Algorithms

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Which is better?

- Human intuition?
  - i.e. clinical judgment
- Statistical algorithms?
  - i.e. mathematical models

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CHOICEOLOGY PODCAST   FEBRUARY 04, 2019

Choiceology: Season 2 Episode 7

Choiceology with Katy Milkman | S2:EP7
Data for the Win: With Guests Michael Kist & C…

02:32   30:56
1X

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Where analytical models and algorithms outperform human judgment, it's still so tempting to just go with your gut.

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Algorithms

- Sports
  - Michael Kist: Bleeding Green Nation
  - Decisions by the gut vs. by the numbers
  - Algorithm approach to hiring players and making game strategy
  - Leads to an Eagles SuperBowl victory
- Other Algorithms
  - Netflix recommendations
  - Google maps
- So why do people distrust algorithms?

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Algorithm Aversion

Journal of Experimental Psychology: General

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0096-3445/14/$12.00   http://dx.doi.org/10.1037/xge0000003

Algorithm Aversion: People Erroneously Avoid Algorithms
After Seeing Them Err

Berkeley J. Dietvorst, Joseph P. Simmons, and Cade Massey
University of Pennsylvania

Research shows that evidence-based algorithms more accurately predict the future than do human forecasters. Yet when forecasters are deciding whether to use a human forecaster or a statistical algorithm, they often choose the human forecaster. This phenomenon, which we call *algorithm aversion*, is costly, and it is important to understand its causes. We show that people are especially averse to algorithmic forecasters after seeing them perform, even when they see them outperform a human forecaster. This is because people more quickly lose confidence in algorithmic than human forecasters after seeing them make the same mistake. In 5 studies, participants either saw an algorithm make forecasts, a human make forecasts, both, or neither. They then decided whether to tie their incentives to the future predictions of the algorithm or the human. Participants who saw the algorithm perform were less confident in it, and less likely to choose it over an inferior human forecaster. This was true even among those who saw the algorithm outperform the human.

Keywords: decision making, decision aids, heuristics and biases, forecasting, confidence

Supplemental materials: http://dx.doi.org/10.1037/xge0000033.supp

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Algorithm Aversion

- Ride in autopilot
- With or without a "braking" control
- Illusion of control make passengers more comfortable.

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Why?

- Less forgiving of algorithms when they fail
  - Even though they fail less
- Want to make exceptions
- Experience when seeing the algorithm perform (with mistakes) → more algorithm aversion
- Experience with seeing the human perform (with mistakes) → no change in human aversion
- More willing to use model if they can adjust it

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The Robust Beauty of Improper Linear Models in Decision Making

ROBYN M. DAWES   *University of Oregon*
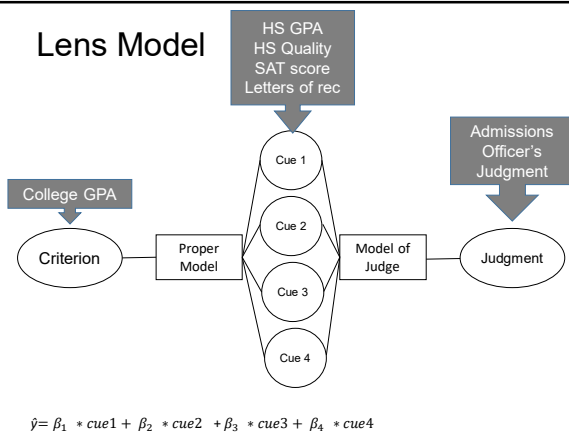
Robyn Dawes

1936 – 2010

SDS faculty 1985 -2010

Dawes, R. M. (1979). The robust beauty of improper linear models in decision making. *American psychologist*, *34*(7), 571.

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Lens Model

HS GPA
HS Quality
SAT score
Letters of rec

College GPA

Admissions Officer's Judgment

Criterion — Proper Model — Cue 1, Cue 2, Cue 3, Cue 4 — Model of Judge — Judgment

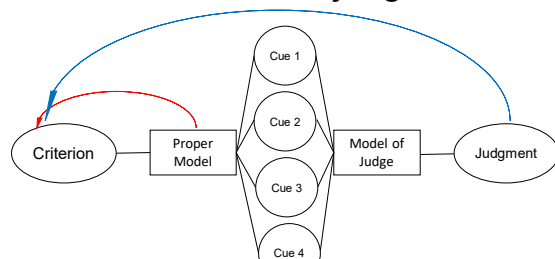$$\hat{y} = \beta_1 * cue1 + \beta_2 * cue2 + \beta_3 * cue3 + \beta_4 * cue4$$

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Lens Model

- A way to study human judgment,
- And a way to improve on it
- Model of Judge (MUD) tells you
  - How the judge is using the cues
  - "Policy capturing" or "Insight"
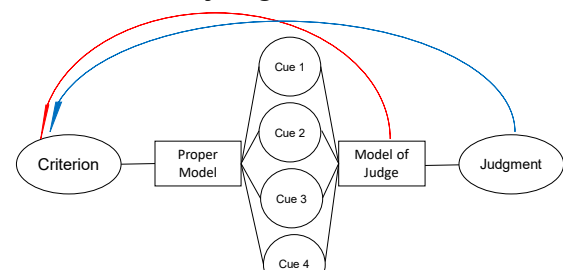 - How that cue use differs from the optimal model

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Proper model predicts criterion better than human judge does

Criterion — Proper Model — Cue 1, Cue 2, Cue 3, Cue 4 — Model of Judge — Judgment

- Why? Judge doesn't weight the cues correctly.
- Judge uses cues inconsistently

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Model of judge predicts criterion better than judge does

Criterion — Proper Model — Cue 1, Cue 2, Cue 3, Cue 4 — Model of Judge — Judgment

- Why? Model of judge captures the consistent, systematic aspects of the human's judgments.

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Even improper models predict the criterion better than human judge

Proper Model
- Best possible linear model
- Uses cue weights that optimize agreement between model and criterion

Improper Model
- Uses non-optimal cue weights.
- E.g., Model of the Judge (aka bootstrapping)
- E.g., unit weights
- E.g., random weights

Must have correct sign

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If linear models are so great, why don't people use them?

- Many people object to the use of linear models
  - Want to make exceptions, treat special cases separately
- Don't treat me as just a number
  - But any method of rank ordering clients "reduces people to a number"
- Judges overconfident in their prediction abilities
  - Think that they can outperform the model
  - Despite all the studies that say otherwise

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- •Statistical algorithms?
  - i.e. mathematical models

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