Fueling doubt and openness: Experiencing the unconscious, constructed nature of perception induces uncertainty and openness to change

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ABSTRACT

Because people lack access to the many unconscious thought processes that influence perception, they often have the experience of seeing things "as they are". Psychologists have long presumed that this "naïve realism" plays a role in driving human confidence and closed-mindedness. Yet, surprisingly, these intuitive links have not been empirically demonstrated. Presumably, if naïve realism drives confidence and closed-mindedness, then disabusing people of naïve realism should reduce confidence in one's judgments and instill openness to change. In the present experiment, we found that participants who read about naïve realism and also experienced various perceptual illusions showed reduced confidence in their social judgments and indicated a greater willingness to change their judgments relative to participants who merely read about naïve realism and perceptual illusions, participants who received failure feedback on an earlier task, or participants left in a baseline state. Broadly, the present research provides evidence for an untested origin of human confidence and closed-mindedness and may have broad implications for decision making.

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1. Introduction

Human confidence and closed-mindedness may, in part, stem from the fact that people are typically unaware that many unconscious thought processes intervene between sensation and judgment. Because much mental work is hidden from awareness (Bartlett, 1932; Bruner, 1957; Nisbett & Wilson, 1977; Shiffrin & Schneider, 1977), people have the experience of seeing things "as they are" (Asch, 1952; Gilovich, 1990; Hastorf & Cantril, 1954; Ichheiser, 1943; Ross & Ward, 1996). Psychologists and philosophers have long postulated that this meta-cognitive phenomenon, labeled "*naïve realism*", drives human confidence and

steadfast adherence to beliefs (e.g., Asch, 1952; Fischhoff, Slovic, & Lichtenstein, 1977; Ichheiser, 1943; James, 1890; Kahneman, 2011; Pronin, 2009; Ross & Ward, 1996; Smith, Kassin, & Ellsworth, 1989). Surprisingly, these intuitive connections between naïve realism and human cognition remain untested. The goal of the present research is to attempt a direct test of these connections. In particular, we address whether *challenging* naïve realism *reduces* confidence in one's judgments and instills a greater openness to change. Hence, the current research tests a long-standing proposition in psychological science regarding the origins of human confidence and closed-mindedness.

If naïve realism contributes to confidence and closed-mindedness, then leading people to acknowledge the self-relevance of naïve realism should instill doubt that one's perceptions match reality and open people up to change. Perhaps if people are made aware that unconscious thought processes are constructing their perceptions, they might

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treat their perceptions with greater skepticism and be more likely to consider changing them. Interestingly, evidence suggests that when people are taught about unconscious cognition they are willing to recognize at least some subjectivity in their own thinking. In one study (Pronin & Kugler, 2007), participants were more likely to acknowledge their own susceptibility to various social-cognitive biases after reading an article about the hidden forces that shape human behavior and judgment. This initial finding is intriguing, partly because it suggests that people are open to acknowledging general biases that reflect unconscious thought processes.

Nevertheless, acknowledging that one may be susceptible to biases is quite different than actually tempering one's confidence or being open to change. Indeed, lowering people's confidence and inducing openness seems rather difficult. For example, despite repeated failed decisions, people often continue to have confidence in their *next* decision and can seem unreceptive to decision change (reviews by Hart et al., 2009; Kahneman, 2011). Presumably, people often fail to understand that the same biases that were present for failed decisions are also likely present for one's current decisions (Kahneman, 2011). People may be similarly reluctant to adjust for the operation of naïve realism in their own thinking for two main reasons (Wilson & Brekke, 1994): (a) the influence of unconscious processes is, by definition, not accompanied by a feeling that the brain is altering reality; and (b) people are rarely made aware of the ways in which such unconscious processes have influenced their *own* perceptions.

Here, our primary objective is to test whether personal firsthand experiences that expose the operation of invisible, uncontrollable thought processes might instill doubt in one's perceptions and greater willingness to change them. Perhaps when people personally witness the unconscious mechanisms constructing a perception and also realize that this influence will not usually be accompanied by a conscious experience of its operation, people should find it easier to subsequently generate uncertainty about their judgment and might see a stronger rationale for change. Indeed, although it may be rather easy for people to dismiss mere warnings about naïve realism (or facts about information processing) as irrelevant to one's own judgments ("in the face of validity," Kahneman & Tversky, 1973), firsthand experiences that expose naïve realism in one's own judgments may be rather difficult to dismiss.

To address these ideas, participants were assigned to either an experiential naïve realism challenge condition or one of three 'control' conditions. Hence, participants could be randomly assigned to one of four conditions: an experiential naïve-realism challenge condition, a non-experiential naïve-realism challenge condition, a "failure" condition, or a "baseline" condition. The experiential naïve-realism challenge condition involved reading about naïve realism with illustrative visual illusions. The non-experiential naïve-realism challenge condition involved reading about naïve realism without illustrative visual illusions. The "failure" condition involved completing difficult verbal problems and then receiving negative feedback about one's performance (i.e., this condition highlighted the fallibility of one's judgments, but it failed to mention

naïve realism as a mechanism). The baseline condition involved reading about the social behavior of chimpanzees. Next, participants completed a social-judgment task that involved reading about a person's ambiguous behaviors (e.g., going out on a midnight hike through the woods alone), categorizing this person in one two possible ways (e.g., adventurous or risky), and then indicating confidence in this categorization and willingness to possibly change the categorization.

In this study, comparisons between the experiential and non-experiential naïve-realism conditions allowed us to assess the role of first-hand experiences that expose naïve realism in fueling doubt and openness to change. Comparisons between the experiential and failure conditions allowed us to isolate the importance of detecting the fallibility of one's own judgment to naïve realism in driving subsequent doubt and openness. Comparisons between the experiential and baseline conditions allowed us to assess the effect of experiential learning against a baseline.

2. Method

2.1. Participants

193 undergraduate students (152 women) participated in the study. Participants were recruited in one of three ways. Some participants were recruited through our Introductory Psychology research pool and they received partial course credit ($N = 126$). Participants signed up online to participate in the experiment. Other participants were recruited through public spaces on the University of Alabama Campus and they received candy ($N = 38$). Still other participants were recruited from a Psychology and Law course and they received extra credit in their course ($N = 29$). Power calculations showed that a minimum of 164 participants were required to achieve a power of .75, with an alpha of .05, to detect a medium-sized main effect of experimental condition ($f = .25$). We over-sampled by 29 participants because we collected data from participants who signed up for the experiment in advance of us meeting the quota.

2.2. Design

The design contained 4 cells with one factor (condition: experiential naïve-realism; non-experiential naïve-realism; failure; baseline). The main dependent variable was participants' self-reported confidence on a social-judgment task and their reported openness to change their minds about their judgments.

2.3. Method

All tasks and instructions were delivered to the participant via the computer. When data were collected in the lab, participants were seated at a computer terminal. When data were collected in the field, participants were seated in front of a laptop computer in a quiet space in a campus library. To limit demand or awareness of the study's purpose, participants were told the session

involved a series of unrelated tasks and studies. We explained "*because each of the studies was rather short, we decided to put them into a single session*". At the outset of the study, participants completed an instructional manipulation check (IMC; Oppenheimer, Meyvis, & Davidenko, 2009). The goal of the IMC was to (a) make sure participants were reading the study materials carefully and (b) possibly motivate a careful approach. The IMC involved the presentation of the question "What is your favorite sport?" at the top of the computer screen. Below this question were various response options (e.g., Football, Basketball). Importantly, a box titled "Instructions for this answering this question" was centered and placed to the right of the response options. This box included text that thanked the participant for reading instructions and instructed them to select "Curling" from the response options. Participants were given five opportunities to pass this check (i.e., select "Curling"), with incorrect responses prompting a message encouraging them to pay closer attention to written instructions. All the participants passed the check, and therefore all the participants were retained in the main analyses (as is suggested in Oppenheimer et al., 2009).

In the "first study" in the session, participants were randomly assigned to one of the four conditions. Participants assigned to the experiential and non-experiential naïve-realism conditions were told:

"*The first study involves reading an article on Psych___ and then getting your views on the article (e.g., did it s___ insightful?) We actually have several articles that ___ would like to get people's opinion on. But, because we re___ ize that your time and energy is limited, t__ ___uter wil___ randomly assign you only one of these ___icles.*"

Participants assigned to the fa___ cond___ ___ instead told:

"*The first study involves co___eting a type___ ___telligence test. We would like to g___ ___pinion of the___ ___k so we know whether to use th___ ___ask in ___equent studies.*"

In the experien___ naïve-realism co___ion, participants read an "article___ ___bout n___ve realism (see Table 1 for excerpts) – sp___cally ___ article argued that the brain engages in "hidd___ ___ that is ___available to consciousness and ___ ___produ___ ___bjecti___ ___and sometimes errors in perce___. ___hin th___ ___t, participants were shown eig___ ___sual ___sions tha___ ___llustrated how the brain alters re___ and ___ ___specific (inaccurate) interpretations of re___ ___ithout o___s intent or awareness (see Appendix A for th___ ___visual illusions). Each visual illusion contained an introdu___y screen that allowed participants to experience the illu___on and subsequent screens explained how the illusion works. In the non-experiential condition, participants read identical information about naïve realism but were not exposed to the visual illusions. In the failure condition, participants completed 10 difficult analogies from the Graduate Record Examination. After participants completed the task, they were told that they scored in the 21st percentile. Participants in a baseline condition read about a Psychology-relevant topic (the social behavior of chimpanzees) that was matched in length to the

description of naïve realism. To stay true to the cover story and mark an end to the "first study", participants in each condition were asked their opinion on the task.

The "second study" was described as a study on person perception that entailed reading a scenario about a person and then indicating an impression of that person. In that context, participants read vignettes about a character that engages in behaviors that could be categorized in at least one of two ways. For example, in one vignette (borrowed from Srull & Wyer, 1979), "Donald" e___ ___ in a set of behaviors that could be perceived as "b___ ___e o___ ___ertive":

> *I ran into my old friend Donald th___ ___er day, and ___ ___cided to go over and visit him, sin___ by c___ ___dence we ___ k our vacation at the same time___ ___n after I ___ ed, a ___ esman knocked at the door, b___ ___onald ___efused ___ ___m enter. Donald also told me ___t he w___ ___efusing t___ ___ay his rent until the landlord rep___ ___ ___apartm___t. We talked for a while, had l___, and ___ ___went o___ ___r a ride. We used my car, sin___ ___nald's had b___ ___n ___n that morning, and he told ___ ___g ___e mechanic___ ___ he would have to go somewh___e els___ ___e couldn't fix his car the same day. We went to the pa___ ___ about an hour and then stopped ___ ___dware store. I ___ sort of preoccupied, but Donald ___ought some small gadget, and then I heard him demand ___is money b___ from the sales clerk. I could not find what ___was lookin ___r, so we left and walked a few blocks to ___her sto___ ___he Red Cross had set up a stand by the door an___ ___s to donate blood. Donald lied by saying that he had diabetes and therefore could not give blood. It's ___ ___t that I hadn't noticed it before, but when we got to the store we found it had gone out of business. It was getting kind of late, so I took Donald to pick up his car and we agreed to meet again later.*

In the other three vignettes, characters engaged in a set of behaviors that could be categorized as "Risky vs. Adventurous", "Agreeable vs. 'A pushover'", and "Introverted vs. Snobbish". After reading each vignette, participants indicated a forced-choice decision about the character's trait (e.g., is the character "assertive" or "aggressive"?) and then indicated their confidence and willingness to change this choice. In particular, participants used a 1–10 scale to respond to three items: *To what extent do you feel confident in your choice?; To what extent do you think others might agree with your choice?; To what extent might you be willing to change your view of [character name]?* We computed participants' average confidence, anticipated agreement, and openness to change across the four vignettes. Average confidence and average anticipated agreement were highly related ($r = .49$), and were therefore averaged into a single index of "*confidence*". The average openness to change index was weakly correlated with this confidence index ($r = .17$, $p = .02$), which prompted us to analyze it separately. Next, participants were probed for awareness of the experiment's purpose using following items: *What do you think the purpose of the experiment was? What do you think this experiment was trying to study? Did you think any of the tasks that you completed were related in any way? Did anything you did on one task affect what you did on any other task?* As a manipulation check, participants completed five items assessing knowledge of unconscious

Table 1
Excerpts from experimental manipulations.

Experiential naïve realism condition	Non-experiential naïve realism condition	Failure	Baseline
The first study involves reading an article on Psychology and then getting your views on the article…	The first study involves reading an article on Psychology and then getting your views on the article…	The first study involves completing a type of intelligence test…	The first study involves reading an article on Psychology and then getting your views on the article…
[Example illusion] Please look at the following image. Which of the two squares, "A" or "B" appears to be darker?	Visual illusions provide a glimpse of how our brain twists reality without our intent or awareness. Under specific circumstances we can misperceive the size of objects, the darkness and lightness of objects, the motion of objects (e.g., seeing a motionless object as moving), and even fail to see certain objects in a scene…	You are now ready to begin the first task. The task consists of 8 analogies… [Example question] ESSAY :: THESIS (a) story : protagonist (b) novel : book (c) writer : fiction (d) article : topic (e) law : stricture	About ten years ago, Stephen Ross began getting more and more calls from chimpanzee owners who wanted to get rid of their animals. Ross is the director of the Lester E. Fisher Center for the Study and Conservation of Apes at Lincoln Park Zoo and he administers the Chimpanzee Species Survival (CSSP). The increasing number of calls made him realize that there were a lot of privately owned chimpanzees in the United States…
Although you likely decided that square "A" is darker than square "B," the two squares are actually the exact same shade			
Visual illusions are often shocking because they show us that we do not simply see "things as they are"…	Visual illusions are often shocking because they show us that we do not simply see "things as they are"…	Your score places you in the 21st percentile of all subjects who have performed this task. This means that you did better than 21% of respondents	And it's not just about changing who should own a chimpanzee. "It also has a lot to do with helping zoos and sanctuaries who have taken in ex-pets and ex-performers understand the special needs of these chimpanzees", says Ross. "The
In conclusion, it is important to know that we cannot stop our brain from engaging in its secret work …	In conclusion, it is important to know that we cannot stop our brain from engaging in its secret work …		more information we give them about what challenges these chimpanzees face, the better they'll be able to set up specific management protocols that can make the transition a bit easier
But there IS good news Although we cannot stop our brain from acting like a brain, we CAN do something else. We can come to doubt the false sense of "seeing things as they are"	But there IS good news Although we cannot stop our brain from acting like a brain, we can do something else. We can come to doubt the false sense of "seeing things as they are"		

processing of information. Participants were asked to respond "true" or "false" to five statements about the role of unconscious processing (e.g., "*Our brains shape our views and perceptions and this process can be hidden from our conscious awareness*"). Lastly, participants completed some demographic questions, such as gender and age.[1] No other measures or experimental conditions were included.

3. Results

3.1. Awareness

Responses to the funnel debriefing were carefully checked for awareness of the experiment's purpose by research assistants under the guidance one of the co-authors (W.B.S). One participant (assigned to the failure condition) expressed awareness that the "two studies"

were related and the analogies were designed to make him/her less confident on the person-perception task. This individual's data were excluded from the analyses we report here. No other participant expressed suspicion or awareness. Instead, people believed they had participated in studies that centered on creating materials for future Psychology studies.

3.2. Confidence

The confidence index was submitted to a one-way ANOVA with experimental condition (experiential naïve-realism; non-experiential naïve-realism; failure; baseline) as the independent variable. We expected reduced confidence in the experiential naïve-realism condition compared to any of the other comparison groups. The analysis revealed a main effect of condition, $F(3, 189) = 11.80$, $p < .001$, $\eta_p^2 = .16$. Planned contrasts revealed that participants in the experiential naïve-realism condition expressed lower confidence ($M = 6.43$, $SD = 0.79$), compared to participants in the non-experiential naïve-realism condition ($M = 7.36$, $SD = 0.97$), $p < .001$, $g = 1.16$, 95% CI [.73, 1.60], failure condition ($M = 7.09$, $SD = 0.73$),

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[1] Participants also completed a brief Need-For-Closure measure (NFC; Roets & Van Hiel, 2011). Because NFC positively relates to confidence and closed-mindedness (Kruglanski & Webster, 1996), we planned to consider it as a covariate in our analysis of the confidence and openness to change indices. Nevertheless, because NFC was unrelated to either variable ($ps > .10$), we did not consider it as a covariate in the main analyses.

DV Measures	Experiential (Group 1)		Non-Experiential (Group 2)		Failure (Group 3)		Baseline (Group 4)		*F*	*p*	Group Differences
	M	SD	M	SD	M	SD	M	SD			
Confidence	6.43	0.79	7.36	0.97	7.09	0.73	7.26	1.04	11.80	< 0.001	1 < 2, 3, 4
Openness	5.58	1.99	4.98	2.04	4.80	1.36	4.47	1.04	3.36	< 0.05	1 > 2, 3, 4
Knowledge	3.65	0.56	3.62	0.71	3.08	0.82	3.10	0.91	8.05	< 0.	1, 2 > 3,

Note. **Groups:** *Experiential* (1) – learn about naïve realism with visual illusion, *Non-experiential* (2) – learn about naïve realism without visual illusions, *Failure* (3) – negative feedback on performance highlights fallibility of judgment, but naïve realism not mentioned as a mechanism, *Baseline* (4) – control condition involving reading about social behavior in chimpanzees; **Dependent Variable Measures:** *Confidence* – participants indicate their confidence in character's after reading about said characters in brief vignettes, *Openness to Change* – participants indicate their willingness to change final judgments of character's traits, *Explicit Knowledge Performance* – participants explicit knowledge of unconscious processing was tested through a brief test ⏴

Fig. 1. Means, standard deviations, and group differences on dependent variable measures.

p < .001, *g* = 0.76, 95% CI [0.35, 1.18], or baseline condition (*M* = 7.26, SD = 1.04), *p* < .001, *g* = 1.00, 95% CI [0.59, 1.43] (Fig. 1). Of note, participants in the three comparison conditions expressed similar confidence, *F*(2, 189) = 1.22, *p* = .30.[2] This null effect implies that people who were aware of the naïve realism *but did not experience it* and people who suffered ego-deflating news about their intelligence were just as confident on the social task as people in a baseline state. In other words, merely receiving information about naïve realism or receiving ego-deflating feedback about intelligence did not lower confidence on the social judgment task in the same way as did learning about experiential naïve realism. Of note, participants in the experiential condition expressed lower confidence than the three comparison conditions combined, *t*(189) = 5.30, *p* < .001, and this linear contrast accounted for approximately 93% of all between-group variability.

3.3. Openness to change

Openness to change was submitted to a one-way ANOVA with experimental condition (experiential naïve-realism; non-experiential naïve-realism; failure; baseline) as the independent variable. We expected enhanced openness to change in the experiential naïve-realism condition compared to any of the other comparison groups. The analysis revealed a main effect of condition, *F*(3, 189) = 3.36, *p* = .02, η_p^2 = .05. Planned contrasts revealed that participants in the experiential naïve-realism condition expressed greater openness for change (*M* = 5.58, SD = 1.99), compared to participants in the non-experiential naïve-realism (*M* = 4.98, SD = 2.04), *p* = .11, *g* = 0.33,

95% CI [−0.07, 0.74], failure-experience condition (*M* = 4.80, SD = 1.36), *p* = .03, *g* = 0.44, 95% CI [0.03, 0.84], or baseline condition (*M* = 4.47, SD = 1.04), *p* = .002, *g* = 0.64, 95% CI [0.23, 1.05] (Fig. 1). Of note, participants in the three comparison conditions expressed similar openness, *F*(2, 189) = 1.07, *p* = .35. Moreover, participants in the experiential condition expressed greater openness than the three comparison conditions combined, *t*(189) = 2.80, *p* = .01, and this linear contrast accounted for approximately 78% of all between-group variability.[3]

Our interpretation of these results is that they demonstrate that challenging naïve realism in an experiential way causes people to reduce their confidence and become more open to change. An alternative explanation, however, is that people in the naïve realism condition expressed lower confidence and greater openness simply because the instructions told them to do so. Along with the awareness check, the fact that confidence was reduced and openness was enhanced in the *experiential* naïve-realism challenge condition more than in the *non-experiential* naïve-realism challenge condition helps rule out this experimenter-demand interpretation. Demand to reduce confidence and indicate openness would be equally transparent in the experiential naïve-realism challenge condition and non-experiential naïve-realism challenge condition because these two conditions included identical content regarding naive realism's implications. Presumably, because it is rather easy for people to dismiss verbal warnings about naïve realism (see "illusion of validity", Kahneman & Tversky, 1973), firsthand experiences that expose naïve realism are required to produce these changes.

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[2] To verify the robustness of the effect, we also examined the pattern of cell means for each of the four vignettes. Regardless of the vignette, confidence was always lower in the experiential naïve-realism challenge condition.

[3] To verify the robustness of the effect, we also examined the pattern of cell means for each of the four vignettes. Regardless of the vignette, openness was always higher in the experiential naïve-realism challenge condition.

3.4. Explicit understanding of naïve realism

Because participants in the experiential naïve-realism challenge and non-experiential naïve-realism challenge conditions were provided with verbal explanations that stressed the role of unconscious processing and participants in the other two conditions were not, we assumed that performance on this explicit knowledge test would be higher in the experiential naïve-realism challenge and non-experiential naïve-realism challenge conditions (vs. the other two conditions combined). To check on this assumption, we submitted scores on the knowledge test to a one-way ANOVA. We found a significant effect, $F(3, 189) = 8.05$, $p < .001$, $\eta_p^2 = .11$. Planned contrasts revealed that participants in the experiential ($M = 3.65$, $SD = .56$) and non-experiential ($M = 3.62$, $SD = .71$) conditions did not differ, $t(189) = .18$, $p = .86$, $g = 0.04$, 95% CI [−.36, 0.44], and participants in the failure ($M = 3.08$, $SD = .82$), and baseline ($M = 3.10$, $SD = .91$) conditions did not differ, $t(189) = .11$, $p = .91$, $g = 0.02$, 95% CI [−.42, 0.37] (Fig. 1). As anticipated, participants in the first two condition combined did better on the knowledge test than participant in the other two conditions combined, $t(189) = 4.91$, $p < .001$, $g = 1.42$.

4. General discussion

Psychologists have long presumed that human confidence and closed-minded adherence to views originates, in part, from the fact that people think that they see things "as they are". Because people lack access to much of the mental work that intervenes between the environment and their perception of it, people conclude no mental work has occurred and therefore perception is an unbiased representation of reality ("naïve realism"; Ross & Ward, 1996). Here, we challenged people's naïve-realism and assessed their confidence and receptivity to change when making social judgments about others. Consistent with various explanations of human confidence and closed-mindedness (e.g., Fischhoff et al., 1977; Kahneman, 2011; Smith et al., 1989), we found that demonstrating to participants how undetectable biases in mental mechanisms altered their perception led them to express less confidence in their subsequent social judgments and greater willingness to consider change. Unlike individuals in a matched control, individuals that received ego-deflating feedback about intellect, or a "baseline".

Interestingly, people in the experiential and non-experiential challenge conditions expressed similar levels of explicit knowledge about naïve realism that exceeded the knowledge expressed by individuals in the other two conditions. Despite these similarities in conscious knowledge, the experiential challenges created more doubt and openness than the non-experiential challenge. It appears that the lowered confidence we observed is not due to demand, nor is it due to people explicitly acknowledging that unconscious processes influence thinking or suffering an ego-deflating experience. In sum, exposing naïve realism in an experiential way seems necessary to fuel greater doubt and openness.

In Pronin and Kugler (2007), merely reading about unconscious cognition and bias increased people's willingness to acknowledge their own susceptibility to various cognitive biases. Acknowledging susceptibility to bias, however, may not always translate to actually tempering ones confidence or expressing an openness to change. Instead, experiencing unconscious cognition and bias was required to reduce confidence and closed-mindedness. Perhaps this experiential component is required to reduce outcomes of naïve realism but is not required to merely acknowledge one's susceptibility to bias. For example, reductions in confidence and closed-mindedness may require a firmer belief that naïve realism is illusory; hence, these outcomes may only occur when this belief is backed by direct, personal experiences. Nevertheless, this explanation is speculative, and future research might address it.

Future research is needed to shed additional light on our findings. First, additional work is needed to test whether the present effects generalize to other confidence tasks. Based on our data and theory, the experiential training in naïve realism might also reduce confidence in other types of judgments (e.g., views on abortion; Dunning, Griffin, Milojkovic, & Ross, 1990). Extant literature suggests that overconfidence manifests in a variety of conceptually distinct domains (e.g., general knowledge, humor, social predictions, motor skills; Dunning et al., 1990; Kruger & Dunning, 1999; McKenzie, Liersch, & Yaniv, 2008; Soll & Klayman, 2004; West & Stanovich, 1997) and that participant confidence in one domain may predict participant confidence in other apparently unrelated domains (Bornstein & Zickafoose, 1999). Indeed, we have additional data showing that an experiential approach to explaining naïve realism can reduce confidence in perceptual judgments over and above education that lacks this experiential component. In one study, participants completed either the experiential or non-experiential learning and then completed a task that involved making various perceptual distinctions (e.g., deciding which of two lines is longer). As anticipated, participants assigned to the experiential-learning condition indicated lower confidence in their choices, $d = .45$, 95% CI [.01, .90]. A second study conceptually replicated this basic pattern, ruled out a demand account for the findings, $d = .28$, 95% CI [.05, .52], and suggested that people were generally unaware of how the experiential learning influenced their confidence. Nevertheless, it seems at least plausible that the present effects could be weaker if they were studied with tasks that require participants to indicate their confidence on issues that reflect their core values (e.g., abortion or religion). Further study will, however, be needed to clarify the boundaries associated with reductions in confidence.

Second, future research is needed to understand the durability of these effects. Experiencing naïve realism has short-term effects on thinking, but it may have long-term effects too. For example, beliefs based in firsthand experience tend to be more accessible, more likely to guide thought and behavior, and are more likely to be maintained over time (Fazio & Williams, 1986; Regan & Fazio, 1977). If these principles can be extrapolated here, it seems reasonable to expect that the present effects could have a rather lasting influence.

Third, future research might examine whether the experiential training can have various downstream effects on higher-order thinking mechanisms related to open-mindedness. For example, as supreme confidence in one's perceptions can promote intolerance of and lack of interest in alternative perspectives (Ross & Ward, 1996), the experiential training might reduce people's confidence enough to induce openness to dissenting perspectives. As a result, the present effects may have implications for fostering a more tolerant, open-minded society.
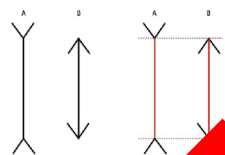
Acknowledgments

Appendix A

Checker Shadow Illusion (gif)
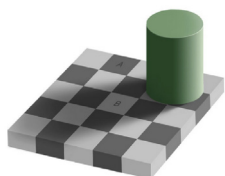
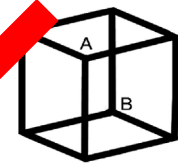Spinning wheels (illusory motion)
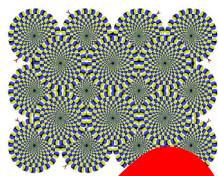
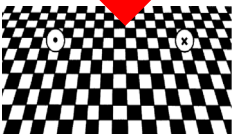
Muller-Lyer Lines

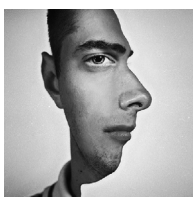
The Spinning Dancer (g...)

"Ponzo" Illusion (...)

Necker Cube

Blindspot ...

Hybrid Image

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