	-0.048	-0.135**	-0.188**	-0.043
	(0.064)	(0.088)	(0.098)	(0.063)	(0.088)	(0.095)
Risk averse	0.025	0.048	0.031	0.019	0.039	0.042
	(0.070)	(0.089)	(0.119)	(0.069)	(0.092)	(0.115)
Overconfident	-0.20	0.121	-0.387*	-0.150	0.115	-0.251
	(0.132)	(0.161)	(0.228)	(0.132)	(0.162)	(0.229)
Reflexive	0.009	0.085	-0.010	0.004	0.080	-0.008
	(0.065)	(0.088)	(0.104)	(0.065)	(0.089)	(0.102)
Arrogant	-0.197***	-0.205**	-0.151	-0.193***	-0.203**	-0.149
	(0.073)	(0.101)	(0.114)	(0.072)	(0.102)	(0.111)
Popularity	0.230***		0.251**	0.202***		0.211**
	(0.041)		(0.098)	(0.042)		(0.097)
Open 1st A				0.227**	0.092	0.276**
				(0.096)	(0.181)	(0.115)
Value of A	0.059	0.088		0.057	0.088	
	(0.067)	(0.089)		(0.067)	(0.089)	
Text First	-0.032	-0.073	0.006	-0.036	-0.075	0.004
	(0.064)	(0.086)	(0.1010)	(0.064)	(0.087)	(0.098)
Observations	209	108	101	209	108	101

Note: All refers to observations in T3, T4, T5 and T6, Same refers to T3 and T4, and Diff refers to T5 and T6. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9. Indirect sensitivity to position: decomposition of individual characteristics

VARIABLES	Opening	Reply		Opening	Reply
Gender			**Overconfidence**		
Male	0.438***	0.038	Non overconfident	0.454***	0.094
	(0.045)	(0.077)		(0.030)	(0.064)
Female	0.447***	0.114	Overconfident	0.309***	-0.113
	(0.038)	(0.071)		(0.096)	(0.144)
Difference test F-statistic	0.02 (p=0.888)	0.87 (p=0.352)		2.09 (p=0.149)	1.99 (p=0.16)
Ability			**Reflexive**		
Low ability	0.461***	0.088	Non reflexive	0.407***	0.126*
	(0.041)	(0.076)		(0.039)	(0.069)
High ability	0.426***	0.068	Reflexive	0.479***	0.031
	(0.040)	(0.071)		(0.043)	(0.078)
Difference test F-statistic	0.38 (p=0.538)	0.06 (0.804)		1.55 (p=0.214)	1.38 (p=0.241)
Family income			**Arrogance**		
Low income	0.451***	0.140*	Non-arrogant	0.458***	0.124*
	(0.039)	(0.072)		(0.035)	(0.068)
High income	0.434***	0.007	Arrogant	0.404***	-0.048
	(0.043)	(0.076)		(0.050)	(0.083)
Difference test F-statistic	0.09 (p=0.766)	2.76 (p=0.098)		0.78 (p=0.378)	4.00 (p=0.047)
Risk aversion					
Non risk-averse	0.414***	0.051			
	(0.056)	(0.087)			
Risk-averse	0.456***	0.091			
	(0.034)	(0.068)			
Difference test F-statistic	0.41 (p=0.523)	0.20 (0.654)			
Observations	222	209		222	209

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix A

INSTRUCTIONS

The purpose of this experiment is to study how individuals take decisions in certain contexts. The instructions are simple and if you follow them carefully you will receive some money in cash and in a confidential manner at the end of the experiment, since nobody will know the payoffs received by the rest of the participants. At any moment you can ask your doubts by raising your hand. Apart from these questions, any other type of communication between the participants is forbidden and will be subject to the immediate expulsion of the experiment.

The use of calculator or mobile phones is forbidden in the experiment.

Please, do not write in the instructions.

In this experiment you will have to solve a number of activities. Each activity is associated with a certain **value** which will be expressed in ECUS (Experimental Monetary Unit).

So that you understand the type of activities you will need to solve, we will show you next a few examples.

Activity: Calculus operation

This activity consists in calculating the score of a certain matrix. Consider the following matrix:

$$\begin{pmatrix} 34-22 & 254-239 & 510-498 \\ 104-98 & 301-290 & 93-78 \\ 35-10 & 115-93 & 122-108 \\ 98-87 & 117-99 & 117-92 \end{pmatrix}$$

To figure out the value of the matrix you will need to follow the next steps:

(1) Calculate the **substraction** indicated in each element in the matrix obtaining a new matrix:

$$\begin{pmatrix} 12 & 15 & 12 \\ 6 & 11 & 15 \\ 25 & 22 & 14 \\ 11 & 18 & 25 \end{pmatrix}$$

(2) Calculate the **maximum** number obtained in the new matrix:

Max{12,15, 12, 6, 11, 15, **25**, 22, 14, 11, 18, **25**} = 25.

(3) The matrix's **score** is **25**.

Activity: Reading and spelling

This activity consists in finding the number of misspellings (or other typos) in a text. The value of the text will be its number of misspellings, errors in the gender and number of a noun or in the conjugation of a verb. To simplify the activity there will be **NO misspellings in proper nouns nor accents. There will also be no errors in the punctuation marks.**

Consider, for example, the following text:

"La mantis religiosa es un insecto cuanto menos inquietante. Lo más curioso del comportamiento de algunas hembras ***son*** *que, durante la cópula, devoran la cabeza del macho con el único fin de aportar nutrientes para la formación de los huevos. Dado que son* ***animale*** *depredadores es poco habitual encontrar ejemplares fósiles. De este* ***echo deriba*** *la importancia del descubrimiento realizado en Utrillas (Teruel) y publicado en la revista Cretaceous Research.*

Observe that in such text there are 4 errors (misspellings/typos): son (es), animale (animales), echo (hecho), deriba (deriva), therefore, the **value of this activity is 4**.

Your task and payoffs

Your task in this experiment will consist of analyzing, in the first hand, 3 "Calculus operation" activities and, in the second hand, 3 "Reading and spelling" activities, or viceversa. Let's suppose that you begin with the "Calculus operation" activities (e.g., three matrices: Matrix A, Matrix B, Matrix C). Next, you will try to figure out which one has highest value, which one has second highest value and which one has lowest value.

Each activity (e.g., matrix) has an associated (real) value which we will denote as P_A, P_B, P_C (i.e., P_A is the value associated with matrix A, P_B is the value associated with matrix B and P_C is the value associated with matrix C). You will have limited time to try to learn the value of each activity following the indications of the previous examples.

Very important: if you want to obtain a high payoff in this experiment you should order the activities from highest to lowest value. In fact, your payoff will depend on such order in a precise manner. For example, let's assume that your answer was:

Response Table

Order	Activity	
1º	B	
2º	A	
3º	C	**OK**

Your final payoff will be a weighted sum of the (real) value of each activity. The value of the first option will be weighted by 6, the second by 3 and, finally, the third by 0. In the previous example your total payoff (in ECUS) would be:

$$\text{Payoff} = \mathbf{6} x P_B + \mathbf{3} x P_A + \mathbf{0} x P_C$$

Notice that the first option is weighted more than the second (twice as much!) and the second more than the third (the last option does not influence payoffs!). **Thus, if you order the activities from highest to lowest according to their values, your payoff will be the maximum.**

The following example illustrates how payoffs are derived from the (correct) values. Let's assume that the values are P_A=10, P_B=3, P_C=15 and your response was:

Response Table

Order	Activity
1º	B

2º	C	
3º	A	**OK**

your payoff would be equal to:

Payoff= **6**xP_B + **3**xP_C+ **0**xP_A =**6**x3 + **3**x15+ **0**x10=63 ECUS

Notice that if, instead, you would have ordered the activities according to their correct values ($P_C > P_A > P_B$), your payoff would have been higher. In particular, if your response would have been:

Response Table

Order	Activity	
1º	C	
2º	A	
3º	B	**OK**

your payoff would have been:

Payoff= **6**xP_C + **3**xP_A +**0**xP_B =**6**x15 + **3**x10 +**0**x3 =120 ECUS

Important: If for some reason you leave blank some box in the "Response Table", (or by mistake you repeat a letter, e.g., A A B) we would not be able to correctly calculate your payoff and then you would obtain in such task a payoff of 2.5 euros, which implies a significantly lower amount to what you would have obtained if you do not leave any blank box. **Thus, it is important that you fill in all the boxes in the table.**

Next to each activity you will have information about what other participants have chosen in this experiment.

- The favorite activity will be presented with 3 yellow stars
- The second favorite activity will be presented with 2 yellow stars
- The least favorite activity will be presented with 1 yellow star

The **favorite activity** is the option chosen most often as first (i.e., with highest value) according to other participants, the second favorite activity is the second option chosen most often as first, and finally, the least favorite activity is the option chosen less often as first.

To perform the 3 activities you will have a limited number of minutes (it is probable that you will not have time to analyze all the activities, but you should not worry). Once the time is finished you will have to provide an answer as in the examples illustrated above. You can choose to analyze the activities in any order you wish.

We will give you a template as sheet in dirty so that you can write, do operations or whatever you need while solving the activities. It is convenient that in the template you take notes of the activities' values since once the time finishes you will not be able to visualize the activities again. You will also have limited time (although enough) to write your answer in the screen with the "Response Table".

Important: when you finish filling all the boxes you must press the red box **"OK"** that will appear in the screen (if the time to complete the "Response Table" -that will appear in the upper right corner of the screen- finishes and you have not pressed OK, your payoff will be 2.5 euros, regardless of the boxes you have filled out).

In summary, try to fill in everything and press OK before the time finishes.

Once the remunerated part of the experiment is finished a new screen will appear with an additional column added to the previous "Response Table" in which you should fill in the value you have obtained in each activity. This screen does not have a time limit, but try to fill in the boxes as soon as possible so as not to overstretch the total time of the experiment. If have not had time to analyze an activity you should write "N" in the box corresponding to its value.

Recall, however, that the payoff you will receive only depends on the order that you have written in the "Response Table".

At the end of the experiment, we will convert your earnings from ECUS to Euros, using the rate of 60 ECUS = 1 euro for the payoff obtained in the "Calculus operation" task and 20 ECUS = 1 euro for the payoff obtained in the "Reading and spelling" task. Your earnings will be received privately.

First, we are going to perform a test round so that you can practice with the activities. This round is not remunerated. Second, we will start with the experiment that will be remunerated. Finally, you will answer a simple questionnaire.

Appendix B: Calculus and Matrix tasks

In this section we provide several arguments for our focus on the reading task. First, in the trial rounds almost all participants (97%) failed in the text task, that is, only 3% provide the correct number of typos of both texts. However, this is not the case in the matrix task in which the majority (58%) succeeded (see Table B.1 below). This may create confounding effects when analyzing influenceability. It is true that in the regressions we can control by the ability but not in the statistical tests (when analyzing the several hypotheses stated above). In addition, subjects report that half of them did have time to complete the matrix task, while only 8% did in the text task (see Table B.1). Although this is just a perception (in reality a much less percentage completed the matrix task according to their answers of the valuations associated to the 3 matrix), this may have again an important effect on influenceability. Note that the idea of our experiment is to analyze how subjects take decisions when they do not have enough information (in our setting due to time constraints), so if they believe they have all information needed to order the alternatives, there is little room for social influence or position effects which are the objectives of our study. In sum, we disregard the results from the calculus task because we believe that they are not comparable with the text task and also because the last task was more appropriate to measure social influence due to participant's ex-post beliefs.

Table B.1: Ability and Performance of the calculus and the text tasks

	Calculus	Text
Participants with correct answer (trial rounds)	0.58	0.03
Participants with all alternatives analyzed (self-reported)	0.49	0.08
Observations	340	340

Appendix C: Additional results

C1: Questionnaire variables and their summary statistics

First, we present the definition of the variables that we used as individual characteristics:

- Female: A dummy variable equal to one for females.
- Ability Text: A categorical variable capturing ability in the text trail. It is equal to 3 for subjects with distance to correct answer and time response below the median, it is equal to 2 for subjects with distance to correct answer below the median and time response above or equal to the median, it is equal to one for subjects with distance to correct answer above or equal to the median and time response below the median and it is equal to zero for subjects with distance to correct answer and time response above or equal to the median.
- Ability: A dummy variable equal to one for individuals with "Ability Text" larger than 1.
- Family income: A dummy that is 1 for subjects living in a neighborhood with mean household income above the percentile 75 in the distribution of mean household income in the sample.
- Risk-averse: A dummy variable equal to one for subjects claiming they would invest 5 euros or less in the risky option (see Footnote 9 in the main text).
- Overconfident: A dummy variable that is 1 for subjects claiming they have performed above average in the text task but whose "Ability Text" is equal or lower than 1 or subjects claiming they have performed on average in the text task but whose "Ability Text" is lower than 1.
- Reflexive: A dummy variable equal to one if the number of correct answers in the CRT test is at least 1 and 0 otherwise.
- Arrogant: A dummy that is 1 for subjects claiming it is hard for them to recognize own errors.

We present below summary statistics for these variables in the social influence treatments:

Table C1: Summary statistics: Social influence treatments

Variable	All	Same	Diff

Female	0.545	0.504	0.587
Ability	0.509	0.540	0.477
Family Income	0.464	0.416	0.514
Risk Averse	0.694	0.637	0.752
Overconfident	0.077	0.089	0.064
Reflexive	0.500	0.469	0.532
Arrogant	0.275	0.257	0.294
Observations	222	113	109

Next, we present the ex-post questionnaire subjects took at the end of the experiment regarding subjects' decision-making process (translated from Spanish):

- "How many matrices did you manage to solve?" Possible answers: 0,1,2 and 3
- "In case you did not have enough time to solve them all: How did you decide to rank those unsolved?" Open question
- "How many texts did you manage to solve?" Possible answers: 0,1,2 and 3
- "In case you did not have enough time to solve them all: How did you decide to rank those unsolved?" Open question
- "Do you think you performed above average in the calculus task?" Possible answer: Yes, No, equal to the average
- "Do you think you performed above average in the text task?" Possible answer: Yes, No, equal to the average
- "Do you find it hard to recognize your own errors?" Possible answers: Yes, No

As we mentioned in the main text, in the ex-post questionnaire, subjects provide the criteria they used to order the alternatives they did not have time to analyzed. These results are presented in Table C3 below. Participants answers were completely free, so we code the answers in the following categories: *All alternatives analyzed* means that they provide no answer because their answer was 3 in the number of solved texts, *Order* refers to those cases in which subjects indicate that they have followed the order in the screen somehow, Social Influence includes those answers that mentioned the order of the popularity of the alternatives, *Random* refers to those answers including random or inspiration ideas and finally, all the remainder kind of criteria belong to

Other. In the baseline, where no social influence is present, it seems that the order plays a relevant role although it is not the most frequently criterion used. Interestingly, in the Social Influence treatments, the most frequently reported criterion is popularity and this is in line with our findings.

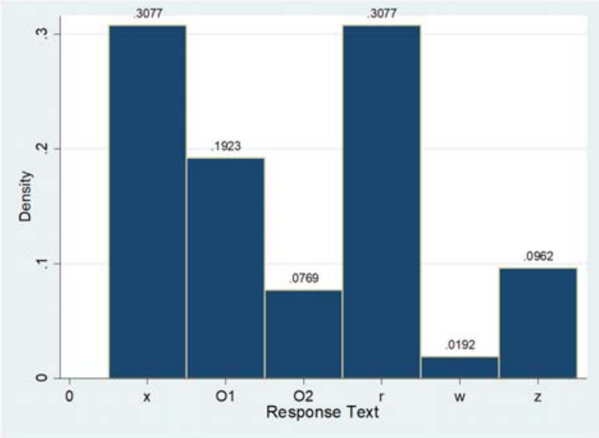
Table C2. Self-reported order criteria for non-analyzed alternatives

	No-Social Inf.	Social Inf.
All alternatives analyzed	0.12	0.05
Order	0.25	0.21
Popularity	-	0.31
Random	0.28	0.22
Other	0.35	0.21

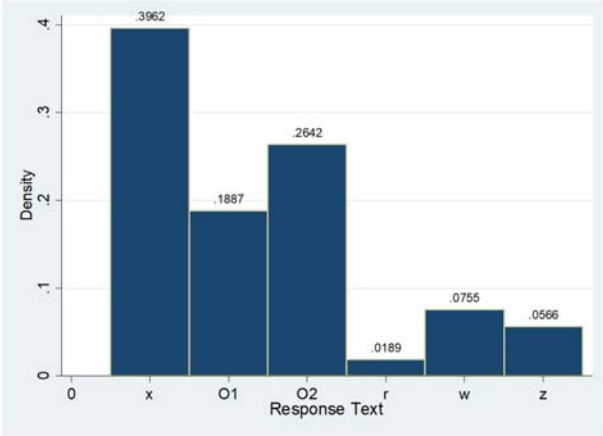
C2: Further details on vector responses

Figure C1 presents the histograms for individuals' response vectors in the six treatments. As can be observed, the distribution of response in treatments where the underlying vector was O1 differ from the distribution of response in treatments where the underlying vector was O2.

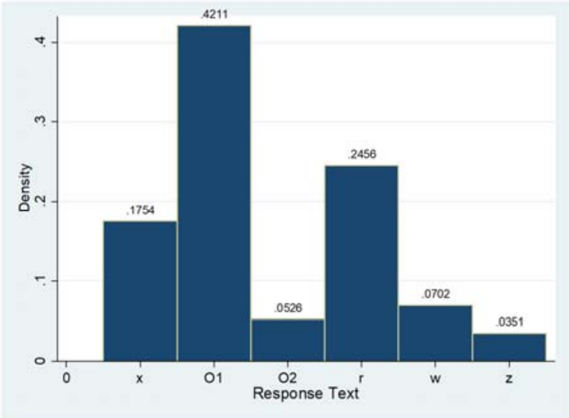
Figure C1: Histograms for vector responses



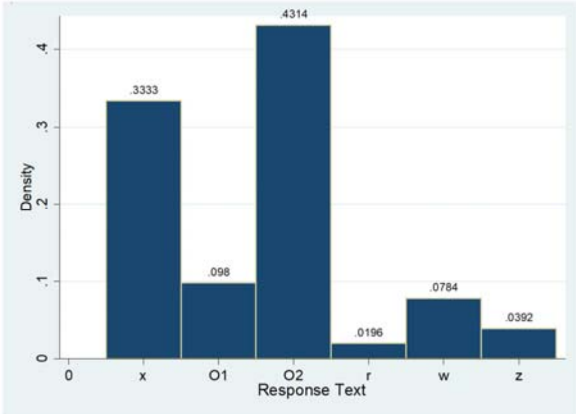
T1



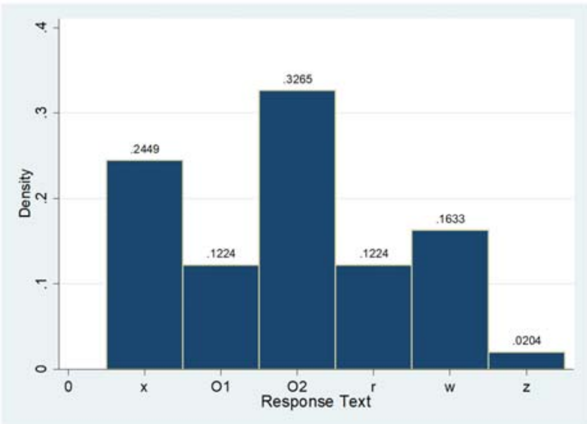
T2



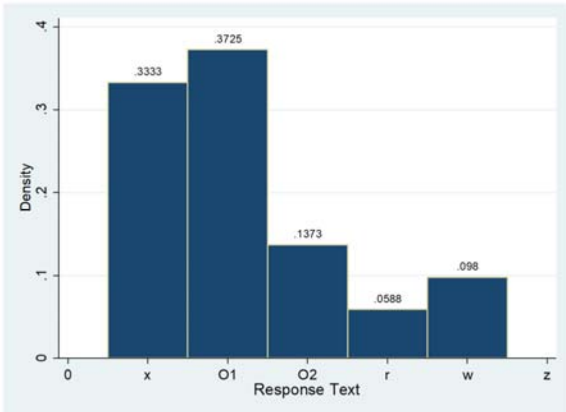
T3



T4



T5



T6

Note: See Figure 1 in the main text for details on treatment definitions. Here x=HML (correct), O_1=MHL, O_2=HLM, r=MLH, w=LHM and z=LMH.

C3: Further details on value effects

Given that alternatives have an objective value in our setting, we can also test for whether individuals actually choose more often the alternatives with higher value (taking all other characteristics as fixed). We refer to this property as value effects. This hypothesis only makes sense for the reply behavior, since the opening behavior should be independent on the underlying values of alternatives as these cannot be inferred before analyzing them.

Hypothesis 4 (**H4**): We say that there are value effects if the probability of selecting an alternative increases with its value. Specifically,

H_4:prob(alt=(v,p)) is increasing in v for any given p in the position treatments

H_4:prob(alt=(v,p,s)) is increasing in v for any given p and s in the social influence treatment.

Regarding value effects, we find that the alternative with higher value, ceteris paribus, selected more often? This only makes sense in the reply behavior since agents cannot infer anything about an alternative's value before opening it.

Result 4 (H4): *There are values effect but specially in the control treatments.*

Table C3: Value effects in reply (Hypothesis 4)

Alternative	Reply	Alternative	Reply	Difference Reply
Non-social influence treatments				
(H,A)	.66	(M,A)	.51	.15*
(H,B)	.38	(L,B)	.13	.25***
(M,C)	.21	(L,C)	.11	.1*
Social influence treatments				
(H,A, ★★★)	.76	(M,A, ★★★)	.67	.09
(H,B, ★★)	.23	(L,B, ★★)	.12	.11*
(M,C, ★)	.12	(L,C, ★)	.11	.01

Note: Mann-Whitney test to compare the frequency of replying (in first place) alternatives with different values. *p<0.1, **p<0.05, ***p<0.001.

One possible reason for why values effects are stronger in the non-social influence treatments than in the social influence ones could be that in the latter case, the information about the popularity of an alternative misleads some participants given that such information does not coincide with the correct answer.

Appendix D: Econometric models

Here, we formally describe the models estimated in Section 4.3 in the paper. In particular, we estimated the four equations described below. In Equation (1) [respectively, (2)] the dependent variable is a dummy that is one if the subject opened [chose as] first the alternative with three stars, and zero otherwise. In Equation (3) [respectively, (4)] the dependent dummy variable is 1 if the subjects opened [chose as] first the alternative in position A, and zero otherwise. We consider as controls a wide set of individual characteristics in vector X_i (ex. Gender, ability, family income, etc.). In addition, we account for several treatment variables. These are the components of the alternative with three stars or in position A in the corresponding treatment for each individual. In particular, its value, position and number of stars denoted by *v(alt)*, *p(alt)* and *s(alt)* (recall Section 3 in the main text). For instance, *p(alt)*, which appears in Equations (1) and (2), indicates the position of the alternative with three stars, which is A (i.e., 3) in T3 and T4, B (i.e., 2) in T5 and C (i.e., 1) in T6. Similarly, *s(alt)* which appears in Equations (1) and (2), is the popularity of the alternative in position A which is *** (i.e., 3) in T3 and T4, ** (i.e., 2) in T6 and * (i.e., 1) in T5. And *v(alt)* indicates the value of alternative *a* and accounts for different behavior depending on the presentation order (O_1 or O_2). Observe that this variable only appears in Equations (2) and (4) as for the opening behavior it should be irrelevant. Finally, we also control for whether the subject performed the text task before the calculus one in the experiment (dummy variable *TextFirst*).

In addition, and in order to study whether the popularity and position effects are larger among some groups of individuals, we included interaction terms between individual characteristics and these treatment variables. These interaction terms, therefore, allow us to measure indirect individual influenceability and sensitivity to position.

$$Prob_{Op}(alt = \star\star\star) = \alpha_0 + \alpha_1 X_i + \alpha_2 p(alt) + \alpha_3 p(alt) X_i + \alpha_4 TextFirst + u_i, \quad (1)$$

$$Prob_{Re}(alt = \star\star\star) = \beta_0 + \beta_1 X_i + \beta_2 p(alt) + \beta_3 p(alt) X_i + \beta_4 v(alt) + \beta_5 TextFirst + v_i, \quad (2)$$

$$Prob_{Op}(alt = A) = \gamma_0 + \gamma_1 X_i + \gamma_2 s(alt) + \gamma_3 s(alt) X_i + \gamma_4 TextFirst + e_i, \quad (3)$$

$$Prob_{Re}(alt = A) = \delta_0 + \delta_1 X_i + \delta_2 s(alt) + \delta_3 s(alt) X_i + \delta_4 v(alt) + \delta_5 TextFirst + w_i, \quad (4)$$

In addition, these four equations are estimated for three subsamples: all the observations from the social influence treatments, only those observations of the social influence treatments in which popularity is reinforced by position and only those observations of the social influence treatments in which popularity and position were different.

Direct individual influenceability or sensitivity to position are measured by computing the overall marginal effects of individual and treatment variables in the equations above. Results presenting these effects can be found in Table 4 (Equation (1)), columns (1) to (3) in Table 5 (Equation (2)), Table 7 (Equation (3)) and columns (1) to (3) in Table 8 (Equation (4)). Indirect individual influenceability [sensitivity to position] is measured by decomposing the impact of the treatment variables $s(alt)$ [$p(alt)$] for each individual characteristic in vector X_i and then check whether they are statistically different. Results presenting these effects can be found in Table 6 (thus using Equation (4)) and Table 9 (now using Equation (2)).

Finally, in the equations analyzing how individuals replied (i.e., (2) and (4)), we have also included as an explanatory variable the subjects opening behavior, denoted by *Op(alt).*, which is a dummy variable equal to one if the subject opened first the alternative with three stars in Equation (2), and the alternative A in Equation (4). This specification allows us to understand to what extend individuals final choice is explained by their opening behavior. Results including this control are shown in columns (4) to (6) in Tables 5 (Equation (2)) and 8 (Equation (4)). In addition, to account for the fact that individuals opening behavior might not be an exogenous variable we follow an Instrumental Variable approach (IV hereafter). Thus, we estimate the causal effect of opening on response outcomes using a two-equation model. The relationship of interest between opening and response behavior is given by the second-stage equations similar to Equations (2) and (4) above:

$$Prob_{Re}(alt = \star\star\star) = \theta_0 + \theta_1 Op(alt) + \theta_2 X_i + \theta_3 p(alt) + \theta_4 p(alt) X_i + \theta_5 v(alt) + \theta_6 TeFi + \varepsilon_i, \quad (2')$$

$$Prob_{Re}(alt = A) = \vartheta_0 + \vartheta_1 Op(alt) + \vartheta_2 X_i + \vartheta_3 s(alt) + \vartheta_4 s(alt) X_i + \vartheta_5 v(alt) + \vartheta_6 TeFi + \epsilon_i, \quad (4')$$

The error terms in both (2′) and (4′) are likely to contain unobserved individual characteristics that affect both opening and response behavior in the same direction. Estimating it by OLS may produce biased estimators of the parameters of interest. To tackle this problem, we exploit the fact that subjects performed another task (the calculus one) in the experiment after the text task and that we know how they decided to open and reply in that task too.[1]

The key assumption for identification of the effect of opening in text and response on text behavior is that, opening behavior in the calculus task is independent of their response in the text

[1] We use the whole simple of individuals in the social influence treatments. We also replicated the IV analysis using only the subsample of individuals who performed the text task before the calculus one and results are very similar. We decided to use the "All" sample for comparability reasons with results in the paper.

task. The exclusion restriction can be justified since it is difficult to argue that the opening behavior in the calculus task may have a direct effect on text response, once we have controlled for opening behavior in the text task and for individual characteristics. Our claim is that its effect on text response operates indirectly through the opening behavior in the text task.

The first-stage equation that we estimate are similar to Equations (1) and (3) above:

$$Prob_{Op}(alt = \star\star\star) = \pi_0 + \pi_1 Op(alt\_c) + \pi_2 X_i + \pi_3 p(alt) + \pi_4 p(alt) X_i + \pi_5 TextFirst + \omega_i, \quad (1')$$

$$Prob_{Op}(alt = A) = \rho_0 + \rho_1 Op(alt\_c) + \rho_2 X_i + \rho_3 s(alt) + \rho_4 s(alt) X_i + \rho_5 TextFirst + \mu_i, \quad (3')$$

where $Op(alt\_c)$ is a dummy equal to one if the subject opened first the alternative with three stars or in position A in the calculus task.

Results for the IV approach are shown in Table D.1 below. We use here the whole sample of subjects in the social influence treatments (results for the other two samples are available upon request). Columns (1) and (3) present results for the first-stage equations. We also show the F-statistics for the validity of the instruments. As can be observed they are well above the 10 rule-of-thumb value. Columns (2) and (4) present results for the second-stage equations. As can be observe results are quite similar to the ones in the paper.

Table D1: Individual influenceability: Instrumental Variable Approach

VARIABLES	Opening (FS) Pr(a=***)	Reply (SS) Pr(a=***)	Opening (FS) Pr (a=A)	Reply (SS) Pr (a=A)
Female	0.0817*	0.00338	-0.0187	0.0747
	(0.0448)	(0.0686)	(0.0448)	(0.0634)
Ability	-0.0262	0.0734	0.0211	-0.0899
	(0.0453)	(0.0679)	(0.0456)	(0.0643)
Family income	0.00813	-0.0576	-0.0358	-0.134**
	(0.0428)	(0.0636)	(0.0427)	(0.0608)
Risk averse	0.0438	0.0232	0.0524	0.0157
	(0.0476)	(0.0705)	(0.0477)	(0.0665)
Overconfident	0.190**	0.231	-0.1249	-0.125
	(0.0847)	(0.145)	(0.0883)	(0.137)
Reflexive	0.0249	0.117*	0.0222	0.000972
	(0.0438)	(0.0645)	(0.0436)	(0.0621)
Arrogant	0.00975	-0.0574	-0.0138	-0.191***
	(0.0481)	(0.0723)	(0.0481)	(0.0692)
Popularity of a			0.1012***	0.187***
			(0.0275)	(0.0505)
Position of a	0.325***	-0.0202		
	(0.0361)	(0.131)		
Opening 1st a		0.340		0.345
		(0.272)		(0.262)
Opening 1st a calculus	0.344***		0.3558***	
	(0.0574)		(0.0615)	
Text First	-0.00340	-0.0671	0.0614	-0.0375
	(0.0425)	(0.0632)	(0.0434)	(0.0611)
F-statistic for instruments	35.83		33.51	
p-value	<0.0001		<0.0001	
Observations	209	209	209	209

Note: The sample used in the one all the observations from the social influence treatment ("*All*").
Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.