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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Permalink

<https://escholarship.org/uc/item/9r43c6t2>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 40(0)

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Publication Date

2018

Addressing Old Mysteries of Gain Scores in a Pretest-Posttest Educational Setting

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Abstract

Gain scores are obtained as the difference between two consecutive measurements of knowledge. Although they are widely acknowledged as a measure of change, they have been harshly criticized since empirical research has shown its serious conceptual problems. To gain insight on the nature of these problems, I developed a model for the gains of knowledge in the setting of a pretest-posttest instructional intervention. The model explains seemingly odd phenomena associated to gain scores: (a) negative gain-pretest correlations, and (b) lack of correlations between gain scores and learner's cognitive abilities. This highlights the potential of the proposed model for investigating the change of knowledge in a pretest-posttest educational setting and emphasizes the importance of modelling change by using information provided by specific application areas. Further work may lead to developing novel statistical methods for analysing educational data and for estimating the change of knowledge in diverse educational contexts.