Approaching Cognitive Bias in Critical Thinking Instruction

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Research has increasingly identified how cognitive biases can filter and influence thinking before people are consciously aware of them. These findings have led some scholars to question the traditional critical thinking framework, which seeks to analyze and evaluate thinking processes that are typically inaccessible and rethink how to approach conventional critical thinking pedagogy. This paper first describes critical thinking instruction and the importance for it to include a framework for bias mitigation. Three types of activities are then introduced to facilitate bias mitigation, which include promoting a general mindset to encourage open-mindedness, integrating awareness-raising strategies to show that certain biases can impair rationality, and intervention strategies to target and reduce the negative outcomes of cognitive bias. Instructional strategies and interventions to contend with cognitive biases in different contexts are described to give instructors a clear understanding of some practical and powerful tools that can be used immediately to address the adverse outcomes of cognitive bias that can limit and undermine rational thinking processes.

認知的バイアスは、人々が意識的に気づく前に思考にフィルターをかけ、影響を与えることが、過去の研究によって明らかになりつつある。バイアスはしばしば目に見えず無意識的であるため、思考プロセスを分析・評価しようとする従来のクリティカル・シンキングのアプローチは不適切でり、従来のアプローチ方法が再考されるようになった。本稿では、思考に偏りがあることを示す啓発戦略と、認知バイアスの否定的な結果を標的とし軽減する介入戦略を統合する枠組みを提供し、さらに、クリティカル・シンキングの指導を改善するための最近の研究を紹介する。合理的な思考プロセスを制限し、損なう可能性がある認知バイアスの悪影響に対処するために、すぐに使える、実用的かつ強力なツールについて教師が明確に理解できることを期待して、さまざまな文脈における認知バイアスと闘うための指導戦略について述べる。

Developing critical thinking skills has been a central educational goal at universities for decades (Andreucci-Annunziata et al., 2023). Numerous definitions of critical thinking exist, but many contain overlapping elements of Scriven and Paul's version (1996), which states that it is the "intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action." Much of this infusion is based on the assumption that critical thinking skills are durable and portable (Maynes, 2015): durable in that critical thinking skills are thought to apply to a wide range of subjects and portable in that these skills can be utilized beyond the classroom in both a student's personal and professional life. A challenging problem in teaching critical thinking that limits both its durability and portability is the presence and pervasiveness of cognitive bias. This issue has led several scholars to question the effectiveness of current critical thinking instruction in its attempts to counter cognitive bias (e.g., Battersby & Bailin, 2013; Kenyon & Beaulac, 2014).

Battersby and Bailin (2013) contend that critical thinking instruction primarily consists of analyzing the structure of arguments and identifying specific types of errors or problems in reasoning, particularly those commonly identified as fallacies. This pedagogy is based on the idea that teaching learners informal logic and reasoning can equip them with the knowledge and skills to notice errors in examining arguments to prevent making these errors in the future. Kenyon and Beaulac (2014) argue that although critical thinking instruction has begun to contend with cognitive bias, the typical approach found in textbooks and other instructional materials lacks empirically-driven evidence in bias mitigation. The current framework in teaching critical thinking,

which they term "the Intuitive Approach," aims to teach students about types of biases and how they distort thinking with the hope that, in doing so, students will be able to avoid making biased decisions themselves (Kenyon & Beaulac, 2014). Kristal and Santos (2021) argue that this approach fails to adequately thwart the impact of bias because explicit knowledge of biases does little to counter something that manifests unconsciously. How, then, should bias mitigation occur if it is to be an instructional goal in critical thinking education? To answer this question, it is necessary to briefly examine the nature of cognitive bias.

Much of the work regarding cognitive bias relies on Kahneman et al.'s definition (1982) which states that they are unconscious and systematic deviations from rationality that occur when people process and interpret information in their surroundings, influencing their decisions and judgments (Korteling & Toet, 2022, p. 2). These biases can distort an individual's perception of reality, resulting in inaccurate interpretation of information and unsound decision-making (Kahneman, 2011). Other scholars have argued that while cognitive biases can result in errors, they can be considered the product of rationality when they are viewed as adaptive responses to an environment that is always changing and uncertain (Todd & Gigerenzer, 2000; Gigerenzer & Gaissmaier, 2011). Further, Mercier and Sperber (2017) maintain that certain biases can be effective in social situations such as group decision-making by helping people argue their position. Whether or not biases are seen as deviations from rationality can depend on the perspective being applied. However, biases can operate unconsciously, so their negative impact on conscious thought processes is often unrecognized. With this in mind, teachers are likely to benefit from learning about how to implement concrete activities to target the potential negative impacts of biases before they manifest in the classroom.

Practical Strategies to Mitigate Cognitive Bias in the Classroom

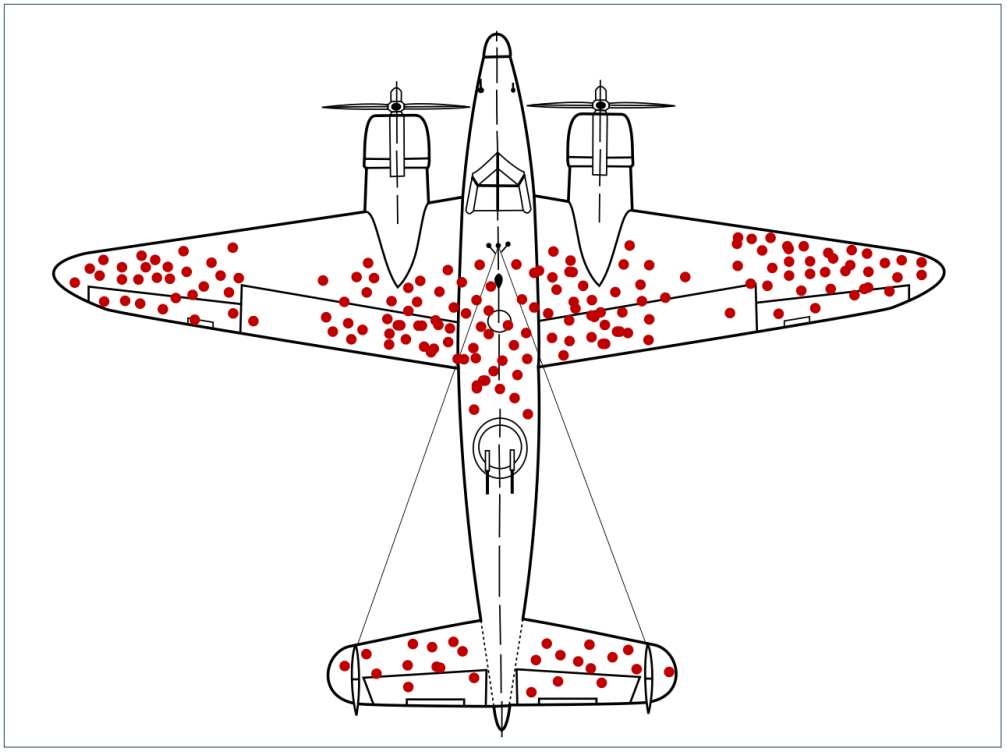
As discussed, cognitive biases can result in both positive and negative outcomes. Thus, teachers should aim their classroom management strategies toward reducing and managing the negative ones. These strategies could be integrated into the usual lesson flow so that no special pinpointing of the emergence of a bias by the teacher is necessary. Instead, the already in-place strategies will work to reduce or remove any emerging negative impact. Classroom activities and group strategies to confront cognitive bias can be divided into three categories. First, at the broadest level, a general mindset should be promoted that one's thinking may be biased. This process, sometimes referred to as "unfreezing," aims to make decision-makers aware that their intuition is flawed (Aczel et al., 2015). Second, it is important to help students understand common biases and how they can impact rational decision-making. The third category includes those strategies that specifically target biases to remove or reduce any adverse effects they may bring to the classroom and beyond. The following groups of activities are suggestions for teachers to adopt to enhance their critical thinking instruction.

Promoting a General Mindset

Questioning and Rethinking

Teachers should promote a general mindset in students which accepts that their thinking may be flawed and that they have fixed blind spots by incorporating case studies and examples that show that thinking processes can be compromised. When students accept that they are susceptible to bias, they are more likely to take a positive attitude towards testing and reflecting on their thinking processes. A good activity is to show research from a study examining the damage done to aircraft that had returned from missions during World War II (see Figure 1). Ask students whether they think it would be a good idea to reinforce the areas with the most damage with more armor. It seems reasonable to strengthen the most damaged areas, but this would be untrue because the worst-hit planes never came back. The spots that were *not* damaged on the surviving planes were actually the worst parts to be hit. This example illustrates survivorship bias which occurs when researchers focus on individuals, groups, or cases that have passed some kind of selection process, while ignoring those that did not. Survivorship bias can lead researchers to make incorrect conclusions because the data observed is incomplete. The results of three large studies by Wang and Jeon (2020), which utilized responses to hypothetical scenarios, showed that participants attribute more bias in others rather than themselves. However, this incongruity dissipates if they see themselves susceptible to biasing influences. This mindset will open students to the necessity of rethinking, accepting uncertainty, and addressing potential blind spots and biases in their thinking. This kind of mindset is well explained in the book *Think Again* by Adam Grant (2021), which looks at the importance of open-mindedness in better thinking and in *Being Wrong* by Kathryn Schulz (2011), which focuses on a positive view of making errors and viewing the thinking process as being fallible. One way that these books could be resources for a classroom discussion on general mindset is for teachers to introduce some of the cases Schulz describes that look at the dangers involved in how people can be irrational and stubborn in their attitude towards sunk costs (i.e. when people are reluctant to give up on something they have invested significant time or energy in even though it is plainly a better and more rational choice to acknowledge the mistake and move on).

Figure 1
Survivorship Bias



Raising Awareness

Making Time to Discuss Biases in the Classroom

Teachers should take opportunities in class to talk about specific biases. Biases can be interesting to discuss and can fit into classroom discussions concerning the nature and quality of evidence, arguments, critical thinking, and statistical data. Kang (2021) argues the need to "Continue to learn more about all kinds of biases and decision-making errors not because education directly decreases these errors but because deeper awareness will support your internal motivation to improve continuously both individually and institutionally" (p. 90). *Myside bias*, the *halo effect*, *authority bias*, *hindsight bias*, and the *ostrich effect* are some examples of biases that can quickly be explained and can be engaging topics of discussion across various classroom tasks.

Recalling Examples of Biased Reasoning

A powerful strategy is for teachers and students to reflect on past behaviors to find instances of biased reasoning. Teachers can first present examples of themselves being biased. Below is a personal anecdote that can introduce myside bias to students:

> I love coffee. I enjoy drinking it every day but I have heard some evidence that casts doubt about its health benefits. Because I want to continue drinking coffee, I either avoid articles that report the harmful effects of coffee or am very reluctant to read them. On the other hand, when I see articles suggesting coffee is healthy for me, I read them eagerly.

After introducing a few examples, teachers can ask students if they have any similar anecdotes. Brainstorming examples of biases that arise in daily life encourages self-reflection and idea-sharing.

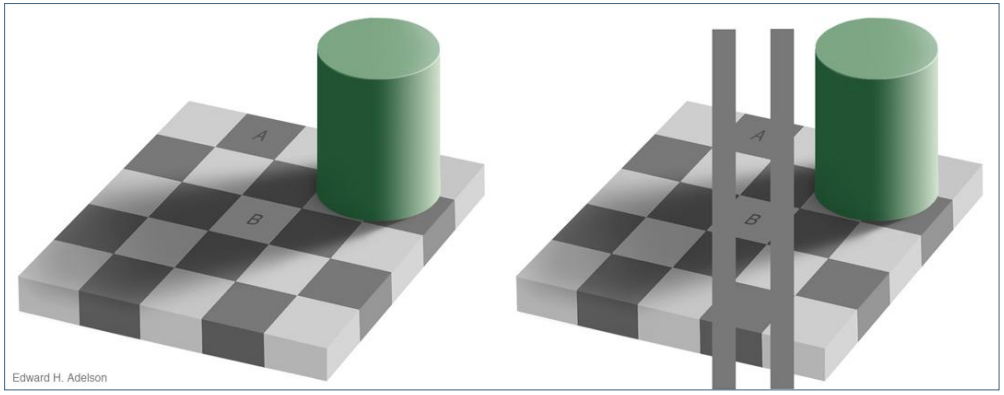
'Aha' Activities

Another interesting way for teachers to introduce and explore cognitive bias is to incorporate some 'A-ha' style activities into their lesson plans. 'A-ha' activities can work in a surprising and non-confrontational way to help students understand that their thought processes are not always available to the conscious mind and to experience on a visible level that they can be affected by cognitive bias. 'Aha' activities can include the following:

Optical Illusions

Optical illusions can effectively show that the conscious mind is not always in the perceptual driving seat. Figure 2, which depicts Adelson's Checkershadow Illusion (2005), is a good example to use in the classroom. The image shows a checkerboard with light and dark squares, partly shadowed by another object. The optical illusion is that the square labeled A appears darker than the square labeled B. However, the image on the right illustrates that they are, in fact, the same shade. Once students know how the illusion works, they should try to use their conscious mind to overcome it. The inability to alter the illusion demonstrates that conscious thought has limits built into the system itself.

Figure 2
Adelson's Checkershadow Illusion



White Bear

Another eye-opening activity is for teachers to tell students, "Don't think about a white bear." Despite consciously trying to avoid thinking of a white bear, the unconscious will keep throwing the "white bear" into the mind, nicely showing the power of the unconscious. This activity is based on the Ironic Process Theory (IPT). This psychological phenomenon suggests that a paradoxical effect is produced when individuals intentionally try to avoid thinking a certain thought or feeling a certain emotion. Wegner et al.'s study (1987) was the first to introduce the paradoxical effects of thought suppression. Their findings have been more recently confirmed in different circumstances, such as darts and baseball, where players were asked to avoid thinking about hitting a particular section of a targeted area (Gray et al., 2017; Woodman et al., 2015). IPT activities like the white bear demonstrate that the conscious does not have full control.

Thought Experiments on Individual Biases

Teachers can easily demonstrate some biases, such as anchoring, through thought experiments. Ioannidis (2023) defines anchoring as "a cognitive bias whereby individuals' decisions are influenced by an uninformative number, the anchor" (p. 1). Teachers can demonstrate the effects of anchoring by splitting the class into two groups. Both groups are asked a question that primes students by setting a different anchor. For example, half the class might be asked, "Did Leonardo Da Vinci die before or after the age of 95?" while the other half is given the question, "Did Leonardo Da Vinci die before or after the age of 59?" The question is exactly the same except for the anchor. Without eliciting responses to the first question, ask students in both groups to now guess how old Da Vinci was when he died. The group with the higher number invariably has a higher median and vice-versa, showing the effect of anchoring on thinking. There are several examples of anchoring experiments that can be found online, such as insideBE (https://insidebe.com/articles/12-examples-of-anchoring-bias/) and ResearchProspect (https://www.researchprospect.com/what-is-anchoring-bias/), and can easily be incorporated into a lesson.

The Tag Game

A final 'A-ha' activity that could be used to provoke some interesting discussion is the 'Tag Game,' derived from the work of Fowler (2006). Students are assigned a badge with a distinct shape, color, and size and told to pin it to their clothes. Without verbal communication and with no specific criteria given, students are tasked with forming groups. After forming groups, students disband and form new groups. This process is repeated several times. Typically, participants group themselves based on a set of shared characteristics such as shapes, colors, or sizes. Seldom do they extend their considerations beyond the badges, and even more rarely do they deliberately form diverse groups encompassing a variety of shapes, colors, and sizes. This non-confrontational exercise creates opportunities to discuss social categorization processes, the automatic nature of "us" versus "them" distinctions, and in-group bias, also known as affinity bias. Moreover, it serves as an excellent tool for introducing the concept of diversity and elucidating the potential advantages of diverse workgroups. These discussions prompt participants to propose strategies for enhancing the recognition, support, and appreciation of diverse perspectives and experiences.

Targeting the Negative Effects

Individual Work before Group Work

It is important to understand that biases can manifest in even the most simple processes. Brainstorming activities, which often require students to form groups to generate ideas about a specific topic, are a prime example. Group dynamics can adversely impact the quality of the task. During group tasks, students may decide to do the following:

- accept and adopt one of the opinions in their group, discarding their own opinion
- water down their opinion to avoid conflict or to move closer to a majority or dominant viewpoint
- outwardly pretend to agree while inwardly disagreeing

These decisions could be due to different possible reasons, including the undesirable effects of various cognitive biases such as groupthink or the halo effect (see Appendix A). To counter these potential issues, teachers should allow time for students to write down their ideas or answers to a question individually before any group brainstorming or discussion occurs. Group work can be enhanced by helping students sidestep some of the negative effects of many social biases. Several studies have examined the effects of engaging in individual brainstorming followed by generating ideas in a group and found that this procedure enhanced idea creation. For example, a study by Ritter and Rietzschel (2017) indicated that participants who directly engaged in group brainstorming encountered more cognitive interference since they were less likely to continue thinking and refining their ideas because they needed to devote their cognitive resources to listening to their group members. Additionally, Ritter and Mostert (2018) discussed how creating their own ideas individually before openly sharing them in a group increased participants' sense of responsibility.

Red Teams

Another bias mitigation strategy is the use of *red teams*. According to the Behavioral Insights Team (2017), the management of government and commercial enterprises has long used red teams and red teaming processes. They generally refer to strategies that challenge conformity and ensure that dissenting viewpoints are generated. They also provide independent critical thought to improve sound decision-making. Hence, red teaming is a methodology that enables organizations to view their vulnerabilities and challenge assumptions. In a language learning context, red teams can be used in group discussions where a student or students are assigned a role to challenge or question the opinions or ideas of the group.

There are two main advantages of employing red teams. The first advantage is that many biases are addressed before they emerge. Biases, particularly social biases, prevent group members from challenging their classmates' viewpoints, so ideas are not properly vetted. Assigning the role to challenge and make objections can counter some of the social pressures to keep quiet. Another advantage is that this activity circumvents the unpleasantness some students may feel if they perceive objections and challenges as personal attacks. By assigning students to question ideas generated in the group, opposition can seen as a role or duty, not a direct attack.

Red Teams can be implemented with all levels of students. With more advanced and confident students, instructions can be given orally regarding the role of the Red Team. With students at the beginner level and/or with lower confidence, a cue card can be used to support this strategy. An example of a cue card can be seen below.

Your **goal** is to check all the boxes during the discussion!

Ask the **questions** below **twice** during the discussion and **check** (✓) the box each time

you do so.

Questions.

- What is your reason for saying that? ❒ ❒
- Do you have any evidence to support that point? ❒ ❒
- Could you tell us more about that? ❒ ❒
- Do you believe that most people hold that opinion? Why? ❒ ❒
- What might be a different way of thinking about .....? ❒ ❒

Counter-arguments

Another useful strategy teachers can employ to address the negative impact of cognitive bias is regularly introducing activities that require students to consider counter-arguments and counter-examples. In general, people are less objective about their own reasons and opinions due to various cognitive biases related to protecting self-image and maintaining a certain identity. However, people tend to be more objective and effective at evaluating the reasons and opinions of others (Mercier & Sperber, 2017). Thus, inserting time in a lesson for students to generate counter-arguments and counter-examples to other classmates' opinions and ideas is an effective practice to help students seek alternatives and look at both sides of an issue, which mitigates myside bias. Battlesby and Bailin (2013) claim that the "development of the habit of considering counter-examples and alternatives is a crucial aspect of critical thinking instruction and is necessary in order to frustrate the natural tendency to leap to conclusions" (p. 8). Over

time, students will begin to think more deeply about counter-arguments, leading to more re-adjusting and rethinking their own position.

Furthermore, it is important for teachers to become involved in these classroom discussions and introduce perspectives and evidence that students may be overlooking. Abrami et al.'s meta-analysis (2015) on what promotes critical thinking (often linked to the mitigation of bias) found that an instructional intervention that is particularly useful in the development of general critical thinking skills is the opportunity for dialogue, especially "where the teacher poses questions, when there are both whole-class teacher-led discussions and teacher-led group discussions" (p. 302).

Silence the Leader

Teachers can also try a technique for group discussions called *Silence the Leader.* It is ideal in classroom contexts where students have emerged as leaders due to their level of attractiveness, language skill, social class, or age. This favored status, however, can trigger any number of biases, such as authority bias and the halo effect, which can thwart the group from sharing their ideas freely and openly. According to Kakkar and Sivanathan (2021), various studies have found that assertive and overly confident students can often discourage other group members from offering opposing opinions. One instructional strategy is to assign these students to be the leaders during group discussions; however, instruct them only to speak after all members have given their opinions. This condition has two potentially beneficial outcomes. First, members will not be influenced by the leader's opinion before giving their own, and second, the leader will be more likely to listen to the group's views, which can impact their own position. This simple intervention, which limits high-status individuals from taking a firm position at the outset of a group activity, can create space for more ideas to emerge.

Blinding

One of the most widely applied bias mitigation strategies is *blinding*. This concept was first introduced in 1952 by the Boston Symphony Orchestra and has been adopted by other prominent symphony orchestras across the United States. It entails placing a screen between musicians auditioning and the selection committee to remove gender, race, or appearance bias. This strategy is now occasionally employed in other contexts. A similar blinding technique can be applied in educational settings by concealing students' names when assessing tests or essays. Even still, despite attempts from instructors to be fair and unbiased, they are affected by unconscious bias, which, over time, leads them to naturally favor some students more than others. Hernandez-Julian and Peters (2017) confirmed this unfortunate reality by comparing university instructors who could observe the appearance of their students with those who could not. They found that a student's level of attractiveness influenced their grade. Other factors, such as grooming (Rodgers et al., 2019) and personality (Denessen et al., 2020), have also been found to impact teacher bias.

Teachers can use blinding to combat their bias in a variety of situations. One way to use blinding is on an in-class writing task or test. Teachers can prepare two separate sheets: a question sheet with the students' information and an answer sheet with only the students' ID numbers. The teacher would only view the answer sheet for grading and then use the ID number to record the grades. This blinding approach will reduce any teacher bias, both positive and negative.

In the same way, repeated interactions among classmates can build up bias, which can impact the outcomes of particular activities. Commenting during peer review, for example, can be influenced by how students perceive their peer partners. Therefore, teachers should consider blinding during peer review. One way this can be implemented in an academic writing course is to ask students to print out their essay draft with only their ID number. Essays can then be swapped for peer review with students in the same class or students with a similar proficiency level from another writing class. Blinding can be implemented in other activities requiring students to evaluate and judge classwork.

Conclusion

The effectiveness of critical thinking instruction in most classrooms is still not well supported by their outcomes (Corriera, 2018; Pasquinelli et al., 2021). Part of this may derive from the failure to adequately incorporate and address strategies and interventions for bias mitigation in critical thinking pedagogy. Throughout this paper, several critical thinking strategies and interventions to target the negative effects of unconscious thinking processes were proposed. By incorporating some of these activities and strategies, teachers could encourage students to develop a general attitude that acknowledges their vulnerability to cognitive bias, realizes how certain biases can infiltrate the mind and create undesirable outcomes, and applies interventions and frameworks to target biases before they emerge. It is the hope that the suggestions and strategies detailed in this paper, such as blinding, the white bear, and red teams offer concrete tools for teachers to move towards a more comprehensive approach to critical thinking instruction.

Bio Data

Guy Smith teaches at International Christian University in Tokyo in the English for Liberal Arts program. His teaching and research interests are in self-determination theory, student well-being, and what the emerging research on cognitive and unconscious bias means for critical thinking.

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Appendix A

Definitions of Biases

- Myside bias – the tendency to look for, remember, interpret, and prefer information that isconsistent with, and supports, previously held assumptions and beliefs and attitudes
- Halo effect – a positive impression of a person due to looks, grooming, confidence, or perceived proficiency that has an effect on how the opinions of that person are evaluated
- Authority bias – the tendency to perceive the opinions of figures of a person(s) in authority as having greater weight or accuracy
- Group think – when the desire to be part of a group and be part of a consensus overrides the motivation to critically explore all options
- Hindsight bias – when people think that events that happened were more predictable than they actually were, also called the I "knew it all along" effect
- In–group bias – when people show favor, or preferential treatment, to their in–groups
- Ostrich Effect – people actively try to avoid or forget negative information to reduce psychological distress