On the logical structure of Bell theorems. JONATHAN WALGATE, Perimeter Institute for Theoretical Physics, ANNE BROADBENT, Universite de Montreal, HILARY CARTERET, University of Calgary, ANDRE METHOT, Universite de Montreal — Some specific predictions of quantum mechanics are inconsistent with local realism, a phenomenon known as nonlocality. Despite overwhelming evidence for quantum mechanics, the practical difficulties of detector efficiency and coordinating space-like separated measurements have provided loopholes for a classical worldview. New experiments have been proposed to meet these challenges, based around a new kind of nonlocality proof called an "EPR Bell inequality". Much investment is now being made to realize these proofs experimentally. We show all these proposals are fundamentally flawed. We focus on a series of designs that have appeared in *PRL* and *PRA* for loophole-free Bell experiments. These experiments use hyperentangled two-photon quantum states to generate experimental data supposedly at odds with local realism. We show how to produce identical results using a single coin, and explain where the logical flaw can be found. To understand our nonclassical world, we must understand precisely the experimental evidence for nonlocality. This tempting shortcut is a logical, theoretical and experimental dead end. http://www.arxiv.org/abs/quant-ph/0512201.

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