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# Rumor clustering, consensus, and polarization: Dynamic social impact and self-organization of hearsay

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## HIGHLIGHTS

- Network structure effects on emergent spatial patterns of rumor were studied.
- 16-person networks discussed ambiguous situations and individuals selected rumors.
- Homogenous clusters of rumors emerged moderated by network clustering.
- Rumor consensus (pluralities/majorities) increased and rumor beliefs polarized.
- Rumor clustering and consensus amplified rumor polarization (Echo Chamber effect).

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## ABSTRACT

The "bottom-up" self-organization of shared sense-making and group decision-making through rumor (unverified information statements in circulation) was investigated in two computer-mediated laboratory experiments on the effects of network clustering (i.e., structural "cliquishness"). Participants in 27 (Study 1) and 33 (Study 2) 16-person laboratory-created networks at three institutions discussed ambiguous situations (e.g., "a professor was found dead") and then chose one of four possible rumors in a judgment task (e.g., "he was killed by an angry student") to explain each situation. Static lattice, "ribbon" (street-like), "family" (connected clusters), random, and dynamic-random configurations were employed. Network clustering led to rumor clustering (emergence of homogenous pockets of rumor choices). There was also evidence for increased consensus, rumor persistence, and belief polarization. Belief polarization was amplified by rumor clustering and consensus. In addition, the extent to which "neighbors" were unified in their disagreement (versus agreement) with the participant tempered confidence increases and strongly affected the selection of rumors that "made the most sense." Results explain rumor persistence and variation, document the role of patterns of connectivity and dynamic social influence processes in unverified collective beliefs, and suggest modification of Dynamic Social Impact Theory to include belief polarization mediated by emergent "echo chambers."



## Introduction

Different rumors often take up long-term residence among different groups. For example, mirror-image tales circulated in the Detroit area in 1967–68 about a boy who was found mutilated in a shopping mall lavatory (Rosenthal, 1971): In the white community, the boy was white and the perpetrator was black while in the black community, the races of the victim and the perpetrator were reversed (c.f., Turner & Fine, 2001). (For different rumors about the "real" perpetrators of the September 11th attacks and the assassins of President John F. Kennedy see Krull, 2007; Polidoro, 2005). These examples raise questions about why both variation and persistence seem to characterize some rumors,

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particularly in the context of different social networks. The current research addresses these questions by investigating the role of social network patterns of connectivity in rumor emergence, variation, persistence, and belief.

According to one explanation, rumor is the quintessential collective sense-making activity (Bordia & DiFonzo, 2004; DiFonzo & Bordia, 1997) for understanding the social world and taking effective action (Cialdini & Trost 1998; Fiske, 2004). In social psychology, rumor sense-making is a close cousin to several other social cognitive and influence phenomena, including attitude polarization (Myers & Lamm, 1976), collective information-processing (Hinsz, Tindale, & Vollrath, 1997; Propp, 1999), collective memory (Baumeister & Hastings, 1997), group problem-solving (Laughlin, 1980), groupthink (Janis, 1982), jury decision-making (Devine et al., 2000), memetics (Heath, Bell, & Sternberg, 2001), shared reality formation (Hardin & Higgins, 1996), social comparison (Suls & Wheeler; 2000), social contagion (Moscovici, 1985), and transactive memory (Wegner, 1987). Ordinarily, perceptual processes (Heider, 1958) and culture (Baumeister, Zhang, & Vohs, 2004; Turner, 1964) help individuals make sense of the world but sometimes events do not cohere or fail to convey meaning leading people to collaborate with the group to understand the situation (Asch, 1955; Sherif, 1936; Shibutani, 1966). The communication that occurs in this context is *rumor* — unverified information statements in circulation arising in contexts of ambiguity, which function primarily to help people make sense and manage risk (DiFonzo & Bordia, 2007a). For example, the rumor that *Tropical Fantasy Fruit Punch* was owned by the Ku Klux Klan and contained a substance that sterilized African-American men, provided a (false) explanation for why the soda was only sold in minority neighborhoods and instructed hearers of color about how to avoid a negative outcome (Freedman, 1991; Harris, 1992).

Antecedents of rumor transmission that have received empirical confirmation include situational uncertainty, personal anxiety, involvement, belief in the rumor and distrust of official information sources (DiFonzo & Bordia, 2007a; Rosnow, 1991). Besides fact-finding, rumors may also be transmitted to promote relationship-enhancement and self-enhancement (Bordia & DiFonzo, 2005). However, the role of social network *patterns of connectivity* has been neglected in empirical investigations of rumor (DiFonzo & Bordia, 2007b), as it has in many other social influence phenomena (Mason, Conrey, & Smith, 2007). Further, rumor research has typically used simple and static frames that inadequately capture complex and dynamic processes (DiFonzo & Bordia, 2007b). Using a dynamic framework to conceptualize emergent processes, the aim of the current research was to investigate how patterns of connectivity in social networks affect both the transmission and belief in rumors. Specifically, we tested the hypothesis that networks characterized by differentiated groups of closely connected persons would lead to the emergence of spatially-proximate clusters of rumors, hinder the emergence of consensus about competing rumors, and – via rumor "echo-chambers" – lead to polarization of rumor belief.

To provide background for the studies, we first describe relevant structural properties of social networks and a relevant framework, Dynamic Social Impact Theory (DSIT; Latané & Bourgeois, 1996; Latané, & L'Herrou, 1996; Nowak, Szamrej & Latané, 1990), which focuses on the effects of different network patterns of connectivity. We situate this study within social psychological research on dynamic processes, rumor, and attitude polarization. The results of two experimental studies are reported, which investigated the network dynamics involved in the self-organization of rumor selection and belief over time and across social space. Networked personal computers were used to capture emergent processes in human collective behavior (Goldstone, Roberts, & Gureckis, 2008).

## Network configuration and clustering

People live in social space where they are closely connected to some people but loosely linked with others. "Network configuration" refers to the pattern, arrangement or structure of these social connections and linkages (Degenne & Forse, 1999; Scott, 2000). Such configurations should affect rumor propagation because rumors typically circulate within closely connected groups rather than between them. For example, friends were more likely to have heard a rumor that a community worker was a communist (Festinger et al., 1948) and military rumors tended to diffuse within established groups rather than between them (Caplow, 1947). Little is known, however, about how particular characteristics of network structure (described below) affect rumor propagation, despite their importance for the spread and reinforcement of social reality in communities over time (Demoulin, Leyens, & Dovidio, 2009; Hardin & Higgins, 1996; Suls & Wheeler, 2000).

The impact of social network configuration on attitudes and behavior has been investigated in a series of experiments and computer simulations by Latané and his associates (Latané, 1996; Latané & Bourgeois, 1996, 2001a; Latané & L'Herrou, 1996). *Lattice* (called "torus" in previous studies), *family*, *ribbon*, and *dynamic-random* (called "random" in previous studies) spatial arrangements were used in this work because they are intuitively interesting, vary in "cliquishness" while keeping a constant *degree* (i.e., the number of connections each individual possesses), possess no borders (and are thus generalizable to networks with large populations), and except for dynamic-random configurations, are spatially uniform (Latané, 1996; Latané & Bourgeois, 1996, 2001a; Latané & L'Herrou, 1996). To illustrate, sixteen-person family, lattice, and ribbon networks are diagrammed in Fig. 1. Each of the depicted faces represents an individual and lines indicate social connections (in network theory, a depiction of a network is referred to as a *graph*, entities – such as individuals – as *nodes*, and relationships between entities as *edges*; Butts, 2008). In the lattice network, each individual is connected to four "neighbors" – north, south, east, and west – in a uniform grid (in three dimensions, the network assumes the shape of a torus or donut). In the ribbon, an individual may be connected to four neighbors aligned as on a street — two on each side and two across the street. In the family configuration, the majority of social interactions are with one's "family" or local cluster of contacts; the people whom an individual knows also tend to know one another (cf., *community structure*, Jin, Girvan & Newman, 2001). In *random* configurations (not depicted), each person is linked with a randomly selected set of neighbors from the network; thus, random network connection

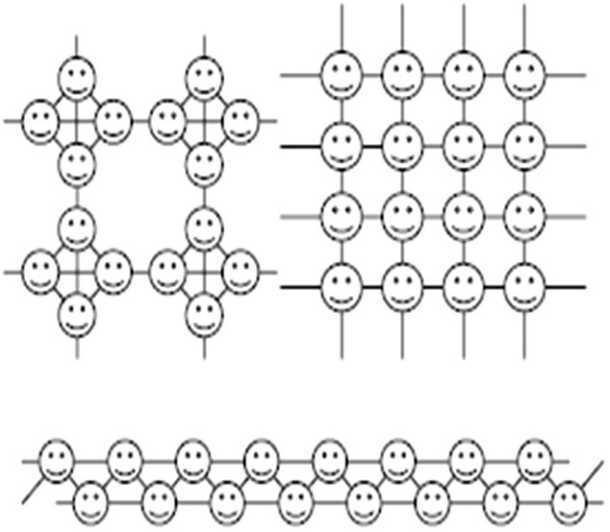

**Fig. 1.** "Family" (upper left), Lattice (upper right) & "Ribbon" Configurations. *Note:* lines at the edges of each structure "circle round" to connect with the face at the opposite edge.