

The right mix of cognitive biases and ambiguity of opinions fosters societal concern about climate change.

SPP Sea Level Conference

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- Agostino Merico^{1,2}
- Paul E. Smaldino^{3,4}
- Deyshawn Moser^{5,6}
- Achim Schlüter^{5,6}



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from Johannes Herbeck's talk

“How to reach better decision-making?

- recognize that knowledge(s) on sea level rise adaptation are outcomes of power-laden societal processes
- consider culturally embedded cognitive biases“



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Sea level rise, climate change, and public opinions –



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Sea level rise, climate change, and public opinions –



Sea level rise, climate change, and public opinions – The tragedy of cognition



VS.



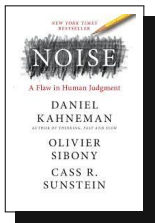
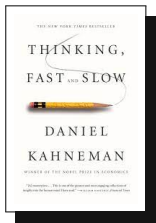


Bias:

systematic error in human
behaviour/cognition

Noise:

random error in human
behaviour/cognition



Opinion dynamics with social influence, in general



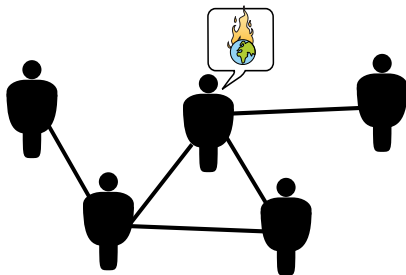
- Agents represent people

Opinion dynamics with social influence, in general



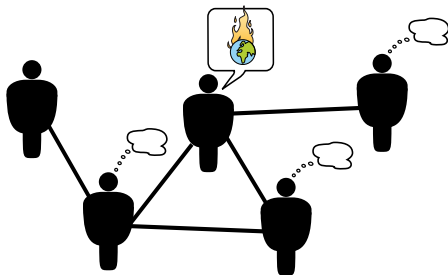
- Agents represent people
... with opinions on a given topic.

Opinion dynamics with social influence, in general



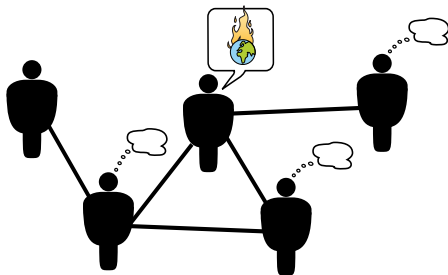
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Opinion dynamics with social influence, in general



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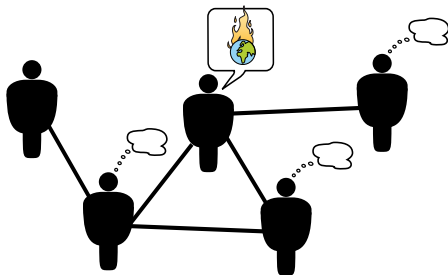
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→ Consensus, disagreement, or polarisation?

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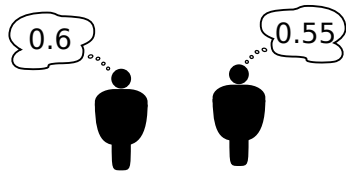
→ Consensus, disagreement, or polarisation?

How do opinion patterns evolve under certain assumptions about human behaviour/cognition?

My opinion dynamics model with bias and noise

Agent opinions are single values $x \in [0, 1]$.

Opinions change through social interaction (in a fully connected network)



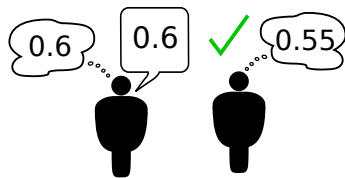
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Confirmation bias

Agents influence each other **only if** their opinions are similar (bounded confidence).



opinion becomes the weighted mean

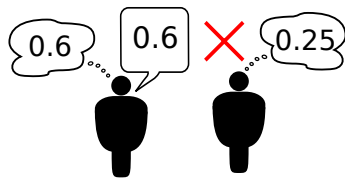
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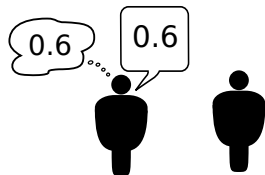
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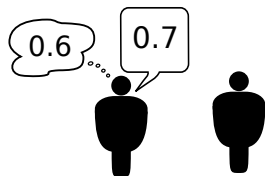
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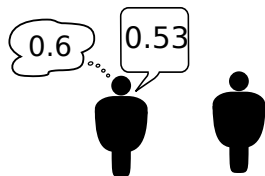
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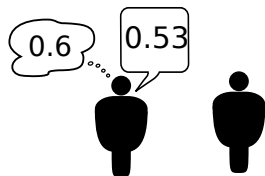
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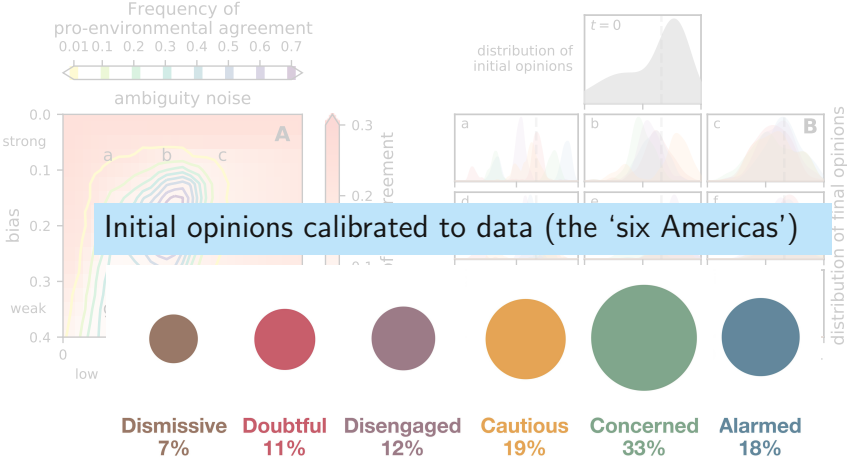
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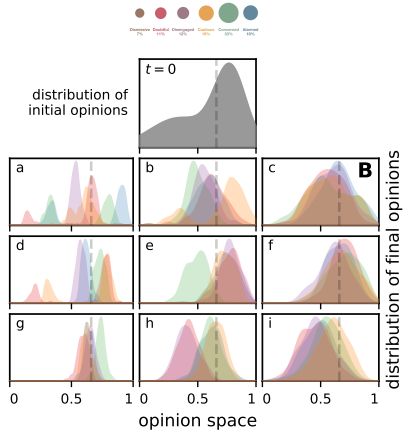
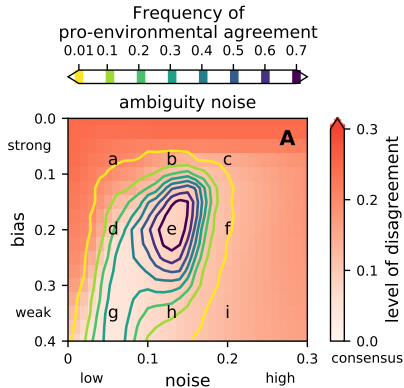
→ particularly relevant for climate change and sea level rise.

Experiments and results



according to (Maibach et al., 2011).

Experiments and results



Pro-environmental agreement (PEA):

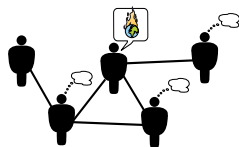
- low disagreement &
- high average opinion

Summary

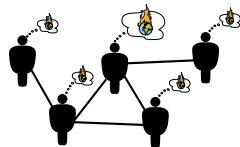
- 'Facts don't change minds' (Toomey, 2023), social influence does.
- But biases and noise interfere.
- Ambiguity in communication (noise) can facilitate pro-environmental agreement.

Some limitations:

- we assume a well-mixed population (no homophily/echo chambers).
 - we assume a society of non-strategic, ideology-free individuals.
- Mathematical models formalise social and mental processes, allowing us to explore the mechanisms that drive opinion patterns.

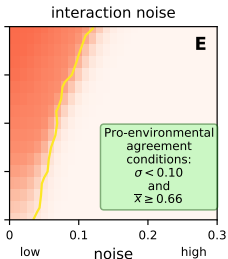
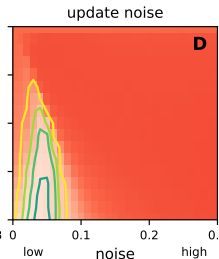
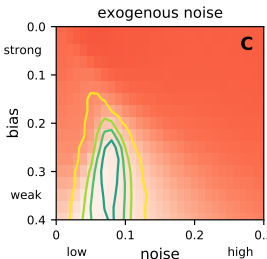
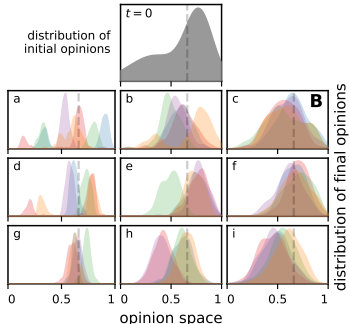
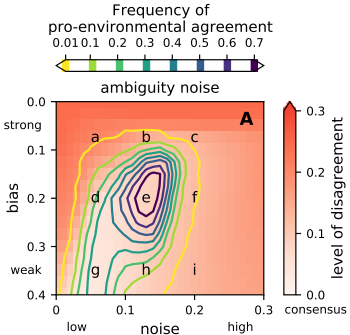


Social influence

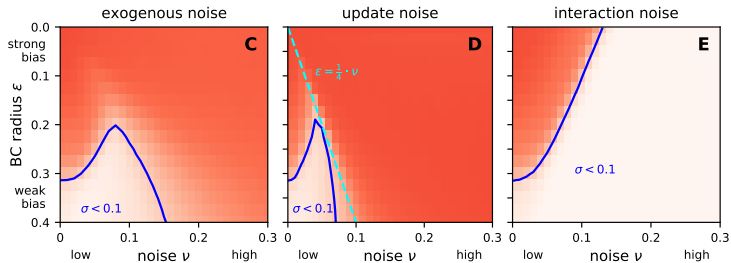
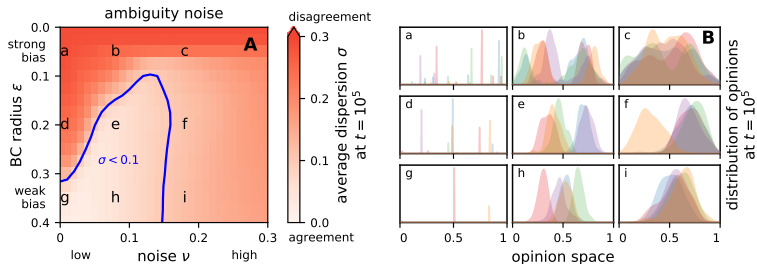


Pro-environmental agreement

Full results



Uniform initial opinions



Sketch

