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Oops, scratch that! Monitoring one's own errors during mental calculation.

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Summary: The feeling of error (FOE) is the subjective experience that something went wrong during a reasoning or calculation task. The main goal of the present study was to assess the accuracy of the FOE in the context of mental mathematical calculation. We used the number bisection task (NBT) to evoke this metacognitive feeling and assessed it by asking participants if they felt they have committed an error after solving the task. In the NBT participants have to determine whether the number presented in the middle of a triplet corresponds to the arithmetic mean of the two outer numbers (e.g., 07_16_25) with a Yes/No answer. Our results show that FOE reports were strongly correlated with arithmetic errors and numerical properties of the NBT, suggesting that the FOE accurately represents the error. This finding indicates that even very fast metacognitive feelings are reliable when it comes to evaluating one's own mental performance. Moreover, our results suggest that the occurrence of FOEs is determined by the fluency with which each triplet was solved and the post-decision evaluation processes that occurred after the NBT was solved. Additionally, we asked participants to report their confidence in the given answer for the cases where they did not report FOEs. Participants reported less confidence for the (objectively) incorrect answers than for the (objectively) correct ones, suggesting that in cases where they did not have a conscious FOE they still were able to implicitly detect their errors. Remarkably, confidence was also determined by the fluency of the NBT.

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