Skat and poker: More luck than skill?

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An image of a person playing the poker varient, Texas Hold'em. Credit: Wikipedia.

Chess requires playing ability and strategic thinking; in roulette, chance determines victory or defeat, gain or loss. But what about skat and poker? Are they games of chance or games of skill in game theory? This classification also determines whether play may involve money. Prof. Dr. Jörg Oechssler and his team of economists at Heidelberg University studied this question, developing a rating system similar to the Elo

system used for chess. According to their study, both skat and poker involve more than 50 per cent luck, yet over the long term, skill prevails.

"Whether a game is one of skill or luck also determines whether it can be played for money. But assigning a game to these categories is difficult owing to the many shades of gradation between extremes like roulette and chess," states Prof. Oechssler. Courts in Germany legally classify poker as a game of chance that can be played only in government-sanctioned casinos, whereas skat is considered a game of skill. This classification stems from a court decision taken in 1906. One frequently used assessment criterion is whether the outcome for one player depends more than 50 per cent on luck. But how can this be measured objectively?

It is this question the Heidelberg researchers investigated in their game theoretic study. Using data from more than four million online games of chess, poker, and skat, they developed a rating system for poker and skat based on the Elo method for chess, which calculates the relative skill levels of individual players. "Because chess is purely a game of skill, the rating distribution is very wide, ranging from 1.000 for a novice to over 2.800 for the current world champion. So the wider the distribution, the more important skill is," explains Dr. Peter Dürsch. In a game involving more luck and chance, the numbers are therefore not likely to be so far apart.

The Heidelberg research confirms exactly that: the distribution is much narrower in poker and skat. Whereas the standard deviation—the average deviation from the mean—for chess is over 170, the other two games did not exceed 30. To create a standard of comparison for a game involving more than 50 per cent luck, the researchers replaced every other game in their chess data set with a coin toss. This produced a deviation of 45, which is still much higher than poker and skat. "Both games fall below the 50 per cent skill level, and therefore depend mainly

on luck," states Marco Lambrecht. "Skill, however, does prevail in the long run. Our analyses show that after about one hundred games, a poker player who is one standard deviation better than his opponent is 75 per cent more likely to have won more games than his opponent."

In principle, the method can be applied to all games where winners are determined, report the researchers. The percentage of skill in the popular card game Mau-Mau, for example, is far less than poker, whereas the Chinese board game Go involves even more skill than chess.

More information: Peter Duersch et al, Measuring skill and chance in games, *European Economic Review* (2020). DOI: 10.1016/j.euroecorev.2020.103472

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