

YOU GOT HEXXED!

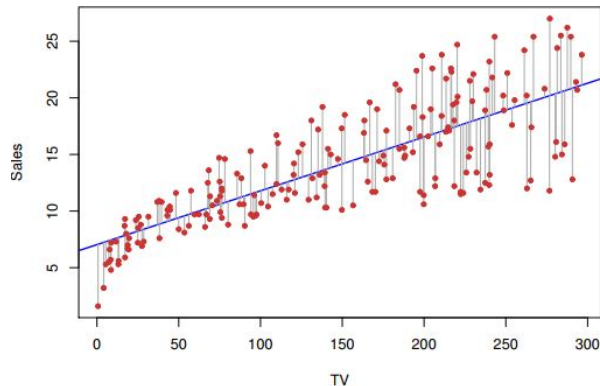
Characterizing persistence in
complex learning tasks

Rahul Jain
Agarwal Lab | Summer 2023



What is “learning”?

Computationally:



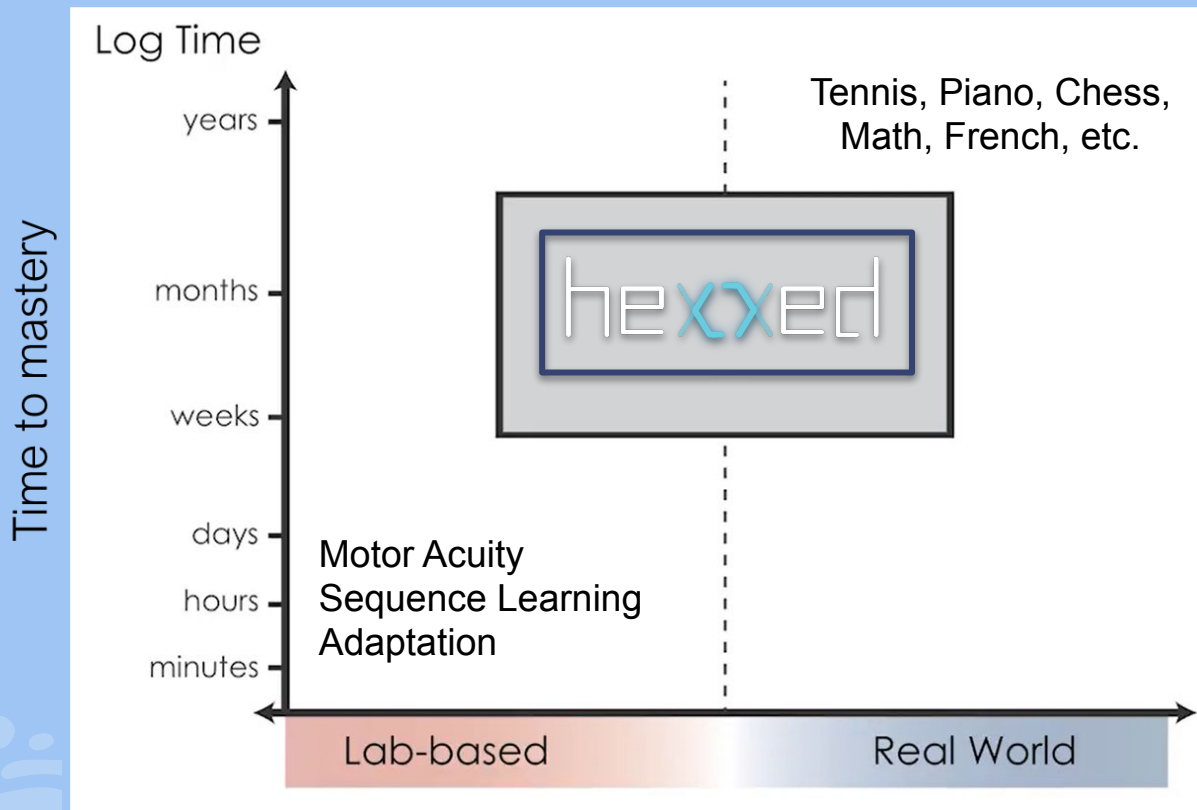
Adjusting model parameters to minimize errors.

Biologically:



Acquiring and interpreting information to improve decisions.

COGNITIVE TASKS AND THEIR RELATIVE SKILL



Experimental control

Krakauer, *CNS*

What is hexxed?

- Mobile strategy game designed by lab
- Built to evaluate human learning

Data:

- ~10,000 users
- 1,716,261 total actions



Download on the
App Store

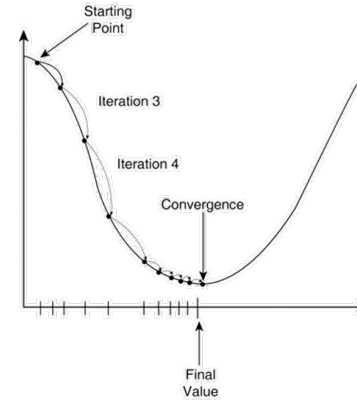
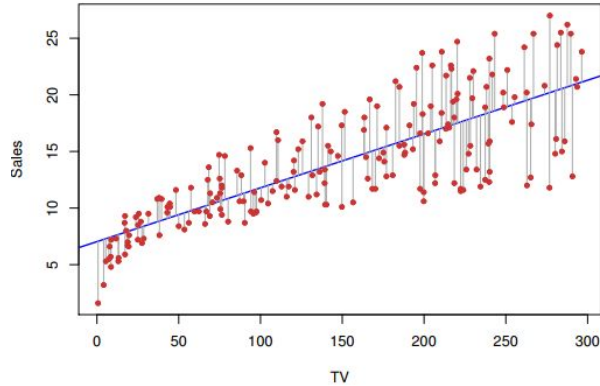


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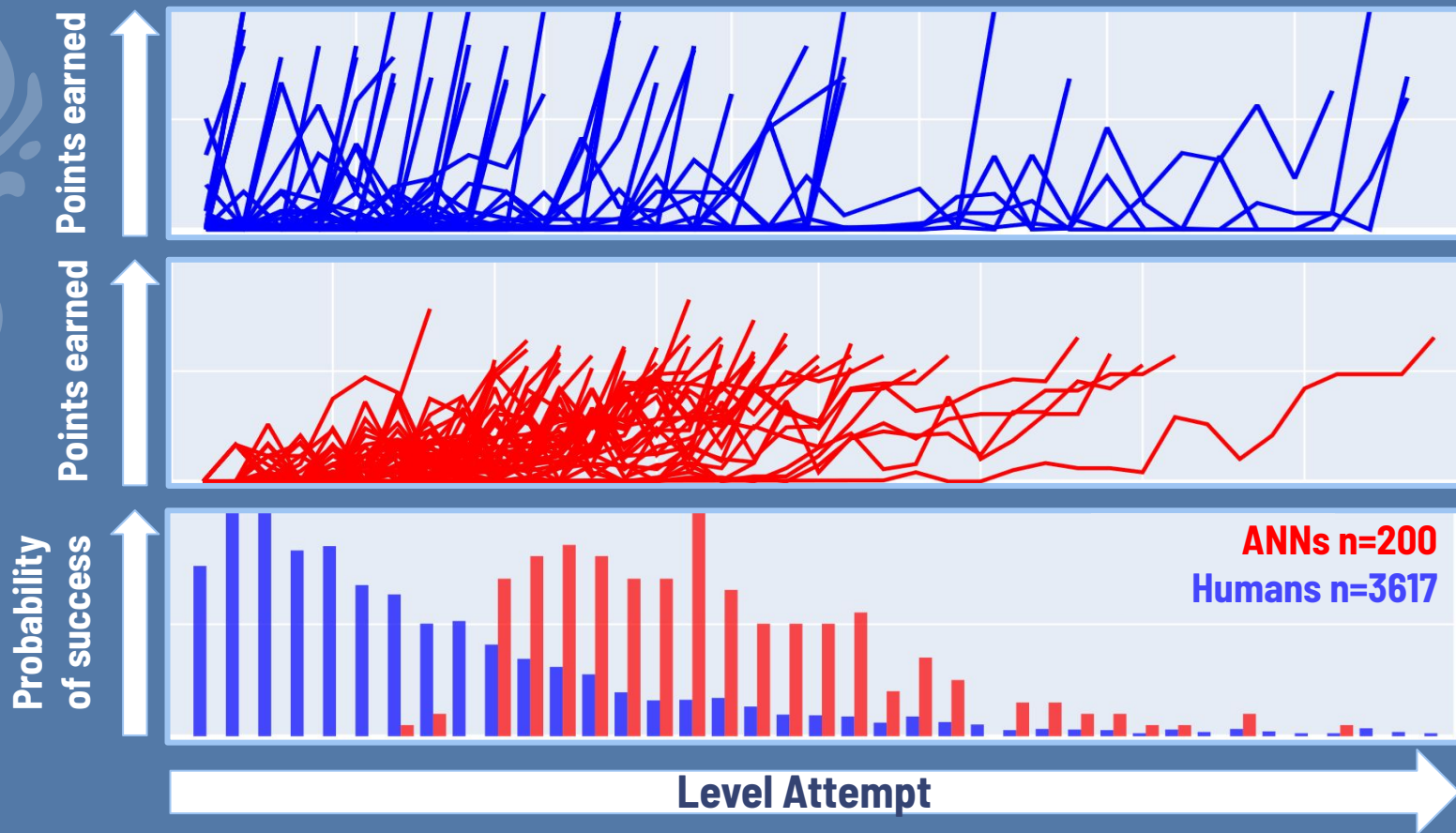
How do computers “learn”?

Machine Learning/Neural Network models:



Adjusting model parameters to minimize errors.

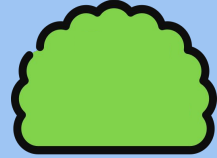
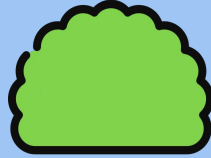
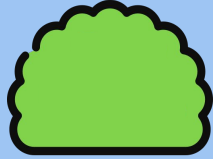
So how did the subjects do?



(An Extremely Brief) Overview of Foraging Theory

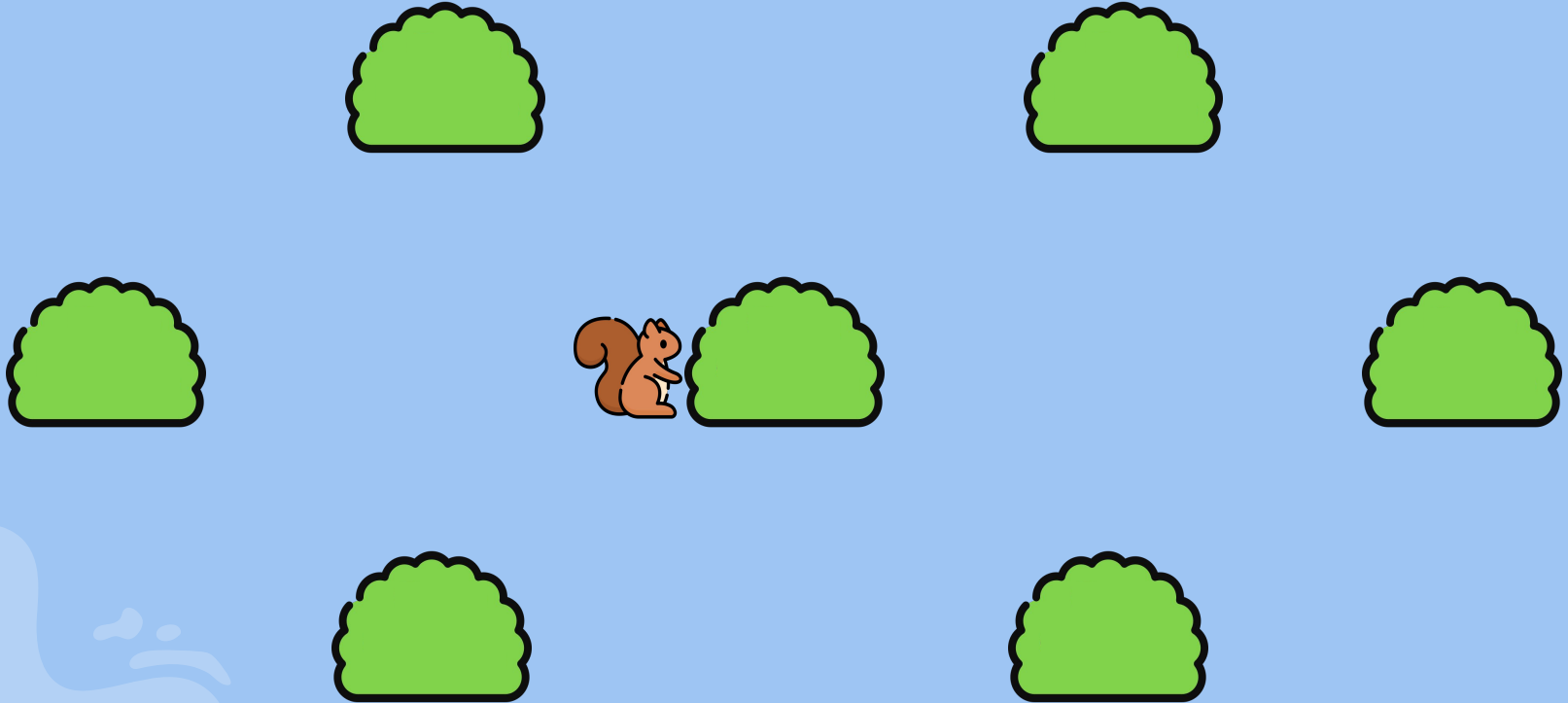
Year 0

So many
options!!



(An Extremely Brief) Overview of Foraging Theory

Year 0



what now?

(An Extremely Brief) Overview of Foraging Theory

Year 1



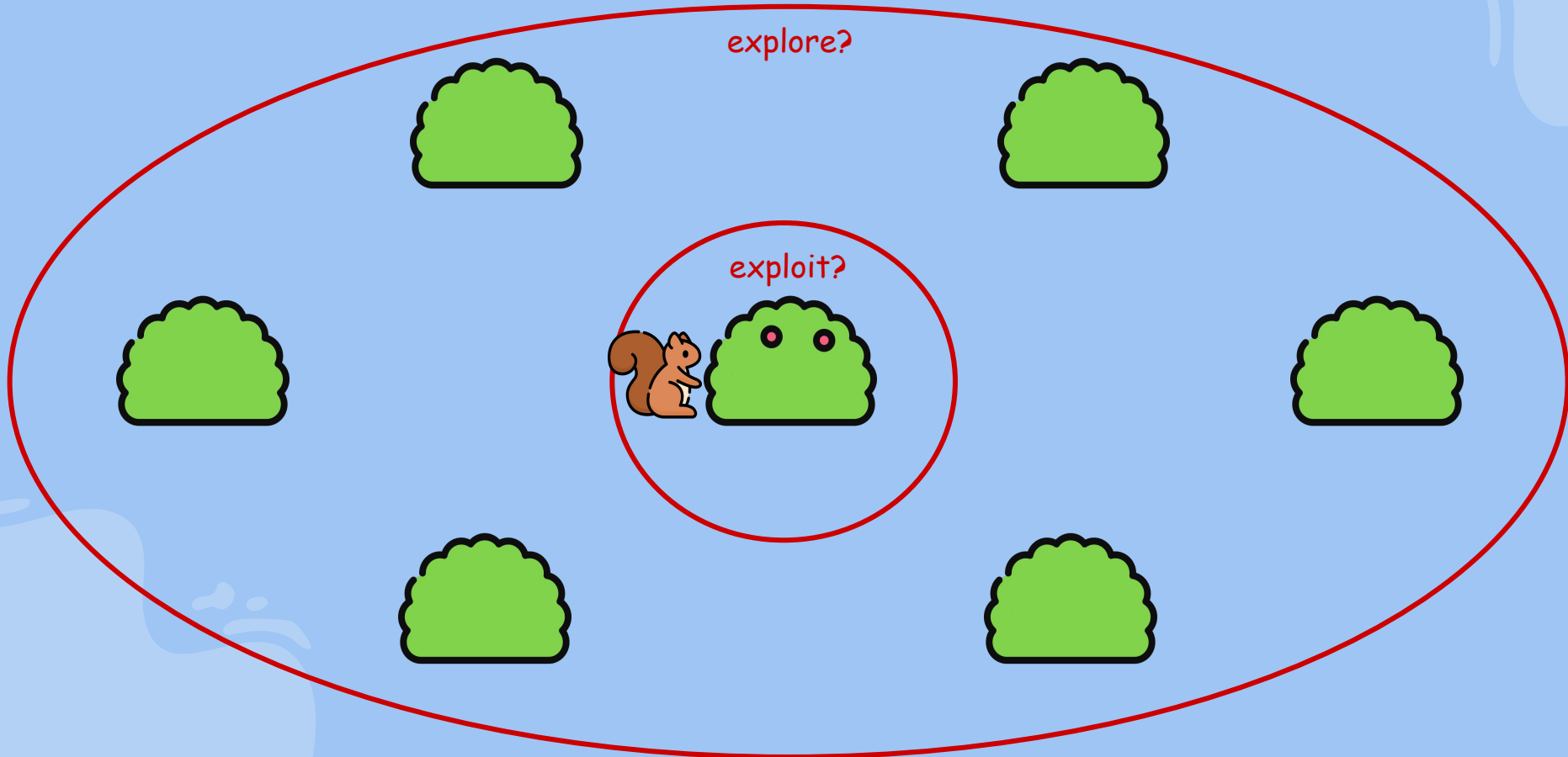
explore?

exploit?



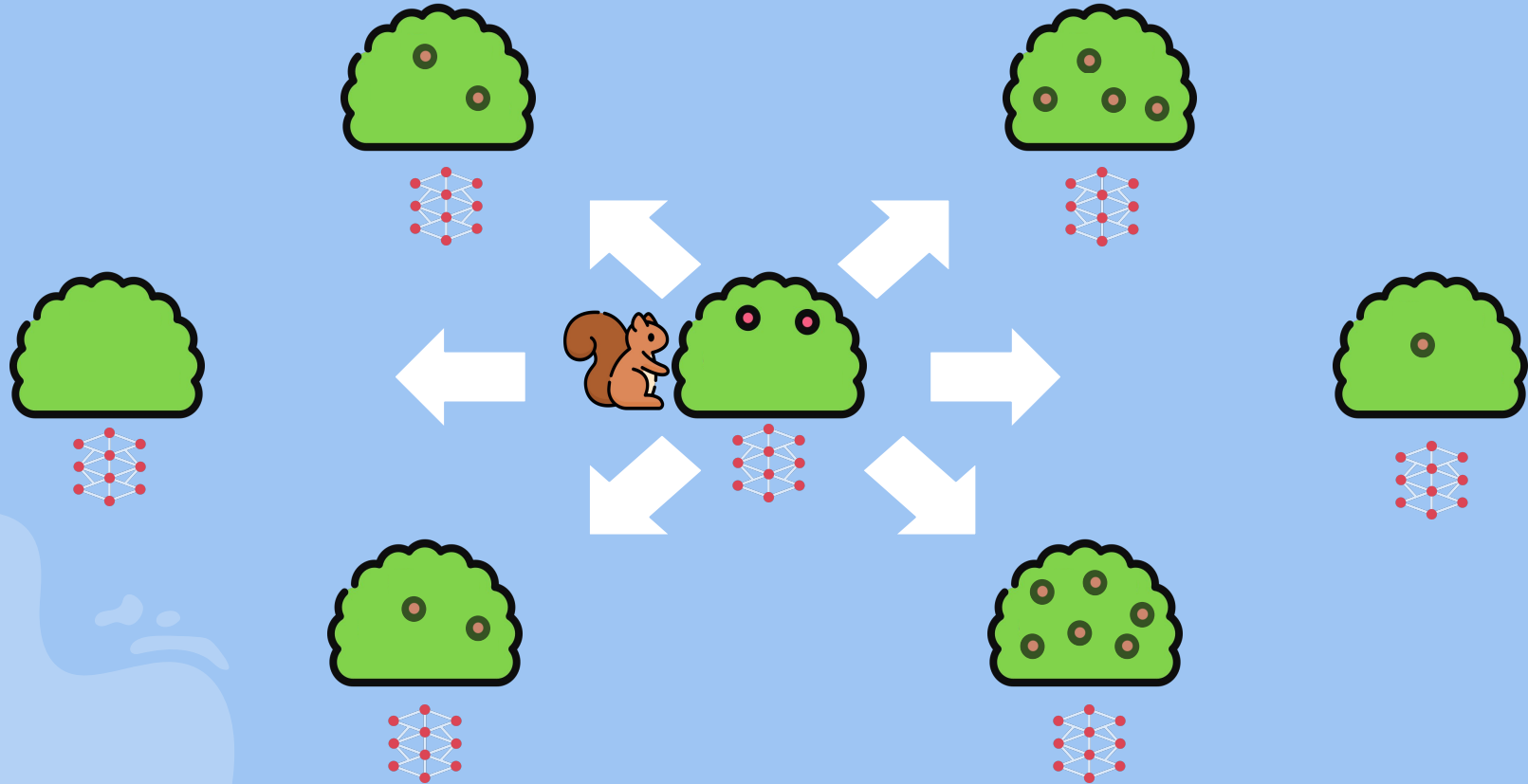
(An Extremely Brief) Overview of Foraging Theory

Year 1

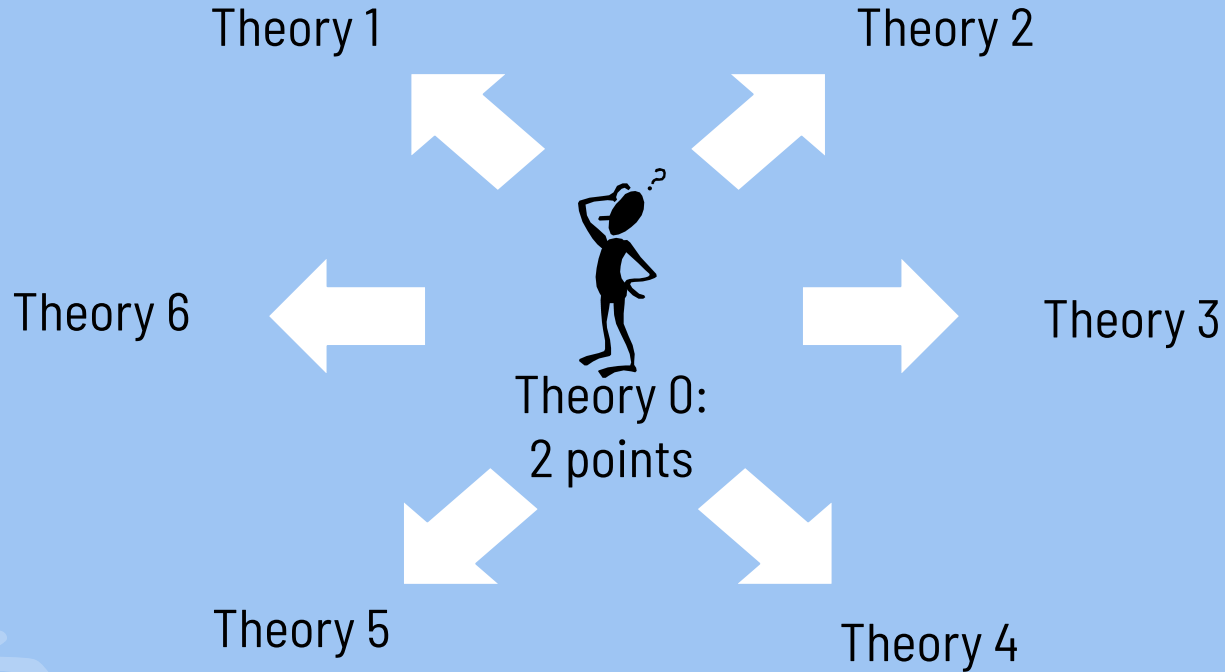


(An Extremely Brief) Overview of Foraging Theory

Year > 1

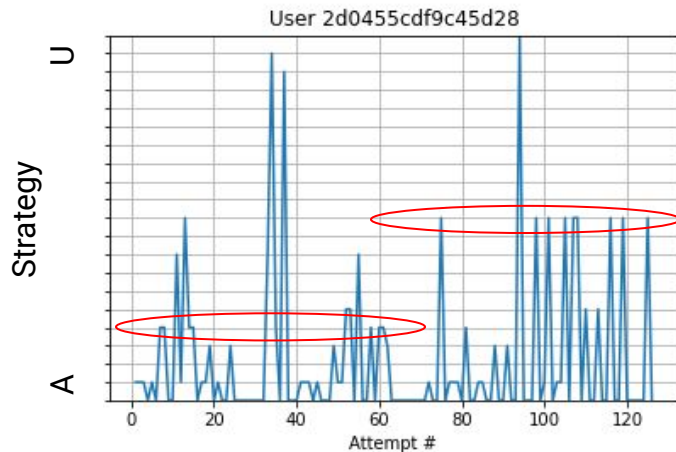
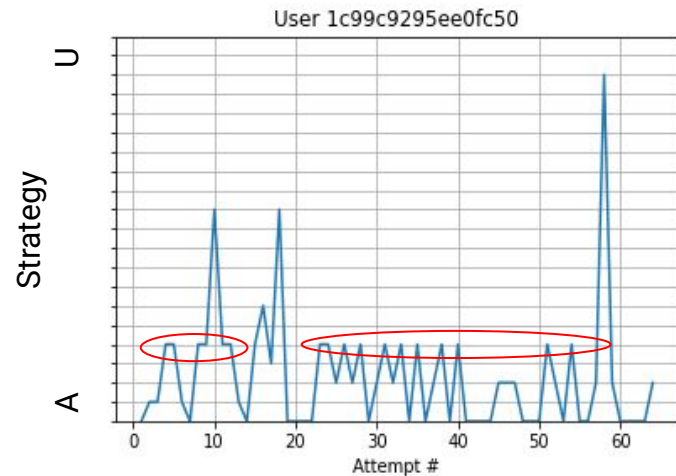
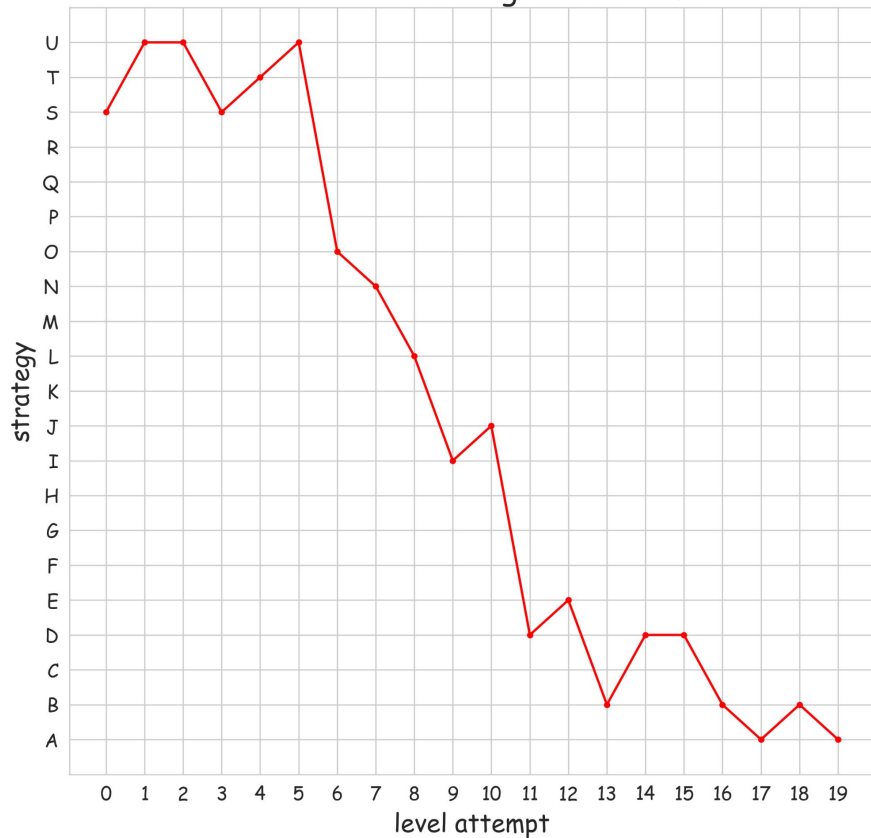


Foraging Theory in Hexxed

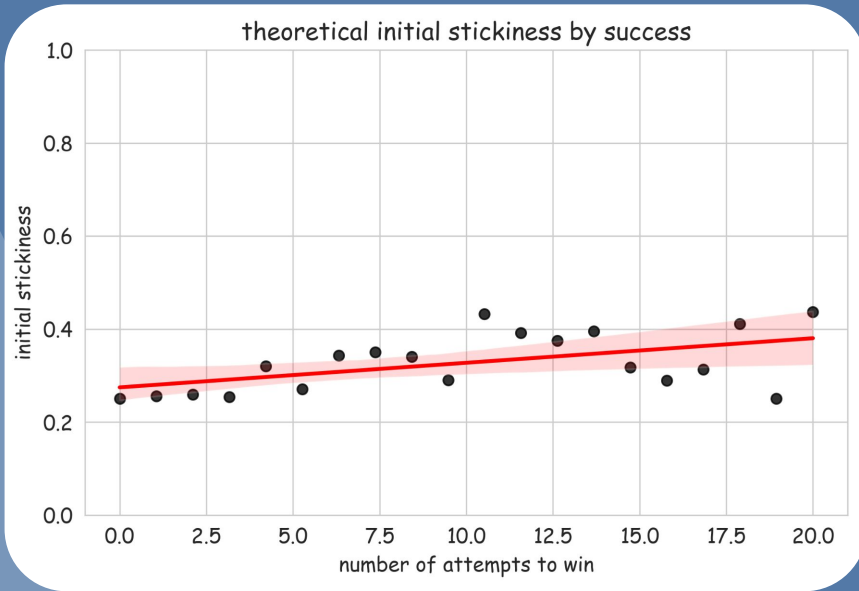


WHY Are people are sticky?

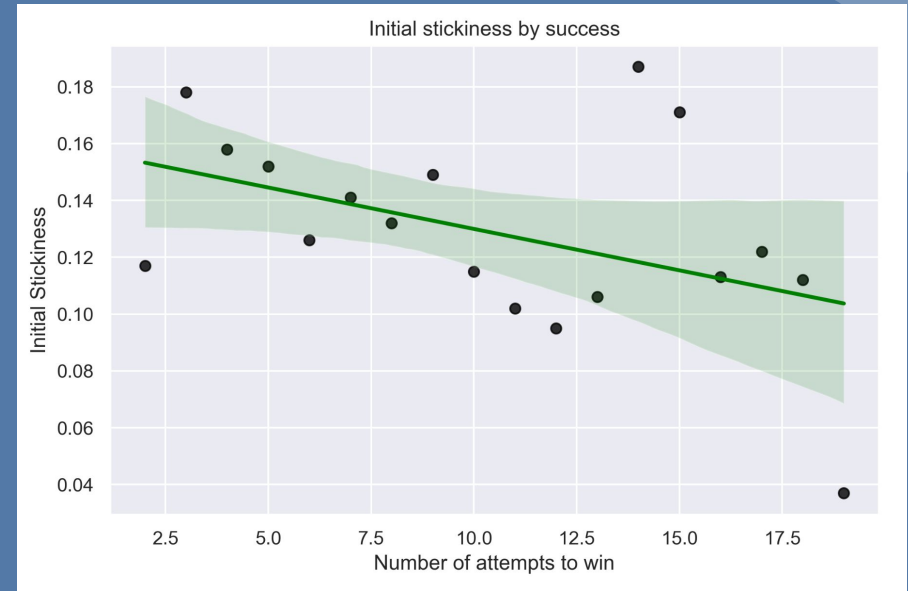
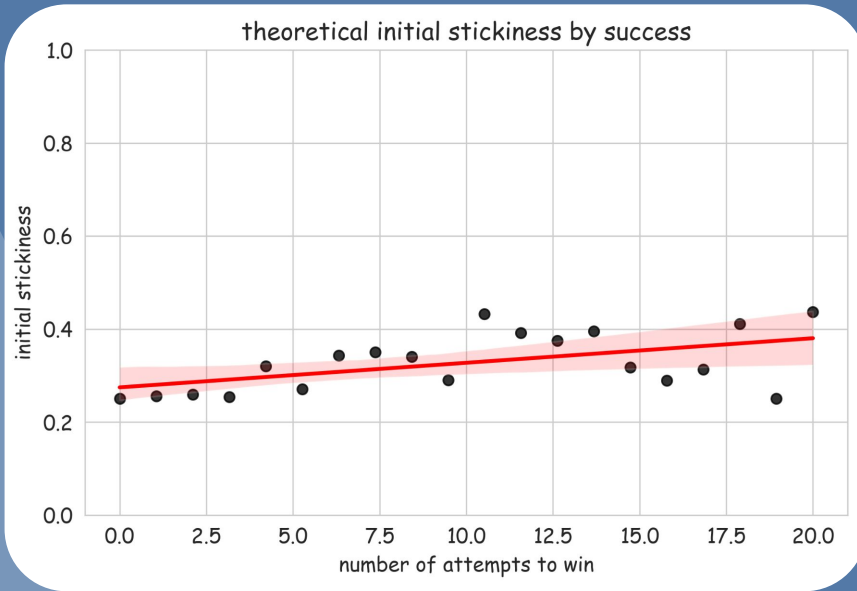
theoretical strategies over time



Persisting on the same strategy **should** indicate poor performance



Persisting on the same strategy *should* indicate poor performance – **but it doesn't!?**

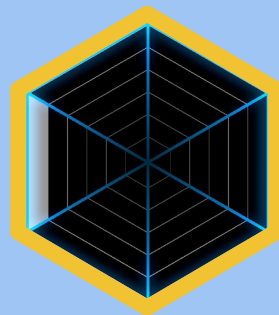
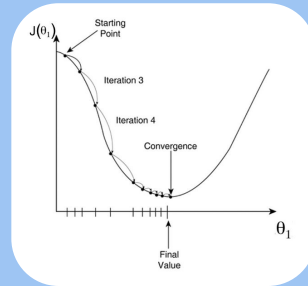


The Results:

- Hexxed aims to provide a method of quantifying **complex skill learning**
- Humans learn by **testing discrete theories** while neural nets learn in a gradual manner
- Results suggest **persisting on a theory is correlated with success** -> yet to determine why



VS.





Download today!

**Thanks for
listening!**

Questions?