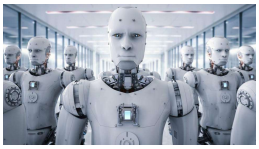
Prediction and decision making

- Does this patient have a depression?
- Is this client committing fraud?
- Will this prospective student successfully complete the program?
- How well shall this candidate perform in this job?
- …

Tasks: 1) Select relevant cues, 2) combine these into a decision.

1

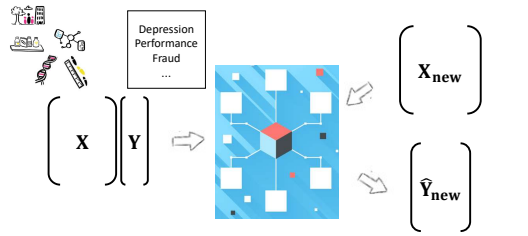


2

Actuarial (statistical) prediction

1. Select relevant cues / variables

2. Combine into a prediction



3

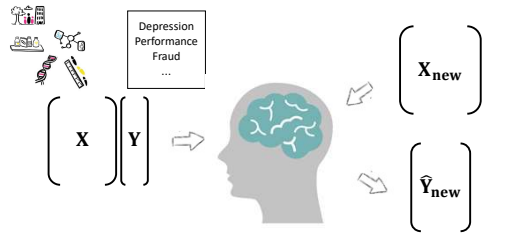
Clinical prediction

4

Clinical (informal / intuitive / holistic) prediction

1. Select relevant cues / variables

2. Combine into a prediction



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Human versus algorithm

Formal decision rules ≥ intuitive/holistic combining

(Kuncell et al., 2013; Grove & Meehl, 1996; Grove, Zald, Lebow, Snitz, & Nelson, 2000; Sawyer, 1966; Ægisdóttir et al., 2006; Kahneman & Klein, 2009)

Mostly because humans are *inconsistent*

- Using *random weights* even does better than the holistic decision maker, as long as these weight are applied *systematically and consistently*
  (Yu & Kuncel, 2020)
- *Model* of holistic decision maker performs better than the holistic decision maker (because more *systematic and consistent*)
  (Karelaia & Hogarth, 2008)

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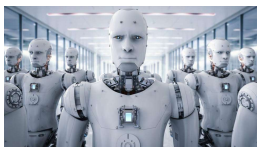
Decision making: Human versus algorithm

Human mistakes in decision making are seen as *normal*, mistakes in algorithmic decisions are seen as *unacceptable*

(Renier et al., 2021; Dietvorst et al., 2018)



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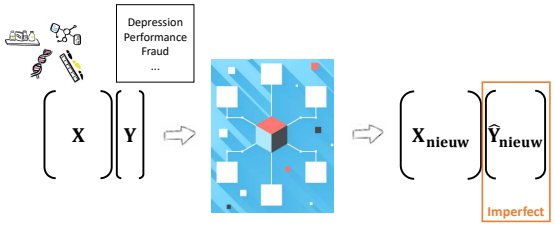

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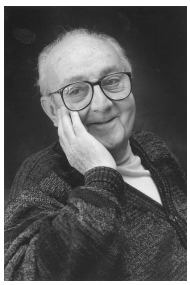
"All models are wrong, but some are useful"
George Box (1919 – 2013)



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Pick a side:

a. The model with the most accurate predictions is most useful.

b. The model that provides the most accurate inference about each variable's effects is most useful.

c. The model that can be understood by a human is most useful.

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Pick a side:

a. Decisions should be made by a computer.

b. Decisions should be made by humans.

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Traditional prediction models often perform as well as black-box machine learning models

Christodoulou et al. (2019)
Youyou et al., (2015)
Gravesteijnet al., (2020)
Yildiz et al., (2017)
Piroset al., (2019)
Fokkema et al. (2022)
...

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Ægisdóttir, S., White, M. J., Spengler, P. M., Maugherman, A. S., Anderson, L. A., Cook, R. S., ... & Rush, J. D. (2006). The meta-analysis of clinical judgment project: Fifty-six years of accumulated research on clinical versus statistical prediction. *The Counseling Psychologist*, *34*(3), 341-382.

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Karelaia, N., & Hogarth, R. M. (2008). Determinants of linear judgment: A meta-analysis of lens model studies. *Psychological Bulletin*, *134*(3), 404.

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Yu, M. C., & Kuncel, N. R. (2020). Pushing the limits for judgmental consistency: Comparing random weighting schemes with expert judgments. *Personnel Assessment and Decisions*, *6*(2), 2.

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