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**Jonathan Barzilai\*** (barzilai@dal.ca), Dalhousie University, P.O. Box 1000, Halifax, NovaScotia B3J 2X4, Canada. *The Mathematical Foundations of Game Theory and the Social Sciences.*

The mathematical basis for measurement in the physical and non-physical sciences has been studied since 1887. This problem is of theoretical and practical importance: among other things, subjective measurement underpins utility theory, the theory of games, economics, decision theory, mathematical psychology and other fields.

Major problems in the classical theory of measurement have been unsolved until now. These include the problem of applicability of mathematical operations to scale values, e.g. expressions of the form  $m_3 = m_1 + m_2$  and  $m_2 = 5m_1$  for a given mass scale. Specifically, the applicability of such expressions in the case of a fixed utility scale was not proved (nor was it claimed – it was taken for granted) by von Neumann and Morgenstern in their development of utility theory. In fact, these operations are not applicable to utility scale values or to any scale values that are based on the models of the classical theory of measurement.

A new theory of measurement which addresses these problems has been developed. (Received February 24, 2006)