Bias, Skill and Decisions

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Bias, Skill and Decisions

I study learning and decision making. Much of my research looks at simple decision making, and simple skill learning, using measures of behaviour informed by work done in computational theory, robotics and neuroscience. More recently a strand of my research looks at complex decisions, and bias in decision making. In this talk I will discuss two recent projects which demonstrate the power of combining psychological theory with computer science techniques:

The first, a promising method which uses timing and error data from typing to infer something about neurological health:

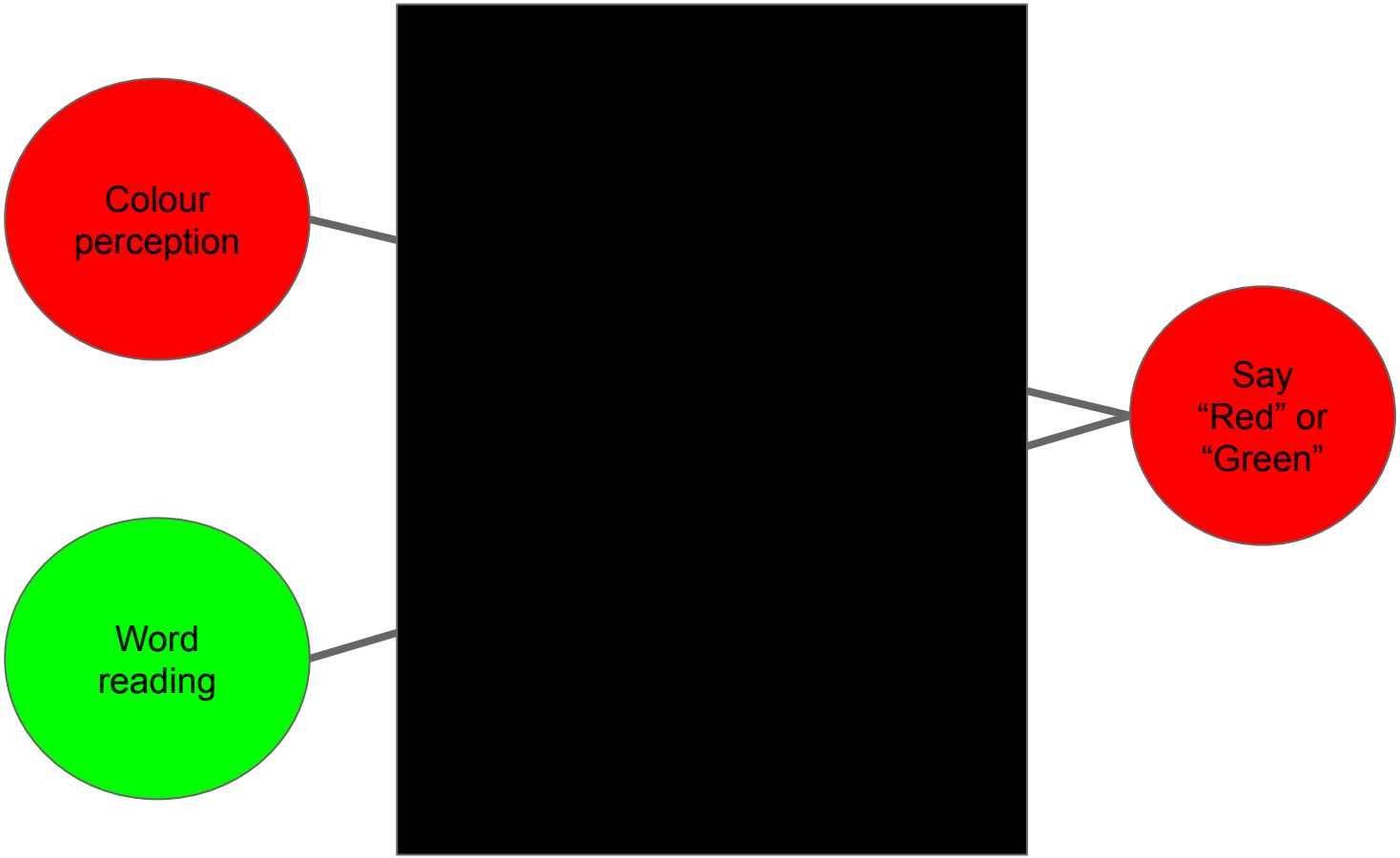
> Bannard, C., Leriche, M., Bandmann, O., Brown, C., Ferracane, E., Sánchez-Ferro, A., Obeso, J., Redgrave, P. and Stafford, T. (2019). Reduced habit-driven errors in Parkinson's Disease. *Nature Scientific Reports.*

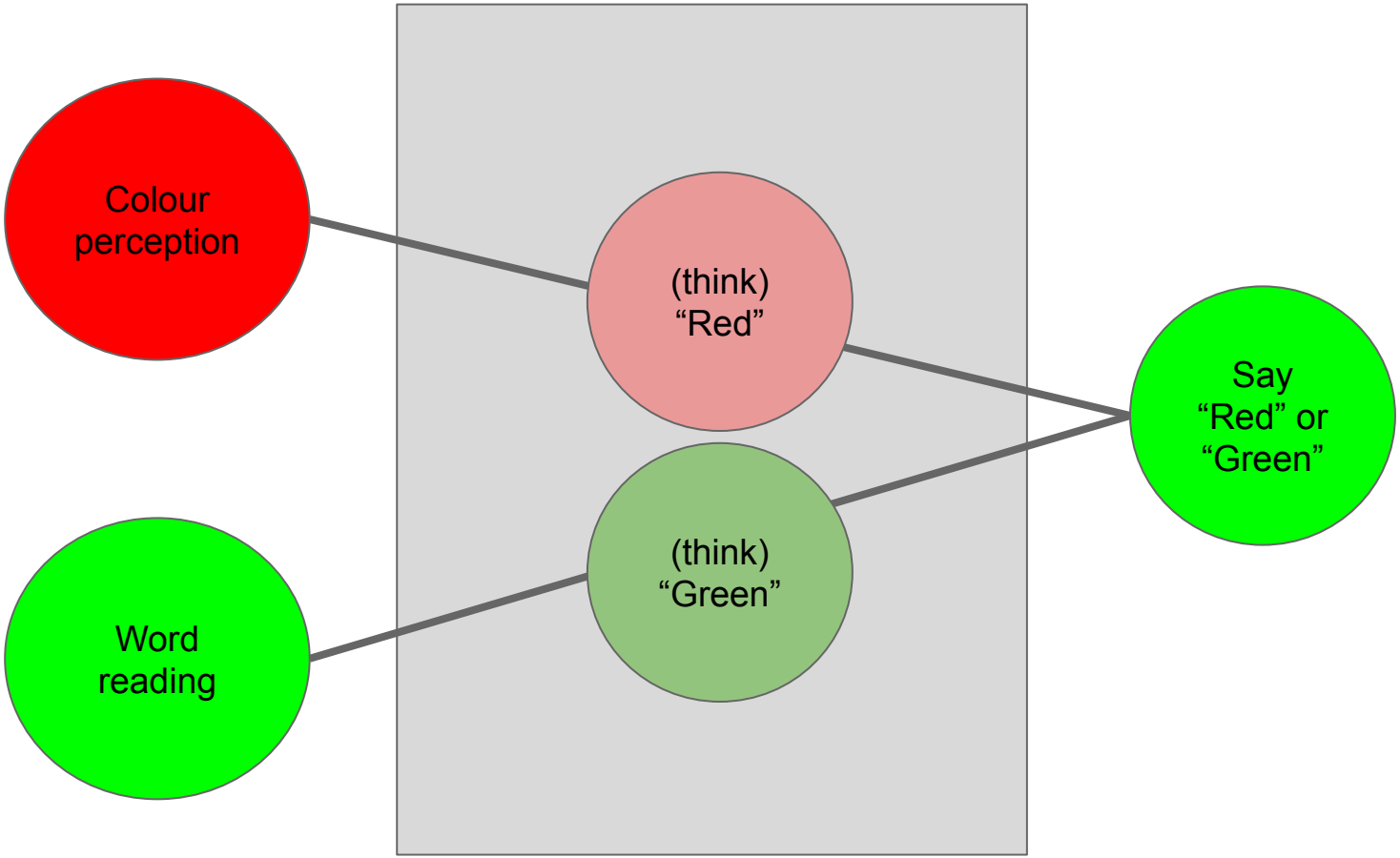
The second, a study of racial bias in soccer referees which also tells us something about biases in the scientific process:

> Silberzahn, R. et al (2018). Many analysts, one dataset: Making transparent how variations in analytical choices affect results. *Advances in Methods and Practices in Psychological Science.* See also : 'Science isn't broken'

Engineering

GREEN

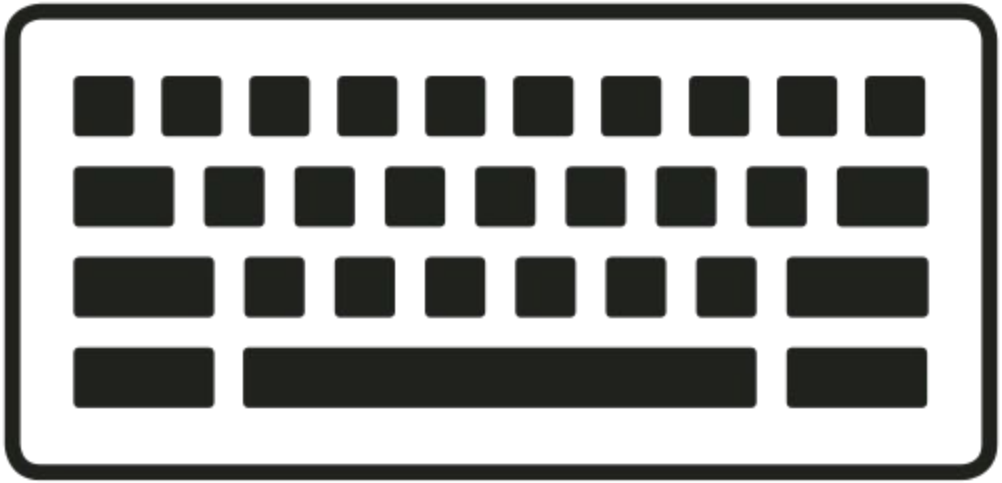

Colour perception
Word reading
Say “Red” or “Green”


Colour perception
Word reading
(think) “Red”
(think) “Green”
Say “Red” or “Green”

Goal-directed and habitual control in the basal ganglia: implications for Parkinson's disease

Peter Redgrave, Manuel Rodriguez[‡§], Yoland Smith[‖¶], Maria C. Rodriguez-Oroz[§#], Stephane Lehericy**, Hagai Bergman[‡‡], Yves Agid[§§], Mahlon R. DeLong[¶] and Jose A. Obeso[§#]*

Abstract | Progressive loss of the ascending dopaminergic projection in the basal ganglia is a fundamental pathological feature of Parkinson's disease. Studies in animals and humans have identified spatially segregated functional territories in the basal ganglia for the control of goal-directed and habitual actions. In patients with Parkinson's disease the loss of dopamine is predominantly in the posterior putamen, a region of the basal ganglia associated with the control of habitual behaviour. These patients may therefore be forced into a progressive reliance on the goal-directed mode of action control that is mediated by comparatively preserved processing in the rostromedial striatum. Thus, many of their behavioural difficulties may reflect a loss of normal automatic control owing to distorting output signals from habitual control circuits, which impede the expression of goal-directed action.



Norman, D. A. (1981). Categorization of action slips. *Psychological review, 88*(1), 1-15

Botvinick, M. M. (2008). Hierarchical models of behavior and prefrontal function. *Trends in cognitive sciences*, *12*(5), 201-208.

That’s what I think

thing

Let’s save the date

data

Blues have

Blue shave

Colin Bannard

Psychology, Liverpool

Peter Redgrave

Psychology, Sheffield

Oliver Bandmann

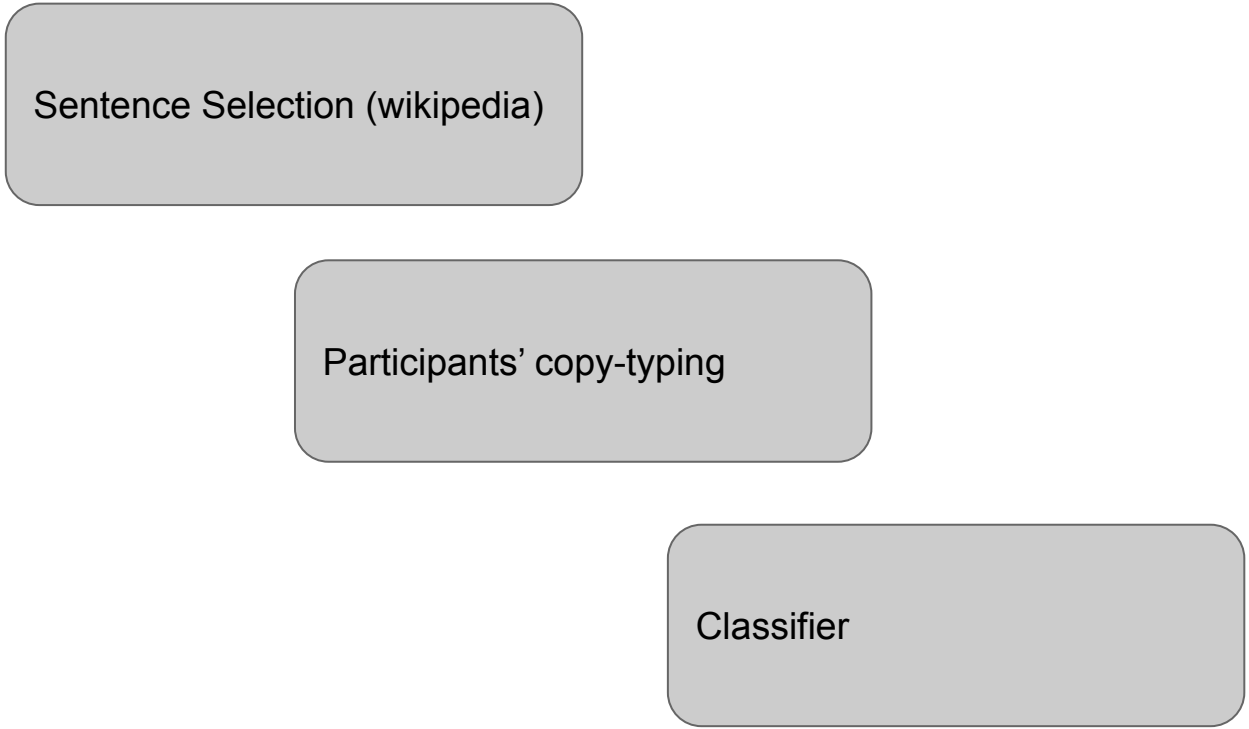
SiTran, Sheffield

José A. Obeso

HM Hospitales, Madrid

Reduced Habitual Intrusions: An Early Marker of Parkinson's Disease?

THE MICHAEL J. FOX FOUNDATION FOR PARKINSON'S RESEARCH



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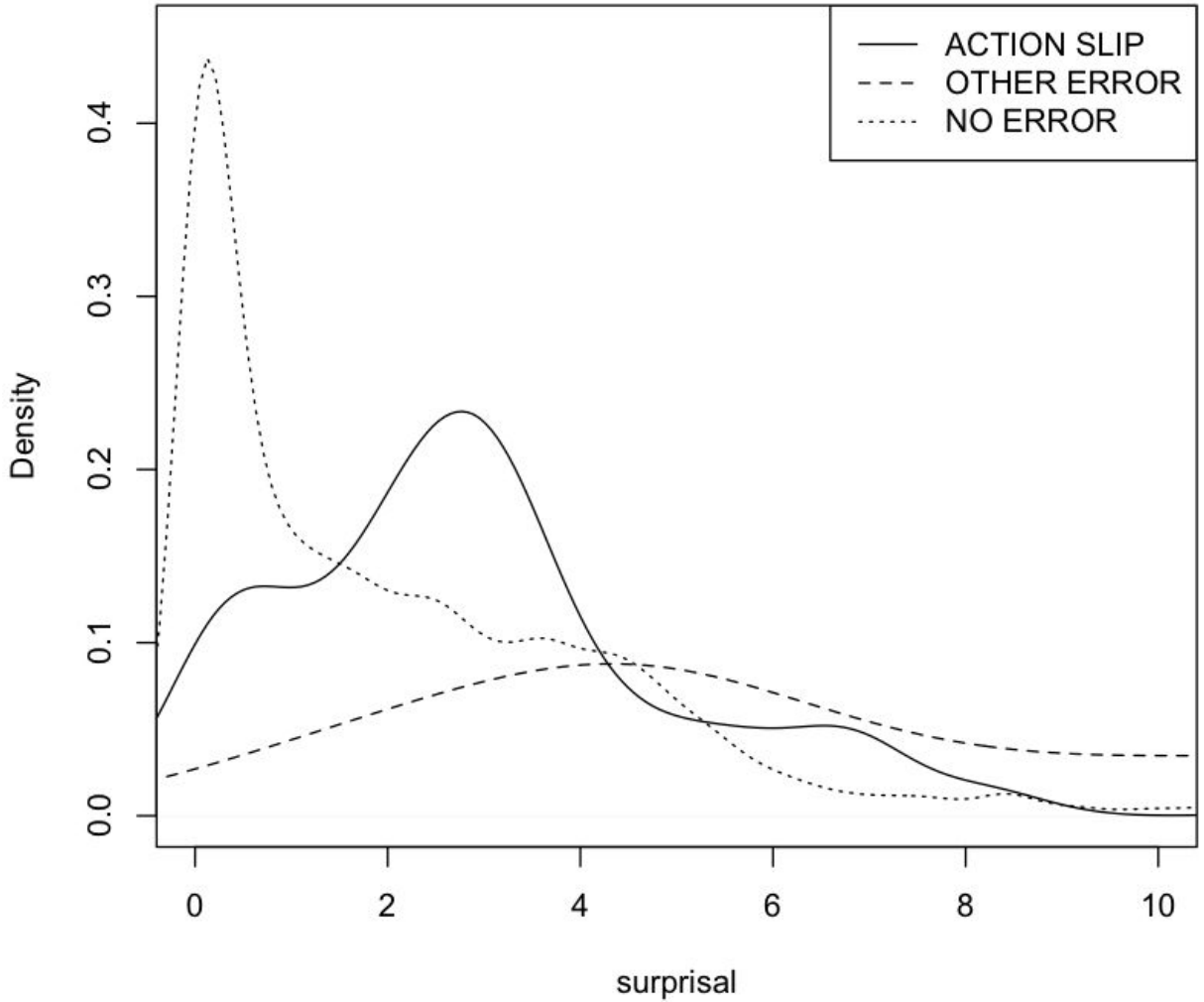

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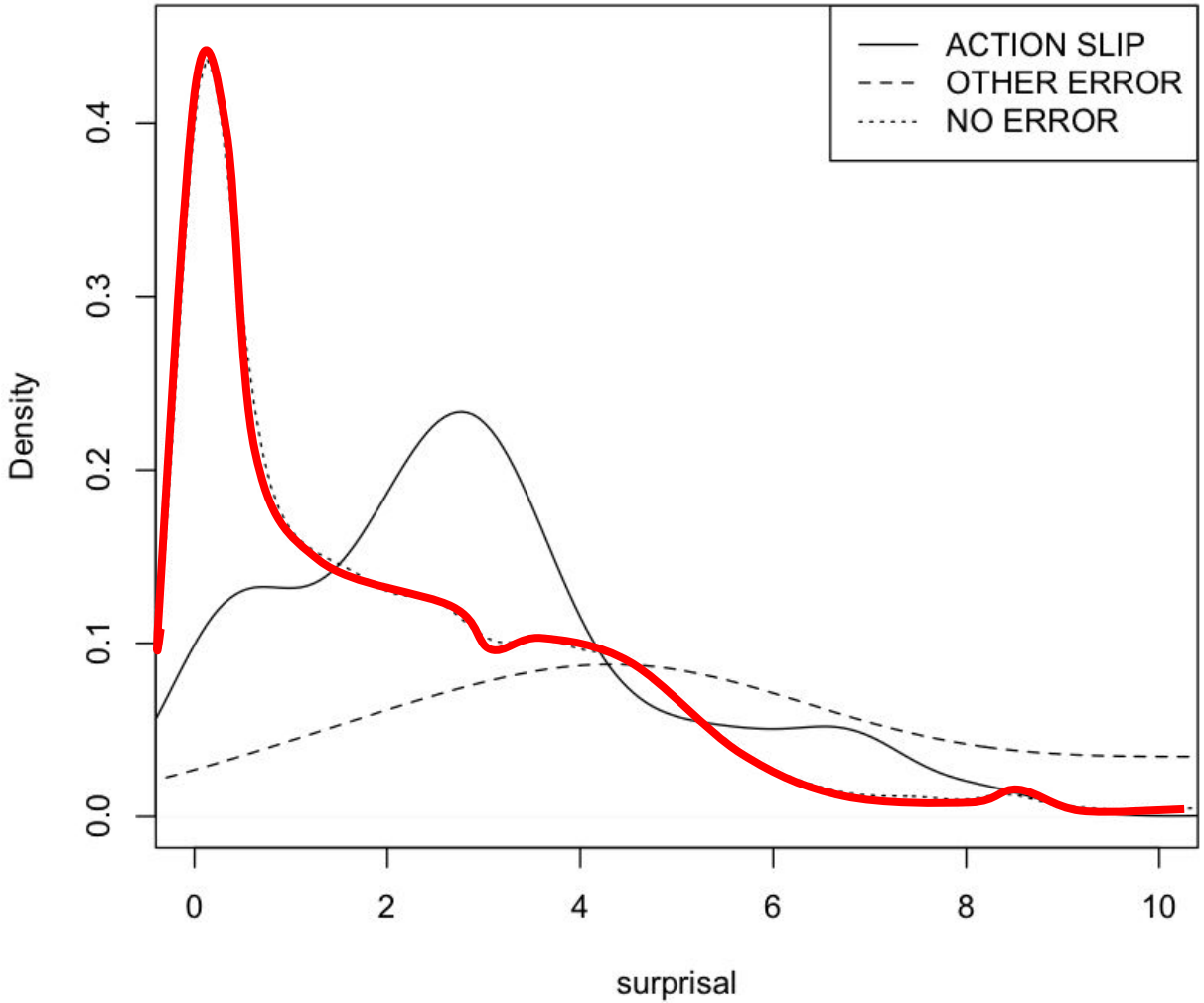

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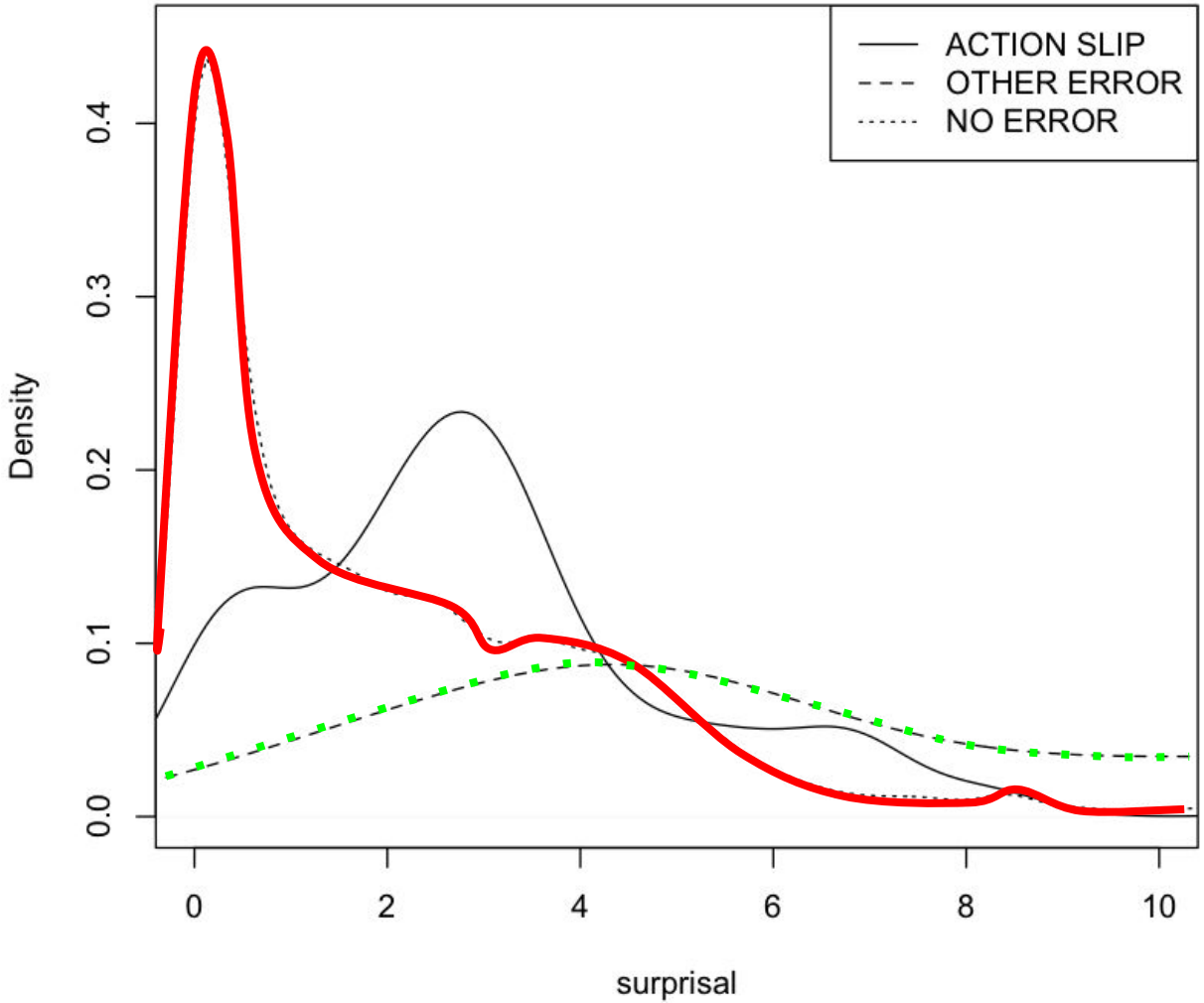

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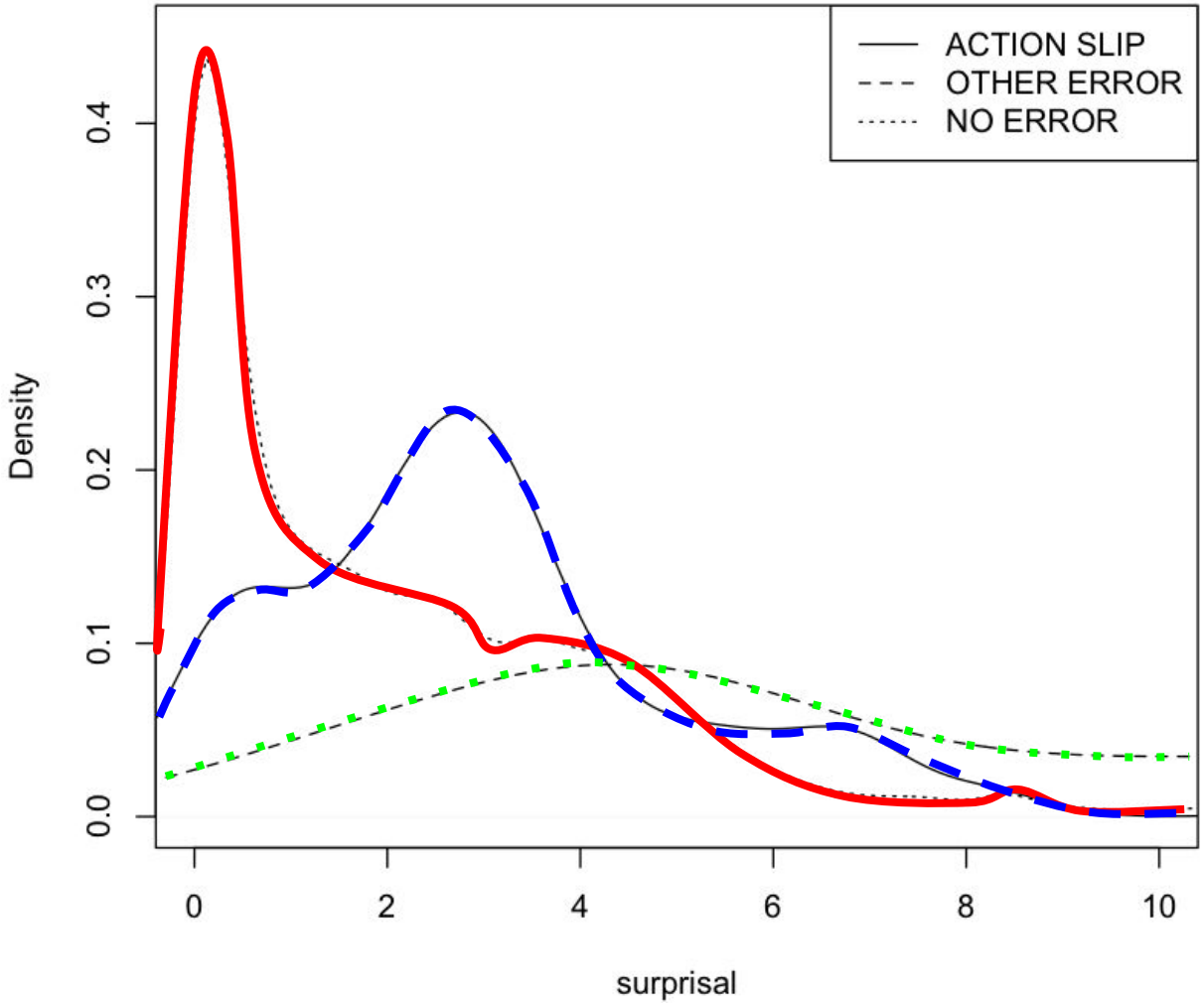

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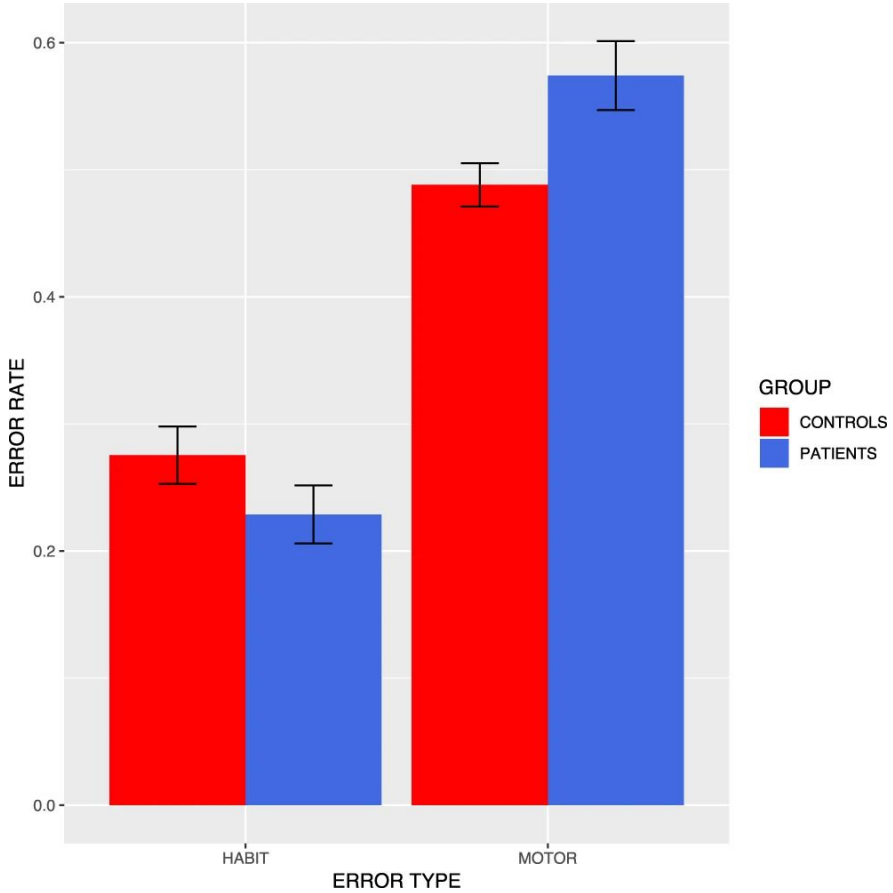

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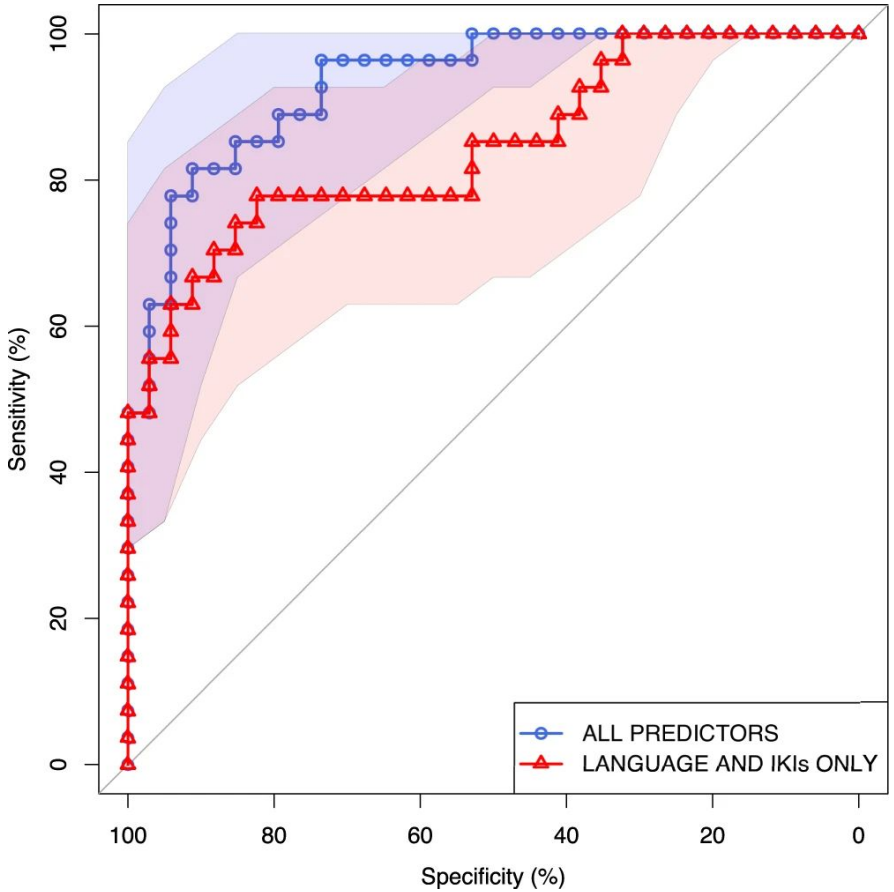

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Current work

Online testing of more patients and controls

- traditional keyboard + tablets/phones
- more data + “in the wild” test of concept

Deep learning classifier

- what is maximum discrimination from typing data
- does classifier recover language representations ?
  - what is contribution of timing / space / language info?

Predict status (patient vs control), disease progression, medication response

- even disease onset?
- generalise to free-form (not copy) typing

2.

Silberzahn, R. et al (2018). Many analysts, one dataset: Making transparent how variations in analytical choices affect results. *Advances in Methods and Practices in Psychological Science*

Silberzahn, R. et al (2018). Many analysts, one dataset: Making transparent how variations in analytical choices affect results. Advances in Methods and Practices in Psychological Science.

Price, Joseph, and Justin Wolfers. "Racial discrimination among NBA referees." *The Quarterly journal of economics* 125.4 (2010): 1859-1887.

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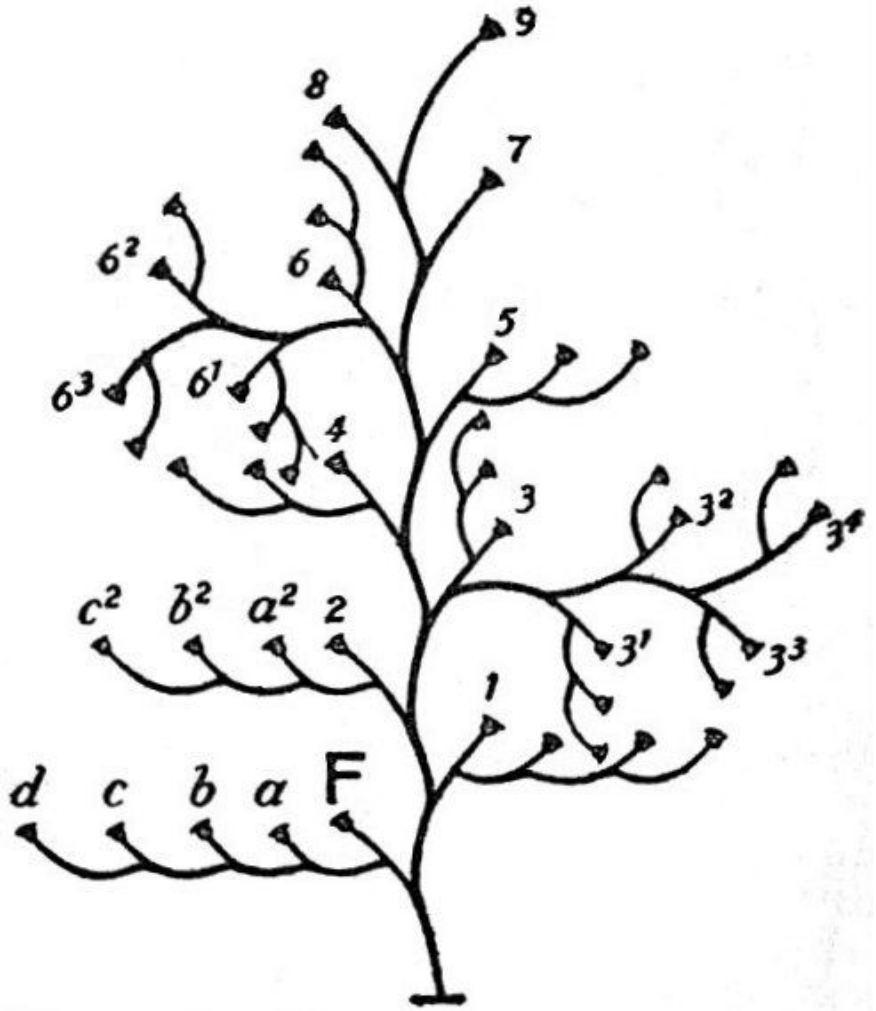
Image: Wikimedia Commons

Gelman, A., & Loken, E. (2013). The garden of forking paths: Why multiple comparisons can be a problem, even when there is no “fishing expedition” or “p-hacking” and the research hypothesis was posited ahead of time. *Department of Statistics, Columbia University*.

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological science*, *22*(11), 1359-1366.



Mat Evans

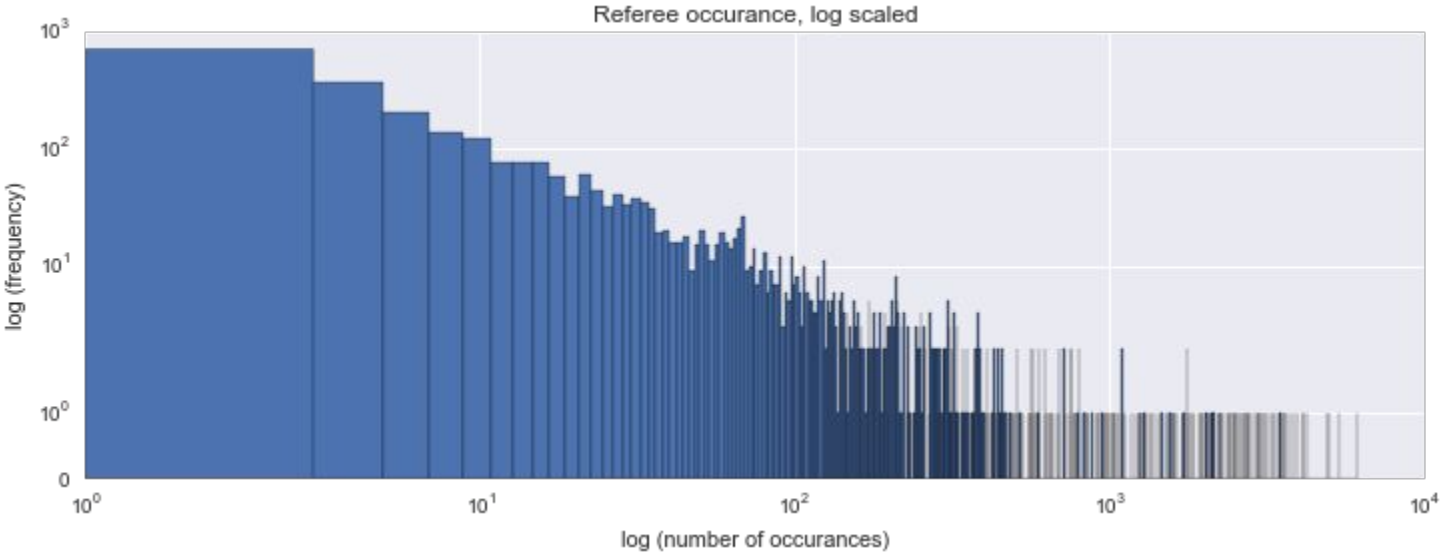
Computational Neuroscientist, Nottingham

Tim Heaton

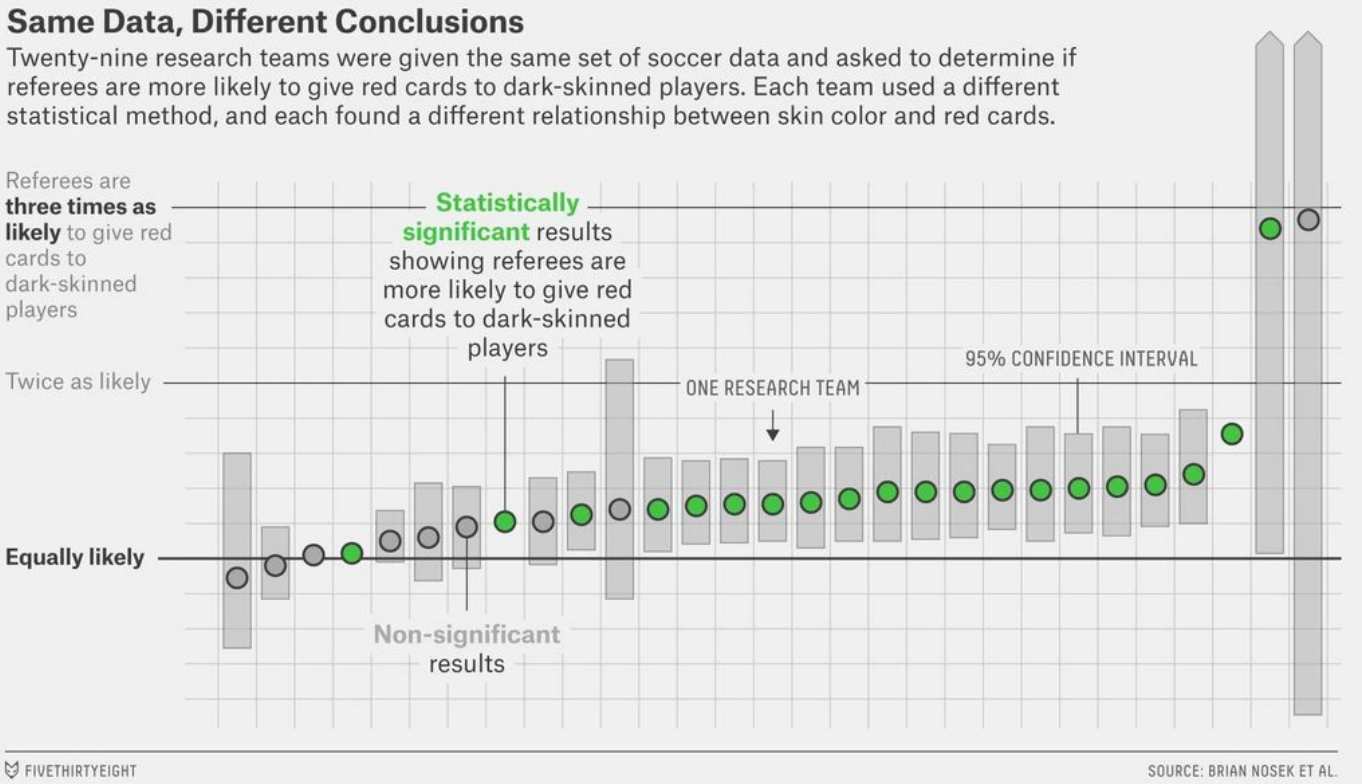
Statistics, Sheffield

Colin Bannard

Computational Linguistics Liverpool



most refs are only involved in a small number of dyads, many officiated over thousands. A median of 11 indicates that more than half of the refs officiated less than one game!



https://fivethirtyeight.com/features/science-isnt-broken/#part1

Conclusions

There is variation, but within limits

Locus of bias is still unclear

For good analysis:

- Team diversity
- visualisation
- domain knowledge

Sheffield Reproducibility Network

...part of UKRN

mailing list

studentship: call 1st October

END

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