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Commentary: How readily can findings from basic cognitive psychology research be applied in the classroom?

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ABSTRACT

The commentary discusses phenomena highlighted in the studies of the special issue such as the hypercorrection effect, overconfidence, and the efficiency of interventions designed to increase monitoring accuracy. The discussion is based on a broader theoretical framework of self-regulation of learning that stresses the inferential character of metacognitive experiences, as posited by the cue utilization approach, the interrelations of metacognition with affect, and the influence of prior knowledge and individual differences factors on monitoring accuracy. The implications of the findings of the studies for learning in the classroom are also pointed out.

1. Introduction

This special issue is a remarkable initiative to bring to the attention of education scientists research that originated in basic experimental research on metacognition. This is a long needed step that can enrich both experimental cognitive psychology and educational psychology in their quest of theories and methods that can explain the nature of learning and facilitate self-regulation of learning in the classroom.

The special issue comprises four articles, all of which aim at highlighting the monitoring process and if, and how, it can be improved for the benefit of students of different ages. The fundamental question the authors had to answer was twofold: (a) is self-monitoring of one's learning accurate and (b) if self-monitoring is inaccurate then can it be improved and how? The implicit assumption is that monitoring accuracy is beneficial for learning because it can inform students' control processes such as how much effort to exert in their studying and how to adapt their learning efforts to task difficulty. But how accurate is self-monitoring and how justified is the assumption that monitoring accuracy is beneficial for learning? And how effective can various interventions for the increase of monitoring accuracy be?

In what follows, and based on evidence coming from the studies reported in this special issue, I shall firstly refer to the accuracy of the monitoring process and the effectiveness of "interventions" used in the various studies to increase monitoring accuracy. Then, I shall discuss the implications of the research findings for theory development in metacognition and self-regulated learning and I shall try to answer the question on how readily the findings from cognitive psychology research can be applied in the classroom.

2. The accuracy of the monitoring process

The prototypical paradigm in cognitive psychology research on metacognitive monitoring in a learning context is that of judgment of learning (JOL), which represents a judgment on whether the studied material will be learned. Right from the very first studies on the accuracy of JOLs it became evident that they can be flawed but under certain conditions – e.g., delayed JOLs (Dunlosky & Nelson, 1992) or JOLs based only on the presentation of the cue of cue-response pair associates (Begg, Martin, & Needham, 1992) – their accuracy can be increased. On the other hand, the association between JOLs and performance on a subsequent memory test of the material to be learned is far from perfect and there were cases where memory performance increased but JOLs remained inaccurate after an intervention and cases where the accuracy of JOLs increased but this improved accuracy did not translate into better memory performance (for a discussion see Dunlosky & Rawson, 2012; Redford, Thiede, Wiley, & Griffin, 2012).

Research on confidence in the accuracy of one's response has also shown that people can be ignorant and at the same time unaware of their ignorance (Kruger & Dunning, 1999). Very often they are overconfident, and this may lead to less effort exertion, or underconfident, although they are studying repeatedly the learning

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material (Koriat & Ma'ayan, 2005). This kind of evidence suggests that monitoring accuracy is crucial for proper control decisions. But is this conclusion justified in light of the studies reported in this special issue?

First of all, is there evidence on the accuracy of monitoring in the studies reviewed here? Metcalfe and Finn (2012) found quite high monitoring accuracy, but also a hypercorrection effect. This is a well documented phenomenon that reflects children's as well as adults' (Butterfield & Metcalfe, 2001) tendency to change their initial response, after they are given corrective feedback, although it had been endorsed with high confidence. Moreover, people often report that they knew the answer all along. The hypercorrection phenomenon is counterintuitive because people change the answers they should not change, had they relied on their feeling of confidence that informs them that their answer is correct.

Dunlosky and Rawson (2012) also found a generally high level of monitoring accuracy and present evidence that decreasing one's overconfidence is critical for improved performance in a learning task in the presence of corrective feedback. This evidence is in the expected direction, because decreasing confidence presumably makes people more careful and more willing to invest effort to improve learning. On the other hand, Pieschl, Stahl, Murray, and Bromme (2012) found mixed evidence on monitoring accuracy depending on the measure of monitoring used. Adaptation to task demands in terms of material studied was associated with learning, suggesting accurate monitoring, but self-report measures such as confidence, satisfaction, or judgment of task complexity were not associated with task performance— an indication of low monitoring accuracy. Redford et al. (2012) also found very poor metacomprehension accuracy. This is a very confusing picture indeed and requires some explanation.

2.1. Methodological issues

One way to explain the contradictory findings on monitoring accuracy is to look more closely at the specifics of the studies reported in the special issue. The findings on monitoring accuracy may vary for a number of methodological differences (see Table 1), including the *age of the participants*: school children to university students; the *measure of monitoring accuracy used* (absolute or relative accuracy) (see also Boekaerts & Rozendaal, 2010); *the type of monitoring indicator selected*: for example, some of the studies collected data based on metacognitive feelings (for the distinction of metacognitive feelings from judgments see Efklides, 2001, 2008; Koriat & Levy-Sadot, 1999), such as confidence or satisfaction, whereas others relied on metacognitive judgments, such as judgment of response correctness and self-scoring, or judgment of task complexity; *the timing of monitoring* (e.g., before, during, or after task processing); *the type of task used* (memory task, reading comprehension task or problem solving); *the presence of corrective feedback*, and *the presence of some kind of intervention* to facilitate monitoring accuracy.

The differences between the studies are gross but still one can conclude that monitoring can be accurate or inaccurate regardless of age, since both accuracy and inaccuracy can be detected in both children and older students. Moreover, accuracy or inaccuracy is found regardless of the measure used—absolute (i.e., the discrepancy between confidence ratings and actual performance) or relative accuracy (i.e., the correlation between the person's ratings of confidence and performance on each item). However, the monitoring indicator used, the timing of monitoring, the presence of corrective feedback, and the type of task used seem to be important for the measurement of the accuracy of monitoring.

2.2. Hypercorrection and overconfidence

Let's take the case of confidence. It was directly measured by Metcalfe and Finn (i.e., the question posed to students regarded how sure they were about the correctness of their answer) whereas Dunlosky and Rawson measured confidence indirectly by asking students to self-score their response (no credit, partial credit, full credit). Pieschl et al., on the other hand, used a composite score that included confidence along with satisfaction and self-efficiency, and therefore departs from the measures used in the other two studies. The measures used by Metcalfe and Finn and Dunlosky and Rawson, however, are quite close, because self-scoring depends, at least to a certain extent, on the confidence on the correctness of one's response.

If the two measures do tap confidence, then the findings of the two studies seem contradictory (i.e., overconfidence facilitating correction of one's response and overconfidence impeding learning). But is there a deeper contradiction between the findings of the two studies? Actually, *not*. Underconfidence in Dunlosky and Rawson (2012) was not associated with improved learning performance. This suggests that some degree of overconfidence is important for effective self-regulation that is initiated by metacognitive judgments. Hypercorrection, on the other hand, implies that overconfidence is not necessarily a liability; on the contrary, it can be helpful because it makes people more open to change and correction of prior responses thought to be correct. What is critical for change is the *presence of corrective feedback*.

But do overconfident people always change their initial incorrect response? As Dunlosky and Rawson showed, high overconfidence associated with low level of prior knowledge is not conducive to change of response even in the presence of corrective feedback. This is the case of ignorance and unawareness of

Table 1
Features of the studies of the special issue.

Variable/Study	Metcalfe & Finn	Dunlosky & Rawson	Redford et al.	Pieschl et al.
Participants' age	3–5th grade children	College students	7th grade students	University students
Measure of monitoring	Relative accuracy	Absolute accuracy	Relative accuracy	Relative accuracy
Monitoring indicator	Confidence; "knew it all along" judgment	Self-scoring of response	Metacomprehension judgment (as in JOLs)	Task-specific questionnaires (e.g., judgment of task complexity, self-efficiency, satisfaction,confidence) and log files
Timing of monitoring	After response production	During practice	After concept map and before testing	After problem solving
Type of task used	General information questions	Learning key term definitions	Reading science texts	Memory and evaluation of scientific texts
Corrective feedback	Yes	Yes	No	No
Intervention	Yes	Yes	Yes	No
Control processes	Allocation of attention	Allocation of time and "effort" on task	Strategies for the construction of concept maps	Number of hypertext pages visited and strategy use.