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A Sense of Proportion: How humans represent relative magnitudes in space and time

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Imagine a basket containing two green apples and two red apples. Now imagine another basket containing five green apples and five red apples. Although the total number of apples is different between the two baskets, you probably noticed that the proportion of red and green apples is the same. In both baskets, half of the apples are green while the other half are red. This ability to perceive relationships between quantities is called proportional reasoning. Interestingly, proportional reasoning can be done for multiple types of magnitudes like number, length, area and duration. The aim of our research is to study how humans perceive and represent proportions for spatial magnitudes (e.g., length) and temporal magnitudes (e.g., duration). Our results show that some aspects of proportional reasoning are specific to the type of magnitude presented while other aspects are shared across the different magnitude types, suggesting a common mechanism for proportional reasoning.

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