**M Equilibrium: A Dual Theory of Beliefs and Choices in Games**

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**Abstract:**

We introduce a set-valued generalization of Nash equilibrium, called M equilibrium, which is based on ordinal monotonicity - players' choice probabilities are ranked the same as the expected payoffs based on their beliefs - and ordinal consistency - players' beliefs yield the same ranking of expected payoffs as their choices.

Using results from semi-algebraic geometry, we prove there exist a finite number of M equilibria, each consisting of a finite number of connected components.

Generically, M-equilibria can be "color coded" by their ranks in the sense that choices and beliefs belonging to the same M equilibrium have the same color.

We show that colorable M equilibria are behaviorally stable, a concept that strengthens strategic stability.

Furthermore, set-valued and parameter-free M equilibrium envelopes various parametric models based on fixed-points, including QRE as well as a new and computationally simpler class of models called MU Equilibrium.

We report the results of several experiments designed to contrast M equilibrium predictions with those of existing behavioral game-theory models.

A first experiment considers five variations of an asymmetric-matching pennies game that leave the predictions of Nash, various versions of QRE, and level-k unaltered.

However, observed choice frequencies differ substantially and significantly across games as do players' beliefs.

Moreover, beliefs and choices are heterogeneous and beliefs do not match choices in any of the games.

These findings contradict existing behavioral game-theory models but accord well with the unique M equilibrium.

Follow up experiments employ 3 by 3 games with a unique pure-strategy Nash equilibrium and multiple M equilibria.

The belief and choice data exhibit coordination problems that could not be anticipated through the lens of existing behavioral game-theory models.