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Paradox resolution as a didactic tool

We share with the audience a few reflections concerning our Puzzles course, offered mainly to students of cognitive science at the Adam Mickiewicz University in Poznań, Poland. Contrary to the usual mathematical exercises, math puzzles are often connected with that which is unexpected, which contradicts our every-day experience. Thus, such puzzles are instructive, as far as a critical attitude towards informal intuitions is concerned. They teach us that we should be cautious in relying on intuitions, which are sometimes very illusory.

Observing the students' activity during our course, we have noticed that it is much more easier for them to acquire small, concise chunks of dissipated knowledge rather than to listen to lengthy expositions of entire theories seldom illustrated with examples.

The puzzles are divided into thematic groups, including such topics as: the Infinite, numbers and magnitudes, movement and change, shape and space, orderings, patterns and structures, algorithms and computation, probability, logic. Many of them are connected with paradoxes, i.e. results which seem counterintuitive but are nevertheless true, which can be shown by resolving the paradox in question.

We claim that paradox resolution is very instructive as far as the development of correct mathematical intuitions is concerned. Obviously, one should use several standard (normal, typical, natural) exercises in teaching mathematics – they doubtlessly serve as proper tools for stabilization of intuitions. However, to see clearly the limitations of our mathematical intuitions, we should also investigate the objects which – for several reasons – are called pathological in mathematics. Such objects eventually become domesticated, thus leading to new mathematical domains.

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