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May the character of the metal-insulator transition of disordered materials be determined by how one looks at it? ARNULF MOEBIUS, Institute for Theoretical Solid State Physics, IFW, Dresden, Germany — In a recent experiment, Siegrist et al. studied the metal-insulator transition (MIT) of phase-change materials [1]. They conclude that these substances exhibit a finite minimum metallic conductivity. The striking contrast to reports on other disordered substances motivates the present study of the influence of the MIT criterion used on the character of the MIT obtained [2]. First, we discuss inherent biases of various approaches to locating the MIT. Second, reanalyzing $GeSb_2Te_4$ data from [1], we show that this solid strongly resembles other disordered materials: The data may also be interpreted in terms of a continuous MIT. Checking the justification of these fits, however, uncovers data inconsistencies preventing an unambiguous interpretation. Third, comparing with previous experiments on crystalline Si:As, Si:P, Si:B, Ge:Ga, disordered Gd, and nano-granular Pt-C, we show that such an inconclusive behavior occurs frequently: The logarithmic temperature derivative of the conductivity highlights serious inconsistencies in the original interpretations in terms of a continuous MIT. Thus, the question for the character of the MIT of these materials has to be considered as yet open. [1] T. Siegrist et al., Nature Materials 10 (2011) 202. [2] A. Moebius, arxiv.org/abs/1308.1538.

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