Do economists have good prediction models? Do they accept new ones? Kuhn's lessons

Pierre Lescanne

ENS de Lyon

June 2010

version of *16 juin 2010 – 15 : 24*

Nouriel Roubini

Fortune magazine (2008) :

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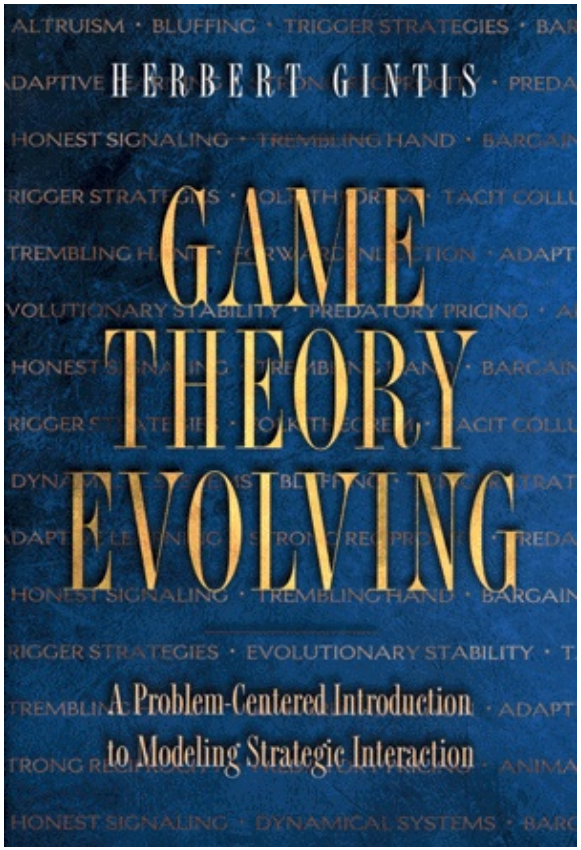
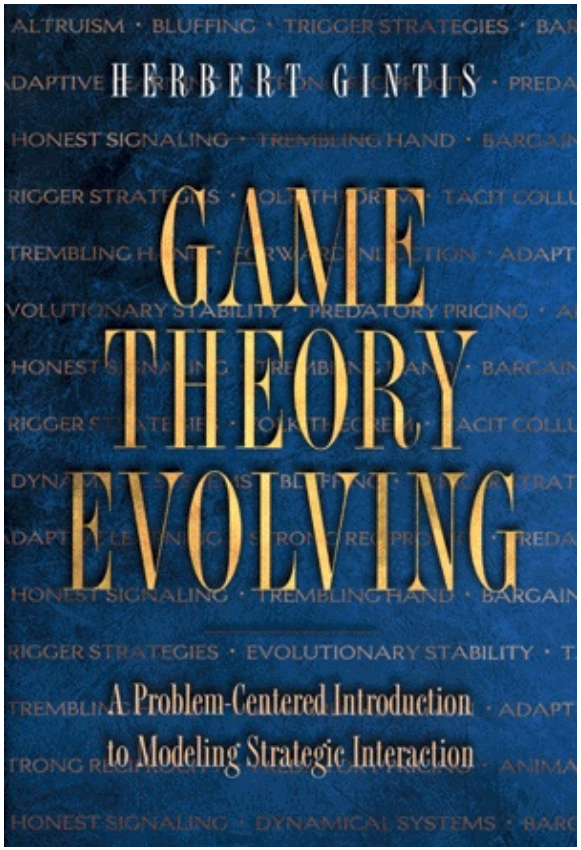

HERBERT GINTIS
GAME THEORY EVOLVING
A Problem-Centered Introduction to Modeling Strategic Interaction



3.13 The Illogic of Conflict Escalation

An auctioneer puts up $\$v$ >\$1, and $n > 1$ players compete for this prize as follows. Players take turns bidding in some fixed order. The bidding starts at \$0 and the player whose turn it is must either raise the bid by \$1 or drop out of the game, paying the auctioneer the amount of his last bid (or zero if he did not bid). The game ends when only one player remains. This player receives the prize, but *all* players pay their final bids to the auctioneer.

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- Despite they loose more and more money players keep bidding.

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☺Thanks to this wise result we should not fear :

- Al Qaeda
- Greece
- Madoff and Ponzi
- North Korea
- Iran
- Israel
- Wall Street

Escalation exists

- Lab experiences have shown that human players escalate.

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- There is no more paradox.

Models of escalation

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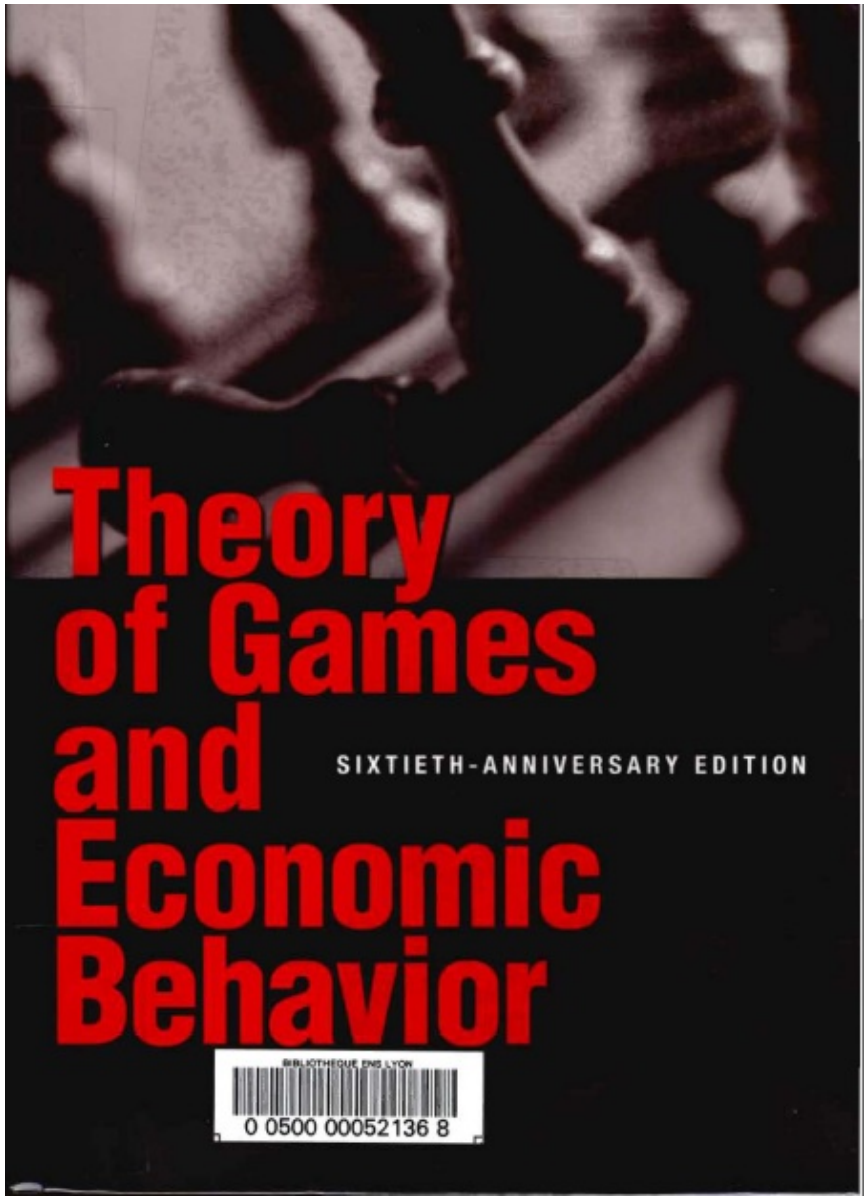
- Mathematical models of escalation used by game theorists fail.
- Economists should reconsider the adequacy of mathematical models to the escalation phenomenon.
- They should consider the experience of computer scientists and logicians who have an old experience in modeling and reasoning on complex systems.

1. Financial models
2. Escalation
3. Kuhn and Kuhn
   - Harold Kuhn
   - Thomas Kuhn
4. Reception of new ideas in the game theory community
   - International Journal of Game Theory
   - Game Theory and Economic Behavior
5. Conclusions

Harold Kuhn


Theory
of Games
and
Economic
Behavior
SIXTIETH-ANNIVERSARY EDITION
BIBLIOTHÈQUE ENS LYON
0 0500 00052136 8

The period of the late '40s and early '50s was a period of excitement in game theory. The discipline had broken out of its cocoon and was testing its wings. Giants walked the earth. At Princeton, John Nash laid the groundwork for the general non-cooperative theory and for cooperative bargaining theory. Lloyd Shapley defined a value for coalitional games, initiated the theory of stochastic games, coinvented the core with D. B. Gillies, and together with John Milnor developed the first game

models with an infinite number of players. Harold Kuhn reformulated the extensive form and introduced the concepts of behavior strategies and perfect recall. A. W. Tucker invented the story of the Prisoner's Dilemma, which has entered popular culture as a crucial example of the interplay between competition and cooperation.

It is important to recognize that the results that Aumann enumerated did not respond to some suggestion of von Neumann; rather they were new ideas that ran counter to von Neumann's preferred version of the theory. In almost every instance, it was a repair of some inadequacy of the theory as presented in the TGEB. Indeed, von Neumann and Morgenstern criticized Nash's non-cooperative theory on a number of occasions. In the case of the extensive form, the book contains the claim that it was impossible to give a useful geometric formulation. Thus, game theory was very much a work in progress, in spite of von Neumann's opinion that the book contained a rather complete theory. Through the efforts at RAND and at Princeton University, many new directions of research had been opened and the way had been paved for the applications to come.

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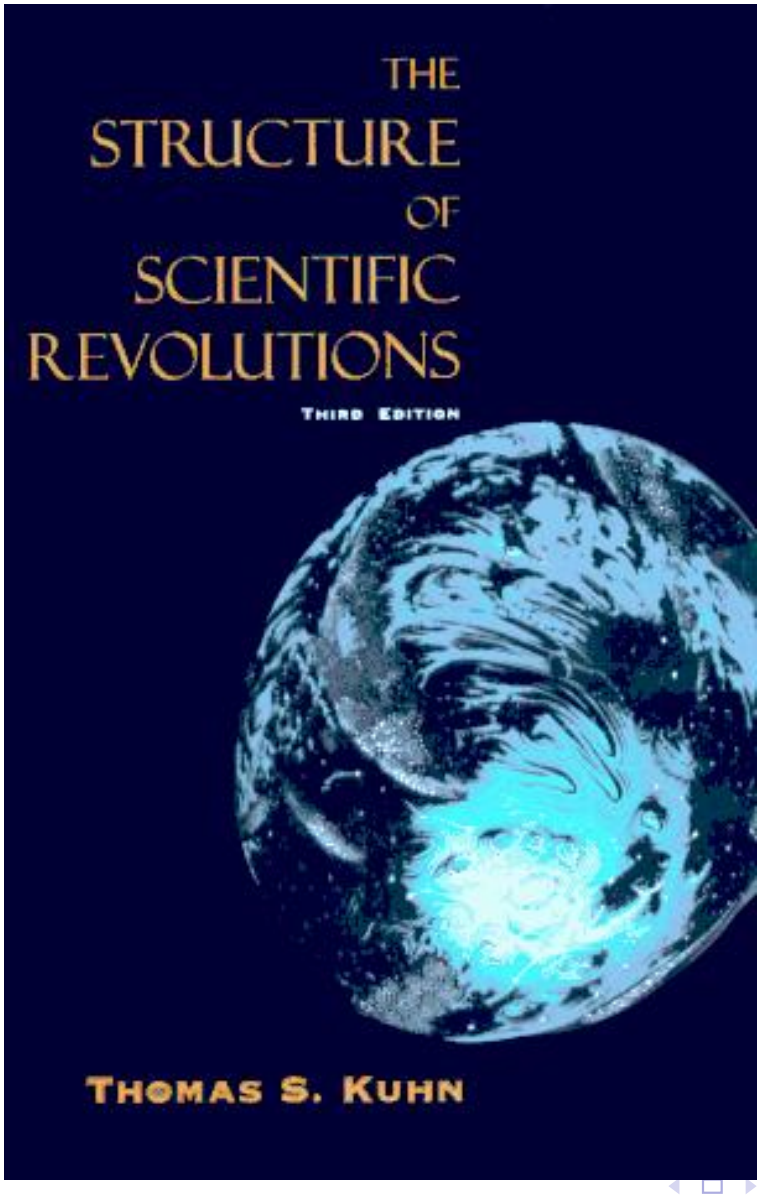
Thomas Kuhn

Author of **The Structure of Scientific Revolutions**.



Thomas Kuhn

A slogan : Progress through Revolutions.

> *« [the terminology revolution] holds not only for the major paradigm changes, like those attributable to Copernicus or Lavoisier, but also for smaller ones associated with the assimilation of a new sort of phenomenon. »*

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revolutionary science	infinite extensive games with coinduction.

- One of the aims of science is to find models that will account for as many observations as possible within coherent framework.

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- Once a paradigm shift has taken place,
  The majority of the scientific community will oppose any conceptual change.

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by Pierre Lescanne.

Contents. Infinite games with infinite histories are defined via coinduction. Nash and Subgame perfect equilibria are then defined in this language. Two classical games (dollar auction and centipede) are then studied.

Referee's advice. I recommend to reject the paper for the reasons listed now.

First, I think that the author made a diplomatic mistake, to say the least, in submitting to IJGT a paper where it is said at the very beginning:

"from a formal point of view they [infinite extensive games] are not appropriately treated in papers and textbooks. In particular, there is no clear notion of Nash equilibrium and the gap between finiteness and infiniteness is not correctly understood."

If the mistake was only diplomatic, I would not see it as important, as candour can be forgiven.

More importanly, this indicates that the author is unaware of many (tons) of standard work in game theory where infinite games are considered. I don't even need to mention the early work on topological games (Blackwell, Martin). Having missed the huge field of infinitely repeated games and the common use of Nash and subgame perfect equilibria there, seems problematic for a paper that aims at contributing to the theory of infinite games. For instance, and contrary to what the author claims, the gap between finite and infinite games is well known to game theorists (see the contrast between Aumann-Shapley and Benoit-Krishna for a striking example). Also, while I am sympathetic to works linking game theory and computer science, I urge the author to look at the literature on verification (many representatives in France: Zielonka, Waluzievicz...) where infinite games are also common use.

Second, I do not see the contribution made to the theory and what new insights are given. The paper contains mainly definitions, that require some time to the reader to connect to standard notions (which again, exist already). These definitions are operated on two examples. It seems that the new insight here goes as follows:

In both games, 'never give up' is an equilibrium. Since nobody knows what the payoff is, if these strategies are played, there cannot exist a profitable deviation.

A standard game theoretic analysis would simply say: the game is not even well defined. I.e., what is the payoff if nobody gives up?

If the author intends at modelling a game where some situations are left unspecified (i.e. not associated to an outcome), then he should say so, and explain how this connects to rational behavior. One could argue for instance that a player expects to die before the game ends (as it never ends) and therefore stops at some point to reap some payoff. If it is this issue that the author is after, then I think it is a matter of modelling rationality in these games, and has very tenuous connections with the 'formal logic' framework of the paper.

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This is classical in infinite structures and is explained in detail in the paper.

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Game Theory and Economic Behavior

From the Advisory Editor :
The authors don't seem to get it. They claim that 30 years of game theory are wrong, and that they are providing a new approach. This could be interesting and exciting.But they certainly don't do any kind of analysis showing where game theory has gotten it wrong up to now. Instead, we get the observation that what happens in the infinite case cannot always be extrapolated from the finite case. While this is certainly true, it certainly gives the reader no insight as to what went wrong (as far as the authors are concerned) in this case.

Next, the authors try to make an argument that there should be no utility for an infinite play of the game. I find this argument unconvincing, to say the least. First, it is seems based on an intuition that utilities should be computable. This is a reasonable intuition, but then it must be taken far more seriously, and we should talk about computable infinite games.

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To summarize : the authors claim that they have a new tool to study infinite games, namely coinduction, and they claim that the old tools give the wrong answer. I could imagine that a paper that made and proved[1] this claim in a convincing way would be of great interest to game theory. This paper does nothing of the kind.

[1] All the proofs have been developed and checked in Coq.

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Theoretical Economics

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Theoretical Economics

- Another framework (F/D-games), but also a reject.
- The paper was not read as well.
- A reject,not based on scientific arguments,
  but only on ideological ones.

About economists

Pro :

- The refereeing process is quick.

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Pro :

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Cons :

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- Are they able to foresee the future ?
- Is it serious to reject escalation as paradoxical ?

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