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NATIONAL PRESS RELEASE | 23 April 2013

## Pathological gambling caused by excessive optimism

Compulsive gamblers suffer from an optimism bias that modifies their subjective representation of probability and affects their decisions in situations involving high-risk monetary wagers. This is the conclusion drawn by Jean-Claude Dreher's research team at the CNC (Centre de Neurosciences Cognitives, CNRS / Université Claude Bernard Lyon 1). These findings, published in the May print edition of *Psychological Medicine*, could help explain and anticipate certain individuals' vulnerability to gambling, and could lead to new therapeutic approaches.

A growing number of gamblers suffer from pathological gambling, a disease that is usually characterized as either a loss of impulse control or a behavioral addiction. It results in an inability to limit the frequency of gambling and the amount of money wagered. This increasingly common psychiatric disorder creates financial, professional and personal hardships that can have severe consequences for the patients and the people around them. The mechanisms responsible for its emergence and development remain largely unknown, which limits the clinician's ability to proceed with a diagnosis, prognosis or effective treatment for this condition.

In this study, the researchers set out to test and verify the hypothesis that links pathological gambling to an alteration of probabilistic reasoning. The capacity to reason in probabilistic terms appears only at an advanced stage of human intellectual development (in fact, the basic concept of probability is not fully understood until the age of 11 or 12). Pioneering research in the late 1970s had already shed light on the difficulties that people experience in situations involving risk or uncertainty. These difficulties are reflected in the development and perpetuation in adults of cognitive biases<sup>1</sup> specific to probabilistic decision-making, one of the most common being probability distortion (2).

The researchers conducted an experiment on compulsive gambling patients using a standard experimental economics task and a mathematical model for measuring both probability distortion and a more general optimism bias in relation to high-risk bets. The primary result obtained confirms the general hypothesis of a distortion, associated with pathological gambling, in the subjective representation of probabilities. The results also show that the compulsion to gamble is not explained by an exaggerated distortion of probability, but rather by an increased optimism bias. In other words, regardless of the objective probability of winning a high-risk bet, gamblers tend to act as though this probability were greater than it actually is. The researchers also observed that in the patient population under study, the intensity of this bias was significantly correlated to the severity of the symptoms.



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For clinical psychiatrists, the simplicity of the procedure used to reach this conclusion could offer a rapid and reliable way of measuring the representation of probability, thus allowing them to refine both their diagnoses and therapeutic decisions. This study raises many new questions for researchers in the cognitive neurosciences: how does the brain represent the probability of winning? How do the cerebral structures responsible for this representation interact with the structures involved in the development and perpetuation of an addiction? Is a pathological gambler's particular relationship to probability accompanied by an increased sensitivity to reward and/or insensitivity to monetary loss? These important questions are now being investigated at the CNC.

For further information: <http://www.isc.cnrs.fr/dre/uk/Publications.htm>

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(1) Internal or external influence causing an alteration of human judgment or perception.

(2) Identified by the Nobel laureates Kahneman and Tversky in 1979, probability distortion is characterized by the overestimation of low probabilities and underestimation of high probabilities.

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### Bibliography

Ligneul R, Sescousse G, Barbalat G, Domenech P, Dreher JC. Shifted risk preferences in pathological gambling. *Psychological Medicine*, (43) 5, 1059-1068, May 2013

DOI: <http://dx.doi.org/10.1017/S0033291712001900>

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