YOU are right! Feedback focused on the self enhances problem solving

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Focus

1. **Does feedback facilitate learning during mathematics problem solving?**
2. **Do the effects of feedback depend on the type of feedback provided or on the learner's prior knowledge?**

Background

Many agree that "the importance of feedback in promoting learning is inarguable" (Moreno, 2004).

However, the effects of feedback vary considerably and are not universally beneficial (Mory, 2004), particularly for learners with higher prior knowledge (Fyfe & Rittle-Johnson, 2016).

One leading theory suggests that feedback is more likely to have negative effects when it draws attention to one's self and abilities rather than to the task (Kluger & DeNisi, 1996). We tested this by manipulating the content of the feedback message and whether it referenced the self or the task.

Method

PARTICIPANTS
114 undergraduate students enrolled in an introductory psychology course at Indiana University-Bloomington (*M* age = 20.2 years; 75 males, 39 females; 74 low knowledge, 40 high knowledge).

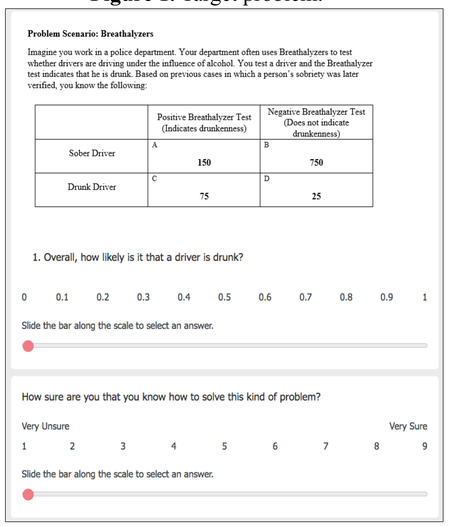
DESIGN AND PROCEDURE
Students participated in a single online learning session (pretest-lesson-posttest). For the lesson, students solved a set of five probability problems and did or did not receive feedback after each problem. Students then studied a worked example and completed a 7-item posttest (2 learning items and 5 transfer items with a novel feature).

Conditions

Table 1. Students assigned to one of three conditions.

Condition	Trial	Feedback
Self-feedback	Correct trial	YOU got it! Your response is correct! You responded with X.
	Incorrect trial	YOU made a mistake. Your response is incorrect. You should have responded with X.
Task-feedback	Correct trial	The response provided is correct. The correct response is X.
	Incorrect trial	The response provided is incorrect. The correct response is X.
No-feedback	Correct/ Incorrect trial	The response has been recorded. Click the arrow button to move onto the next question.

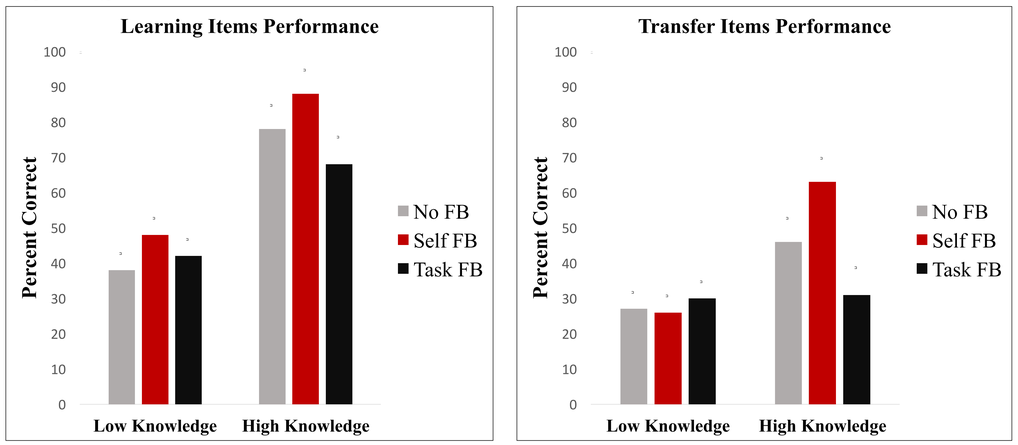
Figure 1. Target problem.



Results

PRETEST
Performance on the two pretest items was low overall (M = 0.5 out of 2, SD = 0.7), but varied by student. Given the skewed distribution, we split students into a low knowledge group (n = 74, solved 0 problems correctly) and a high-knowledge group (n = 40, solved 1 or 2 problems correctly). Importantly conditions, were well matched at pretest.

POSTTEST



Significant condition by prior knowledge interaction, $F(2, 108) = 3.81$, $p = .03$, $\eta_p^2 = .07$ for transfer solve items.

Conclusions

For students with high prior knowledge, self-feedback led to higher scores on the transfer items of the posttest than either task-feedback or no-feedback.

In contrast to our hypothesis, feedback focused on the self had positive effects on undergraduates' mathematics problem solving.

The effects of feedback depend on characteristics of the feedback and characteristics of the learner.

Implications

In order to be effective, feedback needs to possess a number of qualities: it needs to be noticed, timely, constructive, motivational, manageable and directly related to assessment criteria and learning outcomes (Race, 2006; Irons, 2008; Juwah et al, 2004).

Perhaps, feedback focused on the self can have motivating effects – leading higher knowledge learners to feel empowered in their learning. Or perhaps feedback focused on the self heightens attention to the feedback – leading higher knowledge learners to better encode the message and learn from it.

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