## Qeios

### Peer Review

# Review of: "The Guessing Game and Its Implications for Sport Psychology Research — A Tale of Lotteries, Penalties, Mixed Strategies, and Nash Equilibria"

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#### **Matching Pennies and Strategy**

Commentary on 'The Guessing Game and Its Implications for Sport Psychology Research

- A Tale of Lotteries, Penalties, Mixed Strategies, and Nash Equilibria' by Kjetil Haugen

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#### https://vivo.brown.edu/display/jkrueger

A true gentleman, even if he loses his entire fortune, must not show emotion. Money is supposed to be so far beneath a gentleman that it's almost not worth thinking about.

- Dostoevsky, The Gambler

The game Dr. Haugen introduces as the "Guessing Game" is well known as "Matching Pennies." As a two-player variant of rock-paper-scissors, it has been of interest to game theorists since the early days when John von Neumann studied the parlor games popular in Vienna at the time (von Neumann & Morgenstern, 1944). The mixed-strategy solution that finds a Nash equilibrium protects the rational player from exploitation. An unpredictable player cannot be finessed.

Where game theory ends, psychology begins. Do untutored players understand the Nash equilibrium? Can they, or do they even want to randomize their own behavior? Do they think they can outsmart their opponents? Questions like these have inspired some research, including research by my group (Grüning & Krueger, 2021; 2024; Krueger & Grüning, 2022; 2024; see also Lahat-Rania, & Kareev, 2023). We find, for example, that many players think they can think more moves ahead than the average opponent when predicting what the other may believe about one's prediction regarding the other's prediction and so forth. When there are no biased preferences that have been accurately perceived, no one can reliably beat the equilibrium strategy.

The thrust of Dr. Haugen's essay is, it appears, to take to task those who think they can beat a randomizer. The tale of the Norwegian national football team of the 1990s is revealing. A similar tale can be told about the Dutch team of the 1970s, the Schalke 04 team of the 1930s, and many others. These teams, or their coaches, introduced innovations that caught their opponents off guard, and sensational victories ensued. For a while, that is. In time, other players and other teams learned how to respond, or they simply copied these formerly innovative strategies. If the context of a real-world game, unlike the stylized Matching-Pennies Game, allows the freedom to introduce different kinds of innovation, a player or team may hope to stay on top by continually being the first to find hitherto untried innovations. This meta-strategy too, however, can be copied and disarmed. The Nash equilibrium will assert its gravitational pull without mercy. Military history provides further fine examples. Innovators such as Epaminondas, Bonaparte, or von Moltke the Elder made history with surprise moves. They themselves and their immediate successors were less impressive in later campaigns. Though this may partly be due to the regression effect, which is another relentless attractor (Fiedler & Krueger, 2012), the opponent being an apt pupil certainly contributes to the brevity of greatness.

The attentive opponent need not even copy the initial innovator. They may simply learn to predict their moves and then select the best response. In other words, by departing from playing the Nash equilibrium probability, innovators can score points if they have learned the opponent's departures from that probability. Ironically, the same strategy that gives the innovator the initial advantage also sets them up to be predictable and thus exploitable, unless they keep the element of surprise on their side.

As to the stylized Guessing Game of Matching Pennies, one wonders why anyone would play at all. With loss aversion putting a brake on risky bets, an expected value of zero drops to a negative utility. A penny lost hurts more than a penny gained does delight (but see Yechiam, 2019, for a recent critical review of the loss-aversion literature). Why do people play? The thrill of it is often sufficient (Krueger & Grüning, 2024). Note that Dostoevsky [in the epigraph] proscribed the expression of emotion, not its possession. This thrill, however, is not a good-enough reason to go to war.

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#### Declarations

Potential competing interests: No potential competing interests to declare.