

Epistemological beliefs and the effect of authority on argument-counterargument integration

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Abstract

Personal epistemology describes an individual's beliefs about the structure, stability and sources of knowledge and knowing. These beliefs contribute to how we interpret information, weigh evidence and justify an argument. In this study, we examined whether exposure to information from an authoritative source affects Chinese students' performance in a subsequent argumentation task that required integrating conflicting views. Furthermore, we examined how epistemological beliefs interact with the effect of authoritative information on argumentation performance. 204 undergraduates participated. The results suggested that the participants who were experimentally exposed to authoritative information generated fewer counter reasons and produced arguments that were less elaborated and weaker in strength than those produced by participants who were not exposed to authoritative information. Specifically, the experimental manipulation had a more significant effect on those who held a belief that knowledge is drawn from authority than on those who perceived knowledge as constructed. In addition, the performance of those who believed knowledge is complicated and ever-changing was hampered under the experimental condition. Theoretical and practice-based implications are discussed.

Keywords: Personal Epistemology, Argumentation, Higher-ordering thinking,

Reasoning, Higher Education

Epistemological Beliefs and the Effect of Authority on

Argument-counterargument Integration

Good thinking is manifested through the process of argumentation. Argumentation skills are crucial for preparing students to participate critically in a liberal society. In simple terms, to argue is to persuade or to defend an idea. As social issues are often complex and ambiguous, good reasoning requires that a person weigh and integrate contrasting ideas for a cohesive and logical conclusion. Nussbaum and Schraw (2007) referred to this process as argument-counterargument integration. It is believed that incorporating counter views and evidence strengthens an argument, as thoughts are considered in conjunction, hence allowing a more justified conclusion (Nussbaum, 2011).

An individual's representation of the nature of knowledge has been consistently found to relate to his or her approach towards defence or justifying an argument (e.g., Chan, Ho & Ku, 2011; Kardash & Howell, 2000; Mason & Boscolo, 2004). In this study, we examined the relations between the influence of authority, personal epistemology and argumentation performance. Although some empirical evidence has been found on how authority influences an argument's convincingness (e.g., Schommer-Aikins, 2004; Inglis & Mejia-Ramos, 2009; Youn, 2000), investigations linking the influence of authority and personal epistemology on argumentation in Asian contexts have been rare. We designed an experiment to examine whether presenting information from an authoritative source affects how Chinese university

students approach a subsequent argumentation task requiring the integration of conflicting views. We also examined how epistemological beliefs moderate the effects of authority on argument-counterargument integration.

1. Linking Epistemological Beliefs and Skills in Argumentation

1.1 Conception of Skills in Argumentation

In basic terms, an argument is a conclusion supported by at least one relevant reason. The process of argumentation can be broken down and the necessary skills individually identified and assessed (Kuhn & Crowell, 2011). These skills include distinguishing opinions from facts, examining the truthfulness of assumptions, evaluating the strength of reasons, recognising fallacies, etc. Junior-secondary students are often first taught to approach a topic from an either-or perspective, which emphasises the quality of reasons and evidence for a chosen perspective. As students advance, the emphasis gradually shifts to considering how counter-evidence should be acknowledged and addressed to better capture the ill-structured nature of real-world issues. In defending a proposition, sophisticated argumentation demands the process of argument-counterargument integration, in which a person takes a step back from his or her own perspective, recognises the multifaceted nature of an issue and synthesises and evaluates evidence for and against each facet before reaching a final conclusion (Nussbaum, 2008).

Nussbaum (2008) introduced three paths to effective argument-counterargument integration: 1) weighing reasons given by different sides to arrive at a perspective with the strongest reasoning, 2) refuting a weaker side by identifying flawed reasoning and 3) generating an alternative conclusion that considers the merits of both sides. Common to these strategies is a deliberate effort to think contrary to a favoured side. Such effort brings depth to the analysis of the issue at hand, prompts metacognitive monitoring, allows for self-reflection and encourages a more objective examination (Kuhn & Crowell, 2011).

1.2 Empirical Evidence on the Relationships between Epistemological Beliefs and Argumentation Skills

How individuals construct arguments has been found to be related to their beliefs about knowledge, which describe their understanding of its structure, sources and stability as well as their beliefs about how knowledge is acquired (Bråten*, Ferguson, Strømsø & Anmarkrud, 2012; Mason & Boscolo, 2004; Nussbaum & Bendixen, 2003). Following Perry's original work on personal epistemology in the 1970s, subsequent researchers have created different personal epistemology models (see Duell & Schommer-Aikins, 2001; Hofer, 2001; Hofer & Pintrich, 1997, for review). One such widely adopted model (Schommer, 1990) put beliefs about knowledge into five dimensions: simple knowledge (i.e. knowledge as isolated versus interrelated), certain knowledge (i.e. knowledge as unchanging versus evolving), omniscient authority (i.e. knowledge as passed down from higher agent versus the

source of knowledge as challengeable), quick learning (i.e. learning takes place quickly or not at all versus learning takes place gradually) and innate ability (i.e. intelligence is fixed entity versus intelligence is acquired). The literature shares a general consensus that individuals who have less developed levels of epistemological beliefs are referred to as naïve believers while those with more advanced levels of epistemological beliefs are called sophisticated believers. Nonetheless, Elby and Hammer (2001) challenged the perspective that sophisticated beliefs are always superior. They suggested that the sophistication of a person's epistemological beliefs might lead to more or less productive learning strategies in tasks with different learning goals and levels of difficulty. Bromme, Pieschl and Stahl (2010) revealed that a person's sophisticated beliefs might be activated in certain contexts and not in others. Therefore, a learner might approach a learning task in a "naïve" manner despite his or her potential to adopt a more sophisticated approach. These views have extended the general understanding of personal epistemology by linking beliefs about knowledge with other factors of learning, urging researchers to further examine the domain specificity of personal epistemology.

Using the five beliefs of Schommer's model (1990), earlier studies found that university students who held the naïve epistemological belief that knowledge is isolated and unchanging tended to write simplified or absolute conclusions that were unable to reveal the inconclusive nature of controversial issues such as abortion, AIDS and morality (Kardash &

Scholes, 1996; Bendixen, Schraw & Dunkle, 1998; Schommer-Aikins & Hutter, 2002), despite being presented with opposing views. In contrast, sophisticated epistemological beliefs positively contributed to higher school achievement (Rodríguez & Cano, 2006), and predicted students' argumentation performance in generating counter-reasons and rebuttals for controversial topics (Mateos et al., 2011). In studies that investigated learning about science topics, such as evolutionary issues, students with naïve epistemological beliefs were less willing to accept a scientific explanation (Sinatra, Southerland, McConaughy & Demastes, 2003) or to accept a refutation of their existing misconceptions (Qian & Alvermann, 1995). Kardash and Scholes (1996) found that students' propositions about knowledge were linked to their subjective interpretations of issues and how they selected information that justifies their interpretations. For instance, students with a stronger belief in the certainty of knowledge were more likely to overlook the inconclusive and tentative nature of mixed evidence when writing conclusions. In a later study, Kardash and Howell (2000) found that naïve believers used fewer cognitive strategies when reading dual-position text, and distorted contradictory information to make it consistent with their prior beliefs when asked to recall the textual information.

A recent investigation of the argument-counterargument writings of Chan and colleagues (2011) has provided further evidence of how an individual's argumentation might be influenced by his or her beliefs about knowledge. The researchers found that Hong Kong

Chinese undergraduates who perceived the nature of knowledge as certain and absolute exhibited inferior two-sided thinking and a stronger tendency to devalue counter arguments than those who perceived knowledge as more complex and tentative. Their findings revealed that naïve believers tended to overlook views that ran counter to their own perspective (Chan et al., 2011). One possible theoretical explanation for this biased view of opposing information is derived from Kuhn's (1991) model of epistemological development, which states that individuals who regard knowledge as entirely certain and subjective view judgment through reasoning as unnecessary, and are therefore unable to see the value of an argument, which can result in a poor incentive to develop and apply related skills. In contrast, individuals at a more advanced stage believe that the issue of right versus wrong is context specific and that conclusions drawn should remain open for re-evaluation, hence, assertions should be evaluated through the process of argumentation.

2. Omniscient Authority and the Chinese Culture

The evidence discussed in the previous section centred on the relationships between how a person perceives the structure of knowledge and his or her reasoning. This section focuses on the link found between one's beliefs about the source of knowledge and good thinking.

The omniscient authority dimension of Schommer's (1994) model described naïve believers as viewing knowledge as something handed down by external entities, such that it is

the authority's responsibility to determine the ultimate conclusion. The sophisticated believers, however, were described as viewing empirical evidence as a knowledge-seeking tool, such that knowledge is subject to re-evaluation and can be self-constructed. The literature contains some evidence suggesting that students perceive knowledge acquisition as a process of transferring information from authority figures to learners, making knowledge presented by an authority appear more persuasive (e.g., Youn, 2000; English & Mejia-Ramos, 2009).

Schommer-Aikins (2002) argued that students' reliance on experts' opinions might arise from their perception of authorities as "gifted" individuals who enjoy privileged access to information. This view leaves students passively on the receiving end of knowledge acquisition. Earlier research in the West (see Baxter Magolda, 1992; Belenky, Clinchy, Goldberger & Tarule, 1986; Kitchener, King, Wood & Davison, 1989) found that less sophisticated learners assumed themselves to be in a disadvantaged position in relation to experts, thus resulting in passive acceptance of knowledge. More sophisticated learners did not suffer from this assumption, as they believed in evidence-based reasoning that made them more likely to question experts' claims.

Epistemology research investigating the role of authority has been more common in the West where the culture is considered a horizontal display of status, than in the East where status differentiation is presented in vertical relationships (Triandis, 1994). Vertical cultures

communicate an explicit hierarchical structure that demands distinctive treatment for different classes, and disagreeing with individuals of a higher status might be regarded as posing a threat to an implicit cultural custom (Schommer-Aikins, 2004). It is therefore timely to empirically investigate the links between authoritative influence, Chinese students' epistemological beliefs and their thinking.

3. The Present Study

In this study, we adopted an experimental design to examine whether presenting information from an authority figure affected how Hong Kong Chinese university students approached an argumentation task that required integrating conflicting views. In addition to the effects of authority on argument-counterargument reasoning, we were also interested in how students' epistemological beliefs might interact with the influence of authority in affecting argumentation performance. There were two major research questions: 1) Will exposure to authoritative information affect the participants' reasoning on a subsequent and related argumentation task? 2) Will those participants holding a particular kind of epistemology belief be more susceptible to the experimental manipulation? While the first research question aimed to establish findings in line with those of Chan and colleagues (2011), the second question tested a moderation effect unique to the design of this study. We first hypothesised that individuals exposed to information from an authoritative source in the experimental group would exhibit poorer performance in argument-counterargument

integration compared to those without such exposure. Second, we hypothesised that there would be fewer counter-arguments and rebuttals among those in the experimental group. We then hypothesised that those holding a naïve belief that knowledge is drawn from higher-status figures, and those who hold that knowledge is certain and absolute, would be more susceptible to the exposure than those who believed that knowledge is essentially self-constructed and simple in its structure.

4. Method

4.1 Participants

204 Chinese undergraduate students (127 women and 77 men), ranging in age between 17 and 25 years ($M = 21.05$, $SD = 1.57$), participated in this study. The participants were randomly assigned to either the experimental ($n = 72$) or control ($n = 132$) conditions. Random assignments were allocated online and all of the procedures took place in group settings. One of the experimental group sessions was cancelled due to bad weather, resulting in the uneven group size distribution. All of the participants were recruited from nine local universities by campus advertisement.

4.2 Experimental Design and Procedures

All of the participants attended group sessions that took place in a regular university classroom. They were informed that the purpose of the study was to collect their views on educational reform policy.

The participants in the experimental group were told by the experimenter that before the actual procedures she would like to make use of the occasion to promote an upcoming seminar and encourage interested participants to attend. The participants of this group were then shown an A3-size poster of a fabricated research seminar titled “In Search of Creative DNA?” It contained the background of the speaker, the date and venue of the seminar and the following abstract:

This seminar will discuss the origin of individual differences in creativity. I will present a recent twins study (N = 36) that aimed to examine the relative strength of genetic and environmental influences on a person’s creativity. Preliminary results on whether there is an identifiable genetic trait for creativity will be discussed. A 30-minute forum with students will be held right after the seminar.

The poster emphasised the speaker’s position as a prominent researcher in the fields of molecular genetics and human cognition. Although the seminar’s title and the researcher’s background implied the possibility of a nature-based conception of creativity, the abstract gave no information about the empirical findings of the research that the participants might have used to draw conclusions on the subject matter. A critical thinker would have acknowledged that there is a need to withhold judgment, at least until he or she had attended the seminar. Here, we were careful to present authoritative information that was essentially

tentative, incomplete and inconclusive. Yet we postulated that due to the expert's knowledge source, the participants would be more inclined to process information in a peripheral manner, and thus would overlook the indefinite nature of the information presented. The experimenter pointed to the seminar poster, which was projected on a white screen in the classroom, and gave a 5-minute verbal introduction that comprised reading the title and abstract aloud. She then announced the start of the actual testing procedures. The group was asked to fill out an inventory about learning and then work on an argumentation task, with the order of filling out the inventory and working on the argumentation task counter-balanced. The entire procedure took about 50 minutes to complete. All of the materials were administered in a paper-and-pencil format. The participants were fully debriefed and offered US\$15 as token of appreciation.

The control group engaged in the exact same procedures except without the manipulation treatment (i.e. exposure to the seminar poster). They began directly with the experimenter asking them to fill out an inventory about learning and work on the argumentation task, with the order counter-balanced.

4.3 Instruments and Materials

The participants were asked to fill in the *Epistemic Beliefs Inventory* (EBI) to examine how their beliefs about knowledge might co-vary with their argument-counterargument performance, which was assessed with an argument generation task.

4.3.1 Epistemic beliefs inventory.

The Chinese version of the EBI (Schraw, Bendixen & Dunkle, 2002), as adapted by Chan et al. (2011), was used in this study. The EBI comprises 32 items on a 5-point Likert scale ranging from “strongly agree” to “strongly disagree”. In this study it was used to measure five epistemological belief facets: Certain knowledge, simple knowledge, innate ability, quick learning and omniscient authority. Sample items included “*Smart people are born that way*” and “*Too many theories just complicate things*”.

4.3.2 Augmentation task.

The participants’ argumentation performances were assessed by a task that asked them to write their view on the education bureau’s decision to make training for creativity a mandatory examination subject for high school students. Before they gave their views, all of the participants were first asked to read three one-page texts respectively representing neutral, nature- and nurture-based perspectives on creativity. Creativity was chosen as the experimental stimulus due to its relatively controversial roots and nature, which despite extensive discussion are not clearly posited in the literature (Karwowski, 2013). This allowed us to present arguments of similar strengths for both sides of the nature-nurture debate on creativity. In addition, the discussion of creativity education has been a heated topic among Asian educators in recent years (e.g. Hui & Yuen, 2010; Wu & Albanese, 2010). Thus, we felt that the topic might arouse the participants’ interest and motivation towards the task.

Passage A took a neutral standpoint and consisted of 400 Chinese words. The text explicitly pointed out that the definition of creativity remains inconclusive and scholars' views have diverged regarding how creativity should be defined and assessed.

Passage B argued for the nurture side of creativity and consisted of 660 Chinese words. It stated that each individual is born with the cognitive potential to be creative, but that the environment determines the extent of such capability. An empirical study on a positive relationship between open and encouraging parenting styles and the creative abilities of young children was used as supporting evidence.

Passage C consisted of 649 Chinese words and argued for the nature side of creativity. It gave well-known classical musicians as examples to illustrate that creativity is a predisposition exhibited by rare individuals. It went on to state that some scientists have argued that it cannot be fully elucidated where and how creative ability arises, and thus it is possibly an unconscious process that cannot be trained or taught.

The pilot study ($n = 33$) using paired samples t -tests showed no significant differences in the participants' ratings on the strength of the argument (i.e. how convincing do you find the argument presented in passage B/C?) ($t = 1.72, p = .10$) and agreeableness (i.e. to what extent do you agree with the argument presented in Passage B/C?) ($t = 1.16, p = .26$).

All of the participants read Passage A first while the order in which Passages B and C were read was counterbalanced to control for order effects. All of the passages were translated into English and included as appendices (see Appendix A).

4.3.3 Coding of argumentation performance.

The participants' scripts on the argumentation task were coded according to a rubric adapted from Chan and colleagues (2011) that breaks argumentation into a list of sub-components. Three undergraduate students who were unaware of the design of the study and blind to the experiment's group assignment were trained to do the coding. All of the scripts were coded by at least two coders. In cases of disagreement a third coder was assigned and all disagreements were sorted until the inter-rater reliability reached 80%.

4.3.4 Statistical analyses.

Binary logistic regression analysis was performed with variables scored as presence or absence (i.e., presence of conclusion, counter-reason, rebuttal, and elaboration).

Multiple regression analysis was conducted to examine the relationship of number of reasons given, overall strength of the argument with epistemological beliefs, and the nature-nurture inclination displayed in the debate (nurture-inclined coded as -1, no preference coded as 0, and nature-inclined coded as 1).

The same set of predictors was used for all analyses. We predicted students' argumentation skills with students age, gender (0=female; 1=male), EBI subscale scores and

experimental manipulation (0=control; 1=experimental). For age, despite its very narrow range, we had included it as a covariate in all analyses to control and thus remove any potential effect it might have on students' argumentation skills. We examined all potential interaction effects involving experimental manipulation. These interaction terms were formed by first standardizing all predictor variables (i.e., subtracting with their respective means and dividing by their respective standard deviation) (Jaccard, 2001) and computing the product terms by multiplying these standardized variables with the standardized experimental manipulation variable. The centering process would remove the potential multicollinearity problems while the other procedures would produce the appropriate standardized effect estimates (Marsh, Hau, Wen, Nagengast, & Morin, 2013). A significant interaction term would suggest that the effect of manipulation on students' argumentation performance on the dependent variables (argument performance) would be different according to their gender, or epistemic belief. As recommended in all analyses with interaction terms, all main and interaction effects were entered simultaneously in the same equation (Marsh et al., 2013).

5. Results

5.1 Argumentation Performance

For the performance on the argumentation task, all participants were able to present a clear conclusion to the controversial issue with an average of 2.6 valid reasons supporting the conclusion. Among the experimental group, 51% elaborated their views with at least one

valid example, metaphor, or cited reference; 25% gave at least one counter-reason; only 8% generated rebuttal. Among the control group, 72% elaborated their arguments; 53% counter-argued; and about 9% generated rebuttal.

About 44% and 58% of the participants from the experimental and the control group, respectively, clearly acknowledged the ambiguity of the issue in their own arguments. 21% from the experimental group clearly indicated a nature-inclined view in their arguments, while 15% of those in the control group did. See Table 1 for the means, SDs, and in some cases, percentages.

5.2 Effects of Exposure to Authority's View and Epistemological Beliefs on

Argumentation Performance

The Chinese version of EBI (Bendixen et al., 1998) adapted by Chan and colleagues (2011) was used in this study. 19 items were retained for a stable five-facet structure: Simple Knowledge (4 items), Certain Knowledge (5 items), Omniscient Authority (2 items), Quick Learning (4 items), and Innate Ability (4 items). Confirmatory factor analyses supported a reasonable fit of the five-factor structure as measured by the common goodness of fit indexes: $\chi^2(142) = 226.3$, RMSEA = 0.052, NNFI = 0.89, CFI = 0.91 (Marsh, Hau, & Grayson, 2005). Higher ratings on the dimensions of the EBI indicate naïve beliefs whereas lower ratings indicate sophisticated beliefs. This presentation is in-line with the studies on indicate personal epistemology in the literature (e.g., Bråten & Strømsø, 2004; Chan et al,

2010; Kardash & Scholes, 1996). Throughout the paper, we would use “naïve believers” to represent those who reported higher ratings and “sophisticated believers” to represent those who reported lower ratings on the dimensions of the EBI. In addition to the discussion in the literature review of the current study, a full description for the characteristics of naïve and sophisticated believers can be found in the work of Schommer’s (1994).

We analyzed the effects of manipulation (i.e., exposure of authoritative information) and epistemological beliefs on argumentation performance in one single model so that all relevant variables would be controlled simultaneously. In this model all predictors including age, gender, experimental conditions (coded 0 for control and 1 for experimental conditions), the scores of the five subscales of EBI, and the interactions of treatment with all other predictor variables were used to predict the argument performance.

Though we had used logistic (Table 2) and multiple regression (Table 3) separately for the dichotomous (presence vs. absence) and continuous argument performance variables respectively, we would discuss the results from these two types of analyses together.

5.2.1 Gender.

In general, as in a lot of verbal related tasks, male participants tended to be weaker than female participants in producing arguments, have a lower chance of producing counter-reason, Odd Ratio (OD = .59), lower chance of producing rebuttal (OD = .45), and lower

overall strength ($\beta = -.18$). Male participants, however, were slightly better than female participants in their recognition of ambiguity ($OR = 1.38$).

5.2.2 Age.

Within the limited age variation within this sample, age did not have a strong effect on the argument performance.

5.2.3 Epistemological beliefs.

For both groups, participants' epistemological beliefs were generally unrelated to their argument performance (for interaction effects, see section 5.2.4). The only relation found was that participants with stronger belief (naïve believers) in omniscient authority produced fewer rebuttals in their arguments ($OR = 0.37$).

5.2.4 Experimental manipulation.

The focus of the current study was on whether exposure to authoritative information affected participants' argumentation performance. As shown in Table 2 and 3, a number of main and interactive effects were significant.

On the main effects of experimental manipulation that did not involve interaction (see Table 2), it was found that exposure to authoritative information led to fewer counter-reason ($OR = .46$) and less elaborated argument ($OR = .64$).

As can be seen from Tables 2, the effects of experimental manipulation did interact with epistemological beliefs. As compared to the control group, the experimental group

generated fewer counter-reason among those reported low ratings on omniscient authority (sophisticated believers) (OR = .61), and very much less counter-reason among those reported high ratings on omniscient authority (naïve believers) (OR = .18). On the generation of rebuttal in argument, omniscient authority generally led to fewer rebuttals regardless of group assignment (OR = .37). While within the experimental group, simple knowledge was related to more rebuttals (OR = 1.03). Though comparison between naïve believers and sophisticated believers were not significantly different, there was a trend for the naïve believers to produce more rebuttals than the sophisticated believers.

Compared to the control group, the experimental group produced arguments that were weaker in strength (beta = -.21). For the control group, beliefs of simple knowledge (beta = -.04), certain knowledge (beta = -.02), omniscient authority (beta = -.01) were not related to the overall strength of argument. Interactions were found among the experimental group. Specifically, experimental manipulation reduced the overall strength of argument much more for naïve believers of omniscient authority (beta = -.41) than for sophisticated believers (beta = -.10). The beliefs of simple knowledge and certain knowledge were positively related to the overall strength of argument. The sophisticated believers of simple knowledge (beta = -.23) and certain knowledge (-.29) generated much stronger arguments than the naïve believers.

Lastly, the argumentation task required participants to read two equally convincing but conflicting views, and an additional neutral view, on the topic of creativity, under both the experimental and the control conditions. Results suggested that the experimental manipulation led to a display of more nature-inclined argument among the naïve believers in simple knowledge ($\beta = .12$) as compared to the sophisticated believers ($\beta = .06$). Sophisticated believers of certain knowledge ($\beta = .26$) and innate ability ($\beta = .20$) were less inclined to a nature perspective than the naïve believers.

5.3 Summary of Major Findings

The first hypothesis was supported. Under the influence of authoritative information, the experimental group produced weaker arguments that were less elaborated and had fewer counter-reasons compared with the control group.

The second hypothesis was partially supported. Epistemological beliefs interacted with the experimental manipulation to influence the participants' argumentation performances. Among the experimental group we found the following: 1) naïve believers of omniscient authority generated far fewer counter reasons and produced weaker arguments than did sophisticated believers; 2) sophisticated individuals who believed in simple, certain knowledge generated stronger arguments compared with the naïve believers; 3) there was a trend of the naïve believers in simple knowledge generating more rebuttals than the sophisticated believers. The first two interactions were consistent with our expectations but

the last was not. Finally, regardless of group assignment, a naïve belief in omniscient authority led to fewer rebuttals. In addition, despite being shown an equally-convincing opposing view during the experimental procedure, naïve believers of simple knowledge were more inclined to adopt a nature-based perspective (one that was consistent with what was implied by the authoritative information) than the sophisticated believers. Likewise, the sophisticated believers of certain knowledge and innate ability were less inclined to adopt a nature perspective.

6. Discussion

In this study, we investigated the effects of authority on Chinese university students' argument-counterargument integration performance. In addition, we analysed how students' epistemological beliefs interacted with the influence that an expert's view over their argumentation performance. We showed the participants a fabricated research abstract on an authority's investigation of the origin of creativity. We gave neither definite conclusions nor concrete evidence in the abstract, although the title of the research and the background of the researcher implied a nature-based perspective of creativity. We then showed all of the participants two equally convincing nature- and nurture-based arguments, along with a neutral conception of creativity. First, we hypothesised that under the influence of an expert's view, the participants would engage in less two-sided reasoning in their arguments. Second, we hypothesised that the participants who believed that knowledge is passed down by

authorities and is absolute in its structure would be more susceptible to the effect of an expert's view than those with a more sophisticated belief in knowledge as self-constructed and multi-faceted in nature. To different extents, empirical support was found for both hypotheses.

6.1 Effects of Authority on Overall Argumentation Performance

The results demonstrated that authority had a significant influence over the participants' argumentation performances. In particular, exposure to an expert's view led to poorer argument-counterargument integration. We found that participants who were shown the expert's view generated weaker arguments that were less elaborated and had fewer counter-reasons than those developed by the participants who were not shown the expert's view. Under the experimental condition, the participants used fewer examples and metaphors in addition to citing fewer references (i.e., 51%) when illustrating their point of view, compared with those under the control condition (i.e., 72%). Only a quarter of those in the experimental condition incorporated views counter to their own point of view, while about half of those under the control condition did so. The participants in both conditions provided an average of 2.6 valid reasons to support their standpoints. Given that the number of reasons these participants provided to support their arguments were not statistically different, it is reasonable to conclude that participants put similar effort in arguing *for* their own standpoints. Therefore, the differentiated level of performance was due to effort spent responding to the

opposing perspective. We postulated that the participants who were not shown the expert's view would pay equal attention to evidence of the conflicting views and thus be more aware of the controversy and uncertainty of the subject matter. This would lead to them feeling the need to address counter views and put more effort into elaborating their own arguments with convincing examples, metaphors or references. In contrast, the participants under the influence of the expert's view might have seen the subject matter as less debatable and thus been less motivated to develop their arguments, despite being shown equally valid evidence from both sides. In fact, the descriptive statistics showed a trend for those who were shown the expert's view to be more inclined to use a nature-based explanation for creativity. As a result, the expert's view led to a somewhat biased evaluation of the subsequent evidence of the nature and nurture perspectives.

The following section provides a discussion of the role that epistemological beliefs play in argument-counterargument integration under the influence of authority.

6. 2 Epistemological Beliefs and Argument-counterargument Integration under the Influence of Authority

Participants holding different epistemological beliefs were found to be more or less susceptible to the influence of authority. First, among the participants who were shown the expert's view, those who held the belief that knowledge is drawn from authority generated far fewer counter-reasons and weaker arguments than those who perceived knowledge as self-

constructed through empirical reasoning. The perception of knowledge as the result of objective and independent reasoning instead of something passed down by authoritative agents resulted in a much higher likelihood of a two-sided argument, suggesting that a sophisticated epistemological belief about the source of knowledge served to protect an individual in situations where information might be unclear or potentially false.

Associations were also identified for the epistemological beliefs of simple and certain knowledge, and the overall strength of argument under the influence of authority. The participants who were sophisticated believers of simple and certain knowledge generated stronger arguments than those who were naïve believers. This finding is somewhat consistent with results reported in earlier studies, which found that adopting a naïve belief in the simplicity dimension was related to generating an oversimplified conclusion that ignored the opposing view. It was also less inclined to acknowledge the diverse nature of a controversial issue, and thus produced weaker arguments in general (Chan et al., 2011; Kardash & Howell, 2000; Schommer-Aikins & Hutter, 2002).

Surprisingly, we found that the participants who believed that knowledge was complex, such that truth could depend on perspective, generated fewer rebuttals than those who believed that knowledge was straightforward and stable. In other words, the naïve believers of simple knowledge were more likely to counter-argue the counter-evidence. A

possible explanation is that a straight-forward belief about the structure of knowledge may have led to a more determined effort to convince other people of their own perspective.

This study sheds light on how epistemological beliefs might serve to moderate under a particular context. The participants' epistemological beliefs and their argumentation performances were not directly related. Relationships were only observed under the influence of authority, which addresses the question of whether an individual's representation of knowledge is domain generic or specific. We attributed this finding to the possibility that the authoritative information used in the manipulation might have prompted the participants to tackle the argumentation task in a manner that conformed to the sophistication of their beliefs about knowledge. Foregoing the manipulation, the argumentation task itself might be general and thus might not have been an adequate stimulus to capture the differences in participants' epistemological beliefs and reasoning. This interpretation of our findings is somewhat in line with Bromme et al. (2010), who found that only under reflective thinking conditions did learners with sophisticated beliefs approach learning through an elaborative manner.

6.4 Implications for Practice

The expert's view in this study gave considerable credence to the superiority of a piece of information. Intellectual autonomy is a top priority in twenty-first century skills. Stylianides (2007) has called for the design of a pedagogy that encourages students not to rely on external authority figures. Instructional practices are often "interpreted through the

lens of students' epistemological assumptions" (Hofer, 2004). For instance, scholars have argued that it is a common practice for textbooks, particularly in science curricula (Carey & Smith, 1993), to present a uni-dimensional perspective on a topic. Although this study portrayed a systematic and gradual accumulation of how a set of hypotheses were confirmed, alternate approaches to problems might have been omitted. Thus, it is important for educators to present and discuss divergent views when designing teaching materials for students. To advocate critical and independent reasoning, students must become aware of their beliefs about what constitutes knowledge, and reflect on how one comes to know something. In addition, it is important for educators to make more use of ill-structured issues in real-life contexts. Students often find it more convincing when the ambiguities of knowledge are demonstrated using real issues that they are likely to encounter in their daily lives. Teachers should present evidence from diverse sources and of different views, and students should be encouraged to withhold their judgment when evidence is insufficient or incomplete. This will help students to develop conscious strategies for evaluating and integrating information from different sources, and ultimately for knowing.

The process of argumentation involves identifying the conclusion, premises and assumptions; weighing the reasons for and against a particular proposition; and identifying a logical fallacy before reaching a judgment. Yet our findings showed that the participants' ability to explicitly explain why one side of an issue was stronger than another was not

apparent in most of the essays (Nussbaum, 2008). To provide students with more sophisticated argumentation skills, research has suggested that two-sided reasoning can be enhanced when students were given clear and systematic instruction on the criteria of a good argument (Nussbaum & Schraw, 2007). Using a graphic organiser to visually demonstrate two-sided thinking also enhanced the use of counterarguments.

6.5 Limitations and Future Directions

The effects of presenting an expert's view on argument-counterargument performance were visible, but the findings were constrained to the context of the experimental design. We used a topic that the participants were mostly unfamiliar with (i.e. creativity) as the manipulation to gain insight into the domain specificity of an individual's epistemological beliefs. It would be interesting to examine whether our findings could be replicated under a topic from the student participants' own discipline. The literature has repeatedly demonstrated that students' previous beliefs lead to biased reasoning (Evans, 2006; Klaczynski, 2004) and the devaluation of counter evidence (Klaczynski, Gordon & Fauth, 1997; Neilens, Handley & Newstead, 2009). However, as this study was designed to investigate group differences, we were unable to tease out more precise relationships between the previous assumptions the participants' might have held about creativity and their reasoning.

Apart from culture, a number of contextual factors might influence how an individual views the power of an authority, such as a person's previous knowledge and assumptions about an issue, his or her representation of the self as independent or dependent, parent-child relationships, etc. (Hofer, 2010; Markus & Kitayama, 1991). Future studies should examine these factors in addition to cross-cultural comparisons to gain insight into the effects of context on the stability and domain specificity of epistemological beliefs. We examined the overall argument-counterargument performance in terms of whether a student participant acknowledged and addressed a counter view, whereas Mateos and colleagues (2011) argued that there are four levels of argument-counterargument integration that researchers should consider: concluding through acknowledging the inconclusive nature of the issue while urging the need for further evidence, arguing for of a position while against the opposite position, presenting an in-between conclusion that represents the pros and cons of both positions, and restructuring the positions into a hierarchy. These levels provide a comprehensive framework for further qualitative examinations of students' strategies for handling conflicting views.

Given our choice of the malleability of creativity as the experimental stimulus, we felt the need to discuss our findings in relation to the literature on the creative mindset as fixed-versus-growth and implicit theories of personal attributes. The model of implicit theories holds that a person's assumptions about self and the world structure his or her social

perceptions, motivations and behaviour (Dweck, 1996). Previous studies have generally demonstrated that beliefs about the malleability of creativity are associated with higher self-efficacy of creativity, self-reported creativity and better performance in creative problem-solving tasks (e.g., Karwowski, 2013; O'Connor et al., 2013). Our study revealed the participants' preference for the roots of creativity, as displayed in the argumentation task (see Table 3). Previous exposure to authoritative information biasing toward the nature side of creativity did not lead to more nature-based preferences. Furthermore, unlike O'Connor and colleagues' (2013) finding of a mutual relationship between implicit theories on intelligence and creativity, we found that epistemological beliefs about the innateness of learning ability were unrelated to a nature-based conception of creativity. This discrepancy could be due to the fact that we did not measure the participants' creative mindset directly, and thus it was not fully reflected in their argumentative writing. Further, our study somewhat prompted the creative mindset in an either-or manner. Karwowski (2013) noted cases where people held both the fixed-versus-growth mindsets simultaneously. Future studies should therefore assess the previous beliefs and assumptions participants may hold regarding the issue chosen as experimental stimuli in a more explicit and flexible manner. Finally, Confucianism has been found, in some studies, to negatively affect creativity (e.g., Kim, 2009; Kim et al., 2011), yet whether a Confucian culture contributes to the creativity mindset as fixed or changeable requires further examination.

Lastly, the current study adopted the inventory developed by Schraw et al. (2002) basing on Schommer's (1990) original Epistemological Questionnaire. When using an inventory that measures a person's general set of beliefs about knowledge, there is a need to be cautious on the possibility of over simplifying what constitutes sophisticated and naïve believers with regard to different contexts. Our findings suggested that sophistication of epistemological beliefs were made salient only under the experimental condition. Future research should examine factors facilitating or preventing an individual in acting accordingly with his or her general beliefs about knowledge.

In summary, we highlighted the influence that authority had on student participants' two-sided reasoning and a reciprocal relationship between more advanced representations of knowledge and argument-counter argument integration. There is a need to explicitly nurture in students the understanding of the nature of knowledge as multifaceted and ever changing. There is also a need to reflect on whether teachers are presenting themselves as dominating and authoritative, and to what extent such presentation affects students' ability to process evidence, reason and exercise independent thinking.

Table 1

Age, Gender, Epistemic Beliefs and Argumentation Performance of Hong Kong Chinese University Students (N=204)

	Control <i>N</i> = 132 Mean (<i>SD</i>)	Experimental <i>N</i> = 72 Mean (<i>SD</i>)
Age	21.06 (1.65)	20.94 (1.23)
Gender (<i>n</i> , %)		
Male	54 (41)	23 (32)
Female	78 (59)	49 (68)
Epistemic Belief Inventory		
Simple Knowledge	2.67 (0.66)	2.74 (0.59)
Certain Knowledge	1.93 (0.58)	1.98 (0.48)
Omniscient Authority	2.13 (0.72)	2.03 (0.62)
Quick Learning	2.17 (0.61)	2.16 (0.48)
Innate Ability	3.36 (0.78)	3.26 (0.84)
Argumentation Performance		
Presence of Conclusion (<i>n</i> , %)	132 (100)	72 (100)
Presence of Counter-reason (<i>n</i> , %)	70 (53)	18 (25)
Presence of Rebuttal (<i>n</i> , %)	12 (9)	6 (8)
Recognition of the Ambiguity (<i>n</i> , %)	77 (58)	32 (44)
Presence of Elaboration (<i>n</i> , %)	95 (72)	37 (51)
Displayed Preference (<i>n</i> , %)		
No Preference	81 (61)	43 (60)
Nature-inclined	20 (15)	15 (21)
Nurture-inclined	31 (23)	14 (19)
Number of Reasons Provided	2.57 (1.06)	2.55 (1.03)
Overall Strength of the Argument	2.46 (0.81)	2.18 (0.79)

Table 2

Logistic Regression (Odds Ratio) on Argumentation Performance by Age, Gender, Epistemic Belief and Priming

Predictor	Presence of <i>Counter-reason</i>	Presence of <i>Rebuttal</i>	Recognition of <i>Ambiguity</i>	Presence of <i>Elaboration</i>
Gender (0 = female; 1 = male)	0.59**	0.45*	1.38*	1.03
Age	0.84	0.59	1.08	0.94
Manipulation (0 = control, 1 = expt)	0.46***	0.61	0.58	0.64**
<i>Epistemic Belief Inventory</i>				
Simple Knowledge	0.94	0.88	1.34	0.86
Certain Knowledge	1.17	1.76	1.06	1.18
Omniscient Authority	0.93	0.37*	0.92	0.81
Quick Learning	0.89	1.03	0.98	0.97
Innate Ability	1.10	1.67	1.20	1.01
<i>Interactional Effects</i>				
Manipulation × Gender	0.86	1.18	1.18	1.00
Manipulation × Simple Knowledge	1.29	2.14*	1.02	0.80
		[.54,1.03]		
Manipulation × Certain Knowledge	1.29	1.99	0.87	1.33
Manipulation × Omniscient Authority	0.63*	0.67	0.86	0.71
	[0.61*, 0.18***]			
Manipulation × Quick Learning	0.91	0.30	1.10	0.91
Manipulation × Innate Ability	1.08	1.54	1.16	1.34
Model χ^2	31.78**	25.27*	17.94	19.53
Nagelkerke R^2	.19	.26	.11	.13

Note. In gender, male is coded as 1, female as 0; the experimental group is coded as 1, control as 0; for the dependent measures, the code of 1 denotes presence of counter-reasons, rebuttals, recognition of ambiguous nature of creativity, and elaborations in the argument; for displayed preference on the conception of creativity, the reference category (code=0) is absence of any displayed preference. When the interaction is significant, the simple effect (odd ratio) due to experimental treatment (provision of uncertain information) of the low and high groups of the respective moderator variable were shown in brackets; e.g., 0.61 and 0.18 represent the odd ratios of manipulation effects for students with low and high omniscient authority epistemic beliefs respectively.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3
Multiple Regression (Betas) on Argumentation Performance by Age, Gender, Epistemic Belief and Manipulation

Predictor	Number of Reasons	Overall Strength	Nature preference
Gender (0=female; 1=male)	-0.08	-0.18**	.02
Age	0.01	-0.06	.17*
Manipulation (0 = control, 1 = expt)	-0.01	-0.21**	.06
<i>Epistemic Belief Inventory</i>			
Simple Knowledge	-0.03	-0.04	.15
Certain Knowledge	-0.09	0.02	.08
Omniscient Authority	-0.01	-0.11	-.12
Quick Learning	0.05	0.01	-.06
Innate Ability	0.02	0.04	.14
<i>Interactional Effects</i>			
Manipulation × Gender	-0.01	0.03	-.01
Manipulation × Simple Knowledge	0.01	0.17* [-.23*, -.18]	.20* [.06, .12]
Manipulation × Certain Knowledge		0.15* [-.29**, -.12]	-.19* [.26*, -.08]
Manipulation × Omniscient Authority	-0.04	-0.16* [-.10, -.41***]	-.03
Manipulation × Quick Learning	0.02	-0.14	.02
Manipulation × Innate Ability	0.01	0.07	-.19** [.20*, -.08]
<i>F</i> (14,189)	0.31	1.79*	2.20*
<i>R</i>	.15	.34	.37

Note. Male is coded as 1, female as 0 in gender; the experimental group is coded as 1, control as 0. When the interaction is significant, the simple effect (beta weight) due to experimental treatment (provision of uncertain information) of the low and high groups of the respective moderator variable were shown in brackets; e.g., 0.1, -.06 represent the beta weights of manipulation on number of reasons for younger and older students.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix A

Three passages translated from Chinese, respectively representing neutral, nurture- and nature-based perspectives on creativity participants read prior to the argumentation task

Passage A: What is Creativity?

Although creativity has a wide range of definitions, it is generally understood in relation to two elements: novelty and utility.

Scholars share different understandings about the nature of creativity. For instance, psychologist Robert E. Franken who studies human motivation believes that creativity is “the tendency to generate or recognize ideas, alternatives or possibilities that may be useful in solving problems, communicating with others and entertaining ourselves and others”¹. Teresa M. Amabile, a business school professor, believes that “creativity is the production of novel and useful ideas in any domain”², and other scholars believe that creativity is a set of habits of the mind or a personality that is open, flexible and daring.

Individuals exhibit creativity in different ways. Some scholars have defined creativity as an innate ability where genetic influences are primary. Others argue that creativity is the result of one’s upbringing, education and social environment. Some adhere to the position that nature and nurture are equally important and mutually influencing factors.

Psychologists and educationalists have developed various creativity tests. However, there is no universal standard in assessing creativity. There is no one agreed belief regarding what creativity is.

Passage B: Nurturing Creativity

Creativity is not an innate ability. Some people are more creative due to their upbringing.

¹ Franken, R.E. (2007). *Human motivation* (6rd Ed.). Belmont, CA: Thomson/Wadsworth. (p. 348).

² Amabile, T.M. (1996). Creativity and innovation in organizations. *Harvard Business School Background Note*, 396-239, January 1996. (p. 1).

One's environment, including family, society and school, deeply affects the development of one's creativity. The parents of "creative children" tend to be more open-minded. For example, they are more willing to accept children's failure and respond by encouraging their children to learn from their mistakes. Donald MacKinnon, the founder and then Director of Institute of Personality Assessment and Research of UC Berkeley, argued that parenting styles and parent-child relationships are crucial to children's creativity development³. He pointed out that parents could stimulate their children's creative development by being more democratic and respecting than controlling and restraining, avoiding excessive negative comments and encouraging them to explore, imagine and try things out.

Likewise, a corporation's working environment and management styles also affect employees' creativity. The more a corporation accepts change, values the exchange of information, provides employees ample time and space for their tasks and ideas and encourage employees to voice their opinions, the better the employees can unleash their creativity. Ken Auletta described in his best-seller *Googled: The End of the World as We Know It* that Google's unrestrained working environment and open atmosphere is what makes Google one of the most innovative and influential companies in the world. Google's headquarters is equipped with cafés, sports centres, salons and lawns that promote a stress-free, familial work space. Google's corporate culture emphasises fairness, liability and respect. Its employees work without restraints of hierarchy. New employees can speak directly to the management and Google even encourages its engineers to spend 20% of their work time on side-projects that interest them so that they have the time and opportunity to exercise their creativity⁴.

³ MacKinnon, D.W. (1962). The nature and nurture of creative talent. *American Psychologist*, 17(7), 484-495.

⁴ Auletta, K. (2009). *Googled: The end of the world as we know it*. Penguin: New York: NY.

It is evident that social environment is greatly associated with creativity. A free and open environment stimulates the development of creativity, whereas a restrained setting has a negative effect.

Passage C: Creativity is Innate

Many famous people have exhibited their creativity since a young age. W.A. Mozart began writing beautiful music at age 6. Pablo Picasso also exhibited his unique thoughts and personality from a young age, earning first place in a nation-wide arts competition at age 16. More than 70 great musicians in the 16th-19th Centuries came from the Bach family. Young creative geniuses coming from the same family is strong evidence for the role of genetic influence in determining an individual's creativity.

Moreover, many scholars believe that creativity is a rare ability. Educational psychologist and human intelligence researcher Phillip Vernon pointed out that only approximately 2% of the world's population possesses "high" creativity⁵. An ordinary individual and a highly creative individual exhibit creativity in very different ways. Although creativity is needed in our daily lives, only a small number of highly creative individuals can hugely improve the lives and cultures of the masses through their inventions and creations. For instance, Picasso's cubism changed our cognition of the relationship between reality and drawing. Not many people have achieved the high creativity exhibited by Mozart and Picasso, even with the same upbringing and education. Just as genes affect our body shape, intelligence and emotions, they could also determine our creativity.

Creation often happens in a flash. French mathematician Henri Poincaré described creativity, "it is by logic that we prove, but by intuition that we discover"⁶. He proposed that some creative processes happen subconsciously. When things that do not show apparent relationships are subconsciously and randomly associated, they break our usual ways of

⁵ Vernon, P.E. (1979). *Intelligence: Heredity and environment*. San Francisco, NC: W.H. Freeman & Company.

⁶ Poincaré, H. (1914). *Science and method* (F. Maitland, Trans.). London: Thomas Nelson and Sons (p. 129)

reasoning and end up as brand new concepts; that is, the process is not the outcome of learning

The process of creation is mysterious. We have not yet thoroughly scrutinised “creativity”, but it is apparent that creativity is related to genetic influences. No matter how much effort we put into giving a child an ideal upbringing and education, we cannot make a creative genius out of an ordinary individual.

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