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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 39(0)

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Publication Date

2017

Peer reviewed

Numerical and Non-numerical Magnitude Estimation

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Abstract: Despite a heated debate regarding a cognitive mechanism of magnitude representation, little has been done to directly compare numerical and non-numerical estimation and provide a unified account of the two processes. In the current study, we examined estimation of numerical and non-numerical quantities on a continuum using various psychophysical functions. Inconsistent with the proportion reasoning and measurement skills accounts, estimates of both numerical and non-numerical quantities were better predicted by the logarithmic-linear model than by cyclic power models. Furthermore, individual differences in the degree of logarithmic compression was highly correlated over tasks, whereas bias measures from competing models did not show such associations. These findings suggest that estimation of both numerical and non-numerical magnitude is processed via shared representation systems that are logarithmically or linearly constructed.