How Do People Integrate Private and Social Information When Making Risky Decisions?

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Research Question

- People often make decisions in social environments.
- People do not only use social information to inform their belief about the state of the world, but also to make decisions. For instance, when evaluating the risk of getting vaccinated for COVID 19, people often observe the choices made by others and either integrate this information into their risky choices or ignore it.

Our Aims:

1. Examine the bridge between belief update (private information) and choice after observing others (social information) .

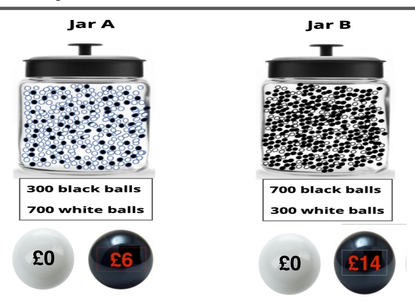
2. Explain *how* people integrate private and social information across different levels of diagnosticity.

Task

Random Selection

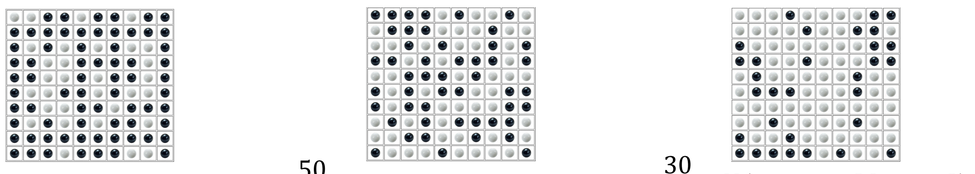
Participants are told that one of the two jars is selected at random

$$P(Jar_A) = P(Jar_B) = .5$$



Sample – Private Information

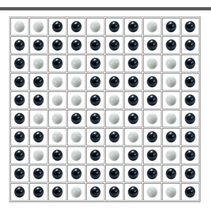
Participants are presented with a sample from the randomly chosen urn



$\frac{70}{30} \sim N(\mu_{black} = 70, \sigma = 3)$ $\frac{50}{50} \sim N(\mu_{black} = 50, \sigma = 3)$ $\frac{30}{70} \sim N(\mu_{black} = 30, \sigma = 3)$

Belief

Participants are asked to indicate the true source (Jar A / Jar B) of the presented sample

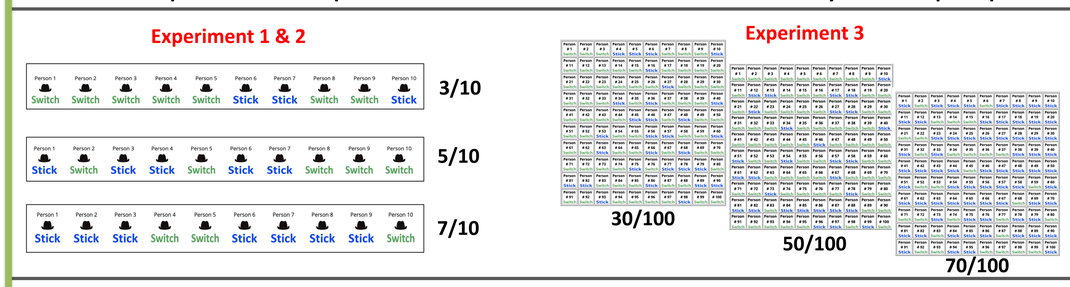


Which Jar (Jar A / Jar B) do you think the balls on the grid came from?

I think it came from Jar A | I think it came from Jar B

Social Information (only Block II)

Participants were presented with the choices made by other people



Decision

Participants were asked to choose one of the jars they wish to draw a final ball from that will determine their payment

Cognitive Models

Bayesian Updating Model

$$P(C_{ij}) \propto P(S_{ij}) \times \left[\int_{.5}^{1} B(n_j, N, p_j)\,dp_j + r_{ij}\right]$$

i represents each individual participant. ***j*** represents the trial type (can take one of three categories: 30/70, 50/50, 70/30).
P* (S_{ij})** is the prior probability of participant ***i, taking risk in trial type ***j***. **B(.)** is the binomial probability mass function for n_j successes (risky agents) out of a total of ***N***. This model takes as it's likelihood the probability of observing n_j agents out of a total of N agents making risky choices (i.e., $p_j > .5$), integrating across every probability above .5. r_{ij} is a parameter that describes the resistance of individual ***i*** towards social influence in trial type ***j***

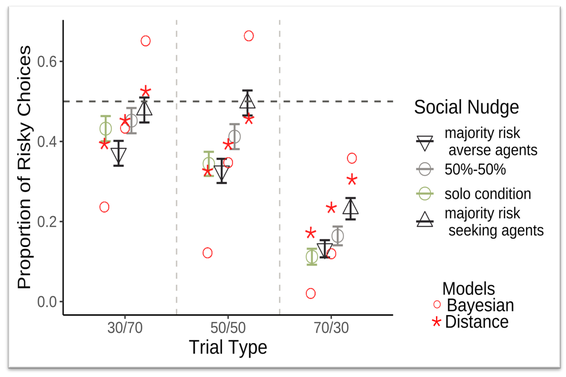
Distance Model

$$P(C_{ij}) = \left[\beta_i \times P\left(S_{ij} - \frac{n_j}{N}\right)\right] + P(S_{ij})$$

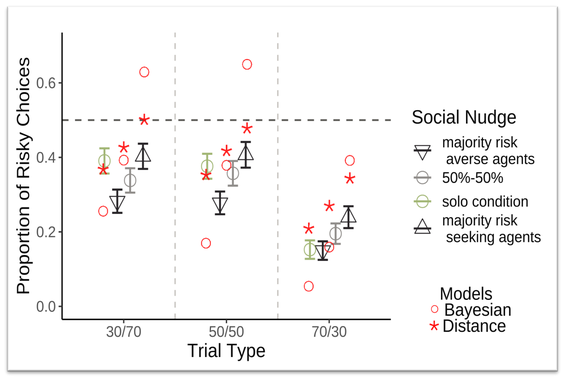
i represents each individual participant. ***j*** represents the trial type (can take one of three categories: 30/70, 50/50, 70/30). n_j is the number of risky agents presented on a given trial , N is the total number of agents presented on every trial. ***N*** is the proportion of risky agents presented to participants on every trial. S_{ij} is the participant's proportion of risky choices in the Solo condition (can take one of 5 discrete values ranging between 0/5 – 5/5), for every trial type. **β** is the a free parameter represent the weight people assign to the distance between their own risk preferences and the number of risk-taking social agents.

Behavioural & Modelling Results

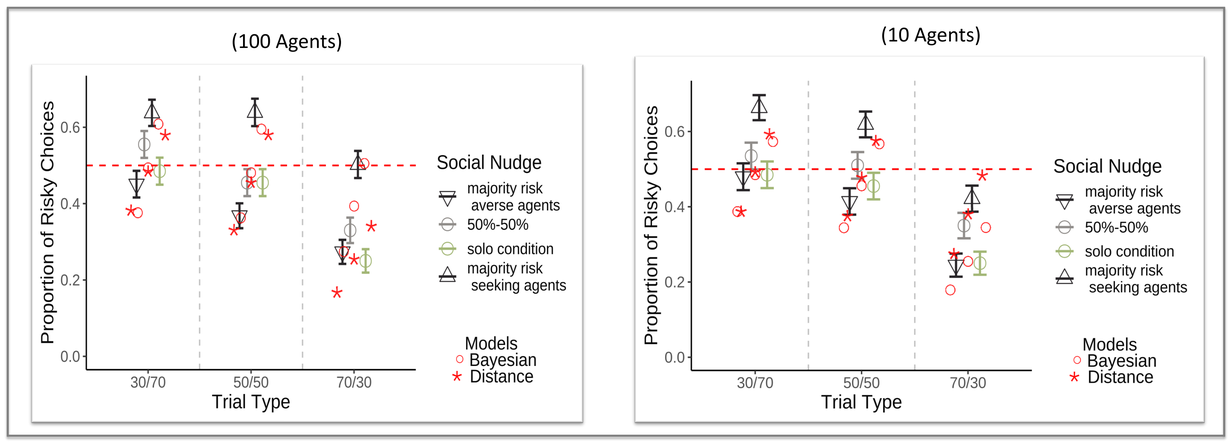
Experiment 1



Experiment 2

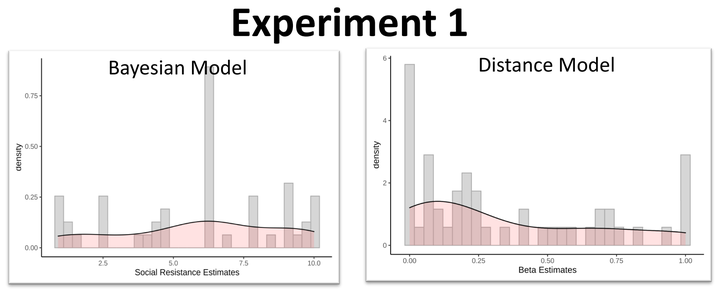


Experiment 3

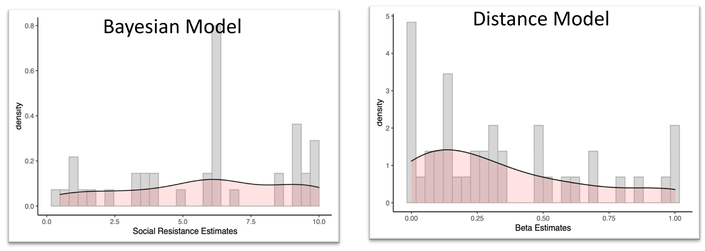


Individual Model Fits

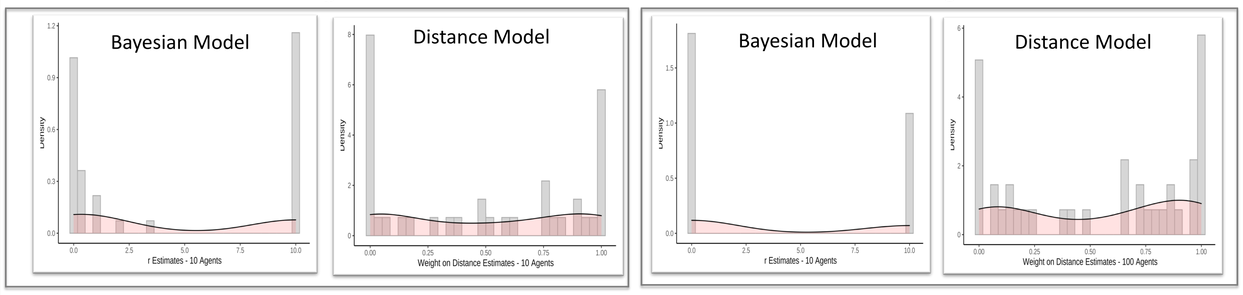
Experiment 1



Experiment 2



Experiment 3



Experiment	Bayesian Updating	Distance
1	22%	78%
2	19%	82%
3 (*10*)	25%	75%
3 (*100*)	30%	70%

Summary

Across three experiments, we observe that:

- People learn from others' choices, in particular when those are risk seeking.
- People are unaffected by sample size .
- People follow normative predictions and ignore new (social) information when it is non-diagnostic.
- People are unaffected by real (Experiment 2) vs. computer-generated (Experiment 1) social agents.

Our modelling work suggests that:

- Participants integrate social and private information.
  - This integration is better explained by relative/comparative process rather than by absolute terms, indicated by the consistent outperformance of the Distance Model on both the group and individual level.
- Individuals differ in responsiveness to social information. While some of estimated weights are below .5, there is a non-trivial proportion of people that are fully influenced by others' choices.