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Unconscious assumptions in mathematical examples (Unbewusste Annahmen in mathematischen Beispielen)

- *Examples must often be as generic as possible* because displaying properties that in general do not hold would be misleading. If we draw a rectangle, then normally we wouldn't draw a square. However, *it is also important to make examples of special cases*, thus presenting the square as a rectangle. (Unfortunately, some exercises of the type "count the rectangles" are mathematically wrong because squares are not counted.)

- *It makes sense to select nice examples for exercises*, like the quadratic equation $x^2 - 5x + 6 = 0$. However, *teachers should occasionally present ugly exercises,* like a quadratic equation with unusual real numbers (e.g. the square root of the logarithm of π), to show that the known formulas still apply.

- *Drawings especially have an impact on imagination*. A triangle has usually a horizontal side, which is conventionally taken as the base. Pupils may then tend to compute the height at the hypothenuse rather than using the legs for determining the area of a right triangle with sides 3,4,5.

- *Examples are a very powerful tool to convey mathematical ideas and stimulate mathematical creativity*. It is important to pay attention that pupils see *examples in which the conventional assumptions are not satisfied*, exceptions to the common practice. To broaden one's horizon, as the common setting may become a restrictive comfort zone.

- Finally, *inventing examples and counterexamples* to simple properties can become an accessible exercise that trains skills needed for mathematical research.

In 2021 the author started a collaborative didactical project, see http://www.antonellaperucca.net/unconscious-assumptions.html. There are being collected some *common practices* in mathematical examples which are almost taken for granted without reflection. Sincere thanks to all the contributors (listed on the project webpage), and especially to Prof. Brad Ballinger from Cal Poly Humboldt. Everyone is welcome to collaborate, raise awareness for unconscious assumptions and propose counteractive measures to *mathematical stereotypes*.