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Playing Mermin's Game with Nonlocal Resources

In a popular science article [Am. J. of Phys. 49, 940 (1981)], N.D. Mermin presented a conceptually simple demonstration of quantum nonlocality. The phenomenon is described using a pair of three-input/two-output boxes that are constrained to have identical outputs whenever the same inputs are chosen. The game then consists in trying to maximize the probability of differing outputs whenever different inputs are chosen. In this talk I will describe a variant of Mermin's game in which the constraint of identical outputs is relaxed. When the constraint is completely removed the CHSH is recovered, while in general the largest quantum advantage is shown to scale linearly in the relaxation parameter ϵ . We then consider playing Mermin's game with nonlocal boxes, or PR-boxes. We show that the optimal score in Mermin's game with one PR-box is $1/6$ while with two PR-boxes the game can be won perfectly.