



Bayesian Reasoning and Behavior

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Understanding our Adversary



- Football
 - Coaches and players spend hours watching film
 - Tendencies, patterns
- Chess
 - Study past games of our opponent
 - Offensive patterns, defensive moves
- Referees
 - Quickly identify troublemakers in soccer
 - Recognize attack tendencies for best positioning



Combat



- Accurate prediction of behavior (group and individual) is REALLY important
- Individual is DIFFICULT – Group is CONSTRAINED
- Human mind can only hold 6 – 8 concepts at one time
- Incomplete / fuzzy concepts
- Need a bounded range of most plausible operational behaviors of our (potential) enemy



Bayesian Reasoning



- “Mathematical thinking provides a clear, crisp way of defining problems” – Earl Hunt in *The Mathematics of Behavior*
- Deals with uncertainty, causality, fuzzy concepts
- Evaluate Evidence
- Now employed in psychology, sociology, economics, ecology



Observations and Comments



- If we are to predict adversary (potential adversary) behavior
 - Begin with best model possible
 - May involve “gut feel” at first
 - Incorporate new evidence as it evolves
 - Reliability of evidence must be considered
 - Incorporate feedback for continuous improvement in predictive ability



Build On Our Successes

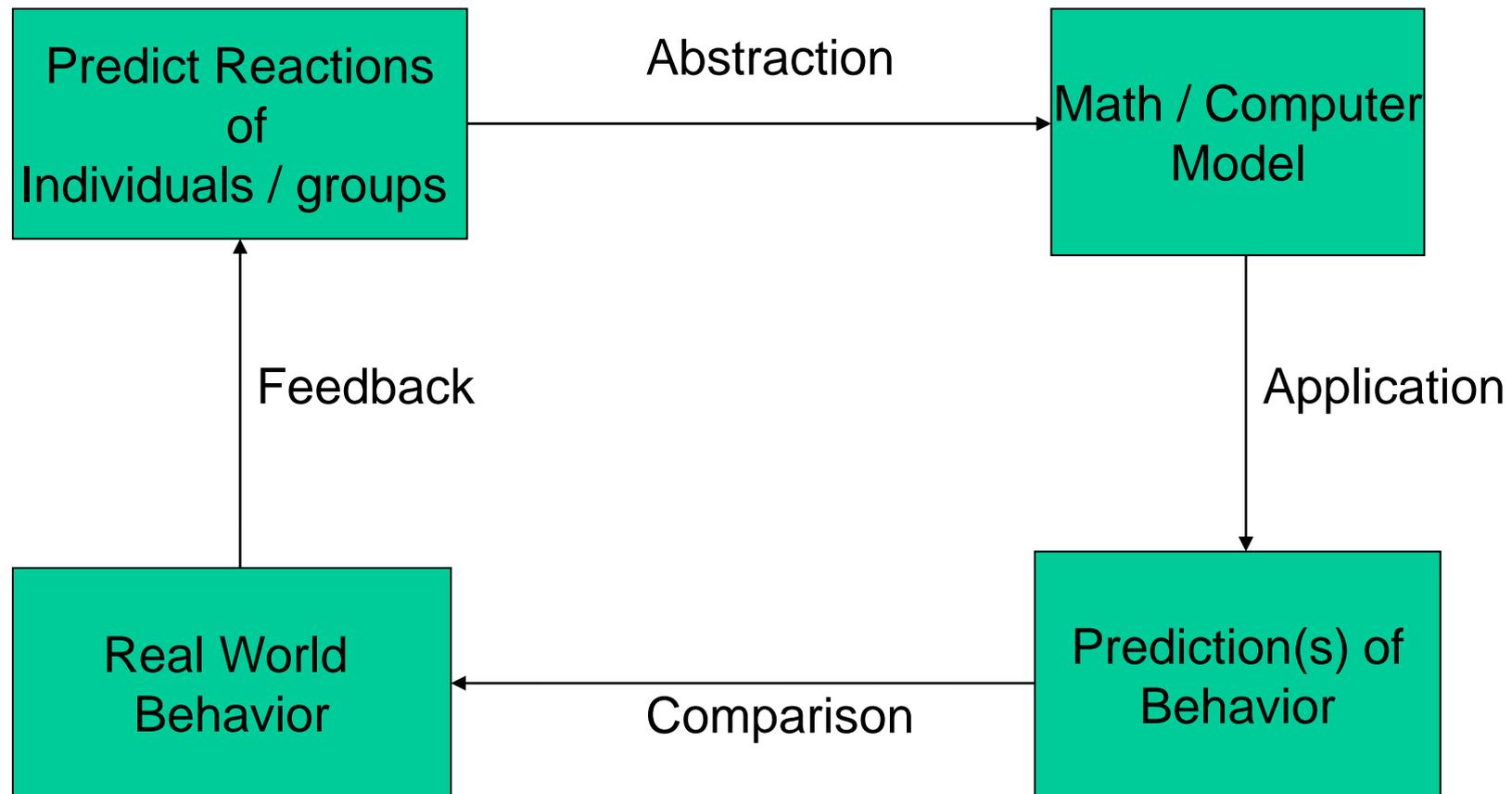


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- We can predict behavior of space craft
- We can predict weather over short periods
- We can predict economic behavior over short periods
 - Models evolved over time
 - Begin with “gut feel” model
 - Incorporate new evidence
 - Feedback loop



The Modeling Cycle





Questions? Comments?



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**Our best chance of success
is with Bayesian models using
feedback to iteratively correct.**