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N-Person Cake-Cutting: There May Be No Perfect Division. Preliminary report.

A cake is a metaphor for a heterogeneous, divisible good. A perfect division of a cake is efficient (Pareto-optimal), envy-free, and equitable. We give an example of a cake in which it is impossible to divide it among three players such that these three properties are all satisfied, however many cuts are made. By contrast, If there are only two players, not only is there a perfect division, but there is also an algorithm for determining where and how many cuts must be made. (Received September 18, 2011)