Know Your Network: Sensitivity to Structure in Social Learning

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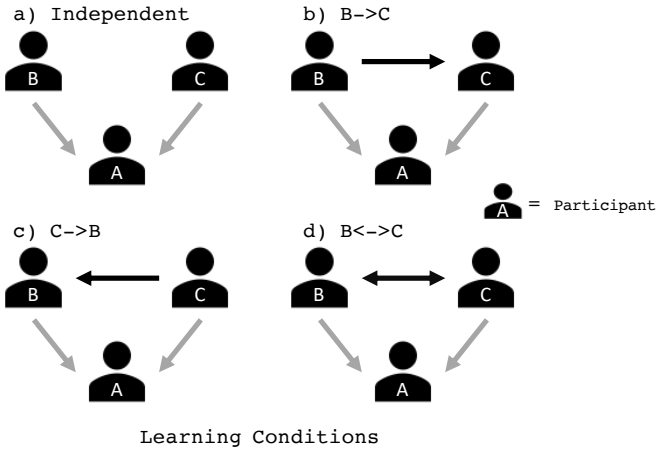
Overview

People are sensitive to known social dependencies when integrating social information (Fränken, Theodoropoulos, Moore, & Bramley, 2020; Whalen, Griffiths, & Buchsbaum, 2018). Here, we investigated whether people:

1. Can *infer* structural dependencies between sources from communications
2. Accurately weigh the evidential value of communications under consideration of the inferred structure

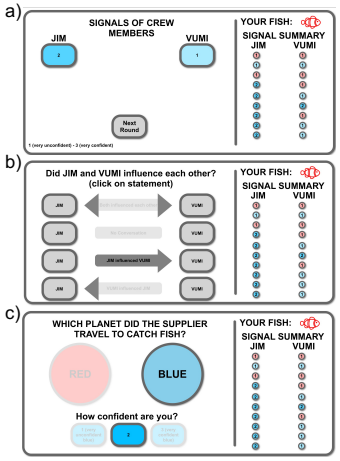


Task

(a). For each of the four network conditions shown above, 81 Prolific workers observed initial evidence $\in \{red, blue\}$ at $t = 0$ followed by 10 belief communication from two sources (panel a)

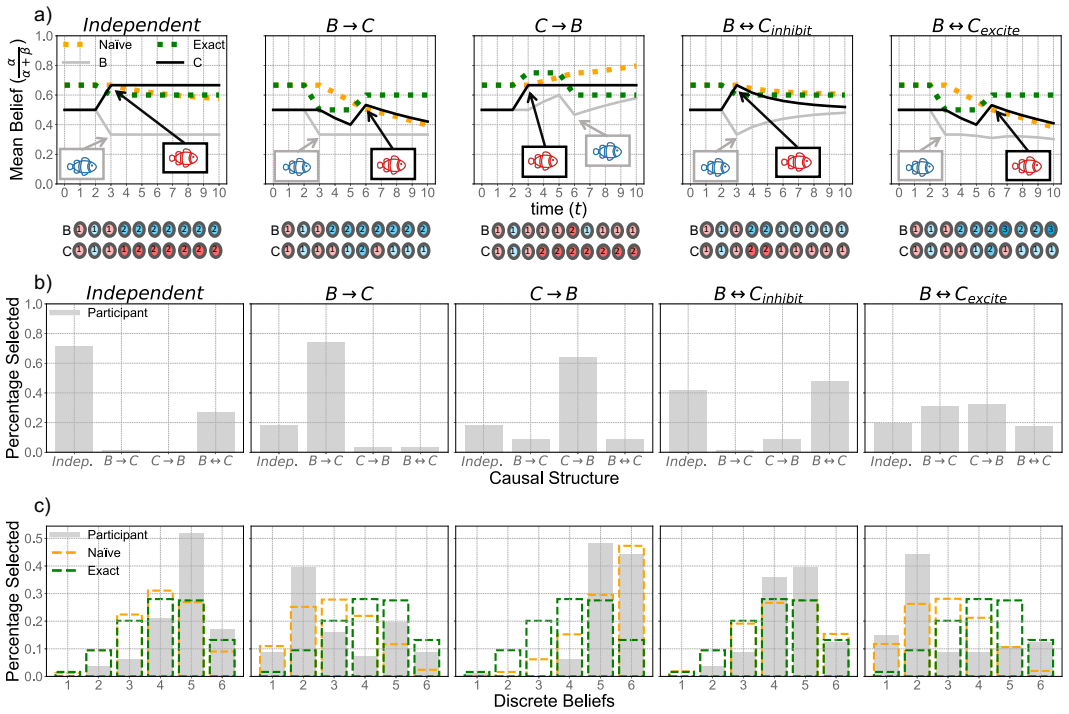
(b). studied the "Judgments" of their peers and provided a guess about structural dependence (panel b)

(c). made a judgment about the shared environment (panel c)



Simulations and Results

We compared participants' judgments about the environment with an "exact" normative (Bayesian) model and a "naïve" account that combined communication signals of sources with their own evidence in a structure insensitive way (i.e., treating all signals as independent). Panel a provides an overview of model simulations, participants structure judgments are shown in panel b, and participants' environmental (planet) judgments in panel c. Here, binary planet judgments and associated confidence (1-3) were transformed to a 6-node discrete belief scale where 1=very confident blue and 6=very confident red.



Model Comparison and Discussion

- Participants correctly identified independent and acyclic network structures
- Judgments resemble a naïve social learning account that integrates social evidence with the learner's own observations in a structure insensitive way
- However, neither account provided a good fit to participants judgments. Further, peers' communication signals were simulated. In current work, we thus extended the present project to include three real participants
- **Our results suggest that while people are capable of using communication patterns to identify social influences, they are still misled by the distortions of evidence that these network dynamics can produce**

Table: Model fits to participants' environmental (planet) judgments

Data	Learner	BIC	τ	$N_{best-fit}$
Full (405 trials)	Baseline	1451.3	-	8
	Non-Social	1401.7	3.99	19
	Exact	1414.5	3.5	4
	Naïve	**1265.7**	6.24	**50**

References

Fränken, J.-P., Theodoropoulos, N. C., Moore, A. B., & Bramley, N. R. (2020). Belief revision in a micro-social network: Modeling sensitivity to statistical dependencies in social learning. In *Proceedings of the 42nd annual conference of the cognitive science society.*

Whalen, A., Griffiths, T. L., & Buchsbaum, D. (2018). Sensitivity to shared information in social learning. *Cognitive science*, *42*(1), 168–187.

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