

**Review of *The Palgrave Handbook of Critical Thinking in Higher Education*
Part V “Critical Thinking and the Cognitive Sciences”**

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Abstract

This review essay discusses three articles from the *Palgrave Handbook of Critical Thinking in Higher Education* (eds. Martin Davies and Ronald Barnett) concerned with outlining the connection between cognitive science and critical thinking. All of the authors explain how recent findings in cognitive science, such as research on heuristics and cognitive biases (e.g. framing effects, the availability heuristic) might be incorporated into the critical thinking curriculum. The authors also elaborate on how recent findings in metacognition can reshape critical thinking pedagogy. For instance, the essays articulate how critical thinking instructors would be wise to broaden the scope of traditional critical thinking content by instructing students in the metacognitive strategies of self-regulation, cognitive monitoring, and evaluation in order to encourage better decision making both inside and outside the classroom.

Key words: metacognition, cognitive science, critical thinking pedagogy

[Editor’s Note: This review essay constitutes the first in a series devoted to *The Palgrave Handbook of Critical Thinking in Higher Education*, and the other members of the series will appear in subsequent issues of *INQUIRY*. The content of the *Handbook* is very rich and has great diversity, covering not only “Critical Thinking and the Cognitive Sciences” but other topics such as “Critical Thinking and Culture,” “Critical Thinking and the Professions,” and “Social Perspectives on Critical Thinking.” The very richness and diversity of content that makes the *Handbook* so valuable, also strongly suggests that a single review cannot do the book justice, hence the need for a series of reviews by diverse reviewers.--FKF]

I. Introduction

It is rare to find institutions of higher education directly opposed to critical thinking, or at least *professedly* directly opposed. Critical thinking’s status as a highly valued pursuit and outcome for students permeates the syllabi

and promotional rhetoric of many colleges and universities, and yet, as Peter Ellerton (2015) has rightly remarked, it has become the Cheshire Cat of curricula: “it seems to be in all places, owned by all disciplines, but it does not appear, fully developed, in any of these” (p. 409). Into this context arrives *The Palgrave Handbook of Critical Thinking in Higher Education*, a substantial collection of essays exploring the connections between critical thinking and higher education. The volume includes seven sections outlining the latest research on relevant subtopics including those devoted to foundational questions like “What is Critical Thinking in Higher Education?” as well as “Teaching Critical Thinking,” “Critical Thinking and the Professions,” and so on. Lest one be concerned that the volume might have a parochial outlook on critical thinking as it is taught in North American institutions, the volume’s editors, Martin Davies and Ronald Barnett (2015), explain that one of their aims was to publish a collection of essays from the

many domains relevant to critical thinking and higher education that spanned both disciplinary and national boundaries, including contributions from “five continents, ten countries, and over eighty institutions” (p. 3).

Taking a decidedly more narrow scope, at least in terms of content, in this review I will be discussing three essays from this *Palgrave Handbook*, all of which focus on the relation between critical thinking and the cognitive sciences in the context of higher education. The essays form Part V “Critical Thinking and the Cognitive Sciences.” After outlining the main arguments and relevant content in each essay, I will raise a point of concern, though I can say at the outset that there is considerable merit in each of the contributions. Aside from outlining helpful approaches to integrating research in cognitive science with contemporary debates in critical thinking, I found all of the authors attentive to potential objections and misunderstandings, and I regularly had the experience of thinking that the authors had overlooked some important distinction or qualification only to find that they addressed that very objection in the next paragraph. The articles are also filled with helpful empirical citations to substantiate their arguments, a few of which I have included in my discussion to give readers a sense of the authors’ approach. As will become evident shortly, there is a considerable degree of overlap in the arguments and proposed pedagogical directives from each of the authors. All are keen to emphasize the importance of embracing *metacognition* (often defined as “thinking about thinking”) as a way of teaching critical thinking, and all embrace the model of dual-process psychology and its relevance to critical thinking pedagogy. They differ more in points of emphasis or to what extent the status quo needs to be altered, not in whether the findings of cognitive science should be incorporated into the critical thinking curriculum.

II. The Metacognitive Curriculum

It is by no means a new idea that teaching critical thinking should involve teaching metacognition as a disposition or strategy (Perkins, Jay, & Tishman, 1993). However, in his essay, “Metacognitive Education: Going Beyond Critical Thinking,” Joe Y.F. Lau (2015) argues for a more prominent role for metacognition in higher education saying that, “the teaching of critical thinking should be expanded and re-conceptualized as part of a broader educational program for enhancing metacognition” (p. 373). In other words, critical thinking should be done for the sake of promoting metacognition, rather than vice versa. Lau (2015) claims that if educators want to teach students how to improve their decisions about what to do and believe, “we need to go beyond critical thinking. It involves teaching more about other aspects of cognition such as the psychology of learning and reasoning and creative problem solving. We also need to help students gain better insight and control over their work habits and personality” (ibid.).

In the sense that Lau uses the term, metacognition is knowledge about cognition and self-regulation and its potential uses in the higher education curriculum are wide indeed. For instance, metacognition can be crucial for creating the right circumstances for doing creative work, when this often involves a delicate balance between devising new ideas and then testing and implementing them. The teaching of critical thinking is too often divorced from creativity, and Lau appeals to Hargrove (2012) to suggest that there is reason to believe that improving student’s metacognitive monitoring skills can improve creative problem solving (as cited in Lau, 2015, p. 374). Similarly, it is not enough to become adept, *qua* critical thinker, at monitoring one’s thoughts and patterns of reasoning. Lau insists that it is essential that students learn some of the scientific research about cognition, such as our tendencies toward bias and an exaggerated sense of our own

abilities. For example, Iyengar and Lepper (2000) have shown that while it is a good practice for a critical thinker to consider alternative options when making a decision, empirical research has found that increasing the range of choices one faces can create decision fatigue and lead to worse outcomes (as cited in Lau, 2015, p. 377). Simply relying on critical thinking as a disposition will lead one astray in such cases, hence creating the need for a broader educational approach. In arguing for his claims, Lau presents some initial reasons for expanding the curriculum along these proposed lines, and he outlines four particular components to be included.

The first component involves educating students in the appropriate meta-conceptions of higher-order thinking, which typically involves correcting some misconceptions about the nature of critical thought and promoting certain critical approaches that might not be immediately attractive to students. Altering a student's metaconceptions of higher-order thinking means convincing students that there is some distinct value in learning how to learn and in being properly critical. This might mean getting students to see that Socrates did not become the gadfly of Athens in order to be annoying (though he probably was that!), but to pursue wisdom through critical inquiry.

Lau's second component of the metacognitive curriculum is to provide students with general knowledge of cognition, as a supplement to standard approaches to teaching critical thinking. Lau (2015) notes that while learning about fallacies is worthwhile, it is far from sufficient to avoid distortions in our thinking (p. 381). Individuals can be subject to anchoring or framing effects where the subtle use of particular words can bias our thinking. Lau points to Liberman, Samuels, and Ross' (2004) notable finding along these lines, which concerns a prisoner's dilemma game where players could be induced to play more or less selfishly on the basis of whether they were told that they were

playing a "Community Game" (promoted comparatively unselfish behavior) or a "Wall Street Game" (promoted comparatively selfish behavior) (as cited in Lau, 2015, p. 381). This result held in spite of the fact that both games were precisely the same, differing only in name. In order to be properly on guard against these and other biases, Lau suggests, it is crucial that one have some understanding of contemporary empirical research on our potential biases, especially since Stanovich and West (2008) have provided reasons to believe that knowing about these biases can mitigate heuristics' negative influence (as cited in Lau, 2015, p. 382).

The third component of the metacognitive curriculum is "meta self-knowledge," which means educating students regarding the difficulties of self-knowledge, especially the ways in which humans have a tendency to underestimate their negative traits and overestimate their positive qualities. As Kruger and Dunning (1999) have famously demonstrated, those who are among the most incompetent are often the least aware of their incompetence (as cited by Lau, 2015, p. 383).

Finally, Lau's fourth proposed component involves teaching students strategies in self-regulation. Despite the importance of self-regulation, it is not discussed or promoted nearly enough in the context of critical thinking in higher education. Lau appeals to research by Duckworth, Peterson, Matthews, and Kelly (2007) showing the extent to which personal traits like "grit" predict educational attainment and college retention over and above what IQ would predict (as cited in Lau, 2015, p. 384). Lau explains that the concept of grit presupposes that an agent have self-regulation strategies, so instructing them on these points could be very helpful for their academic success. In this spirit, Tuckman and Kennedy (2011) have found that explicit instruction in metacognitive strategies, including self-regulation, led to higher grades and graduation rates (as cited

in Lau, 2015, p. 384). As an example of this type of teaching from my own critical thinking courses, I instruct students on how to monitor their levels of ego-depletion (depletion of the psychological reserve of energy used for self-control) in an attempt to make sure that they are able to have proper levels of self-control when it comes time to make important decisions and to be aware of their varying susceptibility to temptations (Baumeister, Bratslavsky, Muraven, Tice, 1998, but see also Inzlicht & Schemichel, 2012).

In his conclusion Lau (2015) shows that he is aware that it is a lot of material to ask critical thinking instructors to include in their critical thinking courses (p. 386). His response to this concern is to say that the curriculum at large should embrace metacognition as a central goal rather than simply dumping it all into a single course. While this response seems reasonable, Lau is not entirely convincing on why precisely we need to “go beyond critical thinking” to metacognition rather than seeing metacognition as part of critical thinking. It is not clear to me that rightly learning critical thinking somehow excludes the psychology of learning and problem solving, as Lau seems to imply (Lau, 2015, p. 373). In fact, some like van Gelder (2005) have explicitly tried to apply the lessons of cognitive science to critical thinking and addressed the ways in which cognitive science can inform critical thinking instruction, especially with regard to the psychology of learning. It would be helpful to hear more from Lau as to how proposals like van Gelder’s would go beyond critical thinking, in the sense that he cites at the beginning with Ennis (1989) as “reasonable reflective thinking on what to believe or do.” (p. 4; as cited in Lau, 2015, p. 373). In sum, Lau might be correct that there needs to be a reconsideration of the priority of critical thinking over metacognition, but he would need a different or more expanded argument for that than what he supplies here.

III. Specific Applications of Cognitive

Science to Critical Thinking

One longstanding debate in critical thinking asks whether critical thinking should be taught as a general set of skills that are instantiated in a variety of domains (Ennis, 1989) or whether genuine critical thinking requires various sets of skills appropriate to specific disciplines (McPeck, 1981; see Davies, 2013 for a more recent characterization of the debate). In their article, “Applying Cognitive Science to Critical Thinking among Higher Education Students,” Jason Lodge, Erin O’Connor, Rhonda Shaw, and Lorelle Burton (2015) “aim to provide a fresh perspective to the generalist-specifist debate in order to make progress in the design of interventions for developing critical thinking in university students” (pp. 391-392). Lodge et al. proceed in this aim by explaining the way in which instructors can apply empirical findings in cognitive science (which has a generalist orientation with respect to this debate) as long as there is some careful translation between laboratory findings and classroom lectures (Lodge et al., p. 392). Instructors can apply cognitive science both in diagnosing where students typically go wrong as well as in proposing strategies to avoid common errors. Readers will find Lodge et al.’s discussion and proposals on these points nuanced and with many interlocutors, but I will be highlighting just two for the sake of concision.

To do the work of diagnosis Lodge et al. appeal to Amos Tversky’s and Daniel Kahneman’s insights to explain the ways in which heuristics can negatively affect decision making, especially decisions made in conditions of considerable uncertainty. While Lodge et al. review several such heuristics, let us consider one that critical thinking students can readily relate to: *the availability heuristic*. The availability heuristic is a decision making process whereby one makes a judgment about something based on how easily it comes to mind. An example from Tversky and Kahneman (1974) points out that just because

it is typically easier to think of words that start with the letter 'r' than have 'r' as the third letter in a word does not mean that it is actually more common for 'r' to occur as the first letter (as cited in Lodge et al., 2015, p. 395). In applying this heuristic to the critical thinking classroom, I sometimes make the point to my students that just because a reading is "relatable" or easy to understand does not make its arguments plausible nor does the fact that a reading is difficult mean that its arguments are flawed. Lodge et al. explain that instruction on these points is time well spent as there is evidence from Epley and Gilovich (2006) that alerting students concerning these heuristics and their hazards has been found to be helpful for avoiding certain types of errors (as cited in Lodge et al., 2015, p. 396).

Lodge et al. propose Halpern's (1998) approach to critical thinking as a further example of the fruitfulness of applying cognitive science findings to critical thinking instruction. Halpern argues that proper critical thinking instruction involves learning how to apply one's cognitive skills in a variety of divergent contexts by exhibiting particular dispositions or attitudes. Such dispositions include "a willingness to engage in and persist at a complex task," and a "willingness to abandon non-productive strategies in an attempt to self-correct." (see Halpern, 1998, p. 425 for a complete list). In order to apply these dispositions, though, Halpern (1998) claims that the critical thinker will need metacognitive monitoring, which is the "executive or boss" among the respective dispositions (p. 454; as cited in Lodge et al. 2015, p. 400). Within Halpern's framework, metacognition is the process whereby critical thinkers evaluate and direct how and where their approach to any particular cognitive problem is going and make the proper adjustments. Noting a similar point to the one made above about Lau's article and Halpern's (1998) contention about the difficulty of skill transfer between different domains, Lodge et al. stress that

the empirical research suggests that critical thinking instructors should be explicit in explaining to students how they are developing students' critical thinking dispositions (as cited in Lodge et al., 2015, pp. 400-401). On this model, students need to know that, while they are developing these dispositions (i.e. the instruction needs to be "deliberate" see Ericsson and Charness 1994), they should not expect that their skills will transfer readily from one domain to another (as cited in Lodge et al., 2015, 402).

While the above findings are hardly encouraging news for critical thinking instructors to deliver to their students ("Accept it everyone—this will be hard!") I suspect that Lodge et al. would emphasize that it is at least better that instructors face up to the facts. Yet while their article effectively showed the relevance and helpfulness of cognitive science to critical thinking, they could have done more to suggest what might be cut from current critical thinking instruction. Lau admitted to this difficulty by suggesting larger curricular reform driven by metacognition, but it is unclear what Lodge et al. would propose since they did not articulate current failures of instructional content beyond saying what was currently missing. At the very close of their article, they suggest that it is not enough to provide a formal education in informal logic, but it is left unsaid precisely what aspects of instruction in informal logic should be excised, and this is problematic for those instructors who may have good reasons to think that what they are currently doing is effective—at least to some degree.

IV. The Pedagogical Imperatives of Metacognition

As has been evident from what has been said thus far, scholars of critical thinking tend to have a substantial number of skills, dispositions, and attitudes in mind for what a critical thinker should be able to do. While not denying that there is good reason to take this view, Ellerton (2015) attempts to bring some

degree of unity to the practice of teaching critical thinking in his article, “Metacognition and Critical Thinking: Some Pedagogical Imperatives.” The source of this unity is his metacognitively evaluative (ME) model of critical thinking. In what follows, I will briefly describe the justification for the ME model and elaborate the practical pedagogical directives that Ellerton derives from it.

Ellerton is aware that there is danger in unifying a conception of critical thinking around metacognition when there is so much contention about the nature of metacognition itself. Nonetheless, Ellerton (2015) does think that there is sufficient unity in the debate among philosophers and cognitive scientists about metacognition to use it for his model: “What does seem consistent in discussion regarding metacognition is that the ‘meta’ part of the word means that we create representations of our thinking, specifically our ‘first order mental states’” (p. 411). He gives the example of how one might have various mental representations of items like a ‘chair’ and ‘sore legs’ from standing all day. At a higher level of cognition, one might make use of these representations to solve a practical problem, namely recognizing the potential use of the chair to rest one’s tired legs (*ibid.*). While one might not always consciously recognize higher-order representations in one’s metacognitive activities, it is necessary that one do so on the ME model. Ellerton (2015) proposes a practical (read: no claims for scientific correctness) definition of *metacognition* which says that it is “attending to mental representations such that the representations themselves, and their interactions become objects of study” (pp. 411-412). In the sense he intends here, to be metacognitive is to take what Daniel Dennett (1988) called “the intentional stance” toward oneself—to examine one’s own beliefs, drives, desires, etc. and evaluate such items just as one would another agent’s (as cited in Ellerton, 2015, p. 412).

The ME model provides a unified conception of critical thinking through its emphasis conceiving of critical thinking as a matter of knowing *how* rather than knowing *that*, following Ryle’s (1970) famous distinction between those terms (as cited in Ellerton, 2015, p. 415). Just as learning to be a piano player is more about non-propositional knowledge than propositional knowledge, so also is it that becoming a critical thinker is about learning how to manipulate, direct, and evaluate one’s cognitive representations rather than learning some set of propositions. Moreover, an agent following the ME model well also involves control and evaluation of the skills that are often listed as being essential to be a critical thinker. Thus, rather than construing the process of becoming a critical thinker as a set of skills, it is more appropriate to construe the process as learning to use metacognition well in deploying the characteristic skills of critical thinking like evaluating evidence, making inferences, etc.

With this understanding in place, Ellerton (2015) prescribes two pedagogical imperatives that contain several sub-imperatives (see pp. 418-425 for the full list of the imperatives). The first is to speak and plan in the language of cognition. This means, among other things, that instructors should give close attention to the cognitive skills in which they train their students. In addition, whatever content the course covers needs to be itself evaluated using the language of cognitive skills. Echoing points from Lodge et al., Ellerton appeals to Hattie and Timperley (2007) to explain how the ME model also puts an emphasis on the importance of feedback that is couched in terms of cognitive skills, noting that this has been identified as, “one of the most powerful influences on learning and achievement” (p. 81; as cited in Ellerton, 2015, p. 421). The second pedagogical imperative following the ME model is to shift the focus of learning experiences and assessment from knowledge to inquiry. Ellerton argues that this

means that critical thinking instructors should abandon what Freire (1996) calls the banking model of education, where teachers construe their work as transferring a set of propositions into students like money into a vault (as cited in Ellerton, 2015, p. 422). Instead, instructors should attempt to create experiences where students can craft their cognitive skills and learn how to employ appropriately the kinds of heuristics that Kahneman (2011) and others recognize as such predominant parts of human cognition (as cited in Ellerton, 2015, p.424).

While there is much to admire about the practical applications of Ellerton's proposed ME model, I do want to raise one point of concern about ME's foundations. I quoted Ellerton (2015) above as saying that there was agreement on the fact that metacognition involves metarepresentation (p. 411). When Ellerton drew this conclusion, he cited Fletcher and Carruthers (2012) who do suggest that this is the case (p. 1366). However, this is an oversimplification of the debate about metacognition, a point that is raised consistently in the work of Joëlle Proust (2010, 2013), a prominent researcher in the field. Carruthers (2009) is well recognized for his stance that metacognition always involves metarepresentation, but this is precisely what is denied by Proust and others (e.g. Peacocke, 2007). They hold that metarepresentational self-ascriptions (e.g. 'I believe that I believe that P') are not always involved in metacognition (see Proust, 2010 for a helpful overview of the debate). This is not a mere academic point for Ellerton's concerns since Proust is specifically concerned with the ways in which humans evaluate their thinking and decide whether one should undertake a specific cognitive task like checking the validity of an argument. Understanding the cognitive science behind our metacognitive activities may well be important for understanding how to use metacognitive activity, and even if Proust is wrong here, it is still worth noting that the debate is less settled than it appears to be in

Ellerton's article.

V. Conclusion

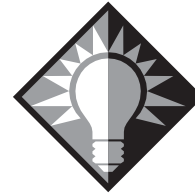
Despite my concerns about each article, all three essays considered here have much to recommend them and it is my judgment that all critical thinking instructors would be wise to read each of the articles from this section of the *Palgrave Handbook of Critical Thinking in Higher Education* if they are at all open to incorporating cognitive science into their critical thinking courses. All of the authors write in an approachable way, taking more time to introduce technical terminology than I have been able to do here. Not only do they provide a strong case for why cognitive science is relevant to critical thinking, but they show due caution and care for how to translate findings from technical academic journals to actual higher education classrooms.

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