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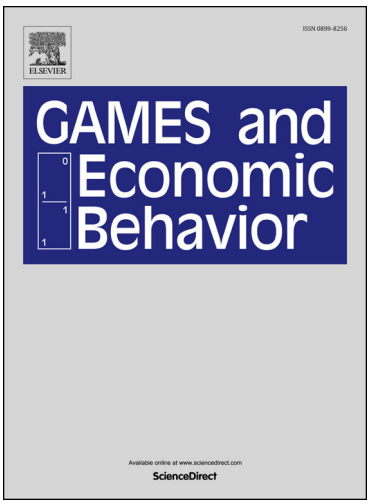


Rationalizability and Nash equilibria in guessing games

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# Rationalizability and Nash Equilibria in Guessing Games*

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**Abstract**

Games in which players aim to guess a fraction or multiple $p$ of the average guess are known as guessing games or ($p$-)beauty contests. In this note, we derive a full characterization of the set of rationalizable strategies and the set of pure strategy Nash equilibria for such games as a function of the parameter $p$, the number of players and the (discrete) set of available guesses to each player.

Keywords: Guessing game, Beauty contest, Rationalizability.
JEL codes: C70, C72.

## 1. Introduction

In guessing games – also called ($p$-)beauty contests – each player chooses a number and the player whose number is closest to $p$ times the average of all numbers wins a fixed prize. Such a game with $p = \frac{2}{3}$ was first used in Ledoux (1981) and brought to the attention of an economic audience by Moulin (1986). Since the seminal paper by Nagel (1995), guessing games have attracted a lot of interest among behavioral and experimental economists. Moreover, they have become the leading example for teaching iterative reasoning processes in game theory courses.

The popularity of this class of games results – at least partly – from the gap between empirical evidence and "theoretical predictions". Roughly speaking, these predictions are typically based on the following informal reasoning: for $p = \frac{2}{3}$, two thirds of the average is further from the highest than from the second highest number irrespective of what the opponents choose. Therefore, the highest number will never be chosen. By iteratively applying the same reasoning, all numbers except the smallest

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