Behavioral Feedback in Disease Dynamics

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Behavioral Feedback in Disease Dynamics

Problem Statement: How does messaging affect compliance with COVID-19 orders and recommendations?
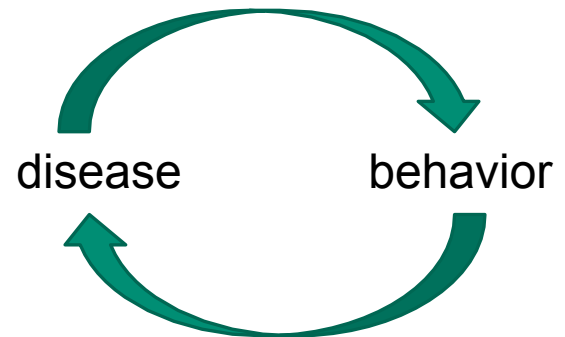
Epidemiology drives spread

Human behavior is a major component determining R_0 (basic reproduction number)

Feedback between disease prevalence, human behavior
◦ Strategies can backfire

Recommendations and messaging change over time
◦ May seem contradictory
◦ May reduce trust in recommendations

disease ⟷ behavior

More disease
→ people avoid exposure
→ less disease
→ people allow more exposure
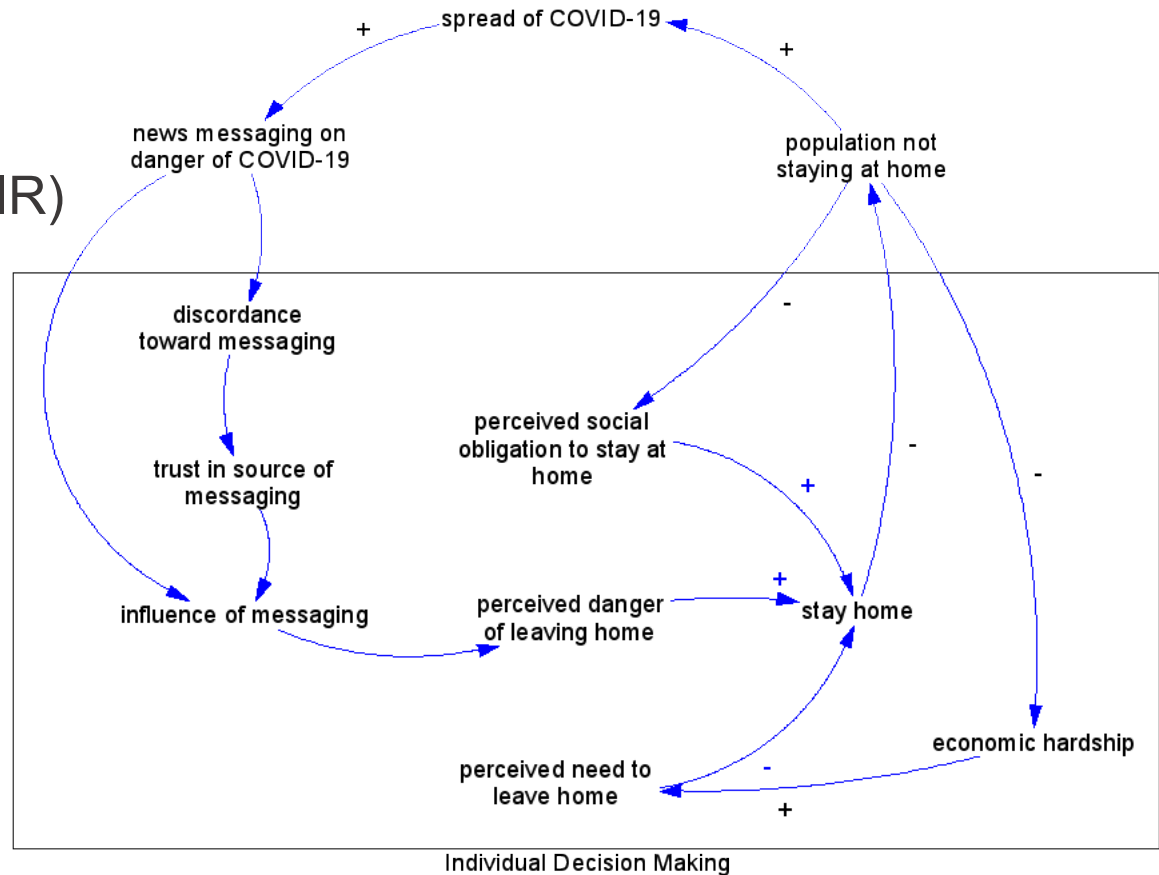→ more disease

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Approach: Hybrid model

Agent-based
- News sources reporting danger
- Humans exerting peer pressure

System dynamics
- Epidemiology model (SEIR)
- Simple economic model
- Each agent has an SD model to implement its behavior

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Results: Model can reproduce the 3-wave pattern (seen in many regions of the world over the last year).

Chart based on data from Miami-Dade County, Florida.