Simulation Cheat-Sheet – Opinion Dynamics Model

This cheat-sheet summarizes the parameters, sliders, and expected effects of the Opinion Dynamics Simulator developed by the Public Opinion Research Group (GROP). It is designed for academic users who wish to explore how opinion, prevalence, influence, and network structure co-evolve under different configurations.

1. Overview

The simulator models a connected population of agents holding bipolar opinions (ranging from −1 to +1). Each agent has a prevalence (representing the number and strength of internal representations or 'memes'), an influence (its capacity to persuade others), and dynamic social links that evolve based on opinion similarity. Interactions, meta-influencers, rewards, and meme-based cognition jointly shape opinion propagation.

2. Core Opinion Dynamics Parameters

Parameter	Range (default)	Effect on Simulation	Example Scenario
prevalence-weight	0.5–2.0 (1.5)	Scales the influence of prevalence difference on adoption probability.	Low: weaker effect of conviction; High: dominant agents shape the network faster.
adoption-floor	0.00–0.20 (0.02)	Minimum baseline probability of adoption despite polarization.	Low: persistent polarization; High: rare spontaneous opinion shifts.
bridge-prob	0.00–0.50 (0.10)	Probability of creating cross-polarity links ('bridges').	Low: echo chambers; High: inter-group mixing like open social networks.
polarization-factor	0.00–1.00 (0.50)	Penalizes adoption when opinions differ strongly.	Low: tolerant debate space; High: entrenched ideological divisions.

3. Group Influence Parameters

Parameter	Range (default)	Effect	Example Scenario

group-impact-weight	0.00–1.00 (0.5)	Controls how strongly neighbour alignment affects adoption.	Low: individualist agents; High: strong conformity and herding behaviour.
group-impact-alpha	0.10–3.00 (1.0)	Defines non-linearity: concave (<1) favours minorities; convex (>1) requires consensus.	α < 1: small groups can trigger cascades; α > 1: resistant to small clusters.
group-k	1–50 (10)	Number of nearest neighbours considered for group alignment effect.	Low k: fragmented influence clusters; High k: smoother, global conformity.

4. Reward System

The reward system introduces adaptive influence: when an agent successfully transmits its opinion to a neighbour, it receives a bonus that increases its future probability of influencing others. This bonus decays gradually unless reinforced.

Parameter	Range (default)	Effect	Example Scenario
reward-step	0.00–0.10 (0.05)	Step increase of influence after successful persuasion.	Simulates charisma or social capital growth.
reward-cap	0.00–1.00 (0.50)	Maximum accumulated bonus.	Prevents a single agent from becoming omnipotent.
reward-decay	0.00–0.05 (0.01)	Rate of decay per tick of the reward bonus.	0.01: temporary influence bursts; 0.00: enduring reputation effects.

5. External Events

External events simulate media campaigns, crises, or collective shocks that shift opinions or prevalence. They can be triggered manually using the 'event' button or automatically via 'auto_event' at a set tick. Events can target specific ranges of opinion or prevalence values.

Limiting the Share of Agents Affected by an Event

`event-prob-max` *(slider, range: 0.00–1.00; default: 1.00)*

This parameter defines the maximum proportion of agents that can be affected by an event. At each trigger, each agent draws a random number *u ~ U(0,1)*:

- If *u ≤ event-prob-max*: the agent is eligible for the event, and the logic applies — opinion shift via `event_size`, possible prevalence change via `prev_change`, and filtering through `meme_set`, `low_meme–high_meme`, and `low-prev–high-prev`.
- Otherwise, the agent is ignored.

Usage Examples:
- 1.00 (100%): global shock — e.g., national crisis.
- 0.10 (10%): partial shock — e.g., regional or segmented media event.
- 0.01 (1%): micro-shocks — e.g., interpersonal exchanges over time.

6. Meme-Based Cognition (Optional)

When `use-memes?` is enabled, each agent tracks two internal stocks: `meme-plus` (supporting its current stance) and `meme-minus` (opposing representations). Their balance determines the opinion, and their sum defines prevalence. This representation allows a richer cognitive structure where opinions evolve gradually rather than abruptly.

7. Credits

Concept and empirical grounding: Public Opinion Research Group (GROP)
NetLogo implementation & enhancements: Pierre-Alain Cotnoir (2015–2025)
AI-assisted design: GPT-4 & GPT-5 (2024–2025)
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