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**Revisiting the medical diagnosis problem: reconciling intuitive and analytical thinking.**

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Summary: A recurrent concern in mathematics education – both theory and practice – is a family of mathematical tasks which elicit from most people strong immediate (“intuitive”) responses, which on further reflection turn out to clash with the normative analytical solution. We call such tasks cognitive challenges because they challenge cognitive psychologists to postulate mechanisms of the mind which could account for these phenomena. For the educational community, these cognitive challenges raise a corresponding educational challenge: What can we as mathematics educators do in the face of such cognitive challenges? In our view, pointing out the clash is not enough; we’d like to help students build bridges between the intuitive and analytical ways of seeing the problem, thus hopefully creating a peaceful co-existence between these two modes of thought. In this article, we investigate this question in the context of probability, with special focus on one case study – the medical diagnosis problem – which figures prominently in the cognitive psychology research literature and in the so-called rationality debate. Our case study involves a combination of theory, design and experiment: Using the extensive psychological research as a theoretical base, we design a new “bridging” task, which is, on the one hand, formally equivalent to the given “difficult” task, but, on the other hand, is much more accessible to students’ intuitions. Furthermore, this new task would serve as a “stepping stone”, enabling students to solve the original difficult task without any further explicit instruction. These design requirements are operationalized and put to empirical test.

*Classification:* K50 M60

*Keywords:* cognitive challenge; dual process theory; intuitive thinking; analytical thinking; mathematical tasks; task design; statistical thinking; medical diagnosis problem

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