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## Book Review: Beyond individual choice: teams and frames in Game Theory. By Michael Bacharach

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*Beyond individual choice --- Teams and Frames in Game Theory.* By MICHAEL BACHARACH. Edited by NATALIE GOLD and ROBERT SUGDEN. Princeton University Press, Princeton and Oxford. 2006. xxiii + 214 pp.

With the death of Michael Bacharach in 2002 decision and game theory lost one of its original thinkers. Thanks to editors Natalie Gold and Robert Sugden the essence of his final project is now available in book form. In *'Beyond Individual Choice'* Bacharach addresses two fundamental problems in the foundations of game theory: How can, and do, players coordinate on mutually beneficial equilibria? And what explains that players cooperate beyond that even in one-shot games?

The subtitle of the book --- *'teams and frames in game theory'* --- characterises Bacharach's approach very well. In contrast to evolutionary or behavioral approaches he writes in the tradition of classical game theory and seeks explanations and concepts that model such coordination and cooperation as rational choices. It is the rationality concept itself that is re-examined in this work.

Key to Bacharach's theory is a distinction between the actual strategy set of a game and its description that informs the player's reasoning and choice. A *frame* is a set of possible descriptions of subsets of strategies. A *framed game* is a normal form game in which each player has a frame, together with a probability that an individual description in the frame is available to the player when he reasons strategically and makes his choice. Beliefs about the opponent's frame are then derived from the descriptions that are actually available to the player. This model allows Bacharach to formulate the (attractive) assumption that a description not available to the player in choosing his own strategy will also not be available to him when reasoning about his opponent.

In this framed game a player picks a description that is available to him. If the description applies to more than one strategy then one of them is chosen randomly. A *variable frame equilibrium* is then a Nash equilibrium in this framed game. Among these equilibria

Bacharach then eliminates (roughly put) those equilibria for which a symmetric counterpart can be found (because rationality arguments cannot distinguish between them) and selects the payoff-dominant remaining equilibrium as the solution to the original game. Bacharach argues that this construction yields the salient equilibrium in a coordination game (even if not payoff-dominant) as the --- possibly unique --- variable frame equilibrium of the framed game.

This approach has many intriguing aspects, although some problems remain. For example, the analysis depends heavily on how the frame is specified. While the approach sheds some light on how a salient equilibrium of the original game is chosen, it is silent on what makes an equilibrium salient. In particular, a payoff-dominant equilibrium need not be salient, yet payoff-dominance plays an important role in defining a variable frame equilibrium. Overall the model appears to be much better at rationalising observed choices than at making sharp predictions.

After a thorough and scholarly review of sources in the psychology and sociology literature Bacharach next argues that coordination games trigger group identification, meaning that players frame their role in the game as members of a group. The author then devotes a chapter on how group identification is consistent with, or even follows from evolutionary theory.

Bacharach's theory then comes into its own when he (implicitly) applies his concept of a variable frame equilibrium to the frame created by group identification in coordination games. Intuitively, this frame allows *team reasoning*, in which a player identifies the strategy that leads to the best outcome for the group. This, in turn, is proposed as an explanation for selecting the payoff-dominant equilibrium in a coordination game.

Sadly, Bacharach did not live to complete the argument and it is left to the editors to elaborate on it in the conclusion. (They also note a tension between these concepts, however.) There the editors also explain how this theory accounts for cooperation as a --- frame based --- 'equilibrium' outcome in the prisoners' dilemma.

The book consists of four chapters written by Bacharach and intended to form the core of a nine-chapter volume. These chapters are put into context by an introductory chapter written by the editors, and their conclusion rounds off the work. The editorial work is superb. The editors provide background, history and clarification, while always separating clearly the original text, their additions based on the author's material, and their own interpretations. The profession owes them a debt of gratitude for making Bacharach's thinking publicly available. That aspects of his theory can be criticised should not distract from the value of an original approach. Coordination and cooperation are topics of fundamental importance in social science, and Bacharach's ideas merit to be further explored.

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