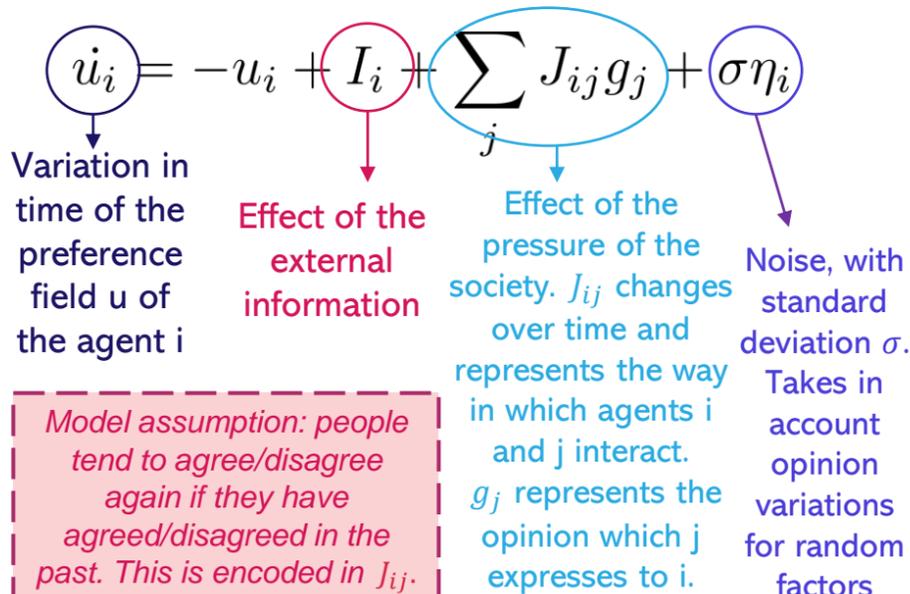


How do events shape society?

News of **disruptive events** in history, such as terror attacks, often appear to change the behaviour of a society and **influence how people react in future**. In order to understand how this may happen, we introduce a mathematical model of a society described as a collection of agents that form and exchange opinions under the influence of their peers and external events. We show how **the combination of human tendencies**, such as imitation, differentiation, homophily and xenophobia, is sufficient to **create a collective memory** triggered by external information.

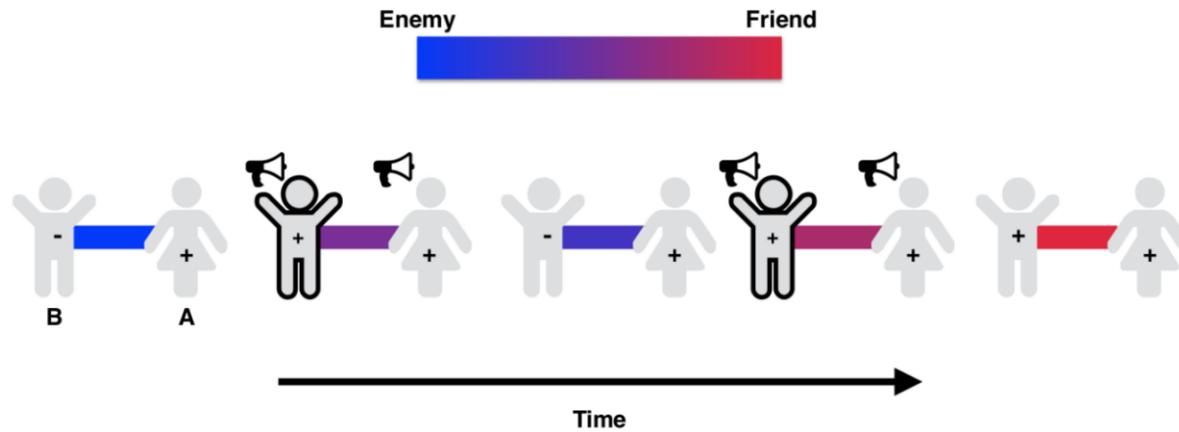
Our model shows how the social interactions and future people's reactions can be shaped by a society's history.

OUR MODEL



Collective memory formation

Our model is inspired by models that have been developed for the description of memory formation within the brain, called 'graded response neural networks' [2]. In analogy to these models, we propose **time-changing interactions between individuals which depend on their history of agreement or disagreement**, as shown in the following figure:



How is memory induced by information?

Bob (B) and Alice (A) are a pair of representative agents in a society and can have positive (+) or negative (-) opinions about a topic. In this example we can see how an external piece of news (megaphone) modifies the relationship between them inducing the memory formation of past opinions. Initially Alice and Bob are enemies and have different opinions about a certain topic. However, the repetitive arrival of information changes Bob's opinion and their relationship.

Collective behaviour:

This mechanism operates between **any pair of interacting people** in a society, and thereby shapes mutual relationships in a large **network of interconnected people**.

The bonds created in this way last also when the signal is removed and **guide people's opinions in reaction to new events**.

Collective memory emerges when a new event triggers the same opinions previously expressed in reaction to similar events.

METHODS

Our study uses stochastic processes, statistical mechanics methods and simulations to model the society's behaviour.

RESULTS

- **Repetitive or intermittent news** shape the relations between individuals and **trigger collective memory** of past opinions.
- Even very **short signals**, if sufficiently strong or repeated often, can guarantee the spontaneous retrieval of past information
- Memory formation of different news depends on the **relative strength and frequency** with which they are presented to the society
- Showing **distorted versions of past news** can trigger recall of their original memory

References

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