



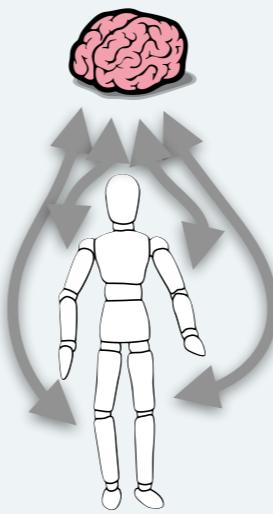
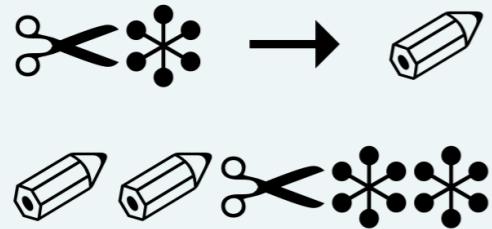
# A STATISTICIAN'S LITTLE SHOP OF HORRORS

# COGS300

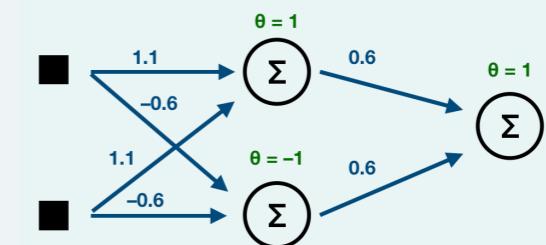
## Of dead salmon and chronological rejuvenation

Instructor: Márton Sóskuthy  
[marton.soskuthy@ubc.ca](mailto:marton.soskuthy@ubc.ca)

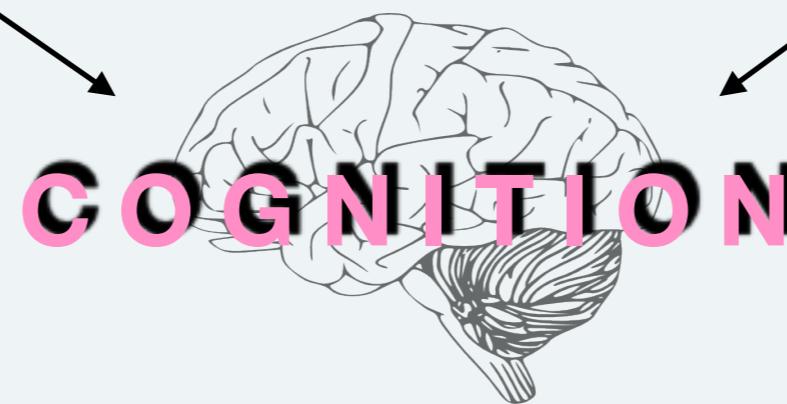
TAs: Daichi Furukawa • Victoria Lim • Amy  
Wang  
[cogs.300@ubc.ca](mailto:cogs.300@ubc.ca)



explain

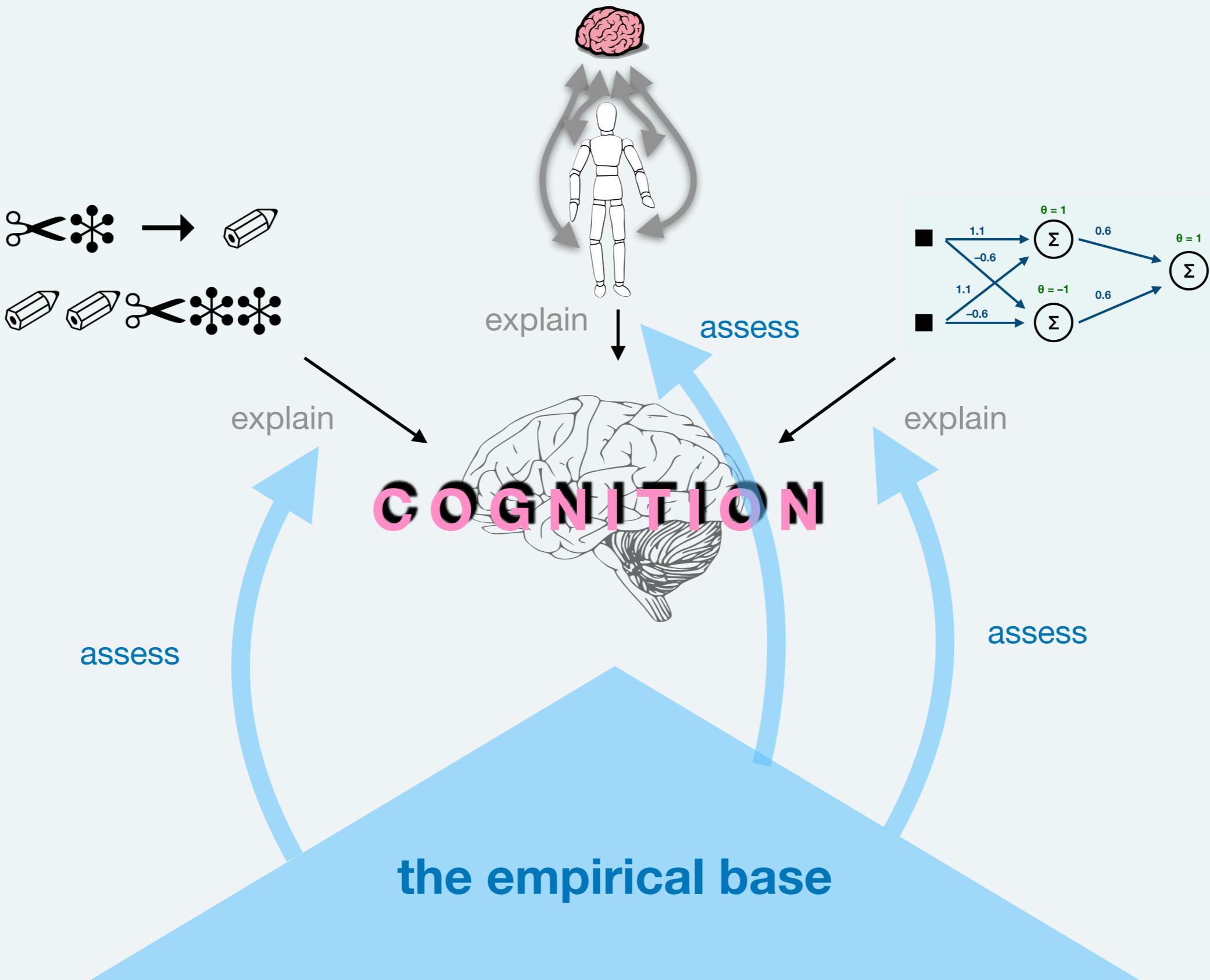


explain



**COGNITION**

explain



goals of a scientist:

- distal goal: figure out how the world works
- proximal goal
  - publish papers
  - present at conferences
  - secure grants
  - ~ have a successful research career!

ideal world: *proximal goals feed into distal goal*

- you write a thousand papers
  - give a bucket load of talks
  - swim in grant money
- each of these activities contribute incrementally to the scientific enterprise

**EVERYTHING IS  
AWESOME!**



unfortunately, our proximal achievements do not *always* feed into our distal goal

publications

lots of      talks      != lots of great science  
                 grants

problem:

- easy to determine whether someone has an impressive publication record
  - much harder to determine whether their research counts as ‘great science’
- incentives towards the former, not necessarily the latter

fine, but surely, journals won't just publish any old rubbish...

→ no, but journals also like to focus on 'objective' criteria

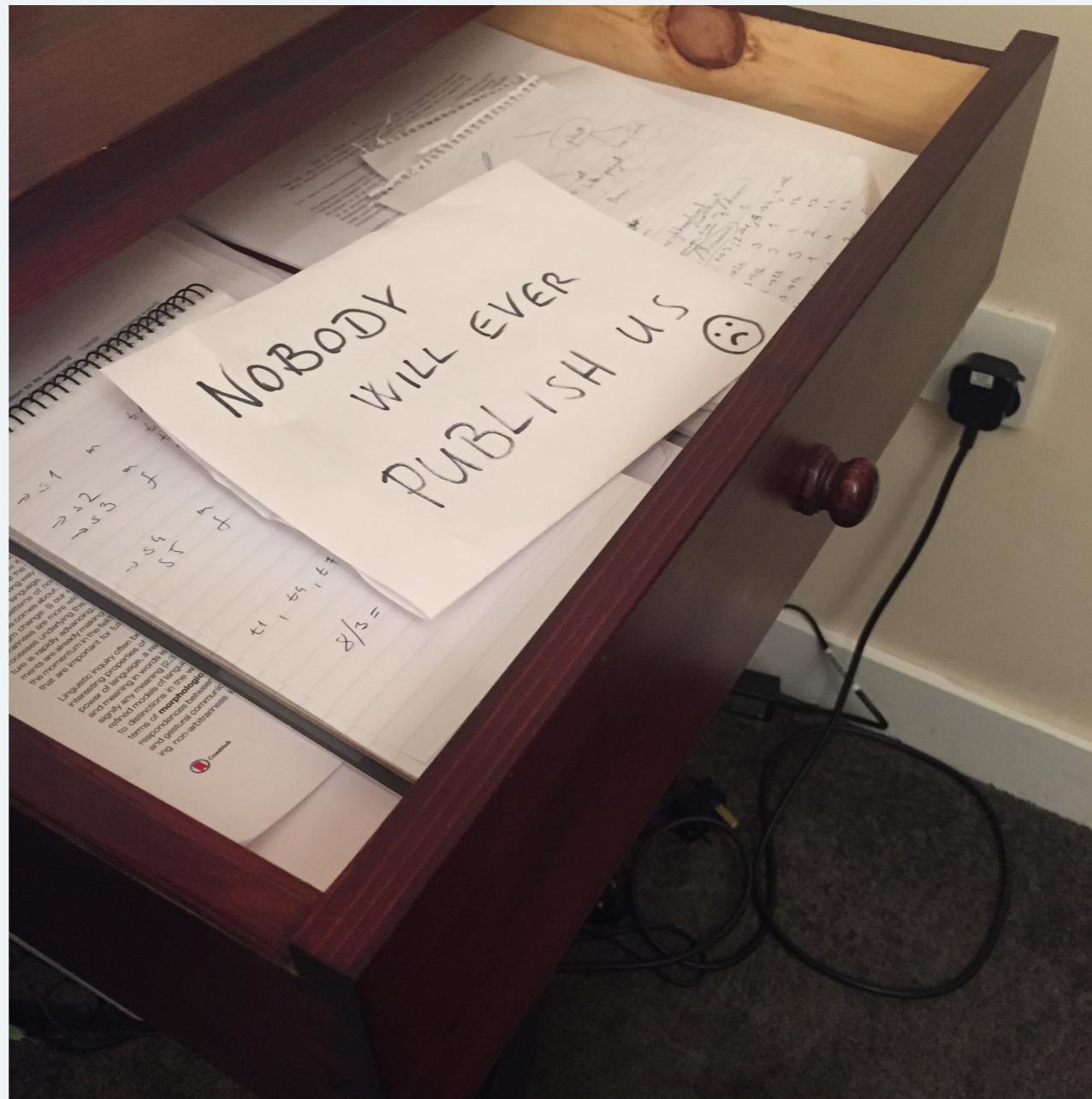
- statistical significance
- new discoveries
- confirmation of theoretical predictions
- impact
- newsworthiness

... but aren't these the defining features of good research?

- sometimes...
- but science also relies on other types of findings:
  - null results
  - replication studies
  - the mundane stuff...

these are extremely hard to publish!

the **file drawer** effect: a *bias towards the publication of papers with positive results*



potential outcomes:

1. inflated proportion of false positives in literature
2. artificially lowered proportion of true negatives (e.g. failed replications)
3. problematic strategies for squeezing positive results out of the data
4. academic misconduct: falsification

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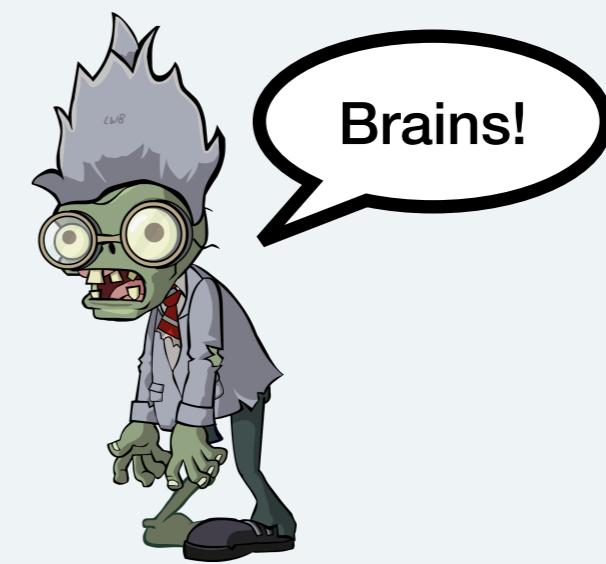
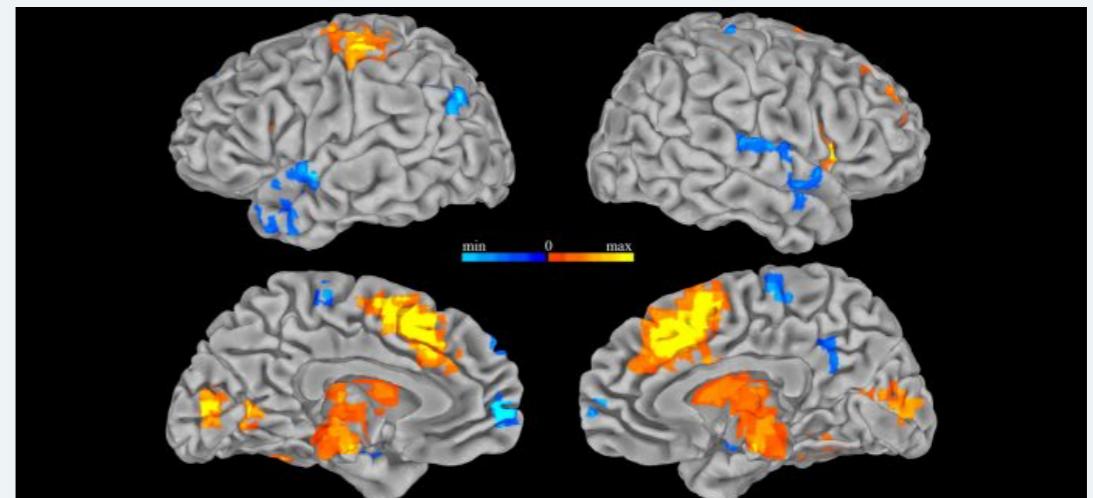
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# The dead salmon study

Bennett, C. M., Baird, A. A., Miller, M. B., and Wolford, G. L. (2010). Neural correlates of interspecies perspective taking in the post-mortem atlantic salmon: An argument for proper multiple comparisons correction. *Journal of Serendipitous and Unexpected Results*, 1:1–5.

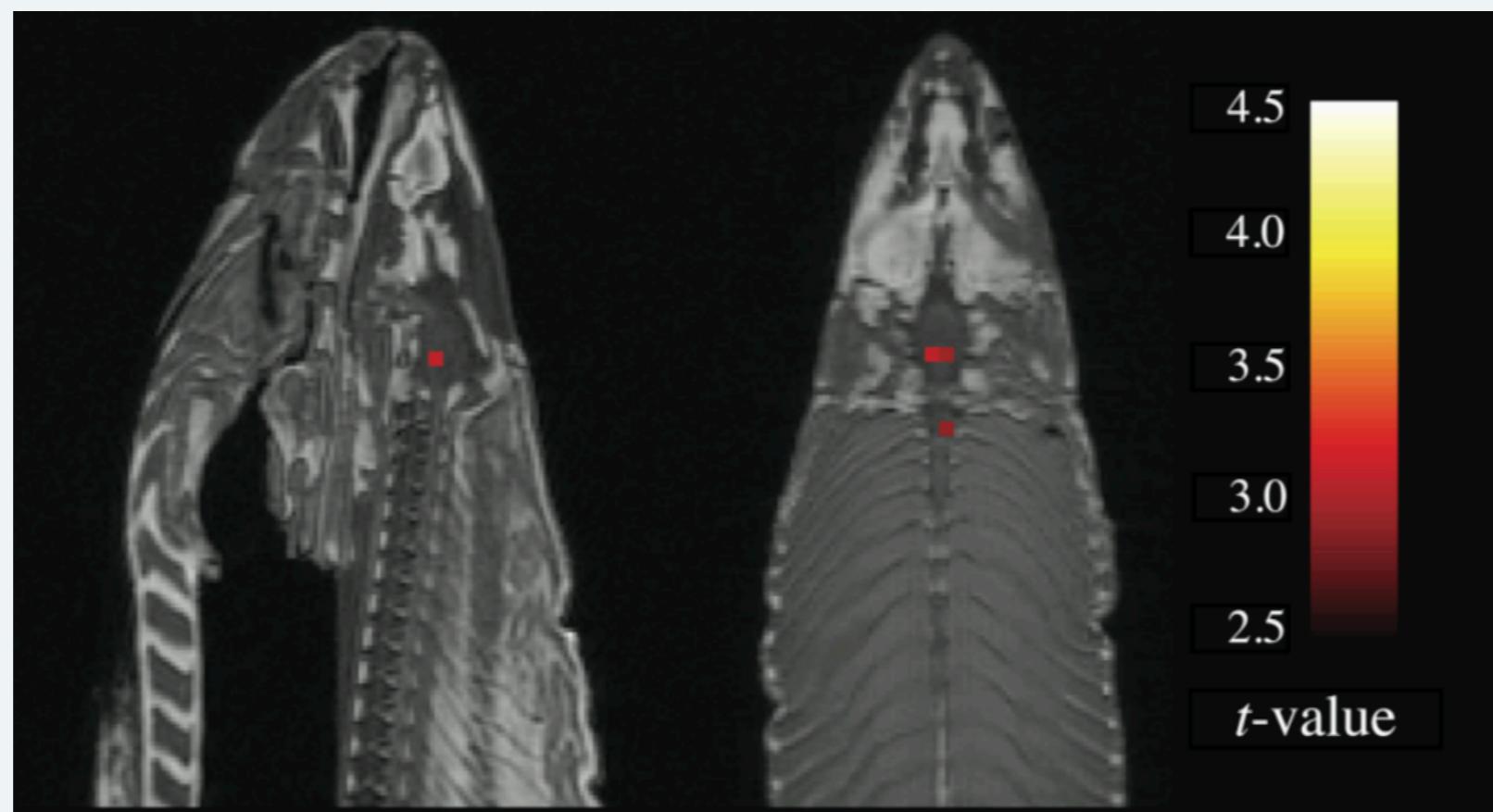
# The dead salmon study

- fMRI: functional magnetic resonance neuroimaging
- detects changes in bloodflow in different brain areas
- changes in blood flow ~ changes in neural activation patterns



# The dead salmon study

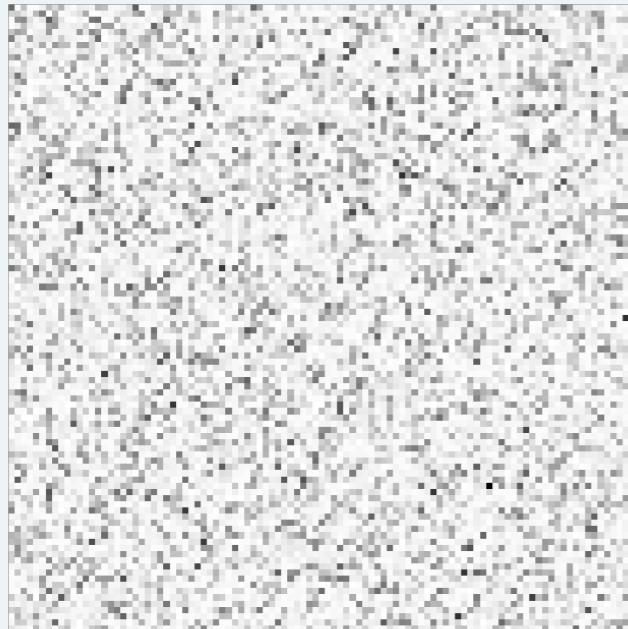
- a dead salmon shown images of humans “in social situations with a specified emotional valence” (Bennett et al. 2010, p. 2)
- salmon asked “which emotion the individual in the photo must have been experiencing” (Bennett et al. 2010, p. 2)
- red areas: significant change in activation during photo display compared to rest



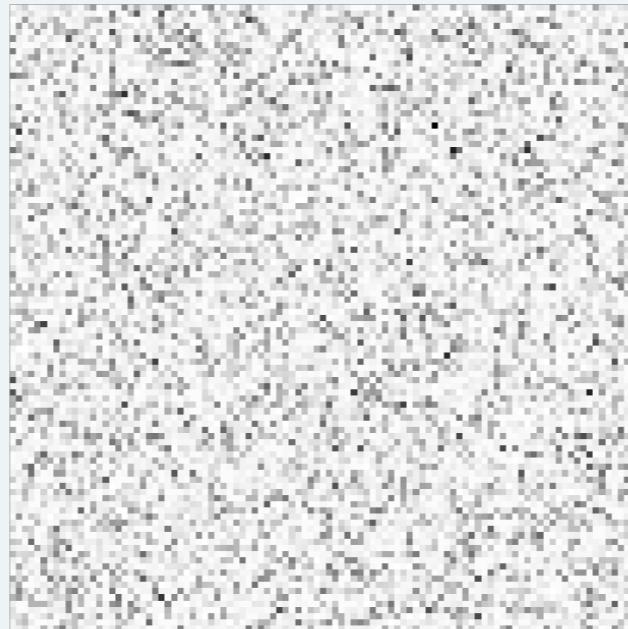
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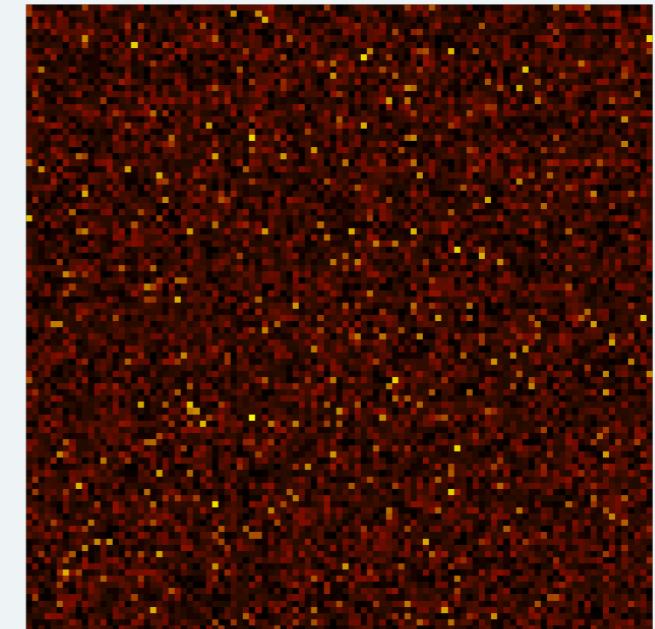
**noise 1**



**noise 2**



**“significant changes”**



# The dead salmon study

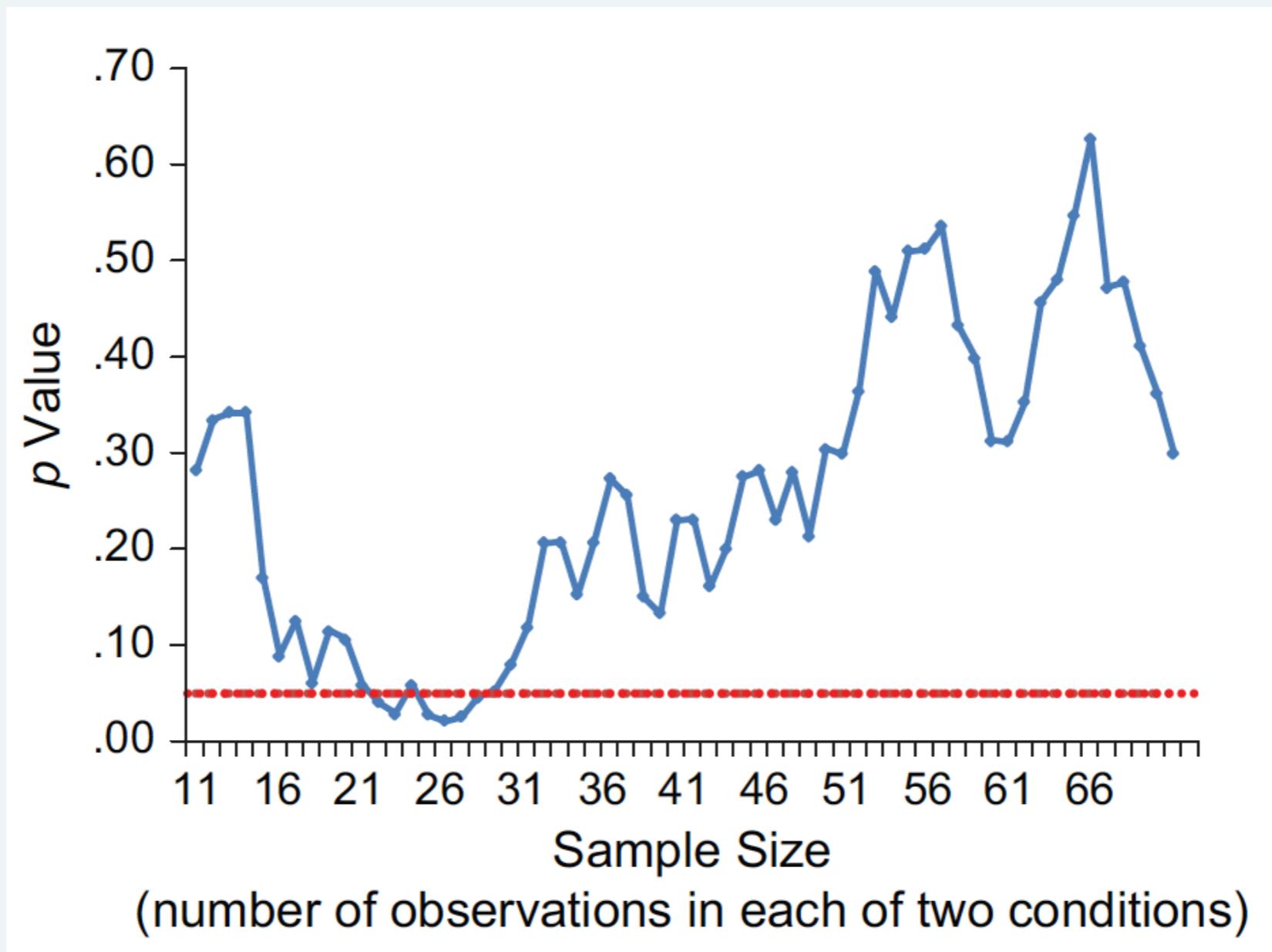
many different brain areas tested at the same time

- tens of thousands of hypotheses
- the proportion of true hypotheses is very small even in legitimate scenarios
- so false positives end up drowning out true positives

# Chronological rejuvenation

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

# Chronological rejuvenation



# Chronological rejuvenation

Having demonstrated that listening to a children's song makes people feel older, Study 2 investigated whether listening to a song about older age makes people *actually* younger.

we asked 20 University of Pennsylvania undergraduates to listen to either "When I'm Sixty-Four" by The Beatles or "Kalimba." Then, in an ostensibly unrelated task, they indicated their birth date (mm/dd/yyyy) and their father's age. We used father's age to control for variation in baseline age across participants.

An ANCOVA revealed the predicted effect: According to their birth dates, people were nearly a year-and-a-half younger after listening to "When I'm Sixty-Four" (adjusted  $M = 20.1$  years) rather than to "Kalimba" (adjusted  $M = 21.5$  years),  $F(1, 17) = 4.92, p = .040$ .

# Chronological rejuvenation

**Table 3.** Study 2: Original Report (in Bolded Text) and the Requirement-Compliant Report (With Addition of Gray Text)

**Using the same method as in Study I, we asked 20 34 University of Pennsylvania undergraduates to listen only to either “When I’m Sixty-Four” by The Beatles or “Kalimba” or “Hot Potato” by the Wiggles.** We conducted our analyses after every session of approximately 10 participants; we did not decide in advance when to terminate data collection. **Then, in an ostensibly unrelated task, they indicated only their birth date (mm/dd/yyyy) and how old they felt, how much they would enjoy eating at a diner, the square root of 100, their agreement with “computers are complicated machines,” their father’s age, their mother’s age, whether they would take advantage of an early-bird special, their political orientation, which of four Canadian quarterbacks they believed won an award, how often they refer to the past as “the good old days,” and their gender. We used father’s age to control for variation in baseline age across participants.**

An ANCOVA revealed the predicted effect: According to their birth dates, people were nearly a year-and-a-half younger after listening to “When I’m Sixty-Four” (adjusted  $M = 20.1$  years) rather than to “Kalimba” (adjusted  $M = 21.5$  years),  $F(1, 17) = 4.92, p = .040$ . Without controlling for father’s age, the age difference was smaller and did not reach significance ( $M_s = 20.3$  and 21.2, respectively),  $F(1, 18) = 1.01, p = .33$ .