

# Teachers, pedagogical skills, and the obstacle of intuition

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When a task calls for intuitive knowledge, as in "subtracting means taking something away," its complexity often goes unnoticed. However, when intuitions are not mobilized – having to grasp, for instance, that subtracting means "finding the difference" – the task is considered difficult, and seemingly requires the use of specific educational strategies. Researchers at the University of Geneva (UNIGE), Switzerland, have demonstrated that teachers sometimes struggle to understand the difficulties encountered by pupils when attempting to solve apparently intuitive problems that are in fact very difficult. The findings suggest that teachers only use their pedagogical skills when a problem seems to mobilize counter-intuitive strategies. The results, which are published in the journal *Educational Studies in Mathematics*, stress the importance of training teachers to avoid the pitfalls of intuition so that the seemingly obvious does not get in the way of understanding the difficulties faced by students.

"Let's say there are 42 cows in a field, and five go back to the farm. If I ask a child how many cows are left in the field, he can count in his head and give me the answer. The intuitive resolution of this problem involves an easy mental projection for the child", says Katarina Gvozdic, a researcher in UNIGE's Faculty of Psychology and Educational Sciences (FPSE).

The learning that takes place at school can be divided into two distinct categories depending on whether or not it is consistent with intuitive [knowledge](#). When intuitive knowledge – what we experience on a day-to-

day basis in everyday life – coincides with an educational concept, we are within the scope of of this intuitive knowledge (as is the case in the above example). When the opposite is true, we are outside its scope. "So, continues Gvozdic, if I tell the child that I've got I've got 5 marbles, and that after playing a game I have 42, and I ask him how many marbles I've won, the problem is no longer within the scope of intuitive knowledge. The child will be tempted to answer by trying to find how to go from 5 to 42 and not by subtracting, and fail." This is why teachers think that a mathematical problem that is consistent with intuitive knowledge is easier for pupils to solve than a problem outside its scope. The latter will, in fact, require learning strategies that are more complex.

## **Intuition and its misleading shortcuts**

The UNIGE researchers then asked themselves whether intuitive knowledge has a real impact on the way teachers perceive pupils' difficulties in solving mathematical [problems](#). "To find the answer," says Emmanuel Sander, an FPSE professor, "we compared 36 primary-school teachers with 36 individuals from other professions using four different scenarios. On each occasion we compared two maths questions that did or did not involve intuitive knowledge." The participants then had to say which problem was the easiest to solve and why.

The results indicated that when the problem falls outside the scope of intuitive knowledge, the non-teachers were not able to explain why it was harder to solve than when the question falls within the scope of [intuition](#). This was in contrast to the teachers, who possess pedagogical skills allowing them to have an informed look into the learning issue and the solutions. "Up to this point, we found confirmation that the way teachers are trained is paying off," says Gvozdic.

At the same time, the study also highlighted that when a troublesome problem nevertheless comes within the scope of intuitive knowledge, the

teachers were as ill-equipped as the other participants in explaining where the difficulties lay. "This proves that the educational skills of the teachers are overshadowed by their intuition in some contexts. This prevents them from assessing the difficulties that a mathematical problem may cause to young pupils, regardless of how much professional experience the [teacher](#) may have."

## **Moving away from intuition toward classroom skills**

Research has recently brought attention to the conceptions teachers have of pupils learning processes. In particular, this study demonstrates the potentially harmful power of the stereotype that claims that intuitive knowledge facilitates learning. As Sander points out: "We can now show that we need to train teachers so that their pedagogical skills are also expressed in the field of intuition and that they go beyond the stereotypes of the supposedly facilitating role played by intuition. If this does not happen, teachers will continue to be trapped by the supposedly helpful nature of intuitive knowledge, and will be powerless to appreciate the difficulties experienced by some children and provide appropriate solutions. Being trained about the misleading shortcuts of intuition would enable teachers to predict future difficulties, to understand them and to offer more help to pupils during the various learning phases."

**More information:** Katarina Gvozdic et al. When intuitive conceptions overshadow pedagogical content knowledge: Teachers' conceptions of students' arithmetic word problem solving strategies, *Educational Studies in Mathematics* (2018). [DOI: 10.1007/s10649-018-9806-7](https://doi.org/10.1007/s10649-018-9806-7)

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