



# A Beautiful Poker Mind

An Introduction to Game Theory

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**S**klansky mentions it in *The Theory of Poker*. Chris Ferguson and other poker professionals use it as a regular part of their strategy. It was the center of John Nash's quest in the movie *A Beautiful Mind*. Most of us have heard of it, but what exactly is 'game theory'? Here is an introduction to the basic concepts as they relate to poker.

## STRATEGY APPLIES TO GAMES CONTAINING A CHOICE OF ACTION.

Chess, checkers, poker, and many other games require the player to make decisions, even if they include some degree of chance. A raffle is an example of a game with no skill. The winner is determined purely by chance. Strategy can only be employed in games of skill.

## UNCERTAINTY IS CREATED BY CHANCE AND IMPERFECT INFORMATION.

Poker will never be conquered in the absolute sense because of uncertainty. It's the element of the game out of our control and the part that tests our patience. We never know what we'll be dealt or what community cards will be turned over on the table.

This is the uncertainty of *chance*. Similarly, we don't know our opponent's hole cards, or what action they will take... check, raise, or reraise. This is the uncertainty of *imperfect information*.

## THE GOAL OF GAME THEORY IS TO REDUCE UNCERTAINTY USING STRATEGY.

The great challenge in game theory was to find an answer to the problem of uncertainty. It was accomplished over time by a type of mathematics for which John Nash won the Nobel Prize. The uncertainty in poker can be reduced by using the solutions from game theory.

## PROBABILITY REDUCES THE UNCERTAINTY OF CHANCE.

Many of us are already familiar with this strategy... which starting cards are best in certain situations, what the chances are of flopping a pair, and so on. The extent to which chance can be reduced will depend on the volume of hands played over a lifetime. As Mike Caro has pointed out, the math of large numbers probably doesn't apply unless you play full time. The speed of online play has probably brought this within the realm of those who consistently

play part time.

## RATIONALITY REDUCES THE UNCERTAINTY OF IMPERFECT INFORMATION.

The concept of rationality begins by assuming your opponents will figure out how you play. This type of knowledge decreases their own uncertainty, so the 'rational' player adds randomness to his game. This is why it is important to bluff. Not only could you take down the pot, it adds randomness and uncertainty to the equation. It is also why you occasionally raise a mid-suited connector in early position, or simply call with a high pair.

Imagine two opponents head-to-head over a long period of time. One employs classic poker probabilities without randomness, and the other adds randomness to his play. Game theory contends the 'rational' player who added imperfect information to his game (randomness) will come out ahead.

Although the above may seem obvious, understanding the game theory behind poker strategy will reinforce important aspects of your play and help you appreciate the deeper beauty of the game.

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