

Eisert, Wilkens, and Lewenstein Reply: The preceding Comment [1] criticizes our Letter [2] for giving a wrong impression that the existence of a white horse would imply that all horses are white. The comment quotes a specific sample of readers (“all readers to whom we have spoken”) who, according to the authors, got a similar impression. We must apologize to these readers, but in order to prove the existence of a quantum extension for which (Q, Q) is a Pareto-optimal Nash equilibrium it is indeed sufficient to explicate one set of strategies for which this is the case. Our set of strategies does just this: it proves that there is a quantum extension of the prisoners’ dilemma for which the dilemma disappears, and for which (Q, Q) with payoff (3, 3) is a Pareto-optimal Nash equilibrium.

Nowhere in our Letter do we claim that (Q, Q) is a Pareto-optimal Nash equilibrium under all circumstances [3]. To the contrary, we explicitly state that the game’s solution acquires a different character if analyzed in a different strategic space. In Ref. [14] of [2] we considered the set of trace-preserving completely positive maps. In this case there are many equilibrium points, one equilibrium point being special—a focal equilibrium—with expected payoff (2.25, 2.25). In a publication following our Letter, Ref. [4], we analyze the unitary game which is underlying the technical argument of the Comment. As reproduced by Benjamin and Hayden, in this case there are indeed no equilibria at all. The lesson to be learned here is that if anything goes, nothing remains. We certainly acknowl-

edge the authors’ efforts for bringing this to the attention of the readers.

Jens Eisert
Imperial College
London, United Kingdom

Martin Wilkens
Insitut für Physik
Universität Potsdam
Am Neuen Palais 10
14469 Potsdam, Germany

Maciej Lewenstein
Institut für Theoretische Physik
Universität Hannover
30167 Hannover, Germany

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- [1] S. C. Benjamin and P. M. Hayden, preceding Comment, Phys. Rev. Lett. **87**, 069801 (2001).
- [2] Jens Eisert, Martin Wilkens, and Maciej Lewenstein, Phys. Rev. Lett. **83**, 3077 (1999).
- [3] Fortunately from our sample of readers, no member got the impression that we actually did.
- [4] Jens Eisert and Martin Wilkens, J. Mod. Phys. **47**, 2543 (2000).