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# A MULTIDIMENSIONAL APPROACH TO INTERORGANIZATIONAL COMMUNICATION VIA EMERGENCY MANAGEMENT ORGANIZATIONS AND THEIR TWITTER ACCOUNTS

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THEIR TWITTER ACCOUNTS

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THESIS

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A thesis submitted in partial fulfillment of
the requirements for the degree of Master of Arts in the
College of Communication and Information at the University
of Kentucky

By

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Lexington, Kentucky

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ABSTRACT OF THESIS

A MULTIDIMENSIONAL APPROACH TO INTERORGANIZATIONAL
COMMUNICATION VIA EMERGENCY MANAGEMENT ORGANIZATIONS AND
THEIR TWITTER ACCOUNTS

Using an adaptation of O'Connor and Shumate's (2018) theoretical propositions, this research examines interorganizational communication through the lens of multidimensional networks. Twitter data was crawled from a selection of emergency management organization accounts to measure affinity, representational, flow, and semantic networks. These data included the organizations' followed accounts, retweets, replies, and mentions. A thematic analysis of the organizations' mission statements was also conducted in order to inform the examination of the semantic networks. The results show a significant relationship between the number of accounts an organization follows and the likelihood of having its message shared. This research provides a further theoretical application of a network analysis method of studying interorganizational communication as well as a practical application for organizations seeking to increase their engagement on Twitter.

Keywords*:* interorganizational communication, multidimensional networks, multiplexity, Twitter, emergency management organization

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Signature

June 13, 2019
Date

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**Chapter One: Introduction**

The study of interorganizational communication often casts a wide net, which is reasonable due to the fact that interorganizational communication examines various processes of developing relationships between organizations, forms of communication exchanged between organizations, and structures that are created through these relationships and communications (Shumate, Atouba, Cooper, & Pilny, 2017). Twitter is one platform that provides an opportunity for organizations to form these connections with one another by encouraging multiple forms of collaboration (Lovejoy & Saxton, 2012). We see this collaboration evolve strategically with many nonprofit organizations purposefully deciding which accounts with which to associate themselves (Lovejoy, Waters, & Saxton, 2012). We also see collaboration evolve more organically, as was the case during Arab Spring when informal organizations were established and managed on Twitter following an extreme event (Tyshchuk et al., 2014).

In order to better understand the nature of interorganizational communication, a multidimensional network approach is quite applicable. A multidimensional network approach allows for a more detailed explanation of the processes, forms, and structures created in the complex environment of interorganizational communication because it looks at multiple types of relationships created by organizations.

This study begins with a brief overview of interorganizational communication, drawing in particular upon the novel approach of using multidimensional networks to understand interorganizational communication. This framework is applied to Twitter accounts from emergency management organizations with the goal of testing a number of O'Connor and Shumate's (2018) propositions about multidimensional networks.

Additionally, this study proposes its own research question regarding multiplexity and what it looks like in these interorganizational relationships as seen on Twitter.

## Chapter Two: Theoretical Approach

**Interorganizational Communication**

It has long been accepted that organizations are not structures that exist in an isolated vacuum. These structures can include a variety of organizations, ranging from tenuous alliances to long-term relationships. These structures, forms, and processes involving "the exchange of messages and the co-creation of meaning among organizations and their stakeholders" are referred to as interorganizational communication (Shumate et al., 2017, p. 1). The primary goal of studying interorganizational communication is to understand the types of organizing acts such entities conduct – acts such as "bridging, contracting, networking, cooperating, referring, collaborating, outsourcing, coordinating, co-branding, sharing information, creating new knowledge, and joint problem solving" (p. 1). While a few organizations may choose to maintain their autonomy in order to maintain the independence to choose their own course of action, many organizations are compelled to create relationships with one another because resources are not distributed equally (Cook, 1977). Forming interorganizational relationships may limit the autonomy of an organization, but this lack of autonomy is a tradeoff amongst the sharing of information and resources within the network. Organizations must also overcome language and semantic barriers in order to communicate with one another, as organizations tend to develop their own, internal method of sharing information (Shumate et al., 2017). The infrastructure itself also poses a potential challenge for organizations when sharing information, as they often must find

a way to balance the use of different information and communication technologies (ICTs). Ultimately, the study of interorganizational communication consists of examining the structures, forms, and processes created by these acts, or exchange of messages, in an effort to create meaning between organizations and their stakeholders (Eisenberg et al, 1985).

*Structures* exist in the form of rules and resources like exchange norms, power imbalances, and shared meaning between organizations (Giddens, 1984). *Forms* exist as types of interorganizational relationships, ranging from a solely information-sharing interaction within communities of practice to a richer, alliance-based relationship where information, resources, and outcomes are shared amongst organizations (Shumate et al, 2017). *Processes* are established and routine communication habits between organizations. At their core, these processes are responsible for the creation, maintenance, and dissolution of interorganizational relationships (Poole, 2012). (For example, a majority rule, centralized decision making, etc.)

Stakeholders and other public entities are also a focus of interorganizational communication research, as organizations are not closed systems, but are instead influenced by their environments. Individuals "who are invested in and/or affected by organizations… receive and co-construct messages about organizational affiliation" (Shumate et al., 2017, p. 2). Stemming from the examination of message sharing and the co-creation of messages, interorganizational communication research seeks to understand how organizations create meaning with one another as well as with their stakeholders.

Systems theory "suggests that an organization is an open system interacting with its environment" (Kapucu, 2006, p. 210). Organizations act as systems with structure,

though the structure is situated in the social systems from the environment rather than physical parts of the organization. While environmental stimuli could include concrete influences such as natural disasters or economic development, intangible influences including expectations and values from the public also alter an organization's structure (Katz & Kahn, 1978). In a similar vein as systems theory, contingency theory posits that the environments in which organizations are situated place different requirements on the organization (Scott, 2001). The nature of the organizations' environments necessitates different methods of management and communication depending on external input.

Building from the understanding of organizations as systems influenced by their environments, organizational theory suggests that the interaction between organization and environment shapes the organization itself and creates boundaries for the organization (Kapucu, 2006). Interorganizational communication is one of the primary methods in which organizations interact with their environments. Communicating with other organizations and creating relationships allows an organization to trade both resources and information. These interactions help an organization define their own goals and values in conjunction with the larger system. The particular nature of emergencies often creates an environment of uncertainty. According to Dynes and Qurantelli (1977), the rate of decision-making increases during emergencies, requiring rapid information sharing between organizations. This information sharing does not occur solely between organizational higher-ups. "Managers, directors, or staff in the lower levels of the organizations contribute to interorganizational communication, as well" (Kapucu, 2006, p. 212). Therefore, having a clear understanding of organizational boundaries and relationships prior to emergencies allows for more effective interorganizational

communication.

Eisenberg et al. (1985) introduced a network approach to studying interorganizational communication by examining the ties between organizations. The nature of interorganizational communication research lends itself well to the application of network theory in order to better understand the structure and flow of messages between organizational entities.

**Network Approach**

A network approach to study interorganizational communication allows for one of the most detailed examinations of relationships between organizations because it maps out the entire system in a population of organizations (Frandsen & Johansen, 2015). Communication networks are a type of social network; social networks consist of "a set of entities and relations in a social system" (Contractor & Forbush, 2017, p.1). These entities, referred to as *actors*, can be individuals or groups of individuals in the form of teams or organizations. Just as with the study of interorganizational communication, the study of social networks looks at the relations that these actors form through the messages they transmit, exchange, and interpret (Shumate & Contractor, 2013, p. 449).

Actors in a network are represented visually in graphs and are referred to as nodes. A multimodal network exists when there are two or more different types of actors. Relations between nodes are often called ties. These ties can be directed or nondirected depending on the flow of information. If one node (A) seeks information from another node (B), but that node does not reciprocate the information seeking behavior, then the result of this interaction is a directed tie (Contractor & Forbush, 2017). The strength of node relations can also be considered when analyzing a network.

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Relations can be binary – measured solely based on whether the tie between nodes is present or absent. Relations can also be valued – measured by variables such as the regularity or extent of communication between actors. Networks that contain more than one type of relation are referred to as multirelational or multidimensional.

By focusing on an entire network of organizations rather than a single organization, communication research is able to better understand how the relationships between organizations are negotiated and evolved (Provan, Fish, & Sydow, 2007). Human and Provan (2000) used a network approach to interorganizational communication to understand how small firms used networks to find legitimacy and success. This particular study illustrates the versatility of a network approach by examining three different types of networks amongst the firms – form, entity, and interaction – to establish a full picture of the system. Using a network approach, Saxenian (1994) studied companies in Silicon Valley in order to get a look at the relationship between local organizations and their regional economies. This application of a network approach discards the "sharp distinction between what occurs inside and outside the firm" and instead develops a more complex picture of how the organizations interact with one another and their environments (p. 41). Powell et al. (2005) examined how specific structural decisions within biotechnology organizations lead to the development of novel network opportunities, demonstrating how a single organization's operational choices can alter connections within the entire network.

Each of these studies demonstrates how focusing on singular organizations or their members can lead to the exaggerated importance of the individual while the vital nature of the collective remains undervalued (Proven et al., 2007). Further, Human and

Provan's (2000) study indicates the value in taking a look at the multidimensional nature of networks amongst organizations. A multidimensional network approach provides insight on the multitude of networks that exist between organizations.

**Multidimensional Networks**

"Unidimensionality is a significant oversimplification of the complexity that exists in most social networks" (Contractor, Monge, & Leonardi, 2011, p. 686). Multidimensional networks are unique even within the field of network analysis. Many network studies look at a single node and the corresponding relations between that node and other similar entities in its network. As illuminated by O'Connor and Shumate (2018), "a multidimensional approach accounts for the possibility that a single node can have more than one type of relationship" (p. 400), acknowledging the complicated nature of relationships. This multidimensional view inherently suggests that interorganizational communication can be brought to light by examining both the context and the content of the network (Shumate & Contractor, 2013). Contractor et al. (2011) points out the shortcomings of a unidimensional examination with their analogy of co-worker relationships. Many employees engage with one another in a multitude of contexts – everything from accomplishing tasks at work to maintaining social relationships. In order to examine these networks with a unidimensional approach, a separate analysis would need to be used for each relationship. A multidimensional approach instead offers a look at networks through the lens of multiple types of relationships.

**Theoretical assumptions.** O'Connor and Shumate (2018) offer a multidimensional network approach to answering questions about strategic communication within interorganizational networks, specifically regarding novel

examinations of interconnectivity between organizations that goes beyond the typical organization-stakeholder dyad.  This thesis proposes an exploration of the strategic communication networks discussed by O'Connor and Shumate (2018) and represents the first empirical study to date to do so.

Using a multidimensional network approach as a theoretical lens, the following assumptions can be made about the complex realm of interorganizational relationships and strategic communication:

- An organization is embedded in a number of other organizations' networks. Organizations may have relationships with one another in the network without being involved in the original network.

- The organizations in these networks are open systems and therefore reactive to environmental factors, "including changes in the opinions and preferences of stakeholders" (O'Connor & Shumate, 2018, p. 403).

- The goal of strategic interorganizational communication is to affect these stakeholder networks, including organizational relationships.

**Types of multidimensional networks.** The following multidimensional networks are selected from O'Connor and Shumate (2018). These networks are also relationship strategies that organizations often apply to shape their networks. Shaping networks allows organizations to impact their outcomes within their environment (Sommerfeldt & Yang, 2017).

*Flow.* Tracing the flow of information through networks and mapping the relationships which allow that information to travel has been a goal of social network analysis from its inception (Haythornthwaite, 1996). Flow networks show how

information, data, and other resources move from one actor to another (O'Connor &

Shumate, 2018). Flow occurs between a variety of different nodes: individuals,

technologies, or other artifacts entirely (Shumate & Contractor, 2013). Flow networks

often develop naturally over the course of collaboration between network actors, as

sharing information is a necessary step in producing joint outcomes. Whereas affiliation

and representational networks have ties that tend to grow and maintain over time, flow

networks rapidly decay if not maintained.

*Affinity.* "Affinity networks describe the socially constructed communication

relationships that are understood between parties" (O'Connor & Shumate, 2018, p. 405).

The understood relationships between entities typically have either positive or negative

valence (Shumate & Contractor, 2013). Affinity networks do not necessarily rely on the

movement of information between entities in the network. Instead, affinity relations may

be represented by "friendship, collaboration, and alliances" (p. 452). Past studies have

often focused on affinity ties between an organization and its stakeholders, illustrating a

resource for the organization in the form of potential attention (Bortree & Seltzer, 2009).

*Representational.* Representational networks are how organizations acknowledge

a link with other organizations with the primary intended audience being the public. This

could take the form of institutional positioning by providing a type of face-presentation to

other entities (McPhee & Zaug, 2009). They represent an organization's goals, its

character, or other such "external rationalization" relative to another organization (p. 81).

Hyperlink networks, shout-out endorsements, and bibliometric networks are a few

examples of representational relationships (Tateo, 2005; So, 1998). Representational

networks also provide an indication of the type of relationship between actors. These

networks do not rely on the actual exchange of messages, but they still represent an actor's link to another actor. The representation of actor's relationship with another actor is apparent to individuals outside of the network (Shumate et al., 2013). The ability for actors outside of the network to be able to identify the relationship is key to identifying representational networks.

*Semantic.* Crable and Vibbert (1985) argued that an organization's communication strategies are informed by the public interpretation of the organization's messages and issues. These networks describe the goals, beliefs, and values with which organizations identify, as well as the interpretations of these goals, beliefs, and values that stakeholders assign to the organizations. These ties, similar to affinity and representational, do not decay quickly, but are considered more complex, as they focus on the shared meaning between entities in the network. Semantic networks can be found by studying network actors' shared interpretations of a concept (Monge & Contractor, 2001). Changes in one organization's value system or goal have the potential to create a cascading effect through the network. According to Contractor and Grant (1996), the time it takes for a value or goal to converge depends on the semantic network's density.

**Multiplexity**

Much of the research on multidimensional networks focuses on one relationship between actors at a time. While understanding the individual relationships between network actors is an important first step, it is important to take into account the complicated nature of networks. Many network actors will be connected with more than one type of relationship. For example, two organizations may have an affinity relationship in which they collaborate on projects together. As previously mentioned,

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over the course of this relationship, organizations will likely develop a flow relationship between them, as well, as they share information and resources in the process of collaborating. They may also establish a representational relationship by broadcasting their collaboration to other organizations or stakeholders in their network. It is also possible that these two organizations share a semantic relationship, as overlapping values could be the spark that encouraged the organizations to collaborate. In this hypothetical example, all four of the aforementioned relationships exist at the same time rather than in isolation from one another, necessitating a more in-depth examination of the reality of their relationship.

One method of understanding the complexity of interorganizational relationships is by examining a network's multiplexity.  Multiplexity is defined "as the occurrence or interaction of two or more different types of communication relationships between the same actors" (Shumate, Atouba, Cooper, & Pilny, 2017, p. 20).  Each relationship between organizations can affect other relationships, though research is sparse on exactly how interorganizational relationships become multiplex (Ferriani, Fonti, & Corrado, 2012).

**Theoretical assumptions**. Multiplexity suggests that communication relationship between organizations can affect other relationships between the organizations and is necessarily embedded within the scholarship of multidimensional networks. Due to that fact, the following assumptions about multiplexity can be made:

- Organizations are embedded in a variety of different relationships

- The aforementioned relationships interact with or influence each other.

- The interdependent nature of these relationships influences organizations.

Understanding the ways in which interorganizational communication relationships and networks influence one another is a necessary step forward in research, both theoretically and practically.

**Emergency Management Organizations**

Much of recent research on emergency management organizations focuses on the relationships between organizations and their shareholders or public (Latonero & Shklovski, 2011). This area of research is often interested in communicating with individuals affected by disaster (Hughes & Palen, 2009) as well as the volunteers who are active following disaster (Sutton, Palen, & Shlovski, 2008). The other area of research that looks at emergency management organizations focuses on how the organizations coordinate immediate relief efforts following a disaster (Bharosa, Appelman, & de Bruin, 2007). A gap in research exists when it comes to the relationships these emergency management organizations have with one another outside the time frame of eminent disaster.

The aforementioned literature indicates that emergency management organizations are consistently plugged into the communities in which they are situated in order to maintain awareness of their environments. Due to this fact, the organizations are consistently active, as well. Beyond being actively aware of community issues, these organizations have significant reason to interact with one another outside of emergency coordination situations. Following this logic, there is ample opportunity to apply social network analysis to get a better picture of the interorganizational relationships between emergency management organizations during day-to-day operations.

**Twitter as Platform**

As previously mentioned, Twitter provides instances of both strategic relationship formation and spontaneous collaboration. The micro-blogging social media platform allows users to create messages for a large public, direct specific messages to users within their network, link to outside websites, and provide geo-location data in conjunction with tweets. While Twitter's initial launch saw mostly "personal and seemingly inconsequential updates on the goings-on of the everyday life" (Latonero & Shklovski, 2011, p. 2), such minor applications quickly evolved when audiences realized the affordances of the platform. In particular, the cellular nature of the social media platform made it exceptionally useful in emergency situations that required information dissemination to the public as quickly as possible.

Looking beyond the ability to rapidly diffuse information to a wide audience, Twitter has other elements that lend well to network analysis: the platform allows users to see which accounts an individual or organization is following or is followed by, an account's interactions with other users can easily be tracked, and while some accounts are private, the vast majority of emergency management organizations are open to public access without even needing a Twitter account. For the purpose of this research, Twitter is also an ideal platform thanks to the ability to collect large amounts of data with relative ease.

In the next section, the culmination of past literature regarding interorganizational communication, multidimensional networks, and multiplexity come together in this research's hypotheses and research questions.

## Chapter Three: Hypotheses and Research Questions

The first three hypotheses in this study are adapted from O'Connor and Shumate's (2018) propositions on multidimensional networks, while the final research question stems from the literature on multiplexity in interorganizational communication.

According to O'Connor and Shumate's (2018) first proposition, "as the affiliation network around an organization grows, the number of actors… that share the organization's message increases" (p. 407). On social media platforms like Twitter, the followed relationship is an example of an affinity relationship while the retweet functionality is an example of a representational relationship. The more organizations are able to attract followers, the more likely those followers are to spread those messages.

**H1:** The larger an organization's Twitter followed network, the more likely that organization is to be retweeted by other organizations in their network.

From the previous hypothesis, this research logically transitions to the second proposition by O'Connor and Shumate (2018): "The size of an organization's representational network is positively related to the number of information sources about an organization" (p. 408). This hypothesis focuses not only on how organizations get their messages to spread more effectively, but how they get other organizations and stakeholders to engage in communication with the organization through flow networks. In this case, the more an organization retweets messages from other organizations in its network, the more likely it is to have other organizations and stakeholders engage in dialogic communication. For the sake of this research, direct communication can be seen both in Twitter replies and mentions, so the second hypothesis is divided as follows:

**H2a:** The more an organization retweets messages from its network, the more

likely other organizations in its network are to reply to their messages.

**H₂ᵦ:** The more an organization retweets messages from its network, the more likely other organizations in its network are to mention them in their messages.

The final hypothesis in this research that is based on O'Connor and Shumate's (2018) propositions examines the concept that "actors that are central in representational networks are more likely to affect semantic networks through their communication" (p. 411). The logic of this proposition suggests that organizations align themselves with other organizations that share their goals and values. These goals and values could be certain brands that the organization aligns itself with (Han, Choi, Kim, Davis, & Lee, 2013), internal or external issues that are important for the organization to manage (Dutton & Jackson,1987; Heath & Palenchar, 2008), or overarching beliefs that guide the organization while being expressed to the public. In the case of this hypothesis, the mission statements provided by the organizations serve as a clear, public revelation of their goals and values which serve as the semantic framework.

**H₃:** An organization that frequently retweets other organizations is more likely to have similar goals and values to those organizations.

Stemming from the literature around multiplexity, a final research question emerges. This research question is exploratory and aimed at understanding which communication patterns on Twitter influence one another. According to the theory of multiplexity, it is highly unlikely that organizations are embedded in only one type of relationship. The goal of asking this question is to understand the more complex patterns that exist between or among organizations, as well as the effects these patterns have on the communication and relationship between organizations.

**RQ₁:** Which other organizational relationships interact with one another?

## Chapter Four: Methods

**Sample**

The sample was collected through snowball sampling. The sample included an initial seed of five Twitter accounts: a primary emergency management institution, a nonprofit, a healthcare provider, a news outlet, and a school system. These accounts were selected due to their community roles as emergency management organizations and the information posted in their tweets regarding emergency situations. After the initial accounts were chosen, an examination of the accounts they were following led to a selection of other relevant emergency management institutions. The boundary of the sample was the county line, within which included both city and county accounts. By the end of this collection, forty emergency management organizations were used in this analysis.

**Measures**

Using NodeXL to crawl the Twitter data, the organizations' followers, replies, mentions, and retweets were collected. NodeXL is a social network analysis program used for crawling and collecting online network data (Smith et al., 2010). From this method, I searched the handle of each organization, and data was collected from January 19, 2009 to January 30, 2019. In total, 716,617 tweets were collected. Of those tweets, eighteen reply connections, 128 mention connections, and 153 retweet connections were discovered. Based on the aforementioned literature on multidimensional networks, these data were categorized and measured as follows:

**Flow networks.** Both mentions and replies serve as flow networks. A flow

network looks at the transference of information. Mentions and replies indicate direct communication between organizations, and while the communication is also available for public observation, it is a more direct relationship between the organizations themselves than retweets because they are directly including the organization in a message. Flow networks are measured using outdegree mentions and outdegree replies, and the network visualizations can be seen in Figures 1 and 2.

Figure 1: Reply network.

Figure 2: Mention network.
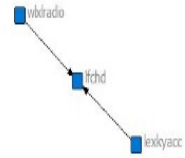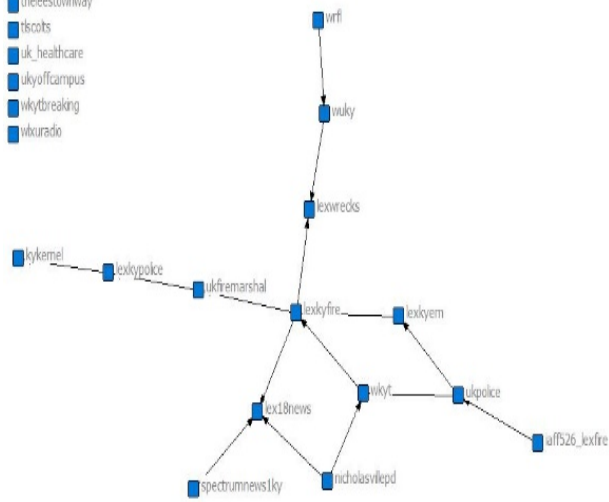
**Affinity networks.** An organization's follower network serves as an affinity network. Affinity networks do not serve as direct transfer of information, but instead act as an indicator of collaboration or the co-construction of friendship between actors in the network. The follow feature on Twitter is a clear indication of friendship between organizations. However, the network is directed; one organization can choose to follow another organization while that organization can choose to follow back or not follow at all. Affinity networks are measured using indegree follows, and the network visualization can be seen in Figure 3.
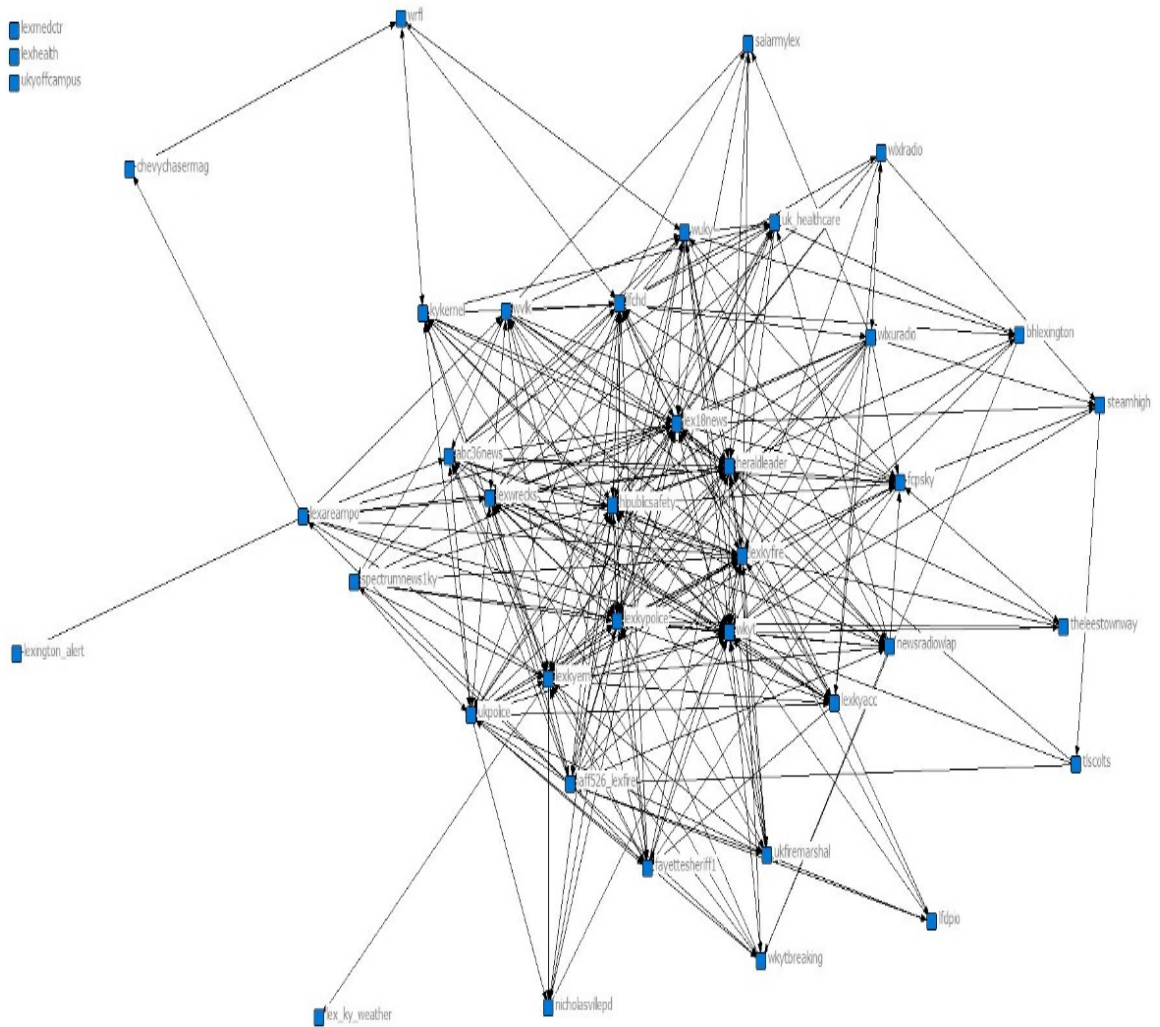
Figure 3: Follow network.

**Representational networks.** Retweets serve as representational networks. Like affinity networks, representational networks are not an examination of the flow of information itself, rather they serve as a representation of the relationship between actors. This relationship should also be apparent to outside observers. In this case, an organization retweeting messages from another organization in its network makes the relationship clear to the public and stakeholders, as well. Representational networks are measured using indegree retweet, and the network visualization can be seen in Figure 4.

Figure 4: Retweet network

**Semantic networks.** The organizations' mission statements serve as semantic networks. Semantic networks are an indication of the organizations' goals and values, and mission statements are a clear description of what goals and values are important to an organization.  This information that informs these networks exists outside of the Twitter platform, though the links to websites with the mission statement information can be found on the organizations' Twitter pages. Semantic networks are measured using centrality semantic, and the network visualization can be seen in Figure 5. In the next section, these mission statements that informed the semantic networks will be discussed.
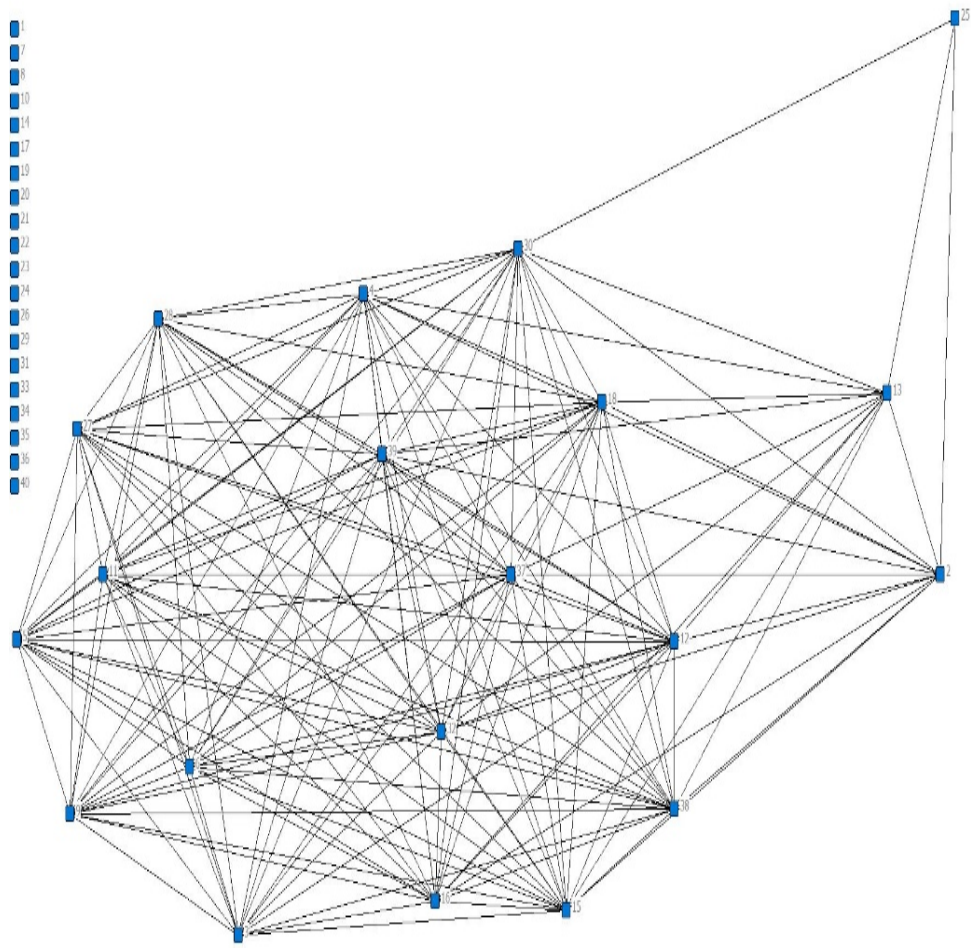
Figure 5: Mission statement network.

**Thematic Analysis of Mission Statements**

Mission statements were gathered from each organization's primary website (as linked on their Twitter account) and analyzed using an inductive thematic analysis, a method of identifying patterns or themes in qualitative data (Maguire & Delahunt, 2017). According to Braun and Clark (2006), there are two types of themes that emerge during a thematic analysis: semantic and latent. *Semantic* themes regard the surface meaning present in the data and do not reach much further than what is explicitly stated in the data. *Latent* themes are a look beyond the surface level information and begin to "identify or examine the underlying ideas, assumptions, and conceptualizations… that are theorized as shaping or informing the semantic content of the data" (p. 84). This research searched for both semantic and latent themes. Several of the themes identified are labeled after the specific language used in the mission statements, while other themes are extrapolated from the language in the mission statements.

Mission statements were collected from the organizations' primary websites. These websites were located through the organizations' Twitter pages. Once on the organizations' primary websites, mission statements were gathered from the "About Us" sections or other pages describing the organizations' goals. The majority of the mission statements were explicitly labeled as "Mission Statement", though seven of the collected statements were present on the organizations' websites but not specifically labeled as "Mission Statements". Once collected, the following themes emerged from the mission statement data.

**Safety and protection.** This theme reflects organizations' goal of preventing harm, immediate injury, or loss of property, whether in times of emergency or otherwise

(n = 7). In several of the mission statements, the phrases "safety", "security", and "protection" are used and therefore borrowed for the name of this theme.

> *The University of Kentucky Police Department's mission is to promote a **safe** and **secure** campus environment for students, faculty, staff and visitors at the University.*

Throughout this theme, organizations offer explanations of their immediate, coordinated efforts to ensure safety, often elaborating on the specific resources available to the community in times of need.

> *The primary purpose of the Sheriff's Office, as a law enforcement agency, is to **safety and protection** of life and property.*

**Health and wellness.** The theme of health and wellness represents a more long-term form of defense that is distinct from the immediacy presented in the previous theme of Safety and Protection (n = 3). This theme also borrows its title from the specific words that appeared frequently during analysis: "health" and "wellness".

> *Helping Lexington be **well**.*

Organizations that promote health and wellness often express values of preventing illness and educating the population on how to remain healthy.

> *UK HealthCare is committed to the pillars of academic health care—research, education and clinical care. Dedicated to the health of the people of Kentucky, we will provide the most advanced patient care and serve as an information resource. We will strengthen local **health** care and improve the delivery system by partnering with community hospitals and physicians.*

**Community as partners.** There is an emphasis on collaborating with members of

the community throughout this theme of Community as Partners (n = 8). Terms such as "community input" and "partnership" appear frequently throughout this theme.

> *Responsible for coordinating the transportation planning process for our region and for seeking meaningful **input** from our stakeholders and the public in that process.*

Organizations emphasize both their willingness and desire to have an open line of communication with the citizens they serve in order to provide the best possible service. The organizations who emphasize this theme express an openness to learning from the community and adapting to their specific needs.

> *We will provide quality police services ethically, fairly and equally in **partnership** with the members of our community.*

**Organizations as informed leaders.** The previous theme, Community as Partners, focuses on learning from the community, while this theme, Organizations as Informed Leaders, highlights the organizations' knowledge and expertise for the public (n = 10). These themes stand to both highlight and contrast one another. The analysis found that many organizations tended to express both themes simultaneously. The organizations emphasized a willingness to listen to the community, but it was often the input from the community that allowed them to take on the role of experts. This theme often used words like "inform" or "information".

> *The station's goal is to inspire and **inform** its community.*

The organizations often frame this information as a source of clarity for citizens when they may be facing uncertainty in times of emergency or otherwise. This theme is distinct from Safety and Protection in that information is one of the only things provided in times

of emergency instead of the full arsenal or resources or man-power that is described in Safety and Protection.

> *Serve our listeners by providing local, timely, relevant content and critical public*
> *safety **information**.*

**Religious guidance.** While rather niche, this theme stood out in the mission statements as unique and worthy of note (n = 2). The organizations whose mission statements emphasize religious guidance or religious origins were not numerous from the sample, but the theme was distinct where it appeared.

> *To demonstrate the love of **Christ** by providing and coordinating care and*
> *improving health in our communities.*

These organizations promote service that is based in religious beliefs and orient their goals in that background. These organizations often utilized several other themes in conjunction with Religious Guidance, but the spiritual provisions were the foremost value for organizations with this theme present.

> *The Salvation Army, an international movement, is an evangelical part of the*
> *universal Christian church. **Its message is based on the Bible**. Its ministry is*
> *motivated by the love of God. Its mission is to preach the gospel of Jesus Christ*
> *and to meet human needs in His name without discrimination.*

**Control Variables**

This study used regression analysis and controlled for each organization's activity on Twitter. Controlling for an organization's activity on Twitter accounts for the alternative hypothesis that the results can be explained by how frequently involved an organization is on Twitter. Taking into account the Twitter activity of each organization

was accomplished by controlling (1) the number of days the organization's account had been using Twitter (age of account), (2) the total number of tweets by the organization, (3) the total number of favorites by the organization, and (4) the total number of other Twitter accounts the organization was following.

**Chapter Five: Analysis**

A Pearson's correlation was conducted to determine the degree to which the organizations in the data set were related. This correlation, along with the means and standard deviations, can be seen in Table 1.

Table 1. Descriptive statistics and correlations.

| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) | Indegree follow | 1.00 | | | | | | | | |
| (2) | Indegree retweet | .66 | 1.00 | | | | | | | |
| (3) | Outdegree reply | .32 | .04 | 1.00 | | | | | | |
| (4) | Outdegree mention | .50 | .54 | .28 | 1.00 | | | | | |
| (5) | Centrality semantic | .08 | .09 | .00 | .18 | 1.00 | | | | |
| (6) | Age | -.12 | .39 | -.26 | .21 | .03 | 1.00 | | | |
| (7) | Tweets | .27 | .40 | -.14 | .01 | -.05 | .46 | 1.00 | | |
| (8) | Favorites | .13 | .24 | .25 | .37 | .13 | .36 | .56 | 1.00 | |
| (9) | Followed | .13 | .37 | -.12 | .31 | -.10 | .46 | .60 | .38 | 1.00 |
| | *Mean* | 3.40 | 3.80 | .45 | 4.20 | 4.85 | 2848.80 | 17915.43 | 601.55 | 1301.43 |
| | *SD* | 2.97 | 4.27 | .71 | 3.89 | 6.13 | 956.55 | 36221.52 | 753.44 | 2388.26 |

This study also conducted a regression analysis to examine the relationship between affinity, representational, flow, and semantic networks ($H_1$, $H_{2a-b}$, and $H_3$), as seen in Table 2. Regression analysis is a statistical procedure used to estimate the relationship between dependent and independent variables, specifically when predicting a criterion variable based in the predictor variable (Lane, 2003). The predictive power of regression analysis makes it appropriate for application in this research.

Table 2. Regression results.

|  | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
|  | Indegree retweet | Indegree reply | Indegree mention | Indegree follow |
| Followed | .09 | -.54** | -.21 | .15 |
| Tweets | -.04 | .42* | .76** | .24 |
| Favorites | -.03 | .15 | .20 | -.04 |
| Age | -.46** | .00 | -.18 | .22 |
| H1: Indegree follow | .71** |  |  |  |
| H2a: Indegree retweet |  | .48** |  |  |
| H2b: Indegree retweet |  |  | .12 |  |
| H3: Centrality semantic |  |  |  | .12 |
| $R^2$ | .66 | .46 | .58 | .24 |

Note: * signifies $p < .05$, ** signifies $p < .01$. Entries are standardized beta coefficients.

A Quadratic Assignment Procedure (QAP) correlation analysis was conducted to examine the relationship between other organizational networks outside the main

hypotheses (RQ$_1$), as seen in Table 3. QAP is often used in social network analysis as a

resampling-based method frequently used to correct standard errors (Krackardt, 1987).

Essentially, QAP repeatedly scrambles the dependent variable data through multiple

permutations in order to produce several random data sets with the dependent variable.

From these random data sets, multiple analyses can be run (Simpson, 2001). Essentially,

QAP is a method to run a correlation analysis between networks.

Table 3. QAP correlations across five different networks to answer RQ$_1$.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| (1) Semantic | 1.00 | | | | |
| (2) Followed | .05 | 1.00 | | | |
| (3) Retweet | .07 | .14** | 1.00 | | |
| (4) Reply | .01 | .07* | -.04 | 1.00 | |
| (5) Mention | .10* | .15** | -.11* | -.04 | 1.00 |

*Note:* * signifies *p* < .05, ** signifies *p* < .01.

## Chapter Six: Results

H$_1$ examined the relationship between the size of an organization's follower

network and the likelihood that an organization would mention or reply to other

organizations in their network. H$_1$ measured whether the size of an organization's

followed network (in-degree follow) would affect the odds of others sharing the

organizations' messages (in-degree retweet). H$_1$ found a significant relationship between

the followed network and the retweet network ($\beta$ = .71, *p* < .01). H$_1$ was fully supported

even after controlling for Twitter activity.

H$_2$ examined the proposition that the more an organization gets its messages

retweeted (in-degree retweet), the more likely other organizations and stakeholders are to

engage with that organization. This research used both replies and mentions as indicators

of this increased engagement, or flow. $H_{2a}$ measured the relationship between retweets and replies while $H_{2b}$ measured the relationship between retweets and mentions. $H_{2a}$ did find a significant relationship between retweets and replies ($\beta = .48$, $p <. 01$). $H_{2b}$ did not, however, find a significant relationship between retweets and mentions ($\beta = .14$, $p = .33$). Therefore, $H_2$ was partially supported.

$H_3$ examined the relationship between the number of retweets by an organization and the similarity in the organizations' mission statements. The relationship between these networks was not significant ($\beta = .12$, $p = .45$), therefore $H_3$ was not supported.

The research question served as an exploration of other network relationships beyond those that were extrapolated from O'Connor and Shumate's (2018) propositions. The results of the QAP correlation analysis indicate a significant positive relationship between retweet networks and followed networks ($\gamma = .14$, $p < .01$) as well as mention networks and follower networks ($\gamma = .15$, $p < .01$). The QAP correlation also indicated a significant negative relationship between mentions and retweets ($\gamma = -.11$, $p < .05$).

**Chapter Seven: Discussion**

The purpose of this research was to test a number of O'Connor and Shumate's (2018) propositions about multidimensional networks in order to better understand interorganizational communication. $H_1$ examined the relationship between the size of an organization's followed network and the likelihood that other organizations in the network would share said organization's message, and the results suggest that this is a significant likelihood. This concept can be likened to ideas based in collective action in which a variety of communicative methods are used as tactics to increase cooperation within large groups (Smith, 2010). One of these methods is reciprocity. Reciprocity

posits that social norms exist which encourage individuals to respond with a positive action when they are on the receiving end of a positive action (Fehr & Gächter, 2000). The current research extends this to multiplex reciprocity. In the case of interorganizational communication, if an organization is followed by another organization, therefore being drawn into their affinity network, they may feel the need to reciprocate this action by further sharing that organization's message.

In the Twitter environment, organizations interested in having their message shared by more individuals in the hopes of reaching a larger audience can help accomplish this by following organizations and other accounts within their target network. The larger the affinity network an organization is part of, the larger the representational network from which it will benefit. This becomes effective when organizations are interested in shaping their networks or breaking into new networks altogether by strategically following organizations with the kinds of audiences an organization hopes to reach.

Once an organization has expanded the number of accounts it follows and has access to more accounts that will potentially share its information, the next step may be to increase the flow of information between the organizations in the network or the stakeholders of the organizations. In other words, it may be also useful for organizations to begin engaging more dialogic communication on Twitter. However, an increase in the sharing of information does not necessarily lead to an increase in the flow of information between accounts.

$H_2$ examined the relationship between an organization's representational network and its flow network. In this scenario, the idea that an organization whose message is

being shared more will also benefit from more information sharing is only partially supported. Sharing information to other individuals may be an easy reciprocal task for organizations in the same affinity network, but developing a continuous flow of information may not be as simple. According to Shumate and Contractor (2013), flow networks require almost constant maintenance in order to be sustained. Without this maintenance, flow networks tend to dissolve, unlike affinity or representational networks.

On Twitter, the constant maintenance needed to preserve a flow of information between accounts may be too difficult. This maintenance difficulty could stem from several factors. The first factor could be the channel itself. Twitter replies and mentions are just as public as tweets and retweets. They are also just as limited by the 280-character count. If an organization wants to be involved in a meaningful exchange of information, it is possible that it will migrate the flow of communication to a different channel that allows for more private, in-depth exchanges. Another factor could once again be in response to the need to reciprocate. An organization whose message is retweeted might find it easy to reply to a tweet by that organization, but crafting an original message which mentions that organization might reach beyond the bounds of what the organization feels that it owes for its message being shared.

Both replies and mentions were used to measure flow networks, as they involve the direct exchange of information. Some scholars may argue that any public interaction on Twitter could serve as a representational network due to the fact that any stakeholder can view the interaction as part of an organization's relationship with another organization, but this research argues that the purpose of replying or mentioning an account on Twitter fits more appropriately in the realm of direct information sharing

rather than representing a relationship to the public.

This research's final hypothesis examined the relationship between representational networks and semantic networks. $H_3$ suggested that an organization that frequently shared the messages of other organizations was more likely to share the goals, values, or beliefs of those organizations whose messages it shared.

On Twitter, purposefully targeted semantic networks could take the form of brand affiliations in which an organization makes clear, whether explicitly or implicitly, that it orients itself with the goals and values of another organization or social movement. Semantic networks may also form without direct influence from an organization. These relationships occur naturally as organizations communicate and collaborate with one another. This collaboration often involves an organization sharing information about the organization with which it is collaborating, especially if the organization mirrors its values. It is also possible that organizations exist in a semantic network with other organizations that serve the same purpose within the environment they are embedded. This particular idea is present in $H_3$, and this research as a whole, as all of the organizations in the sample stem from emergency management and community outreach organizations. However, the frequency at which organizations shared each other's messages did not predict the likelihood of sharing these goals, value, or beliefs.

There are a few reasons that could explain why $H_3$ was not supported. The first of these reasons is the admittedly atheoretical nature of the current research regarding semantic networks. One of the allures of testing O'Connor and Shumate's (2018) propositions included the wide opportunity to fill in some of the blanks in network research up to this point, but they admit that the early framework for analyzing semantic

networks is a bit sparse. It is possible that a different measure of semantic networks could provide an alternative solution. The second reason that could explain why $H_3$ was not supported could be the number of available mission statements from the sample. Of the forty organizations used to collect followed, retweet, reply, and mention networks, only twenty had content from their primary websites that could be categorized as mission statements. The final reason why $H_3$ was not supported could be due to the fact that organizations are interacting with a diverse set of other organizations on Twitter rather than solely interacting with organizations that are similar to themselves.

When examining the data for additional relationships between organizations for this study's research question, a few networks outside those described in the hypotheses were revealed to be significant. The first of these relationships is between the affinity network and the flow network. This relationship makes quite a bit of sense. The QAP Correlation indicated a strong, positive relationship between the follow network (affinity) and both the reply and mention networks (measures of flow). In this scenario, an organization follows another organization, that is an act of co-creating some type of collaboration, alliance, or friendship. By establishing this connection, it makes sense that an organization would also desire an exchange of information, hence the establishment of a flow relationship through replies and mentions. Mutual self-interest and theories of collective action have also been attributed to the relation between affinity and flow networks in previous research (Shumate & Contractor, 2013).

The second relationship that was discovered to be significant was between the retweet network and the mention network. However, these two networks had a significant, negative relationship. Replies and mentions serve as measures of flow, and

while $H_{2a}$ was confirmed with a significant, positive relationship between retweet and reply networks, there was no significant relationship between retweet and mention networks for $H_{2b}$. Finding a negative relationship between these two networks using the QAP correlation can be explained a few ways. One of the explanations for this relationship is that organizations may not see the act of sharing a message via retweet as worthy of more involved reciprocation in the form of information sharing through mentions. Another explanation for this relationship is that the organizations involved in the relationship may be interested in sharing the message of another organization to further their representational relationship – especially as it enhances the relationship from an outside, stakeholder perspective – while not having relevant information to exchange. In order to pinpoint exactly why stakeholders sharing an organization's message could result in the decrease of stakeholders mentioning the organization, further research is required.

**Practical Applications**

Beyond providing theoretical explanations of multidimensional networks, this research provides the beginning of a framework which organizations can utilize to shape their networks and boost the spread of their message on Twitter.

**Follow more to share more.** According to the results of the first hypothesis, the more accounts an organization follows, the more likely it is to see their message being shared across the platform. If an organization is interested in increasing the spread of its message to a larger audience, it could simply follow more Twitter accounts. It may benefit the organization to strategically follow other organizations whose messages it may be willing to share.

**Share more to interact more.** The second hypothesis, while only partially supported, indicates that the more an organization shares messages from its network, the more likely it is to see an increase in the flow of information. Retweeting messages from other accounts in an organization's network is a good method to use if the organization wants to see more replies to tweets. Engaging with other organizations in their network allows an organization to establish a line of communication with said organizations and their stakeholders. It is important to note that these replies represent a flow relationship, and if an organization wants to maintain the flow of information, it should be vigilant and persistent when sharing information. Flow relationships are quicker to dissolve than affinity or representational relationships.

## Limitations

One primary limitation of this study is the sample size of organizations included in the analysis. Five primary emergency management organizations were identified in the initial collection stage, and from that point snowball sampling was used to identify other organizations based off the initial follower and following accounts. Therefore, this did not provide a comprehensive collection of emergency management organizations from the area. In future studies, a larger collection of organizations could help crystalize the networks further.

As mentioned in the literature and discussion regarding semantic networks, using mission statements as a method to create the semantic network is untested, and following this study, it does not appear to be the most effective method. Additionally, the mission statements were coded by a single individual and did not have the benefit of intercoder reliability. While the themes that emerged were largely drawn from direct text and

phrases within the mission statements, the analysis would benefit from another coder in future research.

## Chapter Nine: Conclusion

This research tested several of the propositions put forward by O'Connor and Shumate (2018) in an effort to further the theoretical and methodological fields of studying interorganizational communication. Previous research already acknowledged that interorganizational communication is a complex environment, inhabited by both organizations and their stakeholders. This study acknowledges which types of connections, or relationships, have the ability to influence one another. This research also provides a practical application of how communication decisions and messages can directly affect interorganizational networks. Ultimately, this research demonstrates why organizations that desire more engagement on Twitter should actively seek out and join multiple types of networks by strategically following more accounts and sharing those accounts' messages. By engaging in more than one type of network, organizations are likely to benefit from reciprocal engagements from other organizations in those networks.

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