



## City Research Online

### City, University of London Institutional Repository

---

**Citation:** Hopthrow, T., Hooper, N., Mahmood, L., Meier, B.P. & Weger, U. (2017). Mindfulness reduces the correspondence bias. *The Quarterly Journal of Experimental Psychology*, 70(3), pp. 351-360. doi: 10.1080/17470218.2016.1149498

This is the accepted version of the paper.

This version of the publication may differ from the final published version.

---

**Permanent repository link:** <https://openaccess.city.ac.uk/id/eprint/16691/>

**Link to published version:** <https://doi.org/10.1080/17470218.2016.1149498>

**Copyright:** City Research Online aims to make research outputs of City, University of London available to a wider audience. Copyright and Moral Rights remain with the author(s) and/or copyright holders. URLs from City Research Online may be freely distributed and linked to.

**Reuse:** Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

---

---

---

City Research Online:

<http://openaccess.city.ac.uk/>

[publications@city.ac.uk](mailto:publications@city.ac.uk)

---

## **Mindfulness Reduces the Correspondence Bias**

Tim Hothrow<sup>1</sup>, Nic Hooper<sup>2</sup>, Lynsey Mahmood<sup>1</sup> Brian P. Meier<sup>3</sup>, and Ulrich Weger<sup>4</sup>

1. University of Kent, UK
2. University of the West of England, UK
3. Gettysburg College, PA, U.S.A.
4. University of Witten/Herdecke, Germany

The corresponding author is Dr Tim Hothrow [t.hothrow@kent.ac.uk](mailto:t.hothrow@kent.ac.uk)

### **Abstract**

The Correspondence Bias (CB) refers to the idea that people sometimes give undue weight to dispositional rather than situational factors when explaining behaviors and attitudes. Three experiments examined whether mindfulness, a non-judgmental focus on the present moment, could reduce the CB. Participants engaged in a brief mindfulness exercise (the raisin task), a control task or an attention to detail task before completing a typical CB measure involving an attitude-attribution paradigm. The results indicated that participants in the mindfulness condition experienced a significant reduction in the CB compared to participants in the control or attention to detail conditions. These results suggest that mindfulness training can play a unique role in reducing social biases related to person perception.

**Keywords:** *Correspondence Bias, Mindfulness, Fundamental Attribution Error*

## **MINDFULNESS REDUCES THE CORRESPONDENCE BIAS**

Individuals sometimes overlook the constraints of the situation and attend to dispositional attributes when judging the cause of others' behavior, a tendency known as the correspondence bias (CB; Haney & Zimbardo, 2009; Gawronski, 2004; Gilbert & Malone, 1995; Ross, 1977). In short, people have a tendency to think others are how they act. For example, when a person steps in front of us while we are walking, we might initially think he/she is "rude" rather than "rushing to the hospital". This error can have important consequences, as perceivers are more likely to react negatively toward people whom they directly blame for their actions (Alicke, 2000).

Jones and Harris (1967) used an attitude attribution paradigm in one of the first studies to examine the CB. They wrote two speeches, one speech that was 'pro' Fidel Castro, and a second speech that was 'anti' Fidel Castro. Participants were informed they that were required to read one of the two speeches, and that the speeches had been written by fellow students. Subsequently, participants were required to rate the speechwriter's attitude toward Castro. Unsurprisingly, the researchers found that participants' rating of the speechwriter's attitude toward Castro corresponded to the speech position (pro or anti). Importantly, this occurred even when the participant was informed that a debate coach had chosen the position that the speechwriter wrote from. In other words, participants tended to overlook the situation (i.e., the speechwriter being assigned to position) and instead made dispositional attributions about the speechwriter's attitude towards Castro.

An abundance of research has examined the CB and some underlying mechanisms have been identified (Gawronski, 2004). One potential mechanism is related to cognitive capacity. It appears that people who are better able to fully process or attend to a situation are less susceptible to the CB. For example, Forgas (1998) randomly assigned participants to a positive, neutral, or negative mood induction before they engaged in an attitude-attribution

task (Jones & Harris, 1967). Results indicated that the increased levels of cognitive processing associated with a negative (versus a positive or neutral) mood reduced the CB. Similarly, Trope and Gaunt (2000) found that people tended to correct biased dispositional attributions when the salience of situational factors was low, but only if they had sufficient cognitive capacity or resources to do so. Finally, D'Agostino and Fincher-Kiefer (1992) found that people high in the need for cognition (i.e., people who seek and enjoy effortful thought) were less likely to commit the CB. In total, these results suggest that a relationship exists between cognitive processing abilities and the CB.

Although there are a number of factors that may affect cognitive processing and the CB, we believe that mindfulness may be particularly impactful in reducing the CB. Mindfulness is characterized by a focused, non-evaluative attention to and awareness of the present moment (Brown, Ryan, & Creswell, 2007). Mindfulness can vary at both the state and trait levels (Brown & Ryan, 2003) and it can be enhanced through training in short- and long-term settings (Baer, 2003). In short, people high in mindfulness (either by training or disposition) are more attentive to the current moment and are less concerned about the past or future or with being evaluated. Mindfulness has been shown to be associated with a number of positive factors. For example, higher levels of mindfulness are related to positive mental health (Brown et al., 2007) and relevant to the current context, mindfulness has been shown to enhance various cognitive processes (Chambers, Chuen Yee Lo, & Allen, 2009; Jha, Krompinger, & Baime, 2007; Semple, 2010; Zeidan, et al., 2010). For example, Jha, et al. (2007) showed that mindfulness training enhanced various aspects of attention.

The CB theory asserts that individuals overlook factors involved in a current situation, and mindfulness has been shown to reduce such biases. For example, Weger, Hooper, Meier, and Hoptrow (2012) showed that a brief mindfulness versus control training task decreased stereotype threat related to female's math performance while Jordan, Wang,

Donatoni, & Meier (2014) showed that brief mindfulness training and dispositions were associated with less mindless or thoughtless eating. In both series of studies, mindfulness seemed to increase people's ability to focus on the present moment and associated factors, which reduced errors related to fear of negative evaluation (stereotype threat) and thoughtless eating.

In three experiments, we sought to examine the extent to which mindfulness could reduce the CB. Participants were randomly assigned to a short mindfulness, attention to detail, or control task and then engaged in a standard attitude-attribution paradigm (Jones & Harris, 1967). In all three experiments, we predicted that participants exposed to a mindfulness task would show less CB.

## **Experiment 1**

### **Method**

**Participants and design.** Participants, who were ninety-one undergraduates at the University of Kent taking part to earn course credit, were informed that the experiment aimed to investigate decision-making. The study involved a 2 (Condition: Mindfulness vs. Control) x 2 (Essay Position: For vs. Against nuclear power) between-participants design and participants were randomly assigned to condition. To clarify, there were four groups in the current experiment: a mindfulness group who read the 'for nuclear power essay', a mindfulness group who read the 'against nuclear power essay', a control group who read the 'for nuclear power essay' and a control group who read the 'against nuclear power essay'.

**Materials.** The CB was assessed using a task adapted from the classic attitude-attribution paradigm developed by Jones and Harris (1967). In the current experiment, participants read a paragraph in favor of or opposed to nuclear power (see Appendix A). Before reading the paragraph they were made explicitly aware, in the form of a written instruction, that the writer of the paragraph was assigned by a coin flip to their position (i.e.,

the position was not freely chosen). Subsequently, participants answered two questions: one measured the CB (*'To what degree does the writer favor or oppose the use of nuclear power?'*) and one measured participants' opinions on nuclear power (*'To what degree do you favor or oppose the use of nuclear power?'*). Both items were answered on a scale from 1 (*'very opposed'*) to 7 (*'very favorable'*). In terms of participants' rating of the writer's attitude, scores closer to the scale endpoints are indicative of the classic CB finding (Jones & Harris, 1967).

We also used a measure of participants' own views of nuclear power to include as a covariate. We did this to account for the false consensus effect (Moore & Kim, 2003; McArthur, 1972) which can occur when individuals attribute personal views to social targets. Nuclear power is an important and controversial issue, which may have led participants to relate their own personal views on the subject to their perception of the essay writer. We wanted to determine if the CB was apparent above and beyond this tendency.

Mindfulness was manipulated using the raisin task via a pre-recorded audio file. The raisin task and other short-term mindfulness inductions have been used successfully in past work to induce a state of mindfulness (e.g., Jordan et al., 2014; Heppner et al., 2008; Ostafin & Kassman, 2012; Weger et al., 2012). The 5-minute audio-file encouraged participants to slow down and experience eating two raisins with full awareness and attention to their actions, sensations, and thoughts. For example, participants were told to examine the appearance of the raisin, its texture, the folds and ridges, the color, the smell, etc. When eating the raisin, participants were told to let the raisin sit in their mouths for a time before biting into it. They were told to feel the texture of the raisin on their tongue and then bite into it and experience the sensation of taste and as well as the experience of swallowing. In the control condition, participants were merely asked to eat two raisins in five minutes. This

control condition was chosen to ensure that the behavior of eating was not the causal factor in any differences that emerged between the groups.

**Procedure.** Upon completing the information and consent form participants were randomly allocated to condition. Those assigned to the mindfulness conditions received their 5-minute mindfulness intervention whilst those assigned to the control condition had to eat two raisins in 5 minutes (using an audio file as well). After finishing the mindfulness / control intervention the participants then moved straight to the CB assessment. Finally participants completed the TMS. The Toronto Mindfulness Scale (TMS: Lau et al., 2006) is a 13-item questionnaire that was used to assess whether the mindfulness induction had the desired effect in terms of manipulating state mindfulness (e.g., "I was curious about each of the thoughts and feelings I was having"; 0 = not at all; 4 = very much).

In the control condition, a large difference in the rating of the writer's attitude toward nuclear power between the 'for' and 'against' positions was expected, which would replicate past CB work. Importantly, it was expected that this difference would be reduced in the mindfulness condition. Such results would be supported by a significant interaction between condition and essay position.

### **Results and Discussion**

The mindfulness manipulation was successful, as significantly higher levels of state mindfulness (TMS scores) were recorded by those in the mindfulness condition than in the control condition,  $t(89) = 2.80, p < .01 [M = 2.29 \& 1.89, S.D. = 0.57 \& 0.79]$ .

In order to examine the main hypothesis, a 2 (Condition: Mindfulness vs. Control) x 2 (Essay Position: For vs. Against nuclear power) ANCOVA was conducted on the degree to which participants considered the writer to be for or against nuclear power with participants'

own views as a covariate<sup>1</sup>. Table 1 lists the means by condition. The main effect of mindfulness condition was not significant,  $F < 1$ . As expected, there was a significant effect of the covariate of participants' own views,  $F(1, 86) = 6.26, p < .05, \eta^2 = .07$ . This effect indicated that participants had a tendency to project their own views onto the essay writer. There was also the expected main effect of essay position,  $F(1, 86) = 203.24, p < .01, \eta^2 = .70$ . Participants who read an essay that was opposed to nuclear power considered the writer to be more strongly opposed to nuclear power [ $M = 1.93; S.D. = 1.39$ ] than participants who read a pro-nuclear power essay [ $M = 6.04; S.D. = 1.07$ ]. This strong effect replicates the typical CB finding. Most importantly, there was a significant interaction between condition and essay position,  $F(1, 86) = 6.06, p < .05, \eta^2 = .07$ . As shown in Table 1, this interaction revealed that mindfulness attenuated the CB, as the difference in ratings in the mindfulness condition between the 'for' and 'against' essay positions was smaller (3.60) than the difference in the control condition (4.62).

---

<sup>1</sup> A 2 (Condition: Mindfulness vs. Control) x 2 (Essay Position: For vs. Against nuclear power) ANOVA was conducted on the degree to which participants considered the writer to be for or against the use of nuclear power. The main effect of mindfulness condition was not significant,  $F < 1$ . The expected main effect of essay position was significant,  $F(1, 87) = 237.56, p < .001, \eta^2 = .73$ . This effect indicated that participants who read an essay opposed to nuclear power considered the writer to be more strongly opposed to nuclear power [ $M = 1.94, SD = 1.39$ ] than participants who read a pro-nuclear power essay [ $M = 6.04, SD = 1.17$ ]. There was a marginally significant interaction between condition and essay position,  $F(1, 87) = 3.61, p = .06, \eta^2 = .04$ .

Simple effects analysis revealed that in the for essay condition, there was no significant difference between the mindfulness [ $M = 5.83, SD = 1.34$ ] and control [ $M = 6.27, SD = 0.94$ ] participants  $F(1, 86) = 2.15, p = .15, \eta^2 = .02$ . In the against essay condition there was a significant difference between the mindful [ $M = 2.23, SD = 1.60$ ] and control [ $M = 1.65, SD = 1.11$ ] participants ratings of the essay writer  $F(1, 86) = 4.18, p < .05, \eta^2 = .05$ . Comparing the essay positions in the mindfulness condition shows a significant difference between the for [ $M = 5.68, SD = 1.34$ ] and the against [ $M = 2.44, SD = 1.60$ ] positions  $F(1, 86) = 68.24, p < .001, \eta^2 = .44$ . In the control condition, the for essay [ $M = 6.22, SD = 0.94$ ] was also significantly higher than the against essay [ $M = 1.67, SD = 1.11$ ] position  $F(1, 86) = 151.67, p < .0001, \eta^2 = .64$ .

## Experiment 2

The results of Experiment 1 reveal that an induced mindful mindset can reduce the tendency to engage in the CB. However, one alternative explanation for the findings in Experiment 1 is that the procedure in the control condition may have reduced cognitive processing through boredom. Pattyn, Neyt, Henderickx, and Soetens (2008) offer evidence showing that an “underload” of the cognitive system can result in performance decrements on vigilance tasks. This finding might suggest that boredom may have exacerbated the CB in the current experiment, rather than mindfulness reducing it. In order to test this hypothesis, it was important to exclude boredom as a potential confound. Therefore, in Experiment 2, the procedure was altered in the control condition so that participants were not asked to eat two raisins and wait 5 minutes before completing the CB task. Instead, they were given the CB task immediately.

## Method

**Participants and design.** Participants were one hundred and eight undergraduates at the University of Kent taking part to earn course credit, none of whom participated in Experiment 1. A 2 (Condition: Mindfulness vs. Control) x 2 (Essay Position: For vs. Against nuclear power) between-participants design was again utilized and participants were randomly assigned to condition.

**Materials and Procedure.** The procedure in Experiment 2 was identical to Experiment 1. Specifically, upon being allocated to condition participants entered the intervention phase, they next completed the CB measure before completing the TMS. The only difference was that participants in the control condition did not receive any intervention and instead started the CB task immediately, without eating two raisins or waiting 5 minutes.

### Results and Discussion

Similarly to Experiment 1, participants in the mindfulness condition reported significantly higher levels of state mindfulness as measured by the TMS than participants in the control condition,  $t(106) = 4.08, p < .01 [M = 3.36 \& 2.79; S.D. = 0.74 \& 0.73]$ .

A 2 (Condition: Mindfulness vs. Control) x 2 (Essay Position: For vs. Against nuclear power) ANCOVA<sup>2</sup> was conducted on the degree to which participants considered the writer

---

<sup>2</sup> We conducted a 2 (Condition: Mindfulness vs. Control) x 2 (Essay Position: For vs. Against nuclear power) ANOVA without the covariate on the degree to which participants considered the writer to be for or against the use of nuclear power. The main effect of mindfulness condition was not significant,  $F < 1$ . The expected main effect of essay position was significant,  $F(1, 104) = 168.99, p < .001, \eta^2 = .62$ . This effect indicated that participants who read an essay opposed to nuclear power considered the writer to be more strongly opposed to nuclear power [ $M = 1.98, SD = 1.50$ ] than participants who read a pro-nuclear

to be for or against nuclear power with participants' own view as a covariate. Table 1 shows the means by condition. The main effect of the mindfulness condition was not significant,  $F < 1$  and the covariate of participants' own views approached significance,  $F(1,103) = 3.34, p = .07, \eta^2 = .031$ . There was also the expected main effect of essay position,  $F(1,103) = 162.15, p < .01, \eta^2 = .61$ . Participants who read an essay that was opposed to nuclear power considered the writer to be more strongly opposed to nuclear power [ $M = 1.98; S.D. = 1.50$ ] than participants that read a pro-nuclear power essay [ $M = 5.73; S.D. = 1.53$ ]. Most importantly, there was a significant interaction between condition and essay position,  $F(1,103) = 4.07, p < .05, \eta^2 = .038$ . As shown in Table 1, this interaction again revealed that mindfulness attenuated the CB, as the difference in ratings in the mindfulness condition between the 'for' and 'against' essay positions was smaller (3.11) than the difference in the control condition (4.36).

---

power essay [ $M = 5.72, SD = 1.53$ ]. There was a significant interaction between condition and essay position,  $F(1, 104) = 4.79, p < .05, \eta^2 = .04$ .

Further analysis revealed that in the for essay condition, the difference between the mindfulness [ $M = 5.33, SD = 1.69$ ] and control [ $M = 6.11, SD = 1.28$ ] conditions approached significance,  $F(1, 104) = 3.65, p = .06, \eta^2 = .03$ . In the against essay condition there was no significant difference between the mindfulness [ $M = 2.22, SD = 1.85$ ] and control [ $M = 1.74, SD = 1.02$ ] conditions,  $F(1, 104) = 1.40, p = .06, \eta^2 = .03$ . In the mindfulness condition, the difference between the for [ $M = 5.33, SD = 1.69$ ] and against [ $M = 2.22, SD = 1.85$ ] essay positions was significant,  $F(1, 104) = 58.44, p < .001, \eta^2 = .36$ . This was also the case for the control condition,  $F(1, 104) = 115.33, p < .001, \eta^2 = .53, [M_{for} = 6.11, SD = 1.28 \& M_{against} = 1.74, SD = 1.02]$ .

Simple effects analysis revealed that in the for essay condition, there was no significant difference between the mindfulness [ $M = 5.33, SD = 1.69$ ] and control [ $M = 6.11, SD = 1.28$ ] participants  $F(1, 103) = 2.63, p = .11, \eta^2 = .03$ . The against essay condition also revealed a non-significant difference between the mindful [ $M = 2.22, SD = 1.85$ ] and control [ $M = 1.74, SD = 1.02$ ] participants ratings of the essay writer  $F(1, 103) = 1.51, p = .22, \eta^2 = .01$ .

Comparing the essay positions in the mindfulness condition shows a significant difference between the for [ $M = 5.68, SD = 1.34$ ] and the against [ $M = 2.44, SD = 1.60$ ] positions  $F(1, 103) = 58.75, p < .001, \eta^2 = .36$ . In the control condition, the for essay [ $M = 6.22, SD = 0.94$ ] was also significantly higher than the against essay [ $M = 1.67, SD = 1.11$ ] position  $F(1, 103) = 107.68, p < .001, \eta^2 = .51$ .

### **Additional Analyses for Experiments 1 and 2**

Within each individual experiment, three of the four pairwise comparisons were not significant at the traditional level when comparing the ratings for mindfulness versus control conditions for each essay position,  $ps = .04$  to  $.20$ . The two data sets were therefore combined to increase statistical power. In the ‘for’ nuclear power essay condition, the mean rating in the mindfulness condition [ $M = 5.52$ ] was less extreme than the mean rating in the control condition [ $M = 6.10, F(1,194) = 8.38, p < .05, \eta^2 = .02$ ]. Similarly, in the ‘against’ nuclear power essay condition, the mean rating in the mindfulness condition [ $M = 2.33$ ] was less extreme than the mean rating in the control condition [ $M = 1.73, F(1, 194) = 4.89, p < .05, \eta^2 = .02$ ]. Such results reinforce the idea that mindfulness reduces the CB.

### **Experiment 3**

Experiments 1 and 2 reveal that an induced state of mindfulness can reduce the tendency to commit the CB. However, an alternative explanation for these findings is that participants in the control conditions were not attending to something in a sustained fashion like those individuals in the mindfulness condition. Thus, it could be that sustained attention

is driving the effects rather than more specific mindful attention and the processes that accompany it.

Mindfulness can be described as a specific form of attention, defined by focusing on present, moment-by-moment, experience (Kabat-Zinn, 1990). For example, while one can eat in an attentive manner, eating in a mindful manner involves focusing on a host of details that an individual would not normally consider (e.g., the colour, smell, texture, and production of the food). On the other hand, voluntary attention or attention to detail may have similar features to mindfulness but requires sustained focus, which is limited and leads to vigilance decrements (Maclean et al., 2010). With this in mind, mindfulness and attention to detail both involve sustained focus on a particular feature (i.e. raisin or task) but importantly may lead to different behavioural outcomes.

There is evidence to suggest that mindfulness practice might be beneficial to cognitive performance, freeing up space in working memory to allow for further cognitive processing (Mrazek et al., 2013) and reducing emotional reactivity (Arch & Craske, 2006). In addition, mindfulness practice may alter an individual's attention (Semple, 2010; Tang et al., 2007) and increase the ability to focus one's attention on a single task (Valentine, 1988 in Valentine & Sweet, 1999). To our knowledge, the nature of the relationship between mindfulness and attention is yet to be empirically tested. However, Valentine and Sweet (1999) suggest that the effects of mindfulness on changes to awareness and affect are distinct from other types of attentional focus.

A possible explanation of this may be that mindfulness does not merely increase an individual's focus on the details of a situation, but in fact increases their awareness of the content of it. Since mindfulness is specifically an intentional focus on the present moment, it is possible that those in a mindful state are better able to consider all aspects of the person-situation context more deliberately than automatically, reducing the likelihood of committing

the CB. In contrast, being instructed to pay attention to the task may increase efficiency in absorbing the details of the situation, but have little to no effect on the automaticity of responding to contextual information and thus still cause the individual to commit the CB.

This would then suggest that whilst mindfulness and paying attention to detail in a task might both make individuals more attentive to the details of a subsequent task, any behavioural outcomes may be affected differently by the two processes. In order to test this hypothesis, we compared mindfulness to attention to detail. In Experiment 3, a third condition was added, whereby participants were asked to pay attention to detail in a 5-minute task before completing the CB measure.

### **Method**

**Participants and design.** Participants were 187 undergraduates (154 female and 33 male,  $M_{age} = 19.49$ ,  $SD = 3.05$ ) at the University of Kent taking part voluntarily for course credit, who did not participate in Experiments 1 or 2. Due to an oversight, we did not collect demographic variables in Experiments 1 and 2, but we do so here. The study involved a 2 (Essay Position: For vs. Against nuclear power) x 3 (Condition: Mindfulness vs. Attention to Detail vs. Control) between participants design, and participants were randomly assigned to condition.

**Materials and procedure.** The procedure for Experiment 3 was the same as in Experiment 1, in that participants were assigned to a mindfulness or a control condition wherein they were asked to eat two raisins over a 5-minute period, followed by the CB measure and TMS. The only difference was the addition of an attention to detail condition. This detailed task required participants to count the number of arrows in a particular orientation, within a grid of 228 arrows (e.g. see Appendix), which was repeated over five trials. To ensure consistency with the other conditions, participants were also given the audio instruction to eat a raisin before trial one and then again before trial 4. Each trial lasted

approximately 50-seconds, with 10 seconds to input an answer, ensuring the attention to detail task also lasted 5-minutes.

In the control condition, a large difference in the rating of the writer's attitude toward nuclear power between 'for' and 'against' positions was expected, with the difference in the mindfulness condition being reduced; which would replicate Experiments 1 and 2. Importantly, it was further expected that the attention to detail condition would show similar results to the control condition, showing the unique influence of mindful attention, compared to attention to detail. Therefore, a significant interaction between condition and essay position was expected.

### **Results and Discussion**

A total of 19 participants were removed from the original data set. One participant reported having not heard the 5-minute audio file, four were removed for having failed embedded attention checks throughout the study and 14 were removed for scoring poorly on the attention to detail task (i.e., more than 2 *SDs* from the mean). This left 168 participants (140 female and 28 male,  $M_{age} = 19.26$ ,  $SD = 2.46$ ) in the further analysis.

Similarly to Experiments 1 and 2, participants in the mindful condition reported significantly higher levels of state mindfulness than participants in the control condition,  $t(120) = 2.58$ ,  $p < .01$  [ $M = 2.63$  &  $2.23$ ;  $SD = 0.80$  &  $0.91$ ]. Although the means were in the predicted direction, there was not a significant difference between the mindfulness and attention to detail conditions,  $t(106) = 1.48$ ,  $p = .14$  [ $M = 2.63$  &  $2.41$ ;  $SD = 0.80$  &  $0.72$ ]. The differences between the control and attention to detail conditions was not significant,  $t(106) = 1.12$ ,  $p = .26$  [ $M = 2.23$  &  $2.41$ ;  $SD = 0.91$  &  $0.72$ ].

A 3 (Condition: Mindfulness vs. Control vs. Attention to Detail) x 2 (Essay: For vs. Against nuclear power) ANCOVA<sup>3</sup> was conducted on the degree to which participants considered the writer to be ‘for’ or ‘against’ nuclear power, with participants’ own view as a covariate. Table 2 shows the means. The main effect of mindfulness condition was not significant,  $F(2, 161) = 1.04, p = .34$ . The covariate of participants own view was significant,  $F(1, 161) = 10.76, p < .01, \eta^2 = .06$ , and the main effect of essay position was also significant,  $F(1, 161) = 330.40, p < .001, \eta^2 = .67$ . The participants who read an essay in favour of nuclear power considered the writer to be more in favour of nuclear power [ $M = 5.88, SD = 1.36$ ] than participants who read the essay opposing nuclear power [ $M = 1.75, SD = 1.32$ ]. Most importantly, there was a significant interaction between condition and essay position,  $F(2, 161) = 3.07, p < .05, \eta^2 = .04$ . As shown in Table 2, the interaction reveals that mindfulness attenuated the CB, whereby the difference in ratings was smaller in the mindfulness condition (3.70) than in both the control (4.15) and attention to detail (4.78) conditions.

---

<sup>3</sup> We conducted a 3 (Condition: Mindfulness vs. Control vs. Attention to detail) x 2 (Essay Position: For vs. Against nuclear power) ANOVA without the covariate on the degree to which participants considered the writer to be for or against the use of nuclear power. The main effect of mindfulness condition was not significant,  $F(2, 163) = 1.37, p = .26, \eta^2 = .02$ . The expected main effect of essay position was significant,  $F(1, 163) = 406.79, p < .001, \eta^2 = .71$ . This effect indicated that participants who read an essay opposed to nuclear power considered the writer to be more strongly opposed to nuclear power [ $M = 1.75, SD = 1.32$ ] than participants who read a pro-nuclear power essay [ $M = 5.86, SD = 1.36$ ]. The interaction between condition and essay position was not significant,  $F(2, 163) = 2.18, p = .12, \eta^2 = .03$ .

Further analysis revealed that in the for essay condition the difference between the scores for the mindfulness [ $M = 5.64, SD = 1.04$ ], control [ $M = 5.71, SD = 1.66$ ] and attention to detail [ $M = 6.45, SD = 1.00$ ] conditions approached significance  $F(2, 161) = 2.77, p = .07, \eta^2 = .03$ . The difference between the mindfulness and control conditions was not significant ( $p = .72$ ). The difference between the mindful and attention to detail conditions and the control and attention to detail was significant ( $p$ 's  $< .05$ ). In the against essay condition there were no significant differences between the conditions,  $F(2, 161) = 1.14, p = .32, \eta^2 = .01$ . The differences in the scores between for and against essay positions was significant in each of the conditions; mindfulness,  $F(1, 161) = 90.52, p < .001, \eta^2 = .36$ , control  $F(1, 161) = 126.98, p < .001, \eta^2 = .44$  and attention to detail  $F(1, 161) = 144.37, p < .001, \eta^2 = .47$ .

In order to investigate whether this affect was attributed to a unique aspect of mindfulness, rather than attention to detail, a second analysis was carried out, removing participants in the control condition. A 2(Condition: Mindfulness vs. Attention to Detail) x 2 (Essay: For vs. Against nuclear power) ANCOVA was conducted, with participant's own view as a covariate. The main effect of condition was not significant,  $F < 1$ . The covariate of participants own view was significant,  $F(1, 103) = 5.22, p < .05, \eta^2 = .05$ , and the main effect of essay position was also significant,  $F(1, 103) = 236.70, p < .001, \eta^2 = .70$ . The participants who read an essay in favour of nuclear power considered the writer to be more in favour of nuclear power [ $M = 6.00, SD = 1.09$ ] than participants who read the essay opposing nuclear power [ $M = 1.83, SD = 1.42$ ]. Most importantly, there was a significant interaction between condition and essay position,  $F(1, 103) = 6.19, p < .05, \eta^2 = .06$ .

Further analysis revealed that in the 'for' essay condition, participants in the mindful condition reported less extreme scores than those in the attention to detail condition (see table 2 for means and SDs),  $F(1, 103) = 5.02, p < .05, \eta^2 = .05$ . In the 'against' essay condition this effect was not found ( $F(1, 103) = 1.49, p = .27$ ), although the means are in the expected

direction, showing that scores of participants in the mindful condition [ $M = 1.94$ ,  $SD = 1.53$ ] were less extreme than those in the attention to detail condition [ $M = 1.67$ ,  $SD = 1.27$ ].

The results of Experiment 3 show that a mindfulness induction seemed to reduce the CB in relation to an attention to detail task. Although the comparisons were not significant in every case, the results are consistent with Experiments 1 and 2 in suggesting that mindfulness training modifies the CB in a way that is not simply related to sustained attention.

### **General Discussion**

Across three experiments, we showed that brief mindfulness training reduced the CB. Although the CB was still apparent in our mindfulness conditions, which illustrates the phenomenon's robustness, mindfulness training seemed to cause participants to make less extreme judgments. The findings across the three experiments show similarity regardless of the control condition used, suggesting that mindfulness is associated with a reduction in the CB. Moreover, experiment 3 also demonstrates a difference between a mindfulness task and a straight attention to detail task.

The findings have implications for both theory and practice. At a theoretical level, they suggest that a short mindfulness induction can decrease the CB in a way that is consistent with previous findings related to mindfulness and other social biases such as stereotype threat (Weger et al., 2012) or mindless eating (Jordan et al., 2014). While the current findings add to the literature on the benefits of mindfulness, we have not shown why mindfulness reduces the CB. Future work in this area could focus on identifying the mediators involved in the current effects. We believe that enhanced cognitive processing may be one such mechanism. For example, participants in the mindfulness condition may have been more aware of the scenario instructions stating that the participant was 'assigned' to be for or against nuclear power. Such awareness may lessen the CB, but we did not show that in the current experiments. Furthermore, other broader attention or awareness factors could also

be important. Indeed recent work goes some way in supporting this view. Mrazek, Franklin, Phillips, Baird, & Schooler (2013) show that mindfulness can reduce mind wandering and importantly improved working memory function. Our findings from experiment 3 support the idea that mindfulness is more than just enhanced attention to detail.

An alternative explanation is that mindfulness may help with perspective taking. Block-Lerner, Adair, Plumb, Rhatigan, & Orsillo (2007) suggest that mindfulness increases empathic concern, which is other oriented feelings of sympathy or concern, and is closely linked with perspective taking- the cognitive ability to take on the psychological perspective of another person. They argue that the two are closely correlated and that increases in empathic concern are likely to also signal increases in perspective taking. However the unique impact of mindfulness on this relationship is unclear and the two need to be disentangled before it is possible to suggest that mindfulness has a clear impact on perspective taking (Hooper et al. 2015).

At a practical level, the results suggest that short mindfulness-training exercises could have implications for everyday interactions and behavior. For example, brief mindfulness exercises (e.g., eating a “mindful lunch”) could facilitate positive social interactions, such as in situations in which people negatively react to a perceived affront from another person (e.g., a co-worker). Additionally, one of the intervention’s key strengths is that it is easy to employ and could be completed in different settings (e.g., at one’s desk). In short, the findings suggest that mindfulness may offer promise in reducing the social-cognitive biases that can distort our social world.

It is important to point out that there are differences between the fundamental attribution error and the CB. The terms are often used interchangeably, but while referring to a similar basic phenomenon, researchers argue that they are qualitatively different constructs (for a thorough review see Gawronski, 2004). The CB refers to the tendency to infer that

people's behaviors correspond with their dispositions, whereas the fundamental attribution error refers to the idea that people fundamentally ignore situational influences on others' behavior (Gawronski, 2004). The research presented in this paper more closely coincides with the CB. Being in a mindful state may have implications for the fundamental attribution error, but further research would be necessary to determine whether the underestimation of situational influences can be reduced after a mindfulness induction.

### **Limitations**

The experiments have some limitations that should be addressed in future work. In the first two experiments, two control conditions were employed. The first required the participant to engage with 2 raisins in a 5-minute period. This control condition was designed to ensure that it was mindful eating, rather than eating per se, that led to a decrease in the CB. One potential issue with this control condition is that the participants could have become bored, and therefore it may have been boredom that caused the differences recorded between groups. In order to overcome this issue, control participants in the second experiment moved straight into the CB assessment and participants in Experiment 3 engaged in an attention to detail task. Although the results across the experiments reveal that the mindfulness induction reduced the CB compared to multiple control conditions, the inclusion of additional control conditions might allow a further examination of mediators that function to reduce CB. This is a preliminary piece of research that aimed to determine if the basic effect exists, and future research should therefore make more effort to explore the mechanisms by which mindfulness works to reduce the CB.

There are other ways to improve the current research. Firstly, despite the single item assessment of the CB being the standard paradigm in the area, some have suggested that it is unreliable (Hilton & Slugoski, 1986; Schwarz, 1994). Secondly, all participants in the current experiments were undergraduate students, which makes it difficult to generalize the results to

a wider population. Finally, the demographic variables of the participants were not recorded in Experiments 1 and 2, but doing so in future experiments is recommended.

### **Summary and Conclusion**

Although the studies have some limitations, they revealed for the first time that increasing state mindfulness reduces the CB. These results and other work (Weger et al., 2012) reveal that mindfulness may be an important variable in minimizing biases that can distort our social world. However, future research should begin to investigate the psychologically active mechanisms of mindfulness that cause the reduction in such biases.

### **Acknowledgments**

This work was supported by grant F/00 236/AB from the Leverhulme Trust to the first, fourth, and fifth authors.

### **Ethics Statement**

The University of Kent ethics committee approved the studies. Participants gave informed consent prior to participating in the study.

## References

- Alicke, M. D. (2000). Culpable control and the psychology of blame. *Psychological Bulletin*, *126*, 556-574. DOI: 10.1037//0033-2909.126.4.556
- Arch, J. J. & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy*, *44*, 1849-1858. DOI: 10.1016/j.brat.2005.12.007
- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, *10*, 125-143. DOI: 10.1093/clipsy.bpg015
- Block-Lerner, J., Adair, C., Plumb, J. C., Rhatigan, D. L., & Orsillo, S. M. (2007). The case for mindfulness based approaches in the cultivation of empathy: Does nonjudgmental, present moment awareness increase capacity for perspective taking and empathic concern? *Journal of marital and family therapy*, *33*(4), 501-516.
- Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry*, *18*, 211-237. DOI: 10.1080/10478400701598298
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological wellbeing. *Journal of Personality and Social Psychology*, *84*, 822-848. DOI: 10.1037/0022-3514.84.4.822
- Chambers, R., Chuen Yee Lo, B., & Allen, N. B. (2009). The impact of intensive mindfulness training on attentional control, cognitive style, and affect. *Cognitive Therapy Research*, *32*, 303-322. DOI: 10.1007/s10608-007-9119-0
- D'Agostino, P. R., & Fincher-Kiefer, R. (1992). Need for cognition and the correspondence bias. *Social Cognition*, *10*(2), 151-163.

- Forgas, J.P., (1998). On being happy and mistaken: Mood effects on the fundamental attribution error. *Journal of Personality and Social Psychology*, 75, 318-331.
- Gawronski, B. (2004). Theory-based bias correction in dispositional inference: The fundamental attribution error is dead, long live the correspondence bias. *European Review of Social Psychology*, 15, 183-217. DOI: 10.1080/10463280440000026
- Gilbert, D. T., & Malone, P. S. (1995). The correspondence bias. *Psychological Bulletin*, 117, 21-38.
- Haney, C., & Zimbardo, P.G., (2009). Persistent dispositionalism in interactionist clothing: Fundamental attribution error on explaining prison abuse, *Personality and Social Psychology Bulletin*, 35, 807-814. DOI: 10.1177/0146167208322864.
- Heppner, W. L., Kernis, M. H., Lakey, C. E., Campbell, W. K., Goldman, B. M., Davis, P. J., & Cascio, E. V. (2008). Mindfulness as a means of reducing aggressive behaviour: Dispositional and situational evidence. *Aggressive Behavior*, 34, 486-496. DOI: 10.1002/ab.20258.
- Hilton, D. J., & Slugoski, B. R. (1986). Knowledge-based causal attribution: The abnormal conditions focus model. *Psychological review*, 93(1), 75.
- Hooper, N., Erdogan, A., Keen, G., Lawton, K., & McHugh, L. (2015) perspective taking reduces the fundamental attribution error. *Journal of Contextual Behavioural science*, 4, 69-72.
- Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience*, 7, 109-119.
- Jones, E. E., & Harris, V. A. (1967). The attribution of attitudes. *Journal of Experimental Social Psychology*, 3, 1-24. DOI:10.1016/0022-1031(67)90034-0

- Jordan, C. H., Wang, W., Donatoni, L., & Meier, B. P. (2014). Mindful eating: Trait and state mindfulness predict healthier eating behavior. *Personality and Individual Differences*, 68, 107-111.
- Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness*. New York: Delacorte.
- Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L., et al. (2006). The Toronto Mindfulness Scale: Development and validation. *Journal of Clinical Psychology*, 62, 1445–1467. DOI: 10.1002/jclp.20326.
- MacLean, K. A., Ferrer, E., Aichele, S. R., Bridwell, D. A., Zanesco, A. P. Jacobs, T. L. et al. (2010). Intensive meditation training improves perceptual discrimination and sustained attention. *Psychological Science*, 21, 6, 829-839. DOI: 10.1177/0956797610371339
- McArthur, L.A. (1972). The how and what of why: Some determinants of consequences of causal attributions. *Journal of Personality and Social Psychology*, 22, 171-193. DOI:10.1037/h0032602
- Mrazek, M. D., Franklin, M. S., Phillips, D. T., Baird, B., & Schooler, J. W. (2013). Mindfulness training improves working memory capacity and GRE performance while reducing mind wandering. *Psychological Science*, 24, 776-781. DOI: 10.1177/0956797612459659
- Moore, D.A., & Kim, T.G., (2003). Myopic social prediction and the solo comparison effect. *Journal of Personality and Social Psychology*, 85, 1121-1135. DOI: 10.1037/0022-3514.85.6.1121.
- Ostafin, B. D., & Kassman, K. T. (2012). Stepping out of history: Mindfulness improves insight problem solving. *Consciousness and Cognition*, 21, 1031-1036. DOI: 10.1016/j.concog.2012.02.014

- Pattyn, N., Neyt, X., Henderickx, D., Soetens, E., (2008). Psychophysiological investigation of vigilance decrement: Boredom or cognitive fatigue? *Physiology & Behavior*, 93, 369-378. DOI: 10.106/j.physbeh.2007.09.016
- Ross, L. (1977). The “False Consensus Effect”: An egocentric bias in social perception and attribution processes. *Journal of Experimental Social Psychology*, 13, 279-301. DOI: 10.1016/0022-1031(77)90049-X
- Schwarz, N. (1994). Judgment in social context: Biases, shortcomings, and the logic of conversation. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 26, pp. 123-162). New York: Academic Press.
- Sample, R. J. (2010). Does mindfulness meditation enhance attention? A randomized controlled trial. *Mindfulness*, 1, 121-130. DOI: 10.1007/s12671-010-0017-2
- Tang, Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q et al. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences*, 104, 43, 17152-17156. DOI: 10.1073/pnas.0707678104
- Trope, Y., & Gaunt, R. (2000). Processing alternative explanations of behavior: Correction or integration? *Journal of Personality and Social Psychology*, 79, 344-354. DOI: 10.4236/psych.2013.41001
- Valentine, E. R., & Sweet, P. L. G. (1999). Meditation and attention: a comparison of the effects of concentrative and mindfulness meditation on sustained attention. *Mental Health, Religion & Culture*, 2, 1, 59-70. DOI: 10.1080/13674679908406332
- Weger, U.W., Hooper, N., Meier, B.P., & Hothrow, T. (2012). Mindful Maths: Reducing the impact of stereotype threat through a mindfulness exercise. *Consciousness & Cognition*, 21, 471-475. DOI: 10.1016/j.concog.2011.10.011

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition, 19*, 597-605. DOI: 10.1016/j.concog.2010.03.014

Table 1. Means and Standard Deviations for Ratings of the Writer's View of Nuclear Power.

Essay Type	Experiment 1		Experiment 2	
	Mindfulness	Control	Mindfulness	Control
For nuclear power	5.83 (1.34)	6.27 (0.09)	5.33 (1.69)	6.10 (1.28)
Against nuclear power	2.23 (1.60)	1.65 (1.11)	2.22 (1.85)	1.74 (1.02)
Difference	3.60	4.62	3.11	4.36

Note: 1 = very opposed and 7 = very favourable; means closer to the scale endpoints of 1 and 7 and larger difference scores between conditions indicate greater levels of the CB

Table 2. Means and Standard Deviations for Ratings of the Writer's View of Nuclear Power.

	Mindfulness	Control	Attention to Detail
For Nuclear			
Power	5.64 (1.04)	5.71 (1.66)	6.45 (1.00)
Against Nuclear			
Power	1.94 (1.53)	1.56 (1.00)	1.67 (1.27)
Difference	3.70	4.15	4.8

Note: 1= very opposed and 7= very favourable; means closer to the scale endpoints of 1 and 7, and larger difference scores between conditions indicate greater levels of the CB.

## Appendix A

### For Nuclear Power

*A student in a speech class was assigned by a coin flip to write a paragraph in favour of the use of nuclear power. This is the resulting paragraph:*

*'The use of nuclear power should be encouraged. There are many reasons for having this position. For example, earth has a limited supply of coal and oil; the two natural resources that currently supply us with energy. Nuclear power plants would play a major role in energy production when coal and oil become scarce. Coal and oil burning plants pollute the air with excess carbon dioxide emissions in comparison to nuclear power, which does not contaminate the environment in any way. Despite the popular misconception, the plants almost never experience any problems; if they do it is only via human error. And finally, significantly less fuel is required by nuclear power plants. For example one ton of Uranium will produce more energy than several million tons of coal and several million tons of fuel. For these reasons, the use of nuclear power plants should be encouraged.'*

### Against Nuclear Power

*A student in a speech class was assigned by a coin flip to write a paragraph opposed to the use of nuclear power. This is the resulting paragraph:*

*'The use of nuclear power should not be encouraged. There are many reasons for having this position. For example, nuclear power results in the expulsion of radiation. This radiation damages cells within the body causing effects from sickness to death; indeed people are susceptible to illness even years after they have been exposed. Accidents in nuclear power plants are much more devastating than in normal energy plants, as was the evident from the famous case of Chernobyl. Nuclear power is dependent on Uranium, however Uranium is a scarce source, expected only to last for the next 30 to 60 years depending on demand. And finally, not only do nuclear power plants take 20 to 30 years to build, but they would become an instant target for terrorist acts. For these reasons, the use of nuclear power plants should be discouraged.'*

Appendix B

## Study 3: Example Attention Manipulation

Count how many  arrows there are in the following grid.

