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4 authors:

Gennaro Pica
University of Camerino

Maxim Milyavsky
Ono Academic College

Antonio Pierro
Sapienza University of Rome

Arie W Kruglanski
University of Maryland, College Park

The Epistemic Bases of Changes of Opinion and Choices: The Joint Effects of the Need for Cognitive Closure, Ascribed Epistemic Authority and Quality of Advice

Gennaro Pica[1]

Maxim Milyavsky[2]

Antonio Pierro[3]

Arie W. Kruglanski[4]

[1]University of Camerino UNICAM, Italy

[2]Faculty of Business Administration, Ono Academic College, Israel

[3]University of Rome "La Sapienza," Italy

[4]University of Maryland, College Park

Author contribution

All authors were involved in all parts of the research; Gennaro Pica and Antonio Pierro designed the study and collected and analyzed the data (Study 2), and Maxim Milyavsky designed the study and collected and analyzed the data (Study 1); All authors contributed to write the manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

Authors' note: Please direct correspondence about this article to Gennaro Pica [Telephone number: (+39) 06 4991 7662; email: gennaro.pica@uniroma1.it].

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GENNARO PICA (Orcid ID : 0000-0003-3739-7462)

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Abstract

This research investigates the epistemic underpinnings of changes of opinion and choices. Based on the Lay Epistemic Theory (Kruglanski et al., 2009) and consistent with relevant theories of persuasion (e.g., Chaiken, Liberman, & Eagly, 1989; Kruglanski, & Thompson, 1999; Petty & Cacioppo, 1986), we hypothesized that individuals with a high (vs. low) need for cognitive closure would be more influenced by the high (vs. low) level of the epistemic authority of an advisor, and would be less influenced by the quality of the provided advice. These hypotheses were supported in two experimental studies (Total N=352) within two different domains of decision-making (a legal case in Study 1 and consumer behavior in Study 2). The theoretical and practical implications of the results are discussed.

Keywords: *Need for Closure, Epistemic Authority, Opinion Change*

On 26 April 1986, at the Chernobyl Nuclear Power Plant, the assistant chief engineer initiated an experiment that he wanted to conduct urgently. His staff was against it. They argued that they lacked experience and that conducting the experiment could be dangerous. Nevertheless, confident in his competence and propelled by a lack of time, he rejected their arguments and forced them to continue. The situation quickly spun out of control, leading to a nuclear explosion that claimed thousands of lives and threatened the existence of the entire continent. This story illustrates how dangerous neglecting the opinions of others sometimes can be and points to a potentially explosive mixture of factors—a sense of intellectual superiority and a sense of urgency in making a decision—that may lead to such behavior (for an extensive analysis of factors influencing expert decision making in conditions of crisis, see Meshkati, 1991).

Although the situation at Chernobyl was unique in its tragic consequences, dismissing the opinions of less competent colleagues is more the norm than the exception. Indeed, research has consistently shown that decision makers use other people's opinions sub-optimally by placing an inappropriately greater weight on their own opinions–a phenomenon known as "egocentric advice discounting" (Feng & MacGeorge, 2006; Soll & Larrick, 2009; Yaniv & Kleinberger, 2000; Yaniv & Milyavsky, 2007). This phenomenon is especially strong when one feels more competent than the advisor (Soll & Larrick, 2009; Yaniv & Kleinberger, 2000), because superiority in competence often appears to be a satisfactory excuse for rejecting the opinion of others (Milyavsky, Kruglanski, Chernikova, & Schori-Eyal, 2017). Consistent with this reasoning, research has also shown that individuals primed with high (vs. low) power refused advice from both experts and novices (Tost, Gino, & Larrick, 2012).

The consequences of discounting other people's opinions are often detrimental to many areas of human activity, leading to sub-optimal individual choices (e.g., Yaniv, Choshen-Hillel, & Milyavsky, 2011), inaccurate business decisions (e.g., Önkal, Gönül, Goodwin, Thomson, & Öz, 2017), and biased jury verdicts (e.g., Jacobson, Dobbs-Marsh, Liberman, Minson, 2011). However, despite the obvious harmfulness of this intellectual rigidity in refusing to change one's opinion, the psychological factors underlying it are still poorly understood (Rader, Larrick, & Soll, 2017).

In this paper, we adopt the point of view of the Lay Epistemics Theory (Kruglanski, 1990; Kruglanski et al., 2005; Kruglanski et al., 2009) and of relevant models of persuasion (e.g., Chaiken, Liberman, & Eagly, 1989; Kruglanski, & Thompson, 1999; Petty & Cacioppo, 1986) in exploring the psychological factors involved in changing opinions and choices.

Based on these theories, we propose that utilization of advice is determined by the interplay between individuals' need for cognitive closure (NFC; meaning the desire for knowledge that is certain; Kruglanski, 2004; see also Roets, Kruglanski, Kossowska, Pierro & Hong, 2015), the advisor's epistemic authority (EA; meaning his/her perceived trustworthiness, reliability and expertise in a specific domain of knowledge; Kruglanski et al., 2005), and the quality of the advice.

Need for Cognitive Closure

According to the Lay Epistemics Theory (Kruglanski, 1990; Kruglanski et al., 2005; Kruglanski et al., 2009), the *need for cognitive closure* is a basic epistemic motivation that underlies the formation of knowledge. It is defined as a "desire for a firm answer to a question, any firm answer as compared with confusion and/or ambiguity" (Kruglanski, 2004, p. 6). This motivation constitutes both a stable personal characteristic (Webster & Kruglanski, 1994) and a situational state (e.g., induced by fatigue, noise and time pressure; see Kruglanski, Webster, & Klem, 1993). Research has established that the need for closure has implications for intrapersonal, interpersonal and group phenomena (for a recent review see Roets et al., 2015; see also Pica, Pierro, Bélanger, & Kruglanski, 2013; 2014; Pica, Pierro, Pellegrini, De Cristofaro, Giannini, & Kruglanski, 2018; Stark & Milyavsky, 2019).

Essentially, heightened levels of this need foster cognitive activities aimed at the attainment of certainty. This need promotes "seizing" on information that promises closure quickly and "freezing" one's own judgment once it has been formed. By contrast, lower levels of this need promote thorough information processing in order to arrive at accurate judgments (Kruglanski & Webster, 1996).

Prior research pertinent to these questions has demonstrated that whereas individuals with a chronic and situationally high need for closure tend to seize on earlier information while forming their judgments and making decisions, those with a lower need for closure are less influenced by the order of the presentation of the information (Kruglanski & Freund, 1983). Recent research has confirmed this tendency by demonstrating that high levels of the need for closure are linked with urgency in perceptual decision making (Evans, Rae, Bushmakin, Rubin, & Brown, 2017).

In the same vein, other research has shown that high (vs. low) levels of the need for closure influence people's tendency to seize on conspiratorial explanations for uncertain events when such explanations are situationally accessible (Marchlewska, Cichocka, & Kossowska, 2018), to rely on pre-existing schemas, and to cease subsequent information

processing when making judgments (Webster, Richter, & Kruglanski, 1996). Furthermore, Kruglanski, Peri, and Zakai (1991) found that high levels of the need for closure lead to less information processing in the presence of a fairly confident hypothesis, and to more extensive information processing in the absence of it. This finding is directly linked with the work showing that individuals who have high levels of the need for closure are more resistant to persuasion once they have already formed an opinion (Kruglanski et al., 1993). More recently, Houghton and Grewal (2000) also demonstrated that high levels of this need result in an elaborate information search when no prior attitude about the product is present, and limited information seeking when such an attitude does exist. Furthermore, Klein and Webster (2000) reported that individuals scoring high on the need for closure tend to rely on heuristic cues (if a heuristic cue is available to provide an easy means for closure), while individuals scoring low on the need for closure engage in more systematic scrutiny of various arguments.

Taken together, these findings suggest that when individuals with a high need for closure have a sufficient epistemic basis (e.g., previous knowledge) to make judgments and decisions, they are less open to searching for further information from external sources and tend to freeze their current perspective. In contrast, individuals with a low need for closure are open to more extensive information processing.

According to the Lay Epistemics Theory, the search for pertinent information in order to form, consolidate or revise an opinion and make a decision is mainly aimed at assessing inputs from epistemic authorities— sources that the person trusts and believes to be reliable in a specific domain of knowledge. In what follows, we elaborate on the concept of epistemic authority in some detail.

Ascribed Epistemic Authority

The Lay Epistemics Theory identifies the concept of epistemic authority as one of the key variables involved in the formation of knowledge and decision making (Kruglanski, 1989). Epistemic authority refers to a source (e.g., a person, a book, an ideology, etc.) that an individual may rely on in an attempt to form an opinion or make a judgment (Kruglanski, 1989; Kruglanski et al., 2005; Pica, Pellegrini, De Cristofaro, Sciara, Pantaleo, & Livi, 2019). The ascription of epistemic authority to various sources may vary for an individual across domains and time. Its influence may be either general or domain-specific, and can be extremely powerful, overriding other types of information (Kruglanski et al., 2005). According to the Lay Epistemics Theory, people can ascribe a high level of epistemic

authority to themselves as well. In this vein, a recent study (see Kruglanski et al., 2005) found that individuals with a high level of self-ascribed epistemic authority in a specific domain of knowledge (cell phones) were less likely to seek external information to make a judgment. Of greater relevance to the present research, participants' tendency to seek external information was moderated by the their need for cognitive closure. In particular, for participants who regarded themselves as having little epistemic authority about cell phones, a high level of the need for closure was associated with a stronger tendency to seek external information on the product. In other words, individuals' need for closure seems to predict greater reliance on *external* sources of information when they view themselves as having less epistemic authority in a particular area. Importantly, however, in the above research, neither the epistemic authority of the external source of information nor the quality of the information was considered. Thus, in this study we asked whether individuals with a high need for closure would be influenced more by an advisor's epistemic authority whereas individuals with a low need for closure would be influenced more by the quality of the advice.

Importantly, this idea is consistent with findings in two areas. First, it accords with previous research showing that individuals with a high need for closure prefer the shortest path to a decision, whereas individuals with a low need for closure prefer a path that maximizes the accuracy of the decision even if it is more costly in terms of time and effort (Houghton & Grewal, 2000; Klein & Webster, 2000; Kruglanski & Webster, 1996; Webster, et al., 1996). The idea is also consistent with relevant models of persuasion (e.g., Chaiken, et al., 1989; Kruglanski, & Thompson, 1999; Petty & Cacioppo, 1986). Such models generally predict that, keeping constant the *complexity* of both the message's content and peripheral cues, the effect of (1) the characteristics of an external source (e.g., the advisor's epistemic authority), and (2) the quality of the message's content on the formation of or changes in attitude are moderated by one's motivation to seek more information. In other words, the characteristics of an external source influence the formation of or changes in attitude of individuals with little motivation to seek more information (e.g., a high need for closure) more than of those with a strong motivation to do so. Second, the quality of the message's content may influence the formation of or changes in attitude of individuals with a strong motivation to seek information (e.g., a low need for closure).

The Present Research

Our goal is to investigate the role of epistemic variables in taking advice. More specifically, we examine how individuals' need for closure, the level of epistemic authority

they ascribe to an advisor and the quality of the advice they receive determine their propensity to revise their initial opinions and choices. In particular, based on the Lay Epistemic Theory and consistent with relevant theories of persuasion (e.g., Chaiken et al., 1989; Kruglanski, & Thompson, 1999; Petty & Cacioppo, 1986), we posited two hypotheses and tested them in two areas of decision-making: court decisions (Study 1) and consumers' choices (Study 2).

First, given that high (vs. low) levels of an advisor's epistemic authority prompts more immediate closure, individuals with a high need for closure should be more affected by information coming from an advisor with a high (vs. low) level of epistemic authority (Hypothesis 1). We tested this hypothesis in Studies 1 and 2 by measuring the participants' dispositional need for closure, and by manipulating their advisor's epistemic authority. The dependent variables were a change in one's confidence in one's initial opinion (Study 1), a change of opinion (Studies 1 and 2) and a change of choice (Study 2).

Second, given that a thorough search for and examination of information takes more time than reliance on the epistemic authority heuristic, individuals who score high on the need for closure should be less willing to engage in a thorough exploration of the advice. Hence, the decisions of individuals with high (vs. low) levels of need for closure should be *less* affected by the quality of the advice (Hypothesis 2). We examined this hypothesis in Study 2 by manipulating the quality of the information provided by the advisor.

To estimate the adequate sample size needed to test our hypotheses for the two studies, we used a combination of an a priori power analysis on the G*Power calculator (Faul, Erdfelder, Lang, & Buchner, 2007), and decision rules implemented at the time of the data collection. First, assuming relatively small (f^2 = .03) to medium (f^2 = .07) effect sizes both for the interactive effects of the need for closure x advisor's epistemic authority (Studies 1 and 2) and of the need for closure x quality of advice (Study 2), and setting an α error probability at .05 and power at .80, we needed data from 115 to 264 participants to detect effects ranging between these magnitudes. Second, for both studies, we instituted an a priori stopping rule, such that we terminated data collection within the pre-established period of time (approximately one month). In Study 2, our sample size was also limited by the number of available participants (students in class).

Study 1

Our first study examined the joint influence of the advice recipient's dispositional need for closure and an advisor's epistemic authority on advice utilization. More precisely, we expected that individuals who scored high (vs. low) on the need for closure would be

more affected by advice coming from an advisor with a high (vs. low) level of epistemic authority (H1). We gauged the effect of the advice by the decline in the participants' confidence in their initial opinions and the degree to which they changed their opinions.

Method

Participants. One hundred and ninety-four participants were recruited from the Amazon Mechanical Turk (114 females). They were paid 20 cents each for participating in the study.

Design. To test the foregoing hypothesis, we measured the participants' dispositional need for closure, and manipulated their partner's epistemic authority (high vs. low). Our dependent variables were the change in the participants' confidence in their initial opinions, and the change of the opinions themselves.

Procedure.

Phase 1. In phase 1 of the experimental session, the participants' need for closure was measured using the 14-item scale (the Revised NfCS) developed by Pierro and Kruglanski (2005; e.g., "Any solution to a problem is better than remaining in a state of uncertainty"). The reliability of the Revised NfCS scale was satisfactory (Cronbach's α = .85).

Since the study was conducted online, we embedded two attention check items into need for closure scale: "I have read the instructions to this questionnaire carefully" and "I have answered some of the questions above without reading them." Then, participants answered a few demographic questions. We inserted the demographic questions in order to blur the connection between the NfCS and the main task. Next, participants proceeded to the main task: role playing a juror in a legal case. They were presented with a vignette describing a court case involving losses from wild fires in which one company sued another for negligence (see Appendix A). They were asked to indicate the compensation (percent of damage varying from 0 to 100%) that the defendant company should pay the plaintiff company, to explain their verdict and to rate their confidence in it (1 – not at all to 7 – very confident).

Phase 2. In phase 2, participants were presented with a videotaped verdict of another alleged participant (but actually a confederate). Depending on the condition and the participants' verdict from phase 1, one of four versions of the video was presented. In two videos, the other juror presented himself as someone with a high level of epistemic authority, while in the other two, he depicted himself as having a low level of epistemic authority. Specifically, in the high epistemic authority version of the video, the confederate presented

himself as a criminal justice student and mentioned that because he was from California, he was familiar with wild fires. In the low epistemic authority version of the video, the confederate presented himself as an art school student and reported that he had never seen wild fires because he was from Silver Spring, Maryland (where such fires were largely non-existent). The look and the manner of presentation in both videos were adjusted to fit the respective stereotypes attached to the confederate (e.g., the juror in the high epistemic authority condition wore a white shirt, while the juror in the low epistemic authority condition wore a colorful t-shirt). Except for these differences, the other juror's arguments were kept constant across the conditions.

If the participant indicated that the compensation should be less than or equal to 50%, the other juror would say that it should be 80%; if the participant indicated that the compensation should be more than 50%, the other juror would say that it should be 20%. Thus, the other juror always disagreed with the participants' initial verdict.

Then, the participants evaluated the other juror's epistemic authority. Specifically, they rated (1- not at all to 7 - very much) the extent to which the other juror was *intelligent, thorough, articulate, shallow and inattentive* (the last two items were reverse coded). The reliability of this measure, which served as a manipulation check, was satisfactory (α = .85). Afterwards, the participants rated their confidence in their initial opinion, and indicated their final verdict in percentages and in words.[1] Finally, we gauged the participants' understanding of the vignette, the manipulation of the other juror's epistemic authority, and their beliefs about the purpose of the study (see Appendix A).

Results

Preliminary analyses. Fifty-eight participants were excluded from the analyses: 16 failed one of the catch questions in the need for closure questionnaire, and 42 failed one of the catch questions about the content of the scenario. Thus, we analyzed the results from 136 participants (84 females; M_{age}= 35.32, SD_{age}= 12.65).[2]

Manipulation check. Confirming the effectiveness of the other juror's epistemic authority, participants ascribed greater epistemic authority to the juror in the high epistemic authority condition (M = 5.24, SD = 1.15) than in the low epistemic authority condition (M = 4.50, SD = 1.20), $t(134) = 3.66$, $p < .001$.

Main analyses. The main dependent variables were the change of the participants' confidence in their initial opinion and the change of their initial opinion. There were no effects of gender[3], so we excluded this factor in further analyses.

Descriptive statistics and correlations among variables. Table 1 reports the descriptive statistics and correlations among the variables. Note that the two dependent measures--change of opinion and change in confidence--were negatively and significantly correlated. However, the two independent measures—advisor's epistemic authority and need for closure--were not significantly correlated.

Table 1 here

Change of opinion. To assess the change of the participants' opinions, when the first verdict was above 50%, we subtracted the compensation rate indicated in phase 2 from the compensation rate indicated in phase 1, and vice versa when the initial verdict was less than or equal to 50%. Thus, higher numbers indicate greater changes of opinion. To check whether participants changed their initial verdicts as a function of their dispositional need for closure and the other juror's epistemic authority, we regressed the scores of changes of opinion onto the standardized need for closure scores, the other juror's epistemic authority (coded as -0.5 for low epistemic authority and as 0.5 for high epistemic authority) and their interaction. The effect of need for closure on change of opinion was significantly positive (b = 4.03, se = 1.45, t = 2.78, p = .01, 95% CI = 1.16 to 6.90). The effect of the other juror's epistemic authority was also significantly positive (b = 7.83, se = 2.87, t = 2.73, p = .01, 95% CI = 2.15 to 13.51), indicating that the participants changed their opinions more after watching the video of the more expert juror.

More importantly, the need for closure x the other's epistemic authority interaction was significant (b = 6.14, se = 2.90, t = 2.12, p = .04, 95% CI = .41 to 11.88): Confirming H1, the effect of the other juror's epistemic authority was significant for the participants with a high need for closure (+1SD) (b = 13.34, se = 3.85, t = 3.46, p < .001, 95% CI = 5.95 to 22.00), but not for those with a low need for closure (-1SD) (b = 2.17, se = 3.94, t = .55, p = .68, 95% CI = -6.42 to 9.81). In other words, when exposed to the opposing opinion of high (vs. low) epistemic authority, participants with high need for closure changed their initial opinions more than those with low need for closure.

Figure 1 here

Change in confidence. We ran the same regression on the magnitude of the change in confidence, calculated as the difference between the participants' confidence in their initial verdict in phase 2 versus phase 1 (higher numbers indicate a greater increase in confidence).

The effect of need for closure was significant, (b = -.26, se = .13, t = -2.04, p = .04, 95% CI = -.52 to -.01), indicating that the greater the participants' need for closure, the more their confidence in their initial opinion declined after hearing the opinion of the other juror. The effect of the other juror's epistemic authority was not significant, (b = -.44, se = .24, t = -1.85, p = .07, 95% CI = -.90 to -.03), indicating that the participants' confidence in their initial opinion declined more after hearing the opinion of the more knowledgeable juror. The interaction between need for closure x the other juror's epistemic authority showed the same pattern as change of opinion, but was not significant (b = -.32, se = .26, t = -1.24, p = .22, 95% CI = -.84 to .19). Even though this interaction was not significant, we conducted the simple slopes analysis. In line with H1, these results showed that the confidence of participants with a high need for closure (1 SD above the mean) in their initial opinions declined significantly more after listening to the high (vs. low) epistemic authority juror, (b = -.69, se = .32, t = 2.08, p = .04, 95% CI = -1.34 to -.03), whereas no such decline occurred for individuals with a low need for closure (1 SD below the mean), (b = -.10, se = .33, t = .30, p = .76, 95% CI = -.76 to .56).

Figure 2 here

Discussion

The results of this study showed that individuals with a high need for closure changed their initial opinions more when receiving advice from a source ascribed as having a high (vs. low) level of epistemic authority. Although the results regarding the change in confidence are not significant, their pattern is consistent with this finding. Individuals with a high need for closure became significantly less confident in their initial opinions after receiving advice from a high (vs. low) epistemic authority, whereas no such decline occurred for individuals with a low need for closure. Taken together, these findings support Hypothesis 1. Of interest, the main effect of need for closure on change of opinion was positive. This finding may seem at odds with prior findings showing that individuals with a higher need for closure tend to "freeze" their opinions after they crystallize (e.g., Kruglanski et al., 1993; Kruglanski & Webster, 1996). A potential explanation to this contradiction is that in our experiment, participants received advice that diverged sharply from their own opinions, which could have shaken their certainty. It is possible, then, that individuals with a higher need for closure wanted to reduce their resulting uncertainty quickly by listening to a source that appeared to be more knowledgeable.

Study 2

Study 1 showed that the greater the participants' dispositional need for closure, the more they changed their initial opinion in the direction of that presented by the advisor with high (vs. low) epistemic authority (H1). This outcome suggests that decision-makers with a high need for closure will be more open to relying on the opinions of others, if they appear to have a high degree of high epistemic authority on the topic at hand. As the findings of Study 1 confirmed this effect only for opinion change, and not for change in confidence, in Study 2 we decided to exclude the last variable, and to add another dependent variable, that is, change of choice (i.e., whether or not the initial choice between two personal computers would change after receiving advice). In Study 2, we aimed to replicate this effect conceptually in a different domain of knowledge (i.e., personal computers) and with a different type of decision (i.e., consumer choice). Another goal of Study 2 was to examine our prediction regarding the interactive influence of the participants' need for closure and the *relevance* of the advice. More precisely, we expected that because decision-makers with higher levels of need for closure are motivated to make immediate choices or form immediate opinions, they are more likely to rely on the advisor's epistemic authority. Similarly, they are less likely to engage in a thorough processing of the information. Therefore, they are less likely to be affected by the quality of the advice (H2).

Method

Participants. Two hundred and thirty-two participants (150 females; M_{age}= 28.96, SD_{age}= 10.62), psychology students from the University of Rome "La Sapienza," participated in the online study on a voluntary basis.

Design. To test our hypotheses, we measured participants' dispositional need for closure, and manipulated their advisor's epistemic authority (high vs. control) and the quality of the advice (high vs. low) concerning personal computers. Our dependent variables were the participants' change of opinion and their choice between the two personal computers.

Procedure.

***Phase* 1.** Participants' need for closure was measured with the same scale used in Study 1 (α = .73). Participants then reviewed two personal computers: PC X and PC B. PC X was purposely described to be superior to PC B in order to manipulate the participants' initial opinion of and preference for PC X. Specifically, PC X (as opposed to PC B) was described as having three relevant features, whereas PC B was described as having three relatively minor features. We manipulated the relevance of the information based on the results of a pretest [4]. Afterwards, participants evaluated the degree to which PC X was superior to PC B

[i.e., the participants rated the extent to which PC X was generally better, more useful, and a better buy than PC B (1 - not at all to 7 - very much)] and indicated which of the two PCs they would choose to purchase. Since PC B was deliberately described as inferior to PC X, most of the participants rejected it. Sixteen participants, 6.9% of the sample, chose PC B and thus were removed from the analyses.

Phase 2. Participants read some advice allegedly written by another person maintaining the overall superiority of PC B over PC X in four additional features (i.e., arguing against the participant's choice). Participants were randomly assigned to one of two advisor's epistemic authority conditions. Half were told that the other person had a degree in computer science and that he had worked for several years in a computer store, giving him a high level of epistemic authority. The other half was informed that the advice came from just another participant, giving him a low level of epistemic authority.[5] Within each advisor's epistemic authority condition, the participants were further randomly assigned to one of two quality of the advice conditions (high vs. low). In the *high quality of the advice* condition, four additional features were of major relevance to the computer's overall quality. In the *low quality of the advice* condition, four additional features were of minor relevance (see Appendix B). At this point, the participants again rated the extent to which PC X was generally better, more useful and a better buy than PC B (1 - not at all to 7 - very much) and indicated which of the two PCs they would choose to purchase.

Finally, to check whether the manipulation of the other's epistemic authority was effective we asked participants to rate (1 - not at all to 7 - very much) the extent to which this person was *intelligent, thorough, articulate, shallow* and *inattentive* (the last two items were reverse coded; α = .86). We also checked whether the manipulation of the quality of the advice was effective by asking the participants to rate (1 - not at all to 9 - very much) the extent to which the provided information was *relevant* and of *high quality*.

Results

Preliminary analyses. As stated above, we excluded 16 participants from the experiment because they did not respond to our initial prompting of them to choose PC X. Therefore, we analyzed the data provided by 216 participants.

Manipulation checks.

The advisor's epistemic authority. A *t*-test confirmed that participants in the high advisor's epistemic authority condition perceived their partner as having greater epistemic authority in personal computers (M = 3.71, SD = .88) than those in the low advisor's epistemic authority condition (M = 3.34; SD =1.25), $t(214) = 2.51$, $p = .01$.[6]

Quality of advice. The two items used as manipulation checks were highly correlated (r = .83, p < .001), so we summed them into a unique score for quality of advice. A t-test confirmed that participants in the high quality of advice condition regarded the advice as more relevant to the issue at hand (M = 6.33, SD = 1.69) than those in the low quality of advice condition (M = 5.25; SD =1.86), t(214) = 4.48, p < .001.

Main analyses.

Descriptive statistics and correlations among variables. Table 2 reports the descriptive statistics and correlations among the variables. Note that the measures of change of opinion and change of choice were positively and significantly correlated. While both measures were positively and significantly related to the quality of the advice and the advisor's epistemic authority, there were no significant correlations with the need for closure. Furthermore, there were no significant correlations between the need for closure, the quality of the advice or the advisor's epistemic authority.

Table 2 here

Change of opinion. We calculated the change of opinion scores by subtracting the participants' initial evaluations of the computers (time 1) from their final ones (time 2). Higher scores indicate greater change of opinion (i.e., a more negative opinion of PC X).

To test our predictions, we regressed the change of opinion on the advisor's epistemic authority, the participants' need for closure (mean centered), and the quality of the advice (Model 3, PROCESS program, Hayes, 2013). This analysis revealed no significant main effect of need for closure (b = .15, se = .17, t = .88, p = .38, 95% CI = -.19 to .50). As expected, the main effects of the advisor's epistemic authority and the quality of the advice were significant (b = .64, se = .21, t = 2.97, p = .003, 95% CI = .21 to 1.06; b = .75, se = .21, t = 3.51, p = .001, 95% CI = .33 to 1.17, respectively), indicating a greater change of opinion after receiving better quality advice or advice from someone with greater epistemic authority. Neither the two-way interaction between the advisor's epistemic authority and the quality of the advice (b = -.09, se = .43, t = -.21, p = .84, 95% CI = -.93 to .76), or the three-way interaction (b = .91, se = .70, t = 1.29, p = .20, 95% CI = -.48 to 2.30) was significant.

More importantly, the two two-way interactions between need for closure and the advisor's epistemic authority (b = 1.01, se = .35, t = 2.86, p = .005, 95% CI = .31 to 1.70), and between need for closure and the quality of the advice (b = -.98, se = .35, t = -2.80, p = .006, 95% CI = -1.67 to -.29) were both significant.

To further probe the nature of the interactive effect between need for closure x the advisor's epistemic authority, we performed simple slope analyses, in accordance with Aiken and West's (1991) recommendation. These analyses revealed that receiving advice from those with a high (vs. low) level of epistemic authority made the participants with a high need for closure (+1 SD) change their initial opinions (b = 1.36, se = .32, t = 4.30, p < .001, 95% CI = .74 to 1.99). In contrast, no difference in change of opinion emerged for those with a low need for closure (-1 SD: b =.03, se = .32, t = .08, p = .93, 95% CI = -.60 to .65).

Figure 3 here

The same simple slope analyses performed for the interactive effect of need for closure x the quality of the advice revealed that more (vs. less) relevant advice produced a change of opinion among the participants with a low need for closure (-1 SD: b = 1.47, se = .31, t = 4.71, p < .001, 95% CI = .86 to 2.09), but not among those with a high need for closure (+1 SD: b = .01, se = .31, t = .04, p = .97, 95% CI = -.61 to .63).

Figure 4 here

Change of choice. We conducted a moderated multiple logistic regression analysis (using the PROCESS program) to predict a change in the choice of computers (0 = no change; 1 = change). This analysis revealed no significant main effect of need for closure (b = .27, se = .28, z = .95, p = .34, 95% CI = -.28 to .81). Again, as expected, the main effects of the advisor's epistemic authority and quality of the advice were significant (b = .76, se = .32, z = 2.40, p = .02, 95% CI = .14 to 1.37; b = .65, se = .32, z = 2.04, p = .04, 95% CI = .02 to 1.27; respectively), indicating greater changes in choice after receiving better quality advice or hearing from someone with greater epistemic authority. Neither the two-way interaction between the advisor's epistemic authority and the quality of the advice (b = .33, se = .63, z = .52, p = .60, 95% CI = -.91 to 1.57), or the three-way interaction (b = 1.84, se = 1.12, z = 1.65, p = .10, 95% CI = -.35 to 4.03) was significant. More importantly, the two two-way interactions between need for closure and the advisor's epistemic authority (b = 1.41, se = .56, z = 2.54, p = .01, 95% CI = .32 to 2.50), and between need for closure and the quality of the advice (b = -1.68, se = .56, z = -3.01, p = .003, 95% CI = -2.78 to -.59) were significant.

Simple slope analyses revealed that receiving advice from those with a high (vs. low) level of epistemic authority made the participants with a high need for closure (+1 SD)

change their initial choices (b = 1.65, se = .44, z = 3.74, p < .001, 95% CI = .79 to 2.52). In contrast, there was no difference for those with low need for closure (-1 SD: b = -.17, se = .42, z = -.40, p = .69, 95% CI = -1.00 to .66).

In addition, simple slope analyses revealed that receiving high (vs. low) quality advice made those with a low need for closure change their initial opinions (-1 SD: b = 1.76, se = .46, z = 3.80, p < .001, 95% CI = .85 to 2.67), whereas no difference was found for the participants who scored high on the need for closure (+1 SD above the mean: b = -.32, se = .41, z = -.79, p = .43, 95% CI = -1.12 to .48).[7]

Discussion

The results of the present study further support Hypothesis 1 in showing that participants with a high (vs. low) need for closure change their initial opinions and choices more when receiving advice from a higher epistemic authority. Thus, this study replicates the findings of Study 1 and extends its conclusions to the context of consumer choice. Moreover, it demonstrates that individuals with a low need for closure are more affected by the quality of the advice than those with a high need for closure. Thus, in line with Hypothesis 2, individuals' need for closure makes them less sensitive to the quality of the advice they receive.

General Discussion

We investigated the epistemic variables that underlie people's proclivity to be affected by the opinions of other people. Based on the Lay Epistemics Theory (Kruglanski, 1990; Kruglanski et al., 2005; Kruglanski et al., 2009) and consistent with the predictions of relevant models of persuasion (e.g., Chaiken, et al., 1989; Kruglanski, & Thompson, 1999; Petty & Cacioppo, 1986), we examined the interplay of three factors: individuals' need for closure, the level of epistemic authority ascribed to an advisor, and the relative quality of the information provided. More specifically, we expected that a high need for closure would prompt individuals to rely *more* on advice provided by external sources with a high (vs. low) degree of epistemic authority. We predicted this outcome because a high (vs. low) level of epistemic authority promises to deliver more immediate closure (H1). Furthermore, we posited that individuals with a high need for closure would be *less* likely to rely on high (vs. low) quality advice because a thorough processing of information delays closure (H2).

We confirmed these hypotheses using two experimental studies in two areas of decision making: court decisions (Study 1) and consumer choice (Study 2). In Study 1, we

found that individuals with a high need for closure changed their initial opinions about a legal case more when another juror had a high (vs. low) level of epistemic authority. This effect was conceptually replicated in the domain of computers (Study 2). In addition, Study 2 showed that the quality of the advice had no effect on decision-makers with a high need for closure. In contrast, decision-makers with a low need for closure were more affected by the more qualitative advice.

Theoretical and Practical Implications

The current research extends our understanding of when and why people are influenced by advice in several important directions. Specifically, our findings highlight the role of epistemic motivational variables in this process.

First, consistent with the Lay Epistemics Theory, we reasoned that a high need for closure prompts people to seize upon information capable of providing closure faster, which, in this case, is information delivered by advisors who appear to have a high level of epistemic authority. Epistemic authority, in fact, provides a secure base for making judgments and decisions, which is exactly what individuals with a high need for closure seek. This tendency, however, leads them to rely, almost blindly, on epistemic authorities, a tendency attested to by their lower sensitivity to the quality of the advice. We maintain that they pay little attention to the quality of the advice because evaluating it is time-consuming and, thus (given the availability of easier and less time consuming means of arriving at closure), at odds with their high need for closure. These findings are consistent with previous research showing that individuals with a high need for closure base their judgments on earlier and more accessible information, putting less weight on information that requires more extensive consideration (see Kruglanski, 2004).

Second, as we anticipated earlier, this finding is also consistent with the relevant models of persuasion (e.g., Chaiken, et al., 1989; Kruglanski, & Thompson, 1999; Petty & Cacioppo, 1986). The ascription of epistemic authority to an external source (i.e., a peripheral cue) has a stronger influence on decision-makers with a high need for closure (i.e., with little motivation to seek information). Similarly, the relevance of the information (i.e., the message's content) has a stronger influence on decision-makers with a low need for closure (i.e., a strong motivation to seek information).

Third, our research may also have important implications for improving our understanding of the determinants of egocentric discounting (i.e., disregarding the advice of others in favor of one's own opinion; Yaniv, 2004). In fact, it suggests that egocentric discounting can be driven by the freezing effect displayed by those with a high need for

closure who receive information from advisors with low levels of epistemic authority, irrespective of the quality of the advice. However, egocentric discounting can be attenuated (or even reversed) when individuals with a high need for closure receive information from advisors with high levels of epistemic authority. Indeed, in such a case, decision makers become highly attuned to expert, reliable and knowledgeable advisors (i.e., advisors with high levels of epistemic authority). Importantly, relying on epistemic authorities for decision making may be a quick and good strategy. However, ignoring the quality of the advice may reduce the accuracy of the decisions.

Moreover, to the best of our knowledge, there are no studies on the influence of epistemic motivations on the acceptance of advice (see Bonaccio & Dalal, 2006; Rader, Larrick, & Soll, 2017). This omission is unfortunate because epistemic motivations have been, and still are, central in the persuasion literature that has been correctly paralleled for its commonality to the literature on taking advice (Yaniv, 2004; Yaniv & Milyavsky, 2007). In fact, the uncertainty associated with many decisions may prompt decision-makers with a high need for closure to utilize advice coming from epistemic authorities. Awareness of this possibility is essential because research has shown that using the advice of others is often an effective strategy for making more accurate decisions (Ciampa, 2006; Soll & Larrick, 2009).

From a practical perspective, a high need for epistemic certainty would be extremely problematic when people have to express their opinions on legal cases. In fact, to the extent that (1) prior ideas and prior impressions are present, and/or (2) divergent opinions are provided by others with relatively less expertise, judges' decisions may be biased by intellectual rigidity based on their initial position.

Furthermore, our research could also help marketing managers become more aware of how consumers seek information on products. Consumers, too, may be driven by a high need for closure and prompted by marketing strategies to make choices provided by those with a high level of epistemic authority (e.g., friends who are experts in a particular area, opinion leaders or web influencers). Thus, marketing managers may want to tailor their messages according to the potential consumers' chronic or induced need for closure. For instance, if the target group is expected to have a high need for closure, the advertising message should be rather simple and should come from someone regarded as having a high level of epistemic authority. Conversely, for a target group with a low need for closure, the message should be more elaborate and the source of the message is less important.

Limitations and Future Directions

Admittedly, the current research did not explore all of the epistemic concepts and their combinations proposed in the Lay Epistemics Theory. For instance, epistemic authority in one domain of knowledge can also be ascribed to the self (i.e., self-ascribed epistemic authority). Therefore, it remains for future studies to test how decision-makers' need for closure moderates their sensitivity to advisors' epistemic authority and the quality of the advice when their own epistemic authority is high or low. For example, the literature on social comparison suggests that compliance with source of social influence is more likely to occur in situations of upward (vs. downward) comparisons, meaning when the source of the social influence is perceived as more (vs. less) competent than one's self (Mugny, Butera, & Falomir, 2001; Mugny, Tafani, Falomir, & Layat, 2000; see also Butera, Darnon & Mugny, 2010; Quiamzade & Mugny, 2001; Sommet, Darnon, & Butera, 2015; Sommet, Darnon et al., 2014).

Consistent with the social comparison literature cited above, and based on the Lay Epistemics Theory, various hypotheses can be proposed: (1) those who score high on the need for closure and self-ascribed epistemic authority might be more likely to freeze their initial opinions, becoming closed minded and resistant to external ideas, regardless of the advisor's epistemic authority and the relative quality of the advice. Consistent with this idea, previous findings (Kruglanski et al., 2005) have shown that people who ascribe to themselves a high level of epistemic authority are reluctant to search for external information when they also have a high (vs. low) need for closure. This would also be consistent with research on meta-cognition showing that the more people believe that their own attitudes are valid, appropriate and accurate, the more confident they will be in them and the more reluctant they will be to change these attitudes (Petty, Briñol, & DeMarree, 2007; Petty, Briñol, Tormala, & Wegener, 2007). Therefore, (2) those who score high on the need for closure and *low* on self-ascribed epistemic authority may trust advisors regardless of the quality of the advice they receive from them (See Supplementary material for initial empirical evidence of the above two hypotheses).

Moreover, (3) individuals with a low (vs. high) need for closure and a high level of self-ascribed epistemic authority may trust advisors with a high degree of epistemic authority *less* when they regard their advice as largely irrelevant (or of low quality), and (4) trust advisors with a high degree of epistemic authority *more* when they regard the advice as largely relevant (or of high quality). Future research could consider these possibilities.

Another hypothesis future studies might profitably explore is the idea that, in some circumstances, highly relevant information may make it easier to achieve stable closure. In

fact, being influenced by more relevant information might lead individuals to make stronger judgments that allow for long lasting closure (freezing the effect in the long term). Therefore, manipulating the desire for stable knowledge in the long term may prompt those with a high need for closure to give more weight to more (vs. less) relevant information, especially when this information comes from advisors with high (vs. low) levels of epistemic authority. This prediction would be consistent with recent research suggesting that those with a high (vs. low) need for closure are more likely to engage in effortful and open-minded information processing when they regard doing so as instrumental for achieving clear-cut knowledge and reducing uncertainty (see Kossowska, Szumowska, Dragon, Jaśko, & Kruglanski, 2018; Strojny, Kossowska, & Strojny, 2016).

Last, even though our dependent variables (change of opinion in Studies 1 and 2, and change of choice in Study 2) are clearly decision-related outcomes, our methods were derived from the persuasion literature. Therefore, in order to cross validate the accuracy of our hypotheses, future research should also test them using more classic experimental paradigms about taking advice (and/or other paradigms of decision making) such as the Judge-Advisor System (Bonaccio & Dalal, 2006).

Conclusion

In summary, our results show that individuals' need for closure makes them more attuned to the advisor's epistemic authority and less attuned to the quality of the advice. Those with a high need for closure are more likely to change their opinions and choices when they ascribe to the advisor a high (vs. low) degree of epistemic authority, possibly because doing so constitutes a fast and easy way of reaching closure. In contrast, those with a low need for closure are more likely to change their opinions and choices more when provided with high (vs. low) quality advice.

Endnotes

1. We also had participants rate the quality of the juror's arguments. This measure was used to test another exploratory hypothesis that is not discussed in this paper.

2. When all 194 participants were included in the analyses, the interactive effect of the NFC x EA on change of opinion remained significant, b = 3.54, se = 1.31, t = 2.71, p = .007. However, the interactive effect of the NFC x EA interaction on change in confidence was not significant, b = -.02, se = .20, t = -.10, p =.92.

3. The patterns of results are the same (for both dependent measures) when controlling for the demographic variables (i.e., age and gender).

4. The manipulation of information relevance was based on the results of a pretest (psychology students, N = 28, 17 women; M_{age} = 24.39; SD_{age} = 2.94). The seven highly relevant features we selected were regarded as more relevant (M = 7.59, SD =.64) than the seven less relevant features we chose (M = 4.57, SD = .78), F (1, 27) = 254.20, p < .001, $p\eta^2$ = .90.

5. The manipulation of the other's EA was based on the results of a pretest (psychology students, N = 44, 36 women; M_{age} = 23.61; SD_{age} = 2.29). Participants in the high other's EA condition (M= 3.79, SD= .98) regarded the source as having greater EA than those in the low other's EA condition (M= 3.17, SD= .67), F(3, 42) = 6.50, p = .01, η^2=.13.

6. To check whether the manipulation of the EA was effective, we also asked participants to rate the extent to which the advisor was *an expert in computers, her/his knowledge was trustworthy*, *her/his knowledge was reliable* and *she/he had a great deal of knowledge about PCs* on a 9-point scale, ranging from 1 (not at all) to 9 (very much). The reliability (Cronbach's alpha) of this measure was satisfactory (α = .89). A t-test confirmed that participants in the high other's EA condition regarded their partner as having greater EA in personal computers (M = 6.30, SD = 1.24) than those in the low other's EA condition (M = 5.77; SD = 1.54), t(214) = 2.76, p = .01.

7. The patterns of results are the same (for both dependent measures) when controlling for the demographic variables (i.e., age and gender).

Compliance with ethical standards

Ethical approval

This set of studies was approved by the Ethics Committees of the University of Rome "La Sapienza" and the University of Maryland at College Park.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Data Sharing and Data Accessibility

In the event that this paper is accepted, the authors affirm that they will comply with the journal's policy on data archiving and sharing.

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Appendix A – Study 1 Materials

Vignette in Study 1: A small plane crashed near a rural California community in June 2012 then burst into flames, igniting a brush fire that joined a naturally-occurring fire. The resulting fast-moving fire spread into and destroyed a lumber company's timber. The single-engine Cessna 210, operated by SouthWest Aviation went down in Blackburn Canyon near Tehachapi south of Bakersfield. It sparked a brush fire that joined a natural fire which are common in this area, and the conflagration grew quickly. The terrain in the region is steep and ragged, and the weather conditions made the combined fire spread quickly, using dry brush as a fuel source. Before long it spread into a plot of timber belonging to CalLumber Inc., a lumber company, and destroyed it completely. CalLumber sued the airline company, SouthWest Aviation, for negligence. CalLumber argued that the defendant airline was negligent in plane maintenance, which caused the crash, and that the crash substantially contributed to the damage sustained by CalLumber. The defendant airline company, SouthWest Aviation, stated that the plane crash did not cause the destruction of the timber, since the natural fire would have destroyed the timber even if the plane had not crashed.

Vignette Understanding Check

(1) How did the fire start?

a. Plane crash sparked a brush fire that joined a natural fire **(correct)**
b. Lightening sparked a brush fire
c. Plane crash sparked a brush fire
d. A brush fire was caused by dry and hot weather conditions

(2) The CalLumber company argued that:

a. The aviation company was negligent in plane maintenance **(correct)**
b. The plane crashed on the timber
c. The pilot of the plane did not report about the fire
d. The plane of the aviation company was overloaded.

Other Juror's EA Manipulation Check.

(1) The other juror is:

a. A criminology and criminal justice student

b. An art school student

(2) The other juror grew up in:

a. California and saw many wildfires

b. Silver Spring and saw no wildfires

Appendix B – Materials of Study 2

Information relevance manipulation

On the basis of a pre-test[3], seven highly relevant features (Processor Speed; PC-Weight; Battery Autonomy; Memory; Graphics Quality; Video Quality; Sound Card) and seven less relevant features (Monitor Dimension; VGA port for connecting with a TV monitor; Brand; Color; Numeric Keyboard; Possibility for more USB ports; Design) were associated with the two personal computers (PC X and PC B). The information was counterbalanced between the two personal computers (PC X and PC B) and between participants.

Table 1: *Descriptive and correlations between variables (Study 1).*

	M (SD)	Skeweness (SE)	Kurtosis (SE)	1	2	3	4
			(N = 136)				
1. Opinion change	9.51 (17.62)	2.08 (.21)	4.24 (.41)	-			
2. Confidence change	-.49 (1.38)	-1.27 (.21)	4.20 (.41)	-.46**	-		
3. Advisor's EA	-	-		.20*	-.12	-	
4. NFC	3.23 (.71)	.40 (.21)	1.22 (.41)	.22**	-.17*	-.11	(.85)

Note: ***$p < .001$; **$p < .01$; *$p < .05$. In bracket (Cronbach's α)

Table 2: *Descriptive and correlations between variables (Study 2).*

	M (SD)	Skeweness (SD)	Kurtosis (SD)	1	2	3	4	5
			(N = 216)					
1. Choice change	.37 (.48)	.56 (.17)	-1.70 (.33)	-				
2. Opinion change	1.13 (1.69)	.52 (.17)	-.29 (.33)	.69***	-			
3. Quality of advice	-	-	-	.16*	.22***	-		
4. Advisor's EA	-	-	-	.18**	.21**	.03	-	
5. NFC	3.22 (.62)	.19 (.17)	-.05 (.33)	.04	.02	.04	.001	(.73)

Note: ***$p < .001$; **$p < .01$; *$p < .05$. In bracket (SD; and Cronbach's α)

Figure 1 (Study1). *Opinion Change* as a function of other's epistemic authority (EA) and participants' need for closure (NFC).

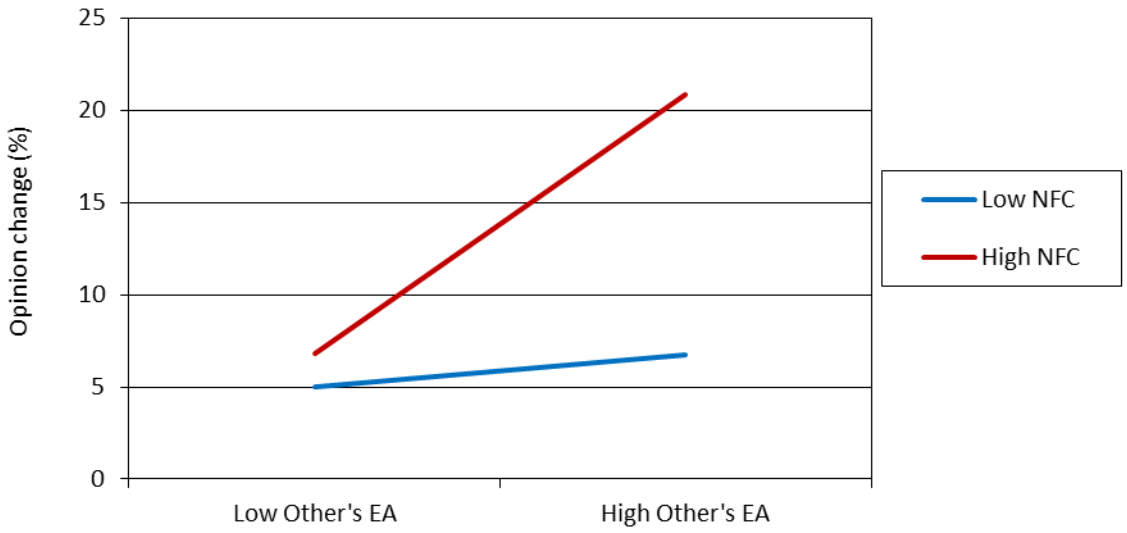

Figure 2 (Study1). *Confidence Change* as a function of other's epistemic authority (EA) and participants' need for closure (NFC).

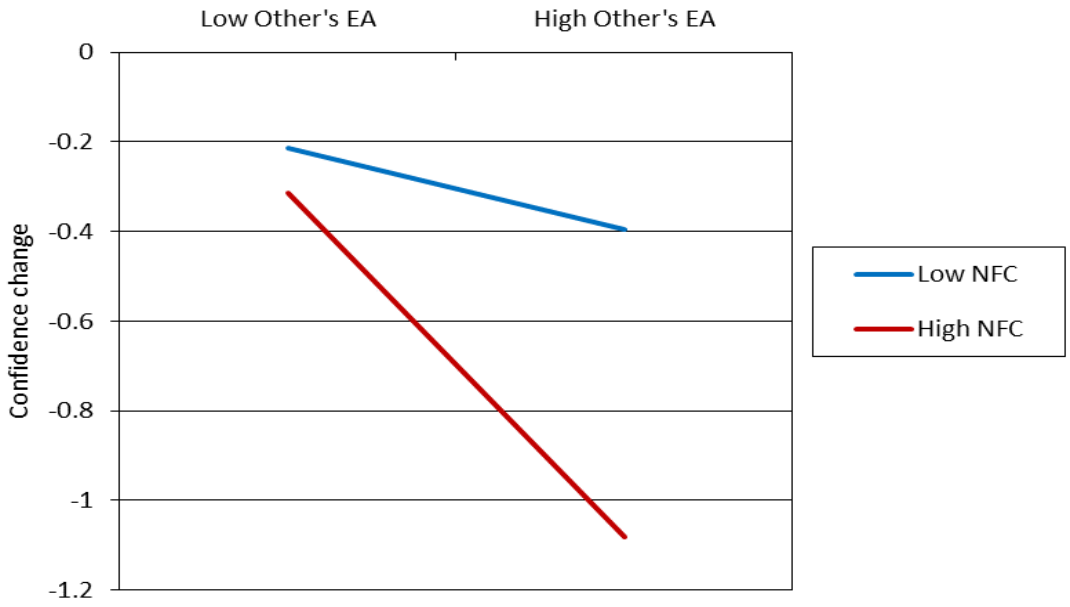

Figure 3 (Study 2). *Opinion Change* as a function of other's epistemic authority (EA) and participants' need for closure (NFC).

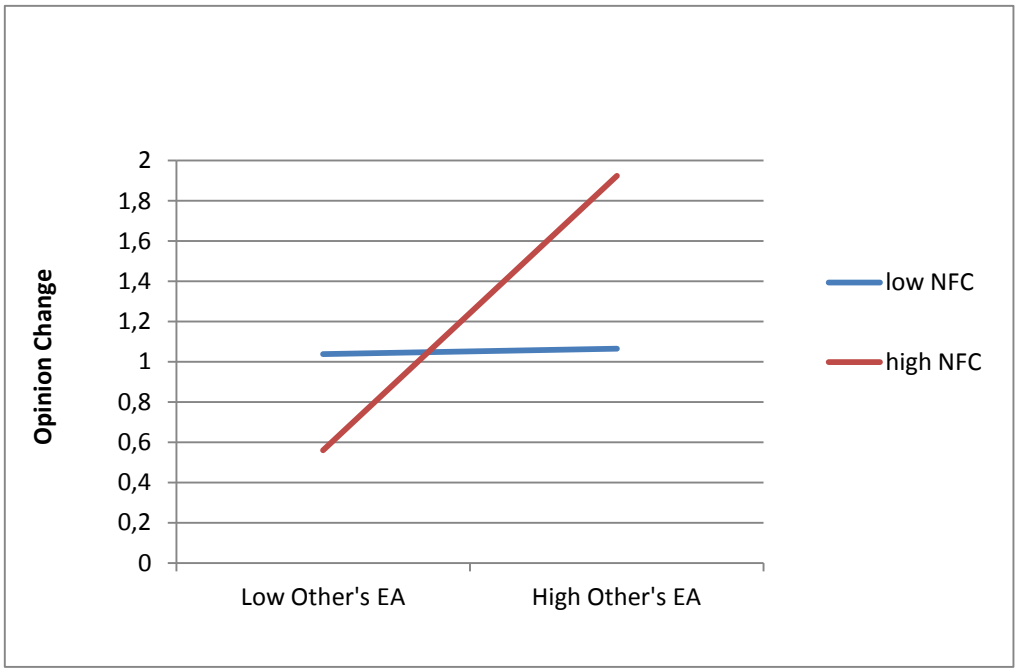

Figure 4 (Study 2). *Opinion Change* as a function of information relevance and participants' need for closure (NFC).