

# MODELING MEMETIC DIFFUSION:

TOWARD AN INTEGRATIVE PREDICTIVE MODEL

*Sir Karl Popper:*

- *"It is easy to obtain confirmations, or verifications, for nearly every theory—if we look for confirmations.*
- *Confirmations should count only if they are the result of risky predictions;...*
- *Every 'good' scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is." (Selections, 1980, p. 167)*

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# MEMES



**Meme:** A *meme* is an act or meaning structure that is capable of *replication*, which means imitation (Dawkins, 1976), requiring:

- Variation
- Selection
- Retention

“Memes may best be understood as cultural information that passes along from person to person, yet gradually scales into a shared social phenomenon” (Shifman, 2013, pp. 364-5)





# MEMES AND EVOLUTION



**Asymmetric fitness:** “selfishness [i.e., adaptiveness, competitiveness] beats altruism within groups. Altruistic groups beat selfish groups. Everything else is commentary” (Wilson & Wilson, 2007).

**Implication:** Within groups or social networks, memes (and their authors) compete for status (to be heard), but when a given homogenous group or network is competing against another group for status, cooperative groups compete better than groups experiencing entropy, chaos or intragroup competition.





# MEMES AND EVOLUTION



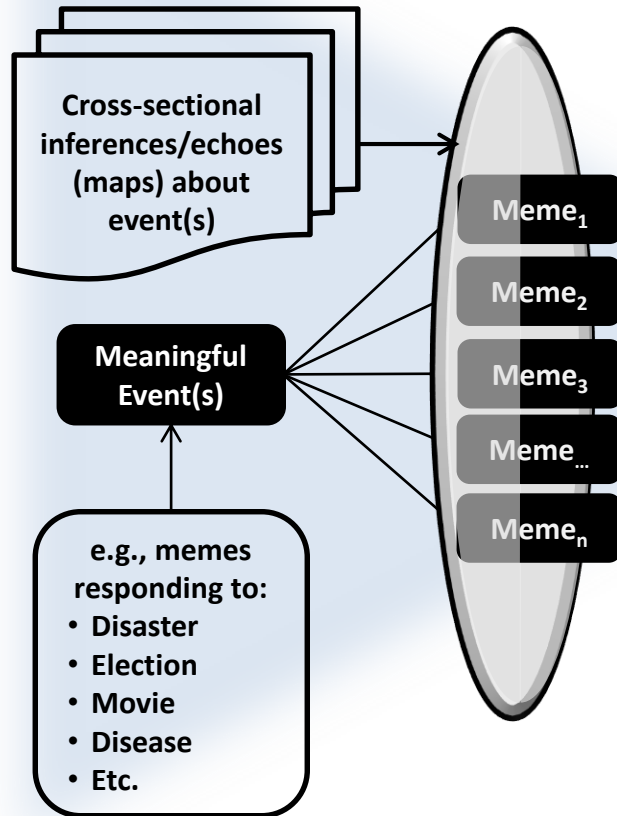
**Information ecologies:** M<sup>3</sup>D proposes that memes, as forms of information, occupy a broader information environment in which fitness is influenced by adaptation to the availability of attention as a scarce resource (Simmons et al., 2014)

**Echo chambers:** Information niches evolve their own information ecologies, forming what is commonly referred to as echo chambers, corresponding to “communities,” in which certain memes are preferentially advantaged by the ecology.



# TYPES OF MEMETIC DIFFUSION PATTERNS:

***Evememic diffusion***: event-generated diffusion of memes linked to the event or experience (from *evenire*: Latin *ex-* “out” and *venire* “to come out, happen, result”), in which events stimulate similar textual expressions about the experience of an event or set of events (e.g., flu tweets; Nagel et al., 2013).



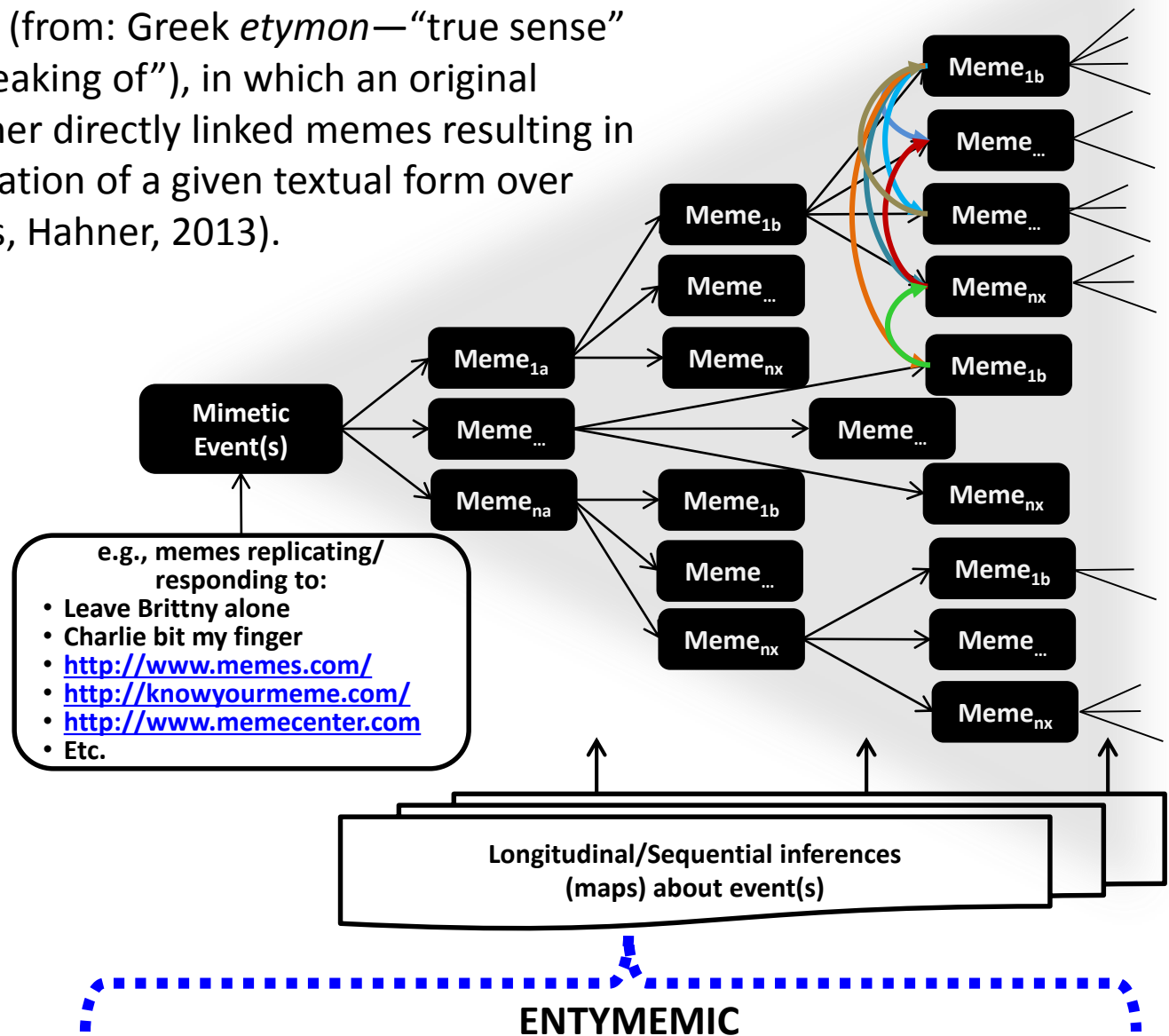
Note: “The word meme derives from the Greek *mimema*, signifying ‘something which is imitated’... In 1870 the Austrian sociologist Ewald Hering coined the phrase *Die Mneme* (from the Greek Mneme, meaning memory)” (Shifman, 2013, p. 363)

The amount of rain positively predicts social network posts about the rain (Coviello, Fowler, & Franceschetti, 2014)

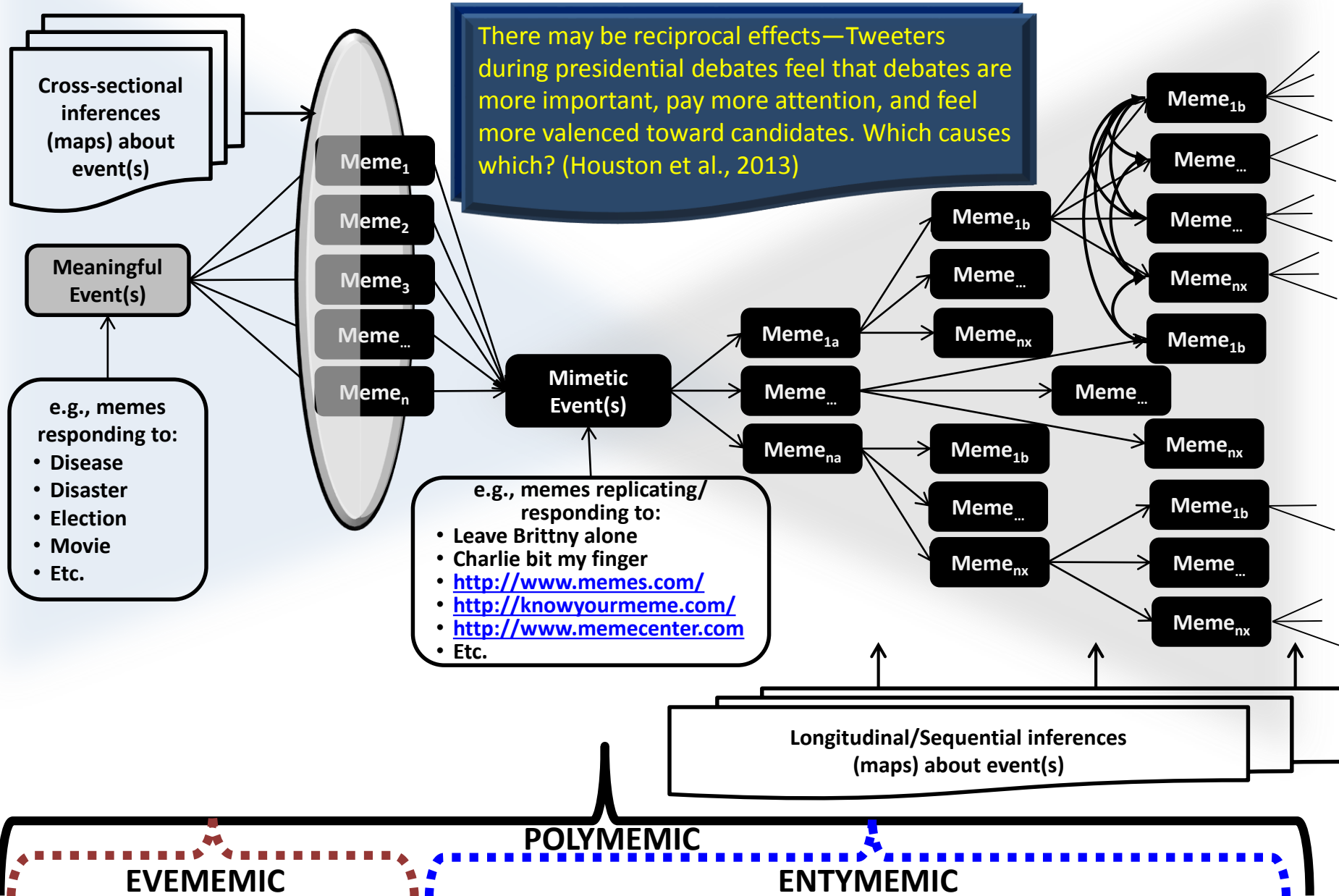
EVEMEMIC

# TYPES OF MEMETIC DIFFUSION PATTERNS:

**Etymemic diffusion:** meme-generated diffusion of directly linked memes (from: Greek *etymon*—“true sense” + *logia* “study of, a speaking of”), in which an original meme generates further directly linked memes resulting in a sort of genetic speciation of a given textual form over time (e.g., the riot kiss, Hahner, 2013).



# TYPES OF MEMETIC DIFFUSION PATTERNS



# MULTILEVEL MODEL OF MEME DIFFUSION (M<sup>3</sup>D)

**AMBIVALENT  
COOPERATIVENESS/  
COMPETITIVENESS**

**NETWORK LEVEL**

'COMPETING' FACTORS:

- SUBJECTIVE/PERCEPTIVE/PSYCHOLOGICAL
- Counter-Memorialization/Frames
- Frame/Narrative/Content/Fidelity
- Subjective Homophily/Heterophily
- Niche/Relative (Dis)Advantage
- Cascade Threshold(s)/Network Structure

**NETWORK LEVEL**

'ALTRUISM' FACTORS:

- OBJECTIVE/STRUCTURAL
- N parameters (e.g., tweets)
- N nodes (computer)
- Network Interconnectivity
- N/Centrality of Influence
- Network Homophily
- Network Edge Heterophily

**INGROUP  
COMPETITIVENESS**

**INDIVIDUAL LEVEL**

COMPETENCE FACTORS:

- Motivation/Knowledge/Skills
- Source Credibility
- Actor Celebrity/Popularity
- Message/Media Adaptability

**MEME LEVEL**

ADAPTIVE FACTORS:

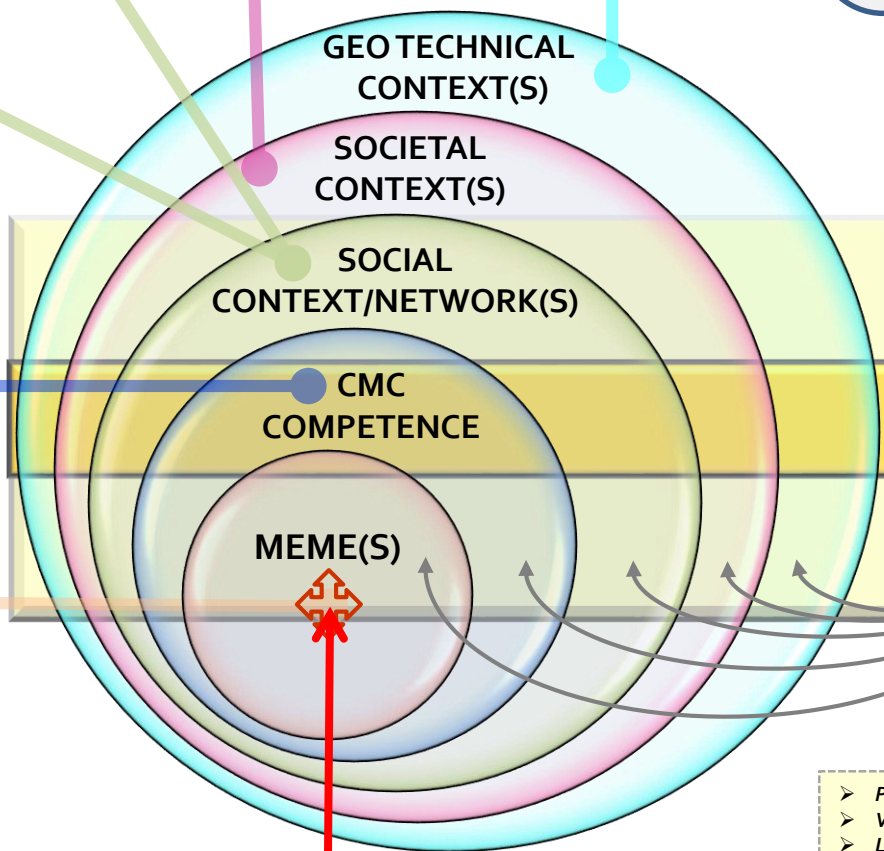
- Distinctiveness/Entailment
- Reproducibility/Redundancy
- Simplicity/Trialability
- Media Convergence
- Media Expressivity/Engagement
- Trope/Frame/Appeal/Credibility

**OUTGROUP  
COMPETITIVENESS/  
CHALLENGE**

**SOCIETAL LEVEL**

- Rival Social Networks
- System Limitation/Trauma
- Counter-Memorialization/Disadvantage
- Diffusion Stage Exhaustion
- Proximity/Density Facilitation
- Mitigating Publicity
- Media Inaccessibility

Drawing on several theories (meme, narrative rationality, frame, general systems, evolution, information, social identity, communicative competence, social network analysis, and diffusion of innovations). M<sup>3</sup>D proposes memes compete at multiple levels to occupy information-ecology niches. M<sup>3</sup>D provides a heuristic framework for organizing manifold investigations into the roles new media play in diffusing ideas in cyberspace and their representation or role in realspace events. M<sup>3</sup>D seeks to integrate theories and stimulate new theory development in the fields of big data and new media.



**MEME  
EFFICACY**

- Popularity
- Velocity
- Longevity
- Fecundity/  
Speciation

Topic-Relevant Outcomes

- **Popularity:** % potential population touching meme
- **Velocity:** Rapidity of market diffusion
- **Longevity:** Duration of meme circulation
- **Fecundity:** Span & Popularity of meme derivations
- **Speciation:** Evolutionary development

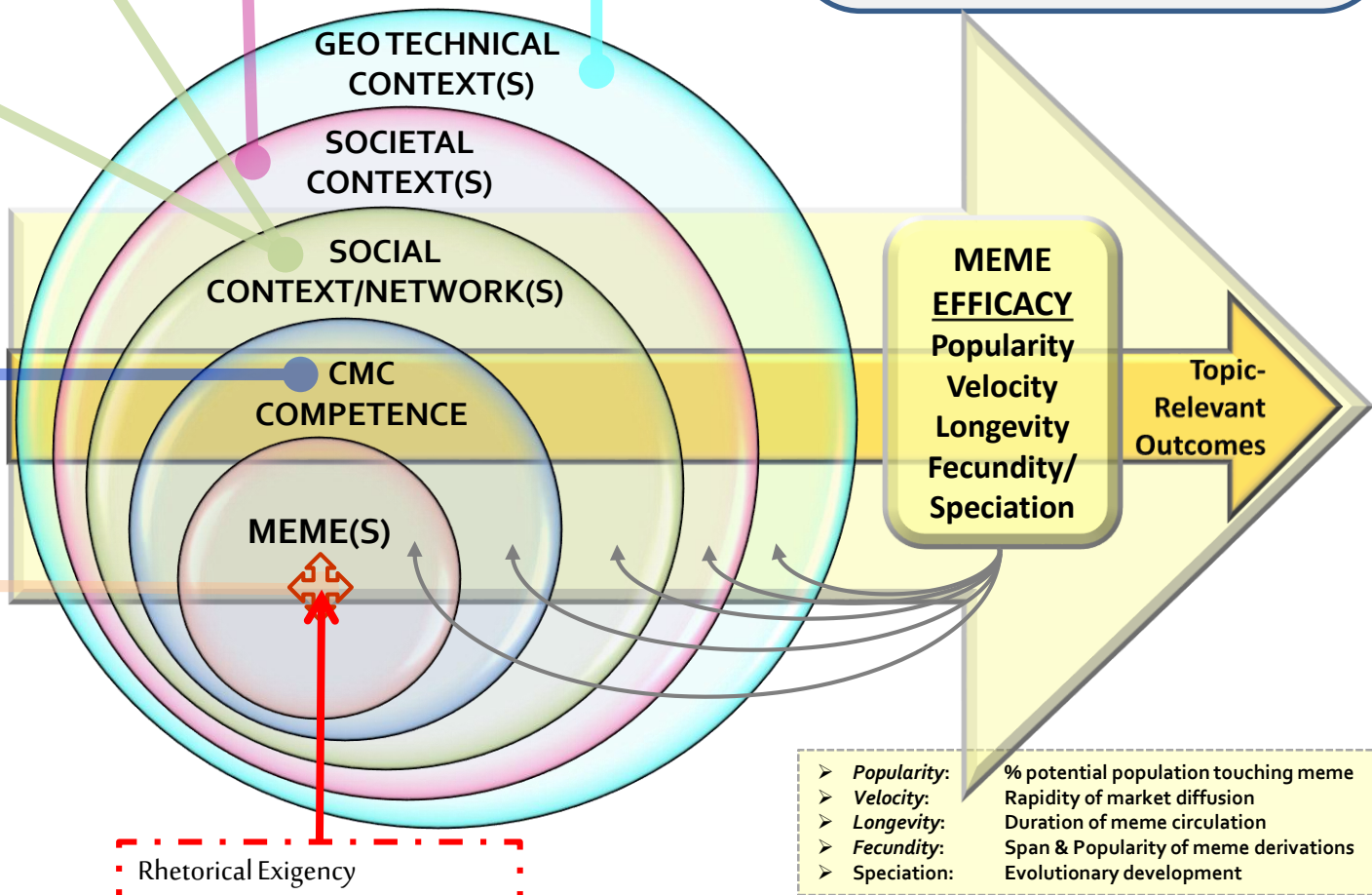


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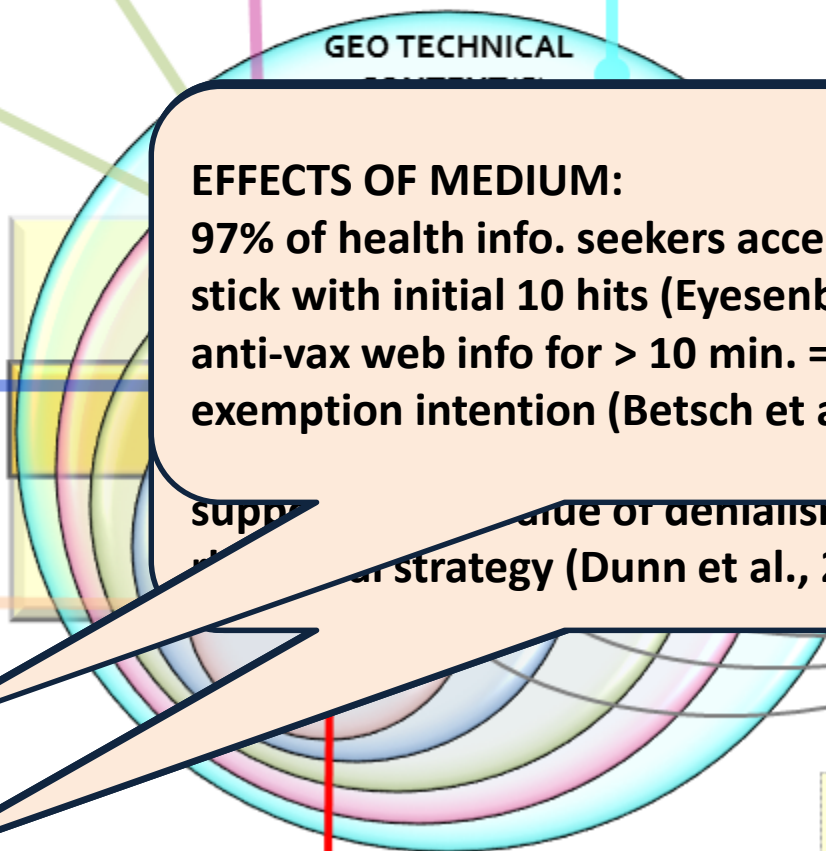
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**EFFECTS OF MEDIUM:**  
 97% of health info. seekers accessing web stick with initial 10 hits (Eyesenbach, 2002);  
 anti-vax web info for > 10 min. = ? vax exemption intention (Betsch et al., 2010)  
 support of denialism as a strategy (Dunn et al., 2015)

**RHETORICAL EXIGENCY**

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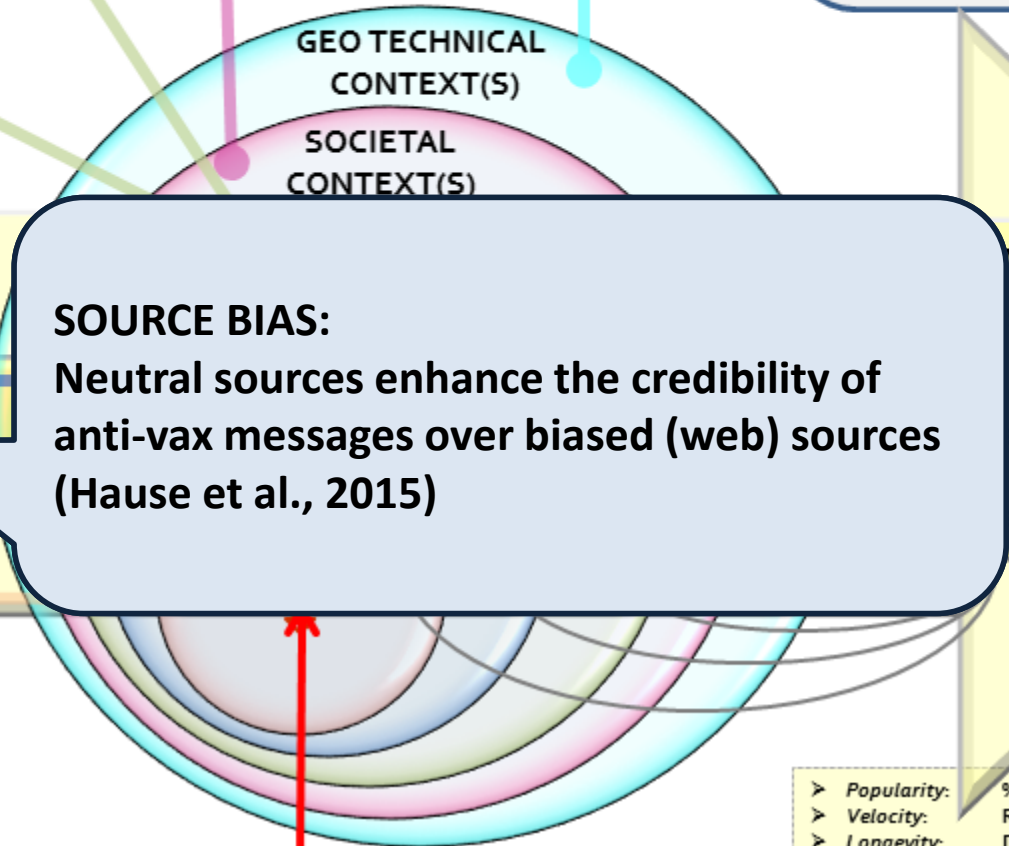
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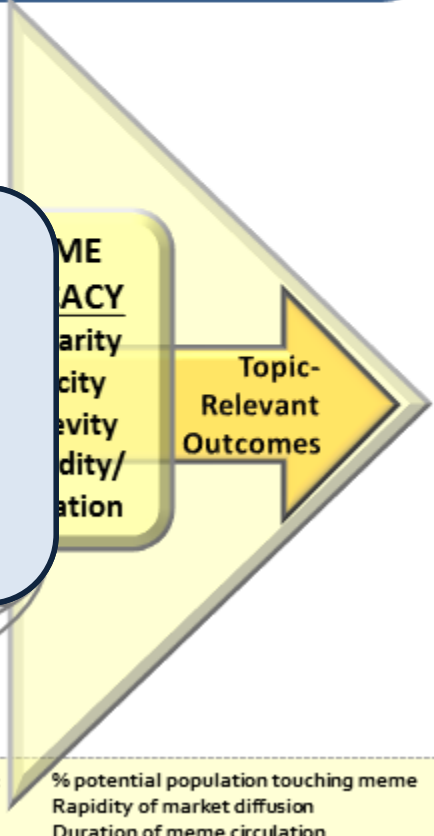
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**SOURCE BIAS:**  
 Neutral sources enhance the credibility of anti-vax messages over biased (web) sources (Hause et al., 2015)



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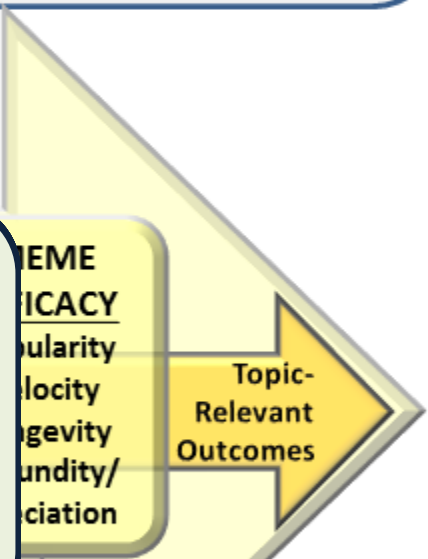
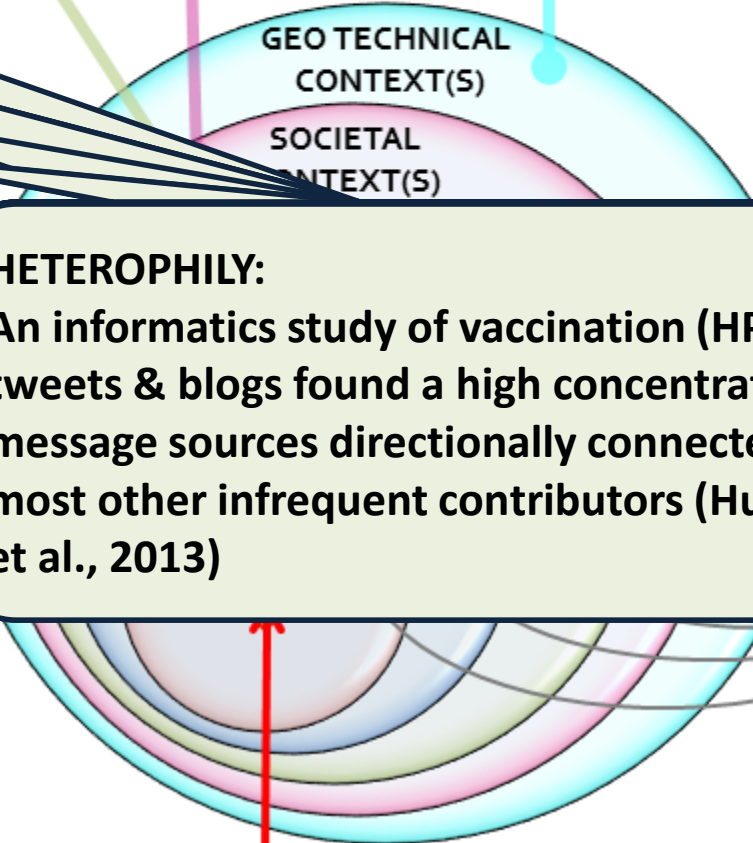
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**HETEROPHILY:**  
 An informatics study of vaccination (HPV) tweets & blogs found a high concentration of message sources directionally connected to most other infrequent contributors (Huesch et al., 2013)



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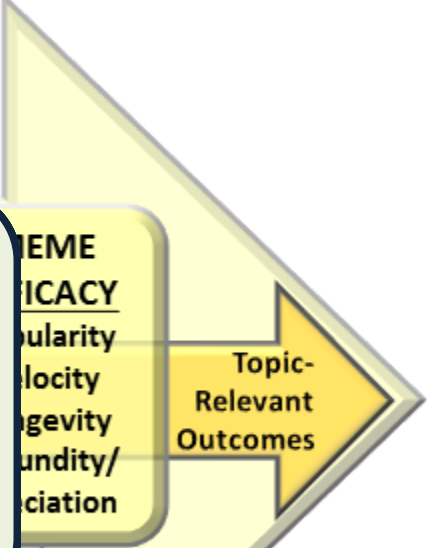
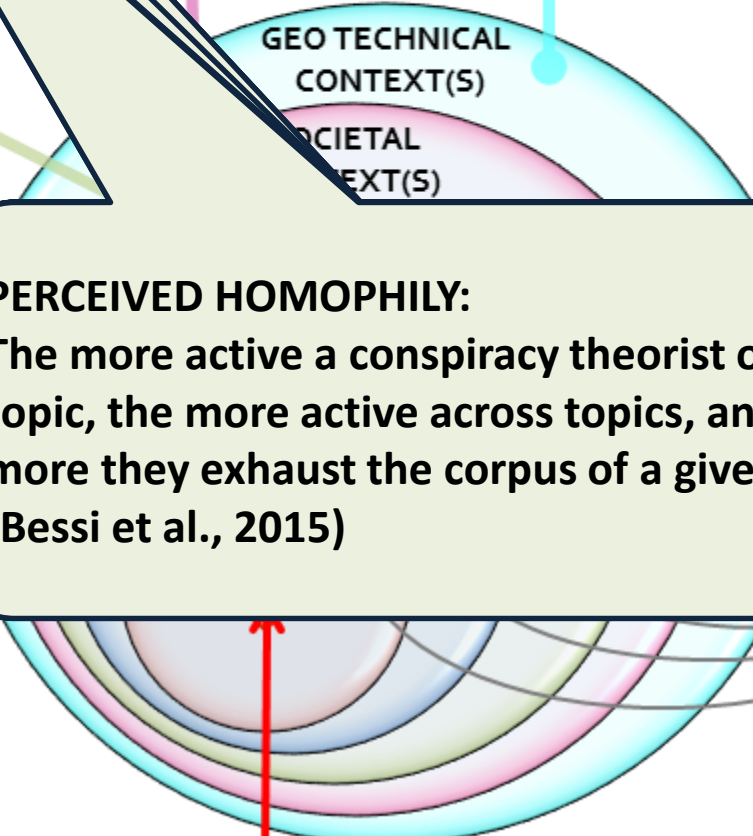
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**PERCEIVED HOMOPHILY:**  
 The more active a conspiracy theorist on one topic, the more active across topics, and the more they exhaust the corpus of a given topic (Bessi et al., 2015)



**RHETORICAL EXIGENCY**

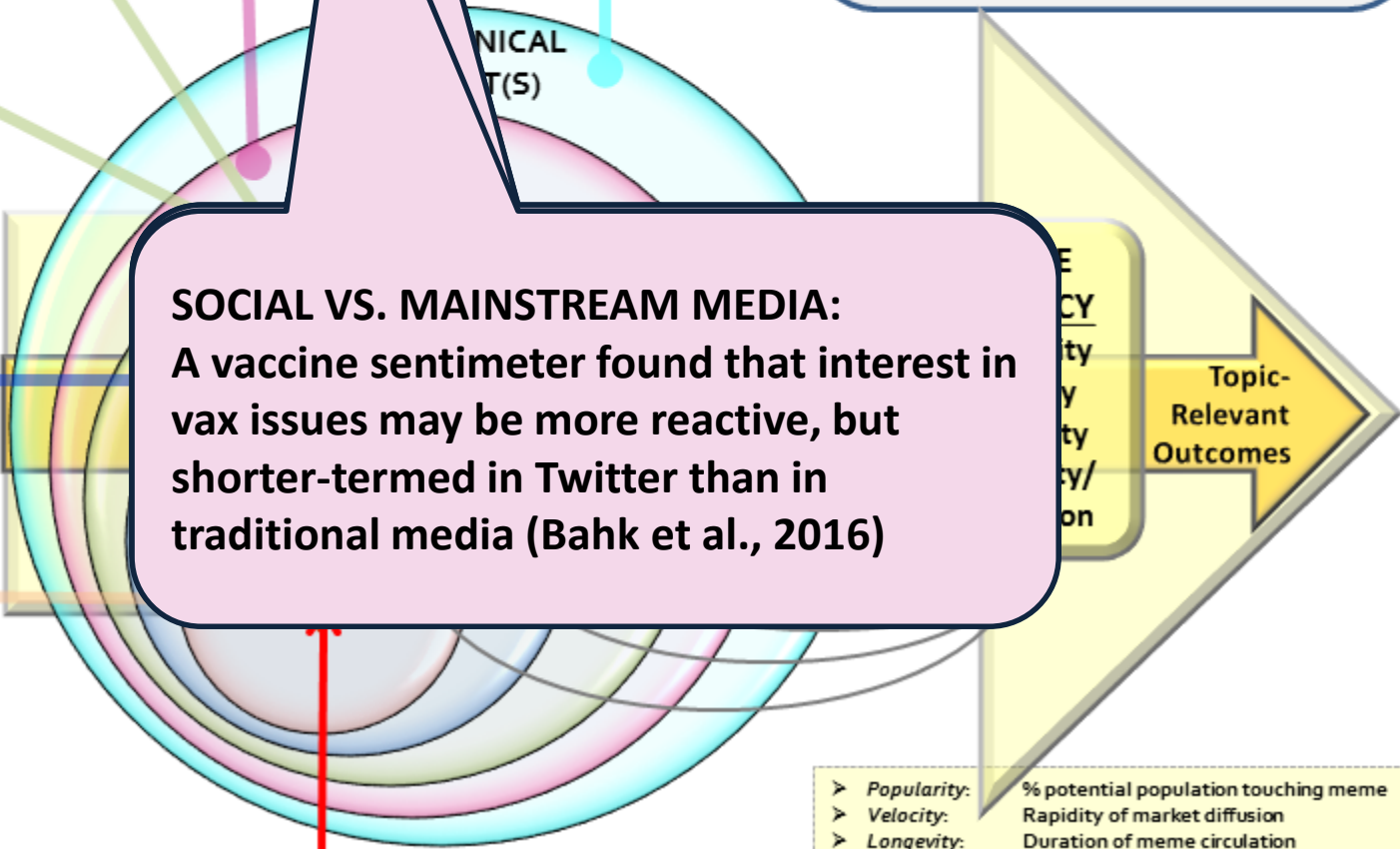
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**SOCIAL VS. MAINSTREAM MEDIA:**  
 A vaccine sentimentometer found that interest in vax issues may be more reactive, but shorter-termed in Twitter than in traditional media (Bahk et al., 2016)

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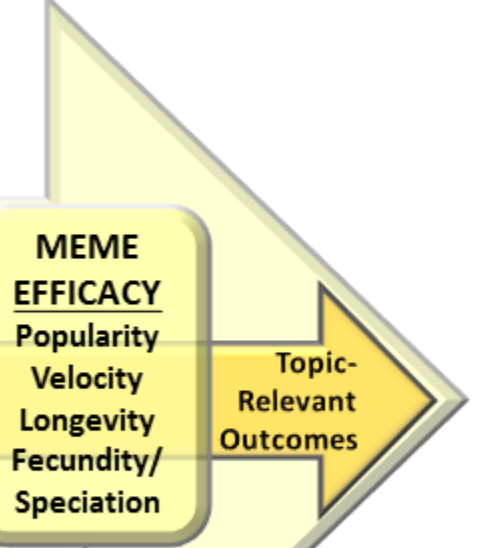
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**TECHNICAL CONTEXT(S)**  
**METAL CONTEXT(S)**

**GEOSPATIAL DISTANCE:**  
 Perceiving a long distance as a barrier to vax ↓ actual vaccination status (Danis et al., 2010)



**RHETORICAL EXIGENCY**

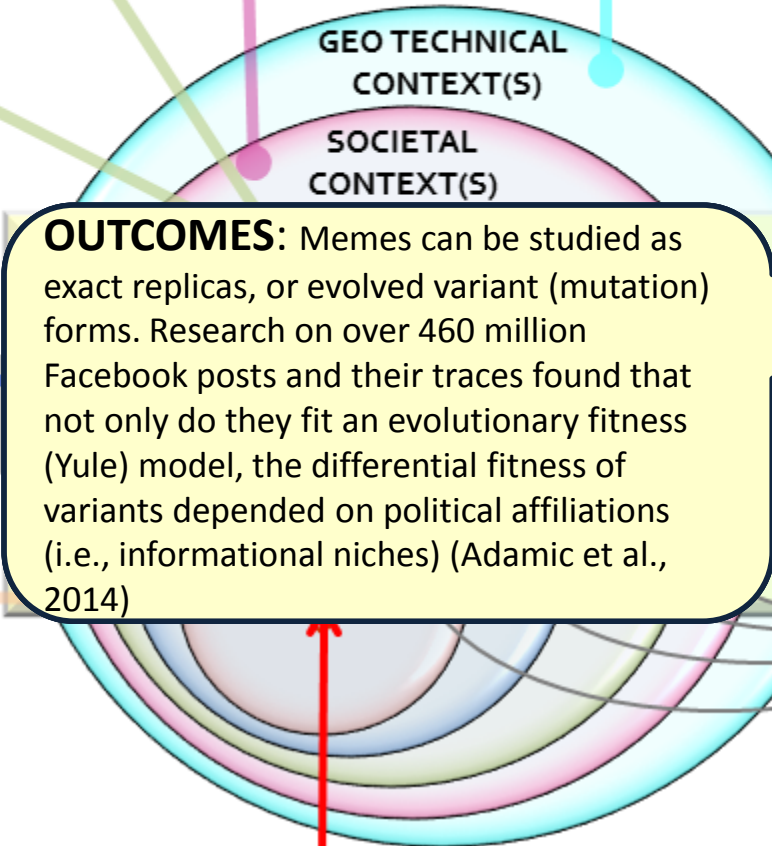
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**OUTCOMES:** Memes can be studied as exact replicas, or evolved variant (mutation) forms. Research on over 460 million Facebook posts and their traces found that not only do they fit an evolutionary fitness (Yule) model, the differential fitness of variants depended on political affiliations (i.e., informational niches) (Adamic et al., 2014)

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- *Current working white paper: 20 axioms, 84 hypotheses;*
- *Several papers and publications relying on it to one degree or another;*
- *Substantial manuscript using it to organize a case study of vax-related tweets;*
- *Going forward—marijuana legalization.*

Brian H. Spitzberg, Senate Distinguished Professor  
(School of Communication, San Diego State Univ.)  
spitz@mail.sdsu.edu

