People are constantly faced with decisions involving uncertainty (risky choices). It has been widely demonstrated that people tend to distort probabilities (i.e., Gonzalez & Wu, 1999; Preston & Baratta, 1948).

Overweight small probabilities, underweight large probabilities (treat probabilities as being closer to .5).

Key component of Prospect Theory (Kahneman & Tversky, 1979).

Existing explanations for probability distortion:
- Based on emotion, memory, psychophysics (Brandstätter, Kühberger et al., 2002; Stewart, Chater et al., 2006; Takahashi, 2011)
- Speak to proximal causes

Propose a novel explanation for probability distortion that is based on ambiguity (uncertainty about probabilities):
- Perfect probability information is rare due to small sample size, measurement error, and unrepresentative samples
- Distorting probabilities is advantageous under ambiguity
- Illustrate with agent-based simulations

Computational Model
- Ambiguity varied across environments
  - Probability information available to decision makers was based on samples from a distribution that reflected the true probability
  - In ambiguous environments samples were small, resulting in imprecise (ambiguous) probabilities
- Magnitude of distortion varied across agents
- Agents made choices between gambles
  - Choices were based on magnitude of distortion
- Genetic algorithm allowed for convergence to the optimal magnitude of distortion for each level of ambiguity

Results
- Magnitude of optimal distortion was dependent on magnitude of ambiguity
  - More ambiguous information led to more extreme distortion
  - Unambiguous probability information led to undistorted probabilities

Discussion
- Probability distortion is advantageous when probability information is ambiguous
  - Regressive distorted probabilities compensate for systematic biases in imprecise probability estimates
- Suggests distortion is not irrational or a cognitive limitation
- Implicit ambiguity is likely to be a factor in risky choice
- These simulations speak to optimal decision strategies under uncertainty, which have applied value.