PSYCHONOMIC SOCIETY
62ND ANNUAL MEETING

Metacognitive Bandits: When do humans seek AI assistance?

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University of California Irvine[1]
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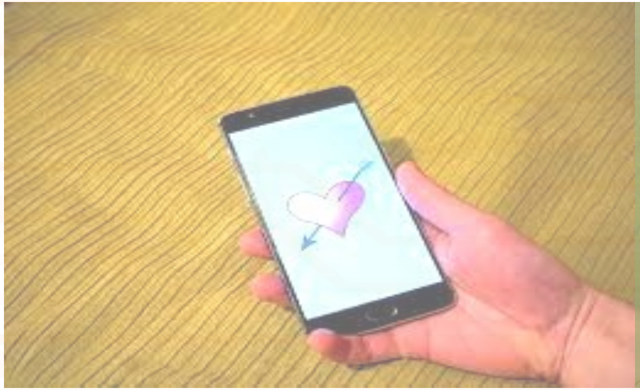
Abstract # 17



AI is everywhere

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But how do humans use AI assistance?

How do humans decide when to ask for AI advice?

A Motivating Example

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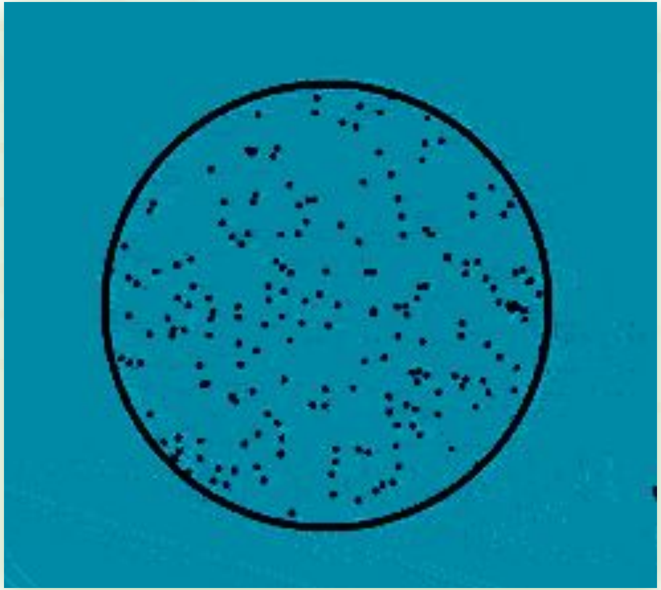

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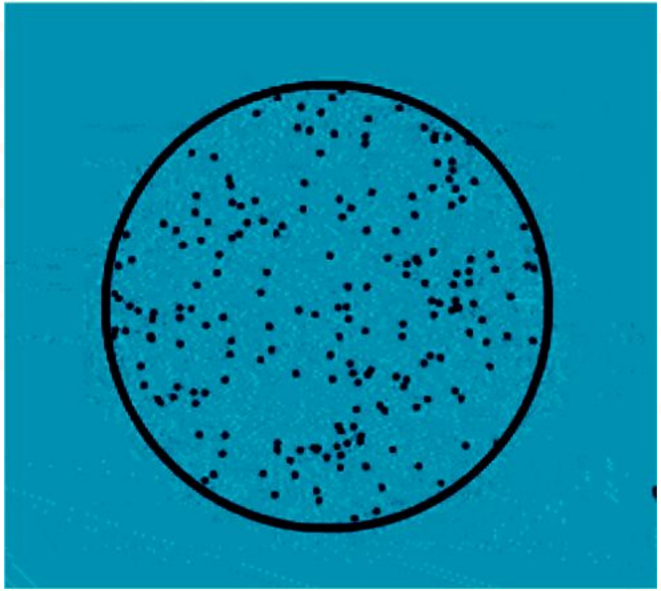

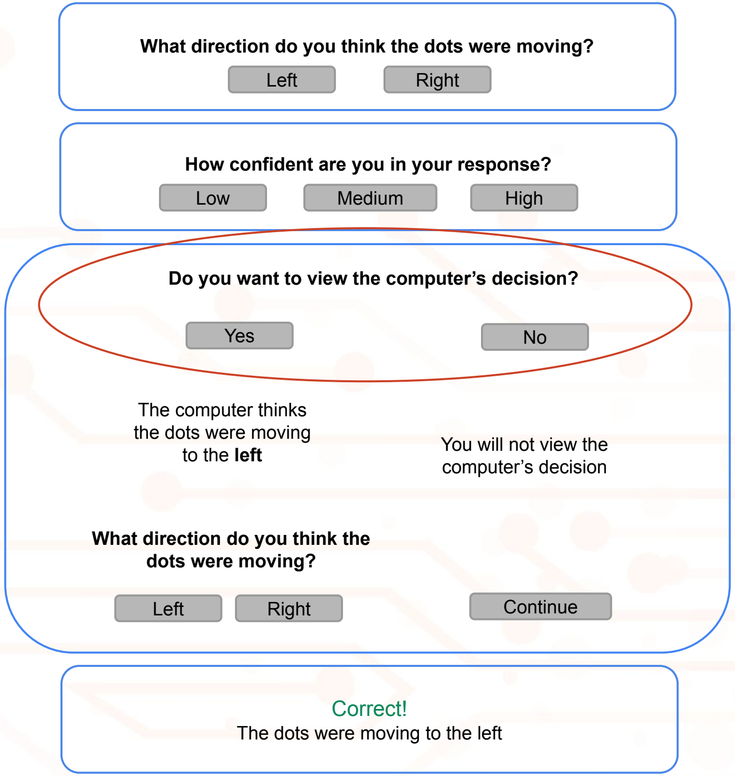

What direction do you think the dots were moving?

How confident are you in your response?

Do you want to view the computer's decision?

The computer thinks the dots were moving to the **left**

You will not view the computer's decision

What direction do you think the dots were moving?

Correct!
The dots were moving to the left

How do humans decide when to take AI advice?

- Combination of **explore/exploit** sequential-decision making and **metacognition**

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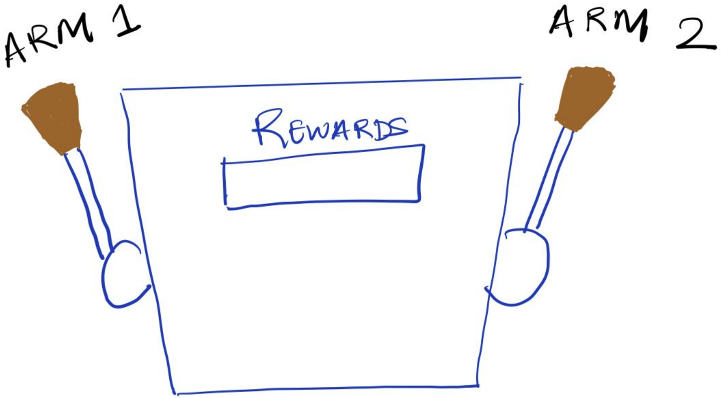
- Two-armed bandit



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AI
Self
REWARDS

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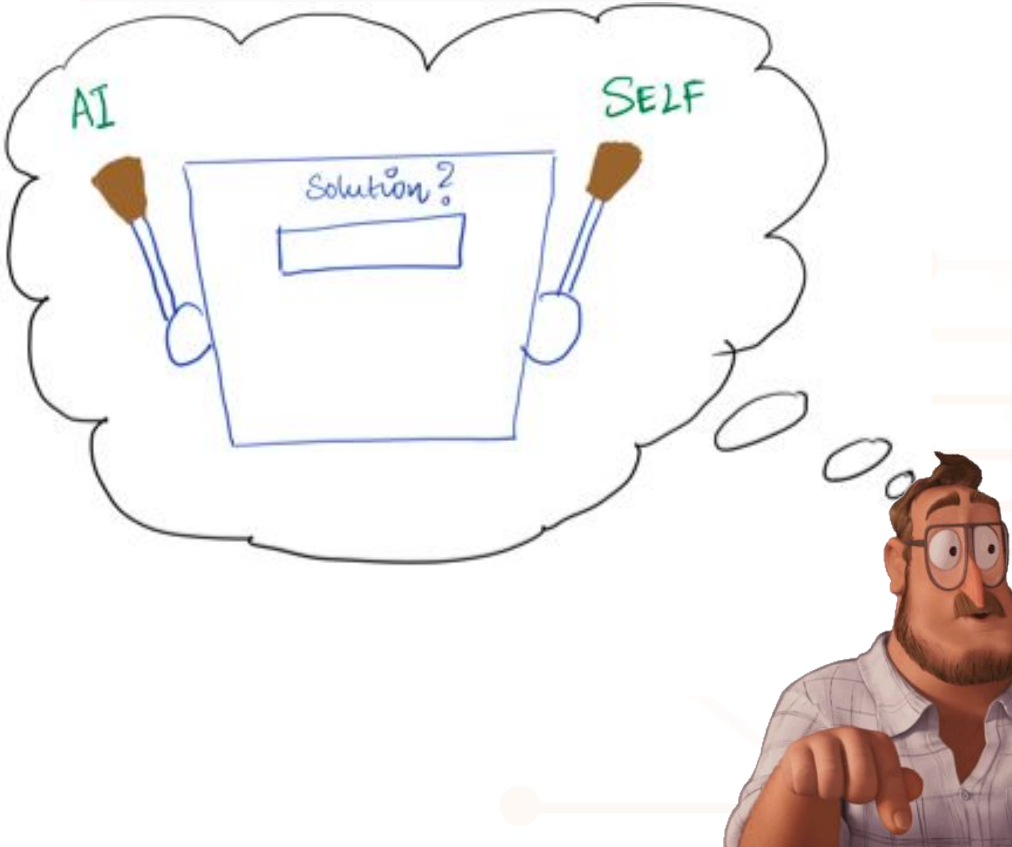

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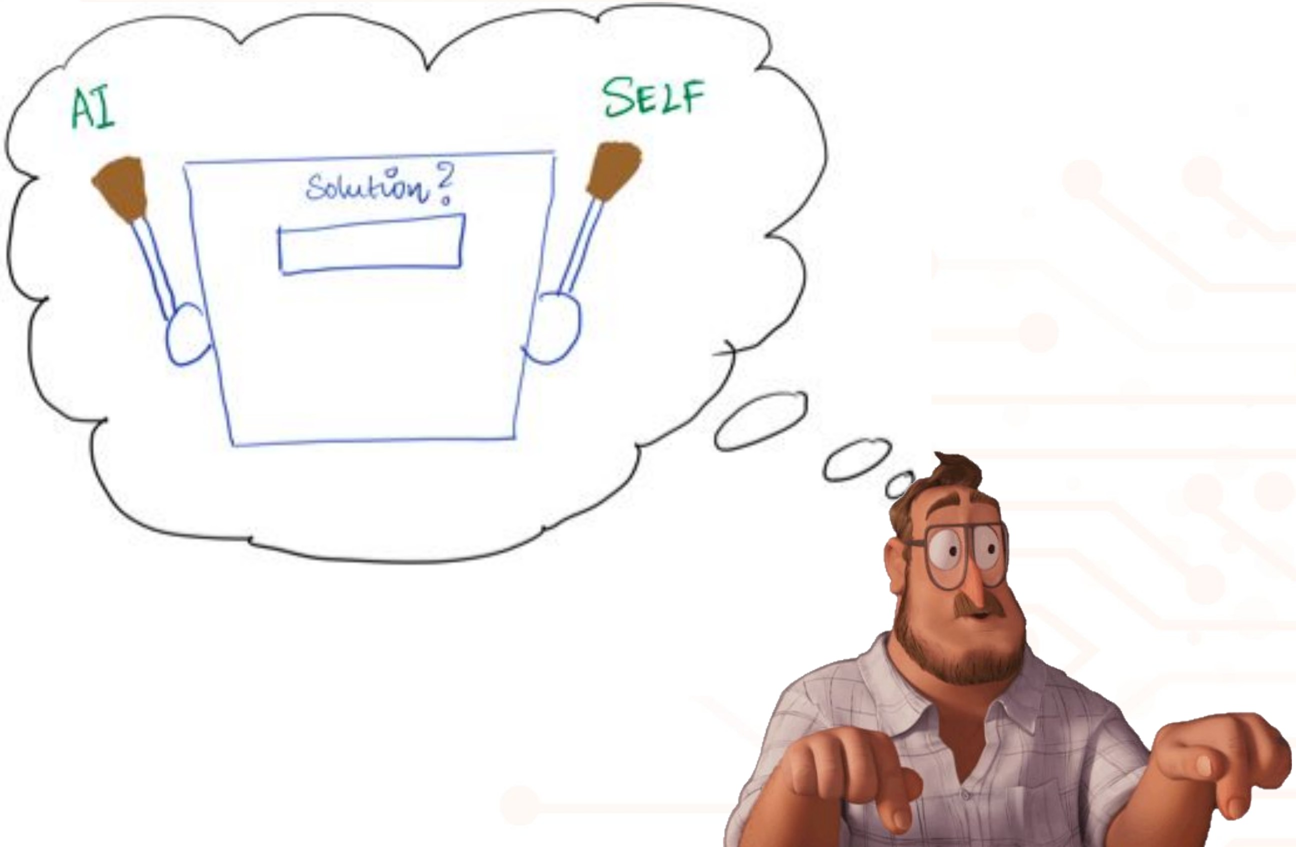
Metacognitive Bandits!



Metacognitive Bandits

- Performance history of both arms (AI and self) to inform the decision of arm selection

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Pavlidis, N. G., Tasoulis, D. K., & Hand, D. J. (2008)

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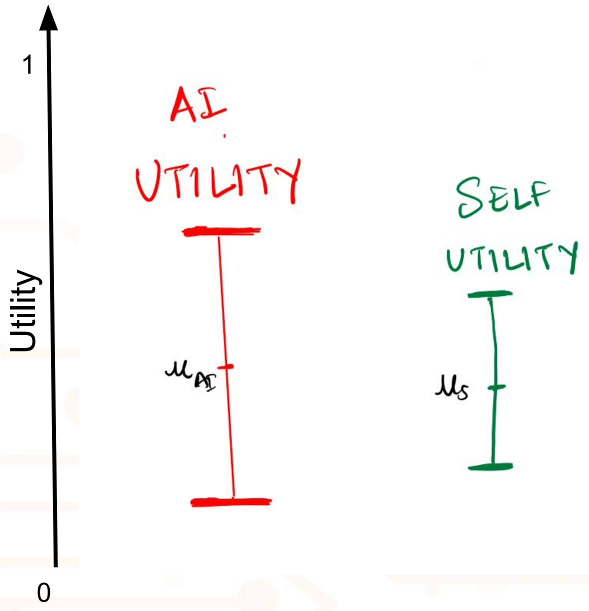

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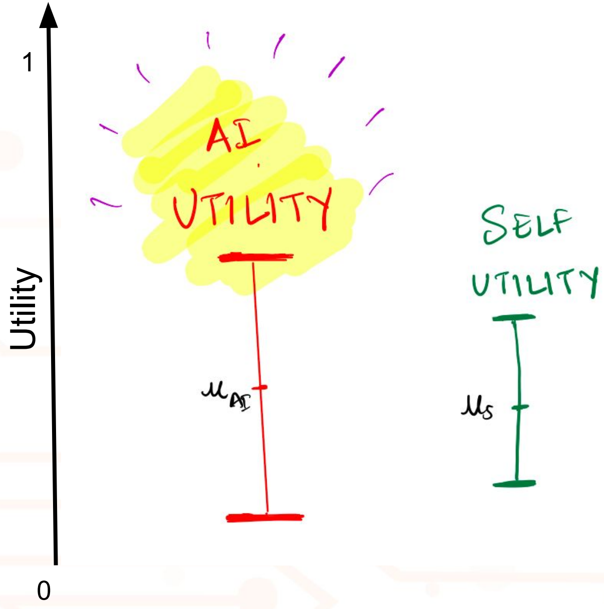

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Metacognitive Bandits

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- Incorporate Rasch model to account for difficulty of the trial

Example Runs from Metacognitive Bandit

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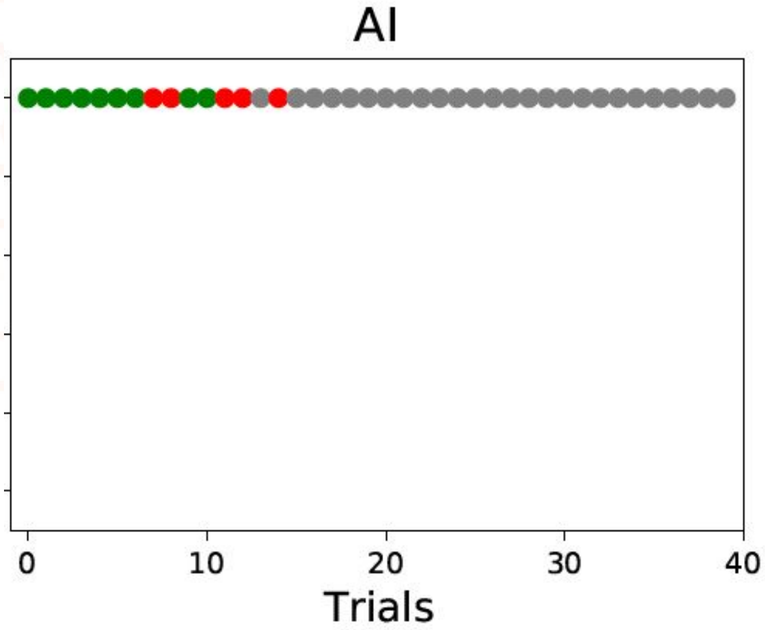

Green - Correct Response

Red - Incorrect Response

Gray - Advice not Solicited

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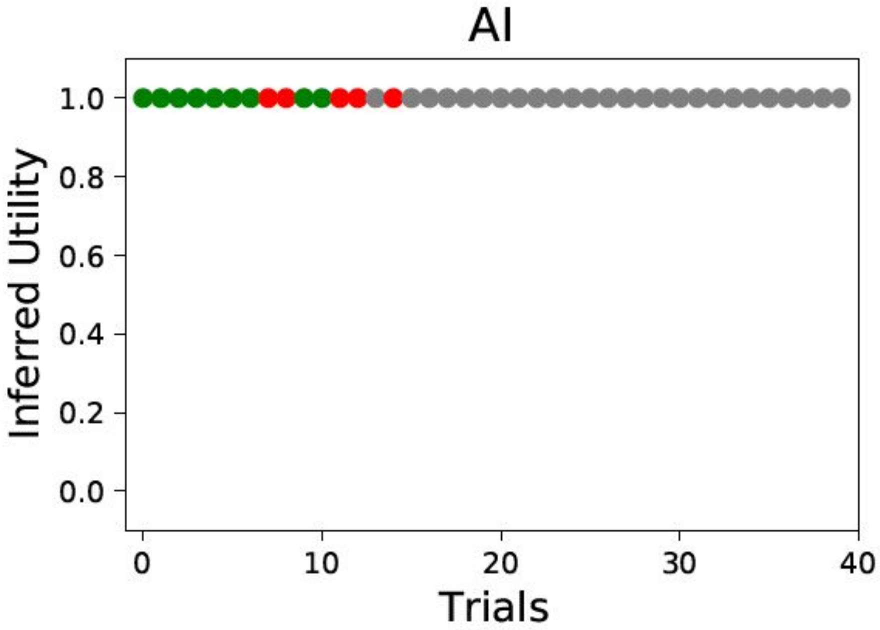

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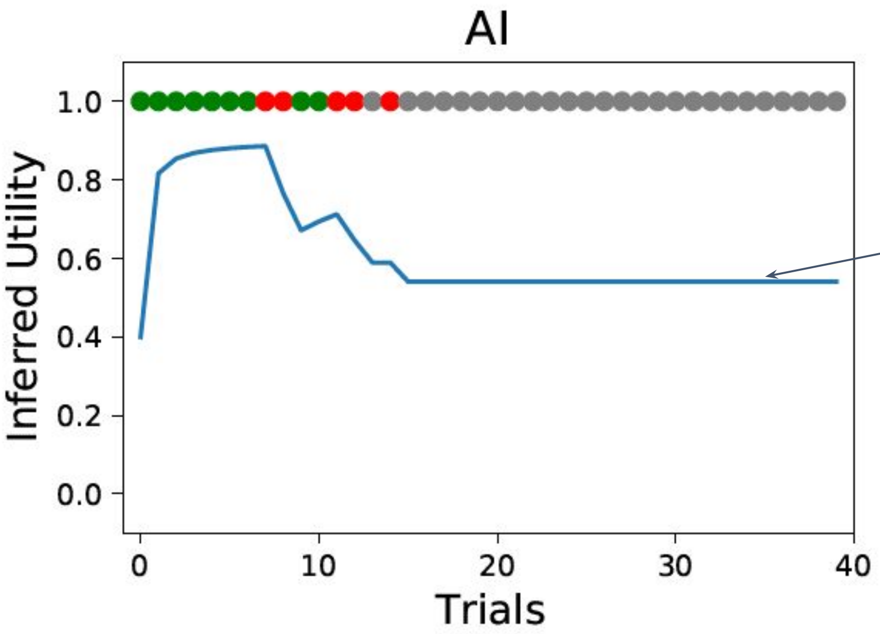
Example run from basic metacognitive bandit



Mean utility inferred by the human

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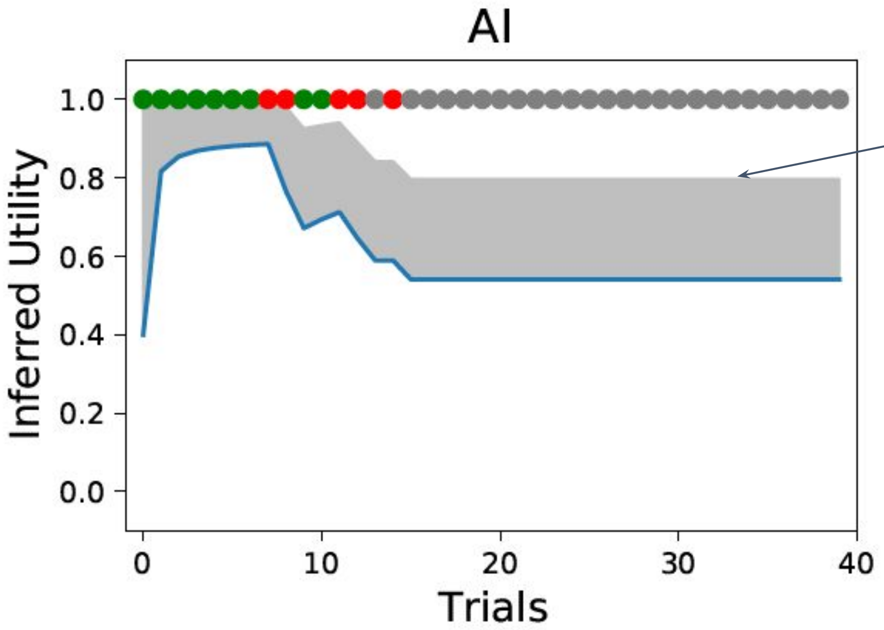
Example run from metacognitive bandit



Upper bound of the posterior uncertainty

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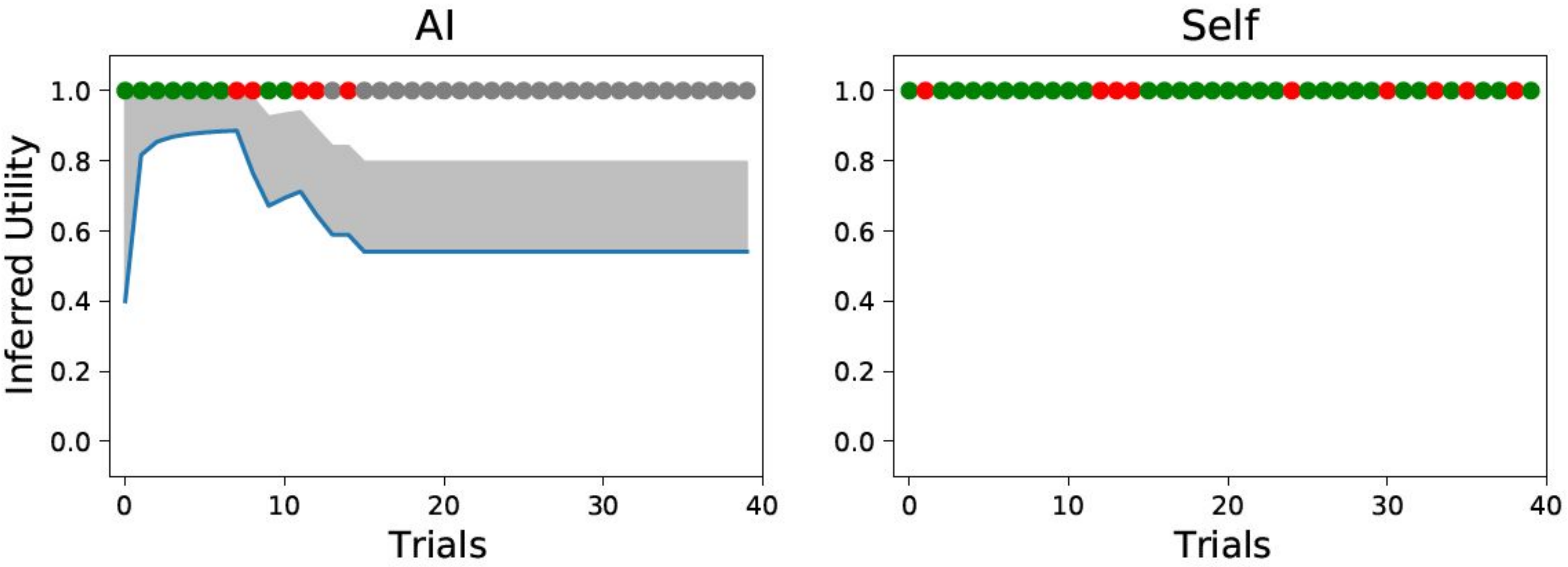

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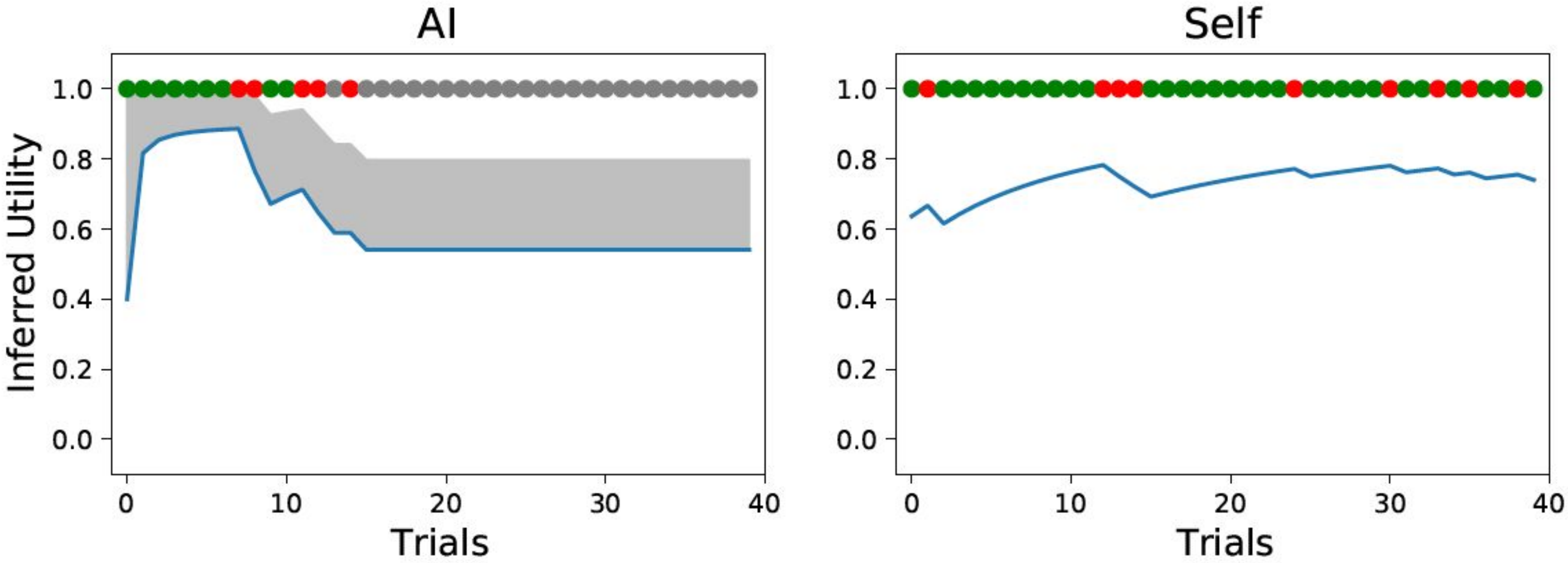

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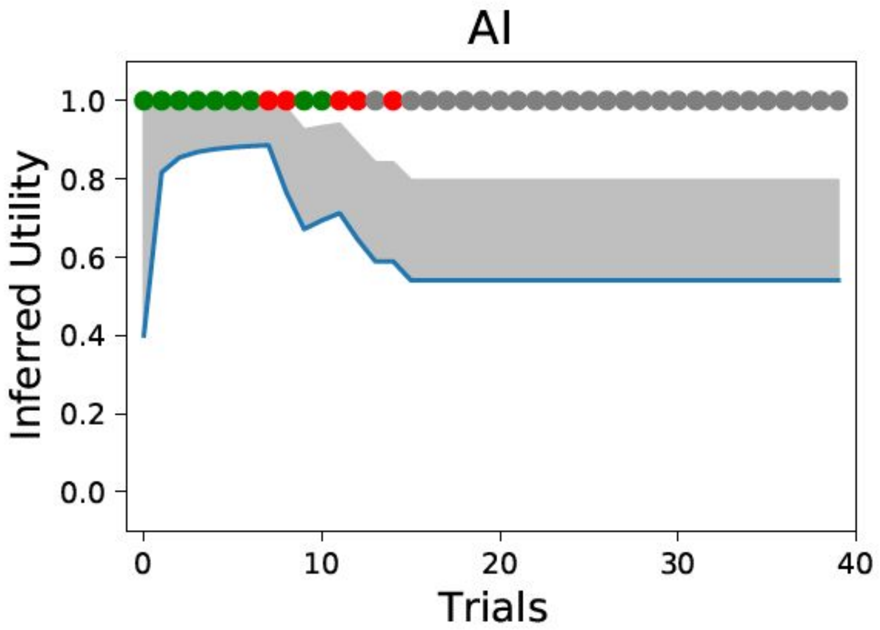

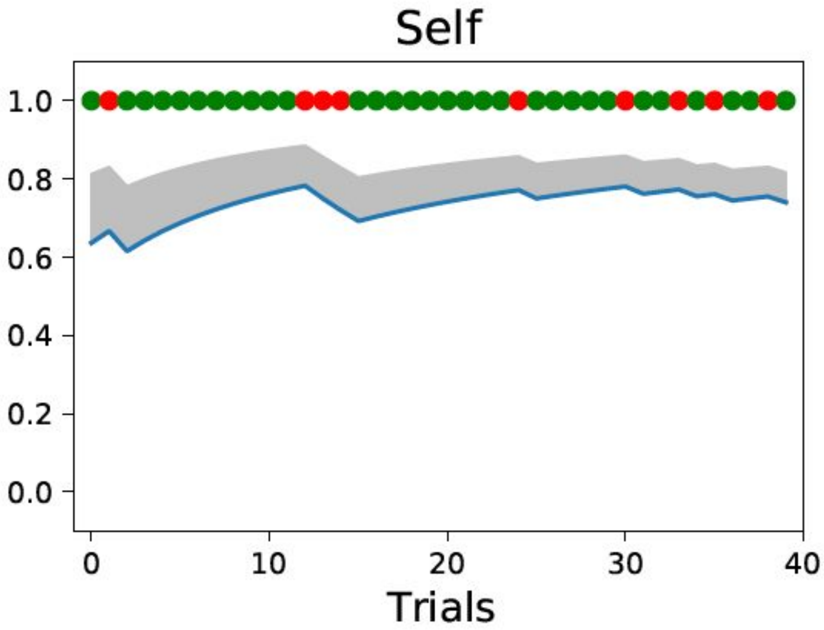

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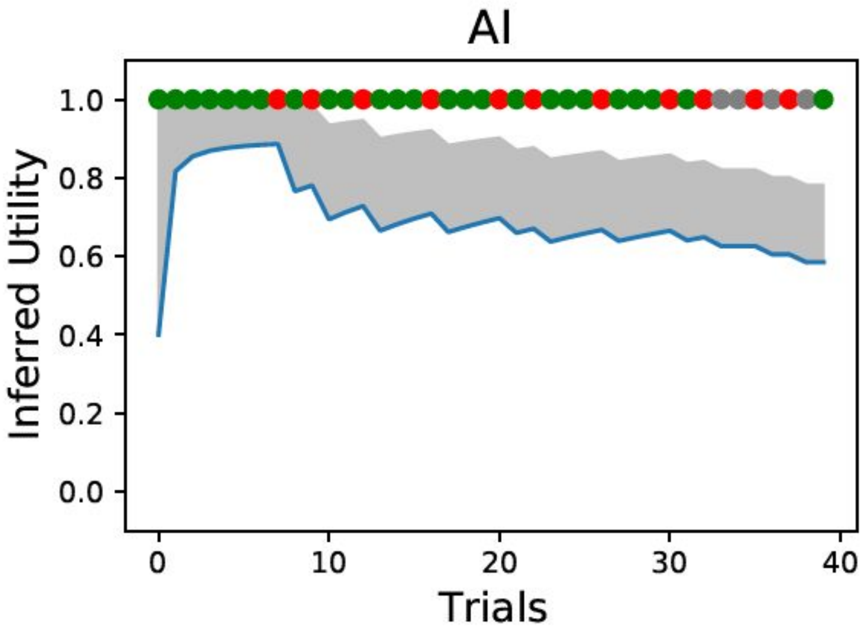
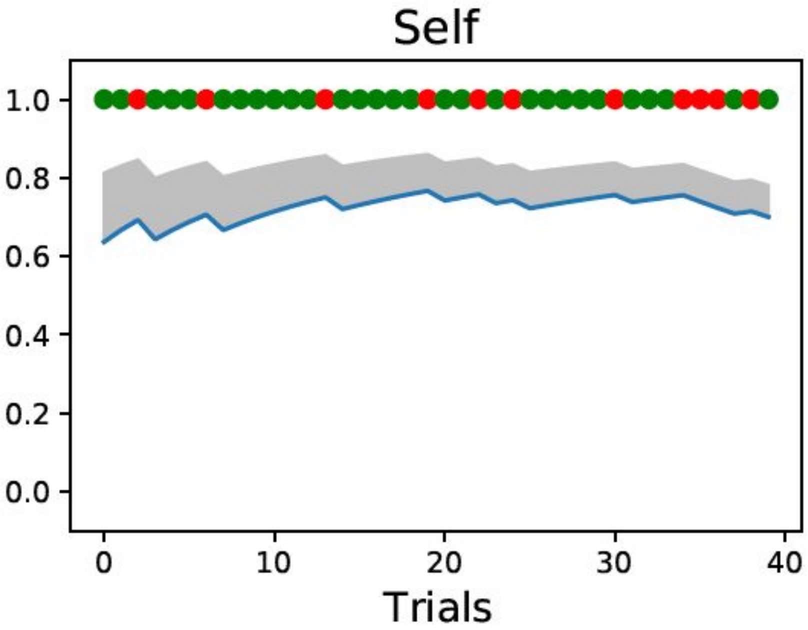
Another example run from metacognitive bandit





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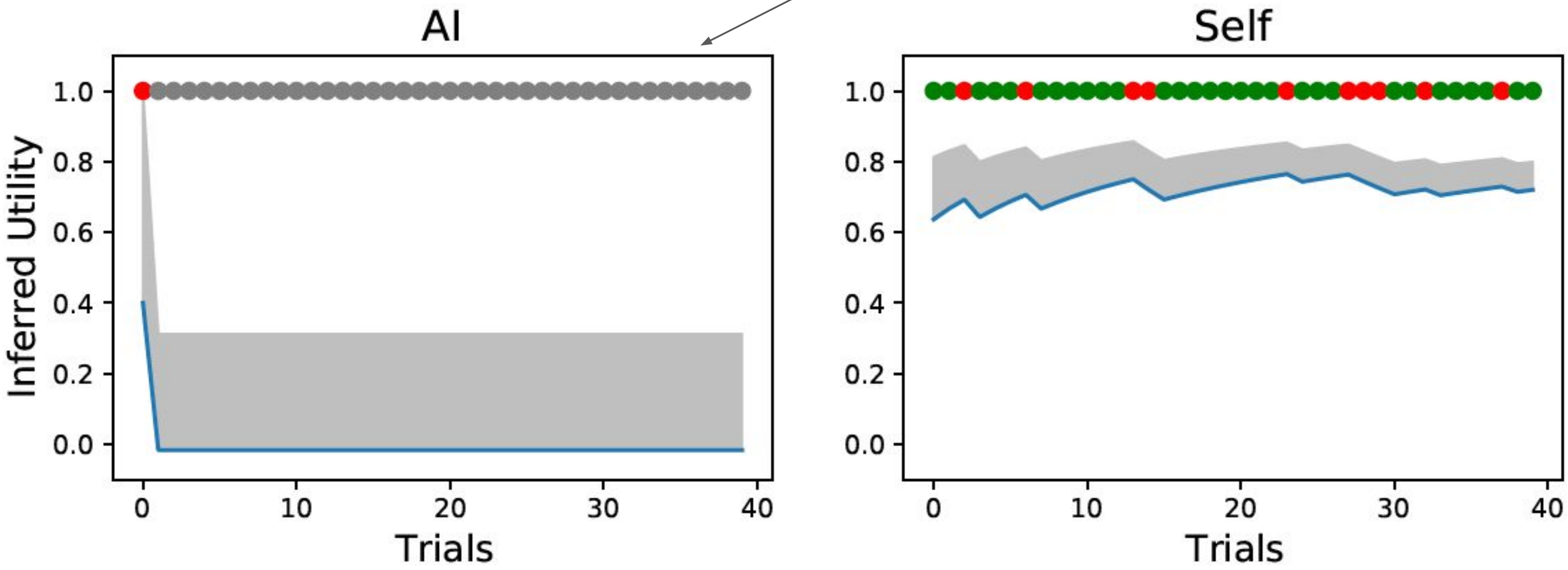
Algorithm Aversion

Another example run from metacognitive bandit

Example of Algorithm Aversion



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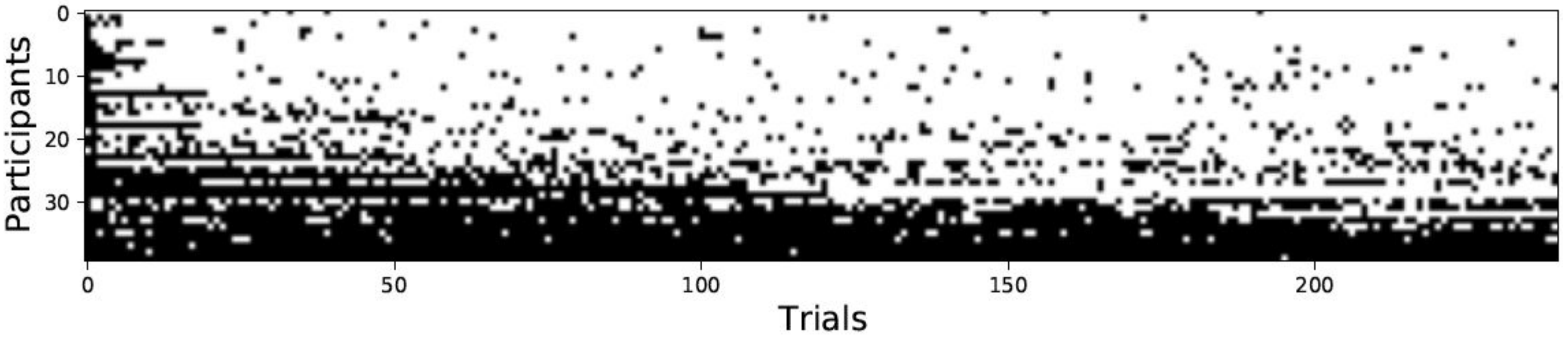
Advice soliciting behavior for actual and simulated participants on 240 trials

Empirical data



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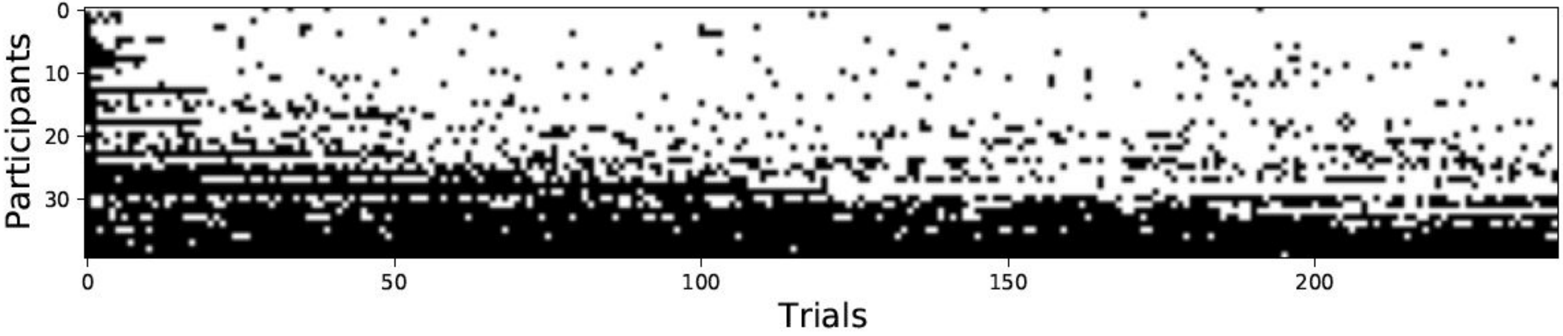
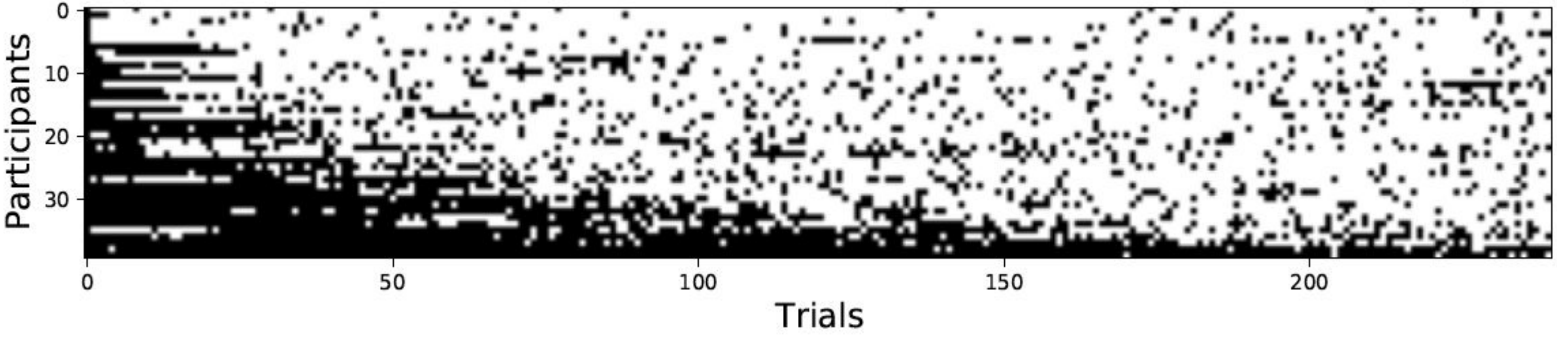
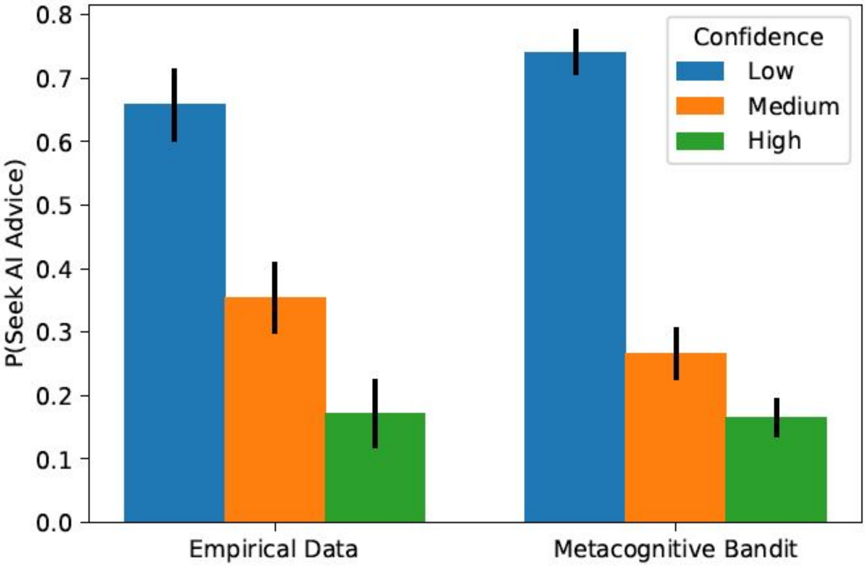


Metacognitive Bandit



Model captures qualitative trends



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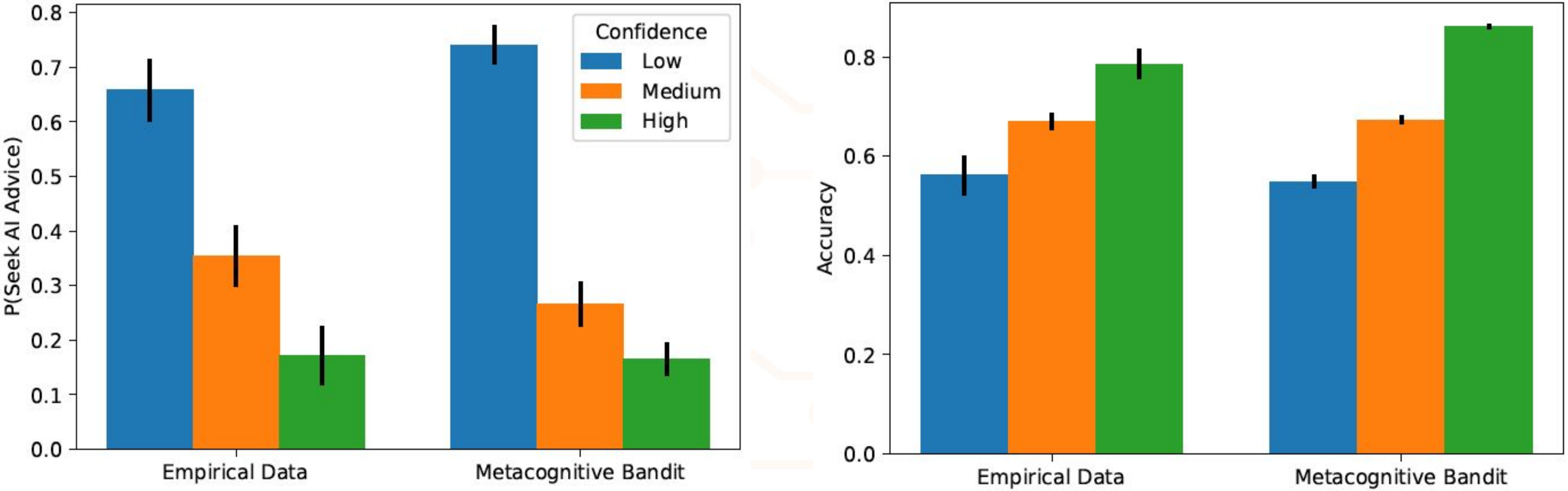

Limitations and Future Work

- Use real ML algorithms
- How AI advice is integrated in decision-making?

Thank you!

Questions?