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Developing the Network Awareness Construct: Evidence supporting the ability to understand novel social situations

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Abstract

We report on an experiment designed to test the relationship between a new construct—network awareness—and performance behavior measured as the ability to understand social network dynamics during novel social situations. The experiment used short video vignettes of varying social complexity as stimuli, and results suggest that the combination of self-monitoring and network awareness traits interact to predict performance. Further, participants scoring high in network awareness also demonstrated more certainty in their evaluations of novel social situations, as expected. Although extant research has demonstrated a correlation between self-reported network awareness and perceived outcomes, this is the first study to demonstrate behavioral outcomes in an experimental setting. Results also offer additional discriminant and convergent validity to the network awareness construct, and are discussed in terms of expansive online computer-mediated social networks and strategic behavior in groups.

1. Introduction

There has been growing scholarly interest in digital, social media and online behavior including management of a wide range of information related to presentation of self, information seeking about others, and generally intentional use and development of social networks via social media [49]. Digital social media afford users unprecedented access to social network-related data, and it may be the case that individuals are building more comprehensive understanding of the on- and offline social networks they routinely navigate, and adapting to the opportunities posed by generally public and persistent information about their associations. However, comparatively fewer academic resources have been dedicated to understanding the precise motivational and cognitive processes that modulate this kind of understanding and knowledge. Proficiency in understanding the complexities and nuances of the social structures that surround us is a useful skill [28], and it is likely that some people are naturally better at understanding their social worlds regardless of online social network data.

As the body of research concerning (online) social networks and social media continues to grow, scholars have sustained interest in communicative dynamics within and across mediated networks, and outcomes like opportunity and control [18]. Much research has been dedicated to investigating how individuals use social networking sites (SNSs) in order to access social capital—the resources and benefits that accrue to individuals via the set of relationships they form with others. Social capital itself is a multifaceted concept. For example, Stefanone et al. [52] examined how perceptions of social capital outcomes including bridging capital (a function of network diversity) and bonding capital (the strong ties between family and close friends) predict actual benefits for social network site users. Results demonstrate a weak relationship between perceptions of social capital and actual behavior.

Regardless, relatively little research has been conducted regarding the ways in which individuals *actually understand* the structure and composition of the complex and dynamic social networks surrounding them. Relatedly, little is known about which individual differences likely demonstrate systematic relationships with attending to, processing, understanding and ultimately leveraging knowledge about the structure and dynamics of relationships comprising one's social sphere. Investigating these processes starts with both an understanding of the intrinsic motivation to pursue this knowledge, and the ability to gain, consolidate and subsequently mobilize it in the pursuit of strategic personal, social goals. The ability to measure declarative knowledge of social structure—the purpose of the current research—will eventually facilitate research on procedural knowledge whereby individuals actively pursue social goals.

The present research further develops the concept of generalized network awareness*,* the capacity to understand social network structure in terms of who knows who, who likes (or dislikes) who, and awareness of the communication reciprocity-related tendencies *of other individuals* embedded in social networks [2]. Badawy et al. [2] first presented this construct as a combination of traits including network awareness which motivates individuals to dedicate cognitive resources to their social environment. These authors suggest that network awareness is fundamental to developing comprehensive understanding of dynamic social network structures.

We are also interested in identifying personality profiles of individuals who devote cognitive resources to understanding their social worlds, operationalized as network awareness. Much like self-monitors are more likely to attend to their social environment, traits can predict what people think about. This is important because accurate and nuanced understanding of others' relationships is strategically beneficial. For example, socially, 'network aware' individuals know who among their friends do not get along, so situations involving those friends together (and the resulting awkwardness and discomfort) can be avoided, setting the stage for continuing beneficial social exchanges. Professionally, knowing who tends to reciprocate within a network allows individuals to be more discerning about whom to do favors for. Knowledge about network gaps (or, structural holes [7]), are also strategically beneficial from a brokerage standpoint.

Network awareness, then, may be best understood as a proxy for identifying individuals who think about social network structure. Our thesis is that network awareness, coupled with an understanding of the reciprocity-related behavior of others in networks, facilitate development of accurate perceptions of social network structure and dynamics. Extending the original work on network awareness, this study uses videos of novel social situations as stimuli. Thus, in this manuscript we operationalize network awareness as the tendency to attend to and process dynamic and novel social stimuli in real time.

We seek to replicate earlier findings [2] and extend these findings by experimentally evaluating the relationship between network awareness and the ability to evaluate interpersonal relationships embedded in novel social situations.

2. Background

Research in social cognition aims to understand how individuals encode, store and retrieve information about others [15].

In addition to social cognitive processes, social scientists must also examine individuals' social motivations, the basic assumption being that individuals are rational actors who make systematic decisions based on a process of what they believe to be objective cost-benefit analyses [10; 30; 36]. While individuals do not always act objectively or systematically [17], research by rational choice theorists (*e.g.*, [25]) describes the process by which people weigh alternative actions in order to maximize personal benefit. This suggests that people can actively monitor and process their surroundings in order to determine optimal courses of action.

Research addressing self-interest as motivation for social action centers around status attainment [4]. Lin's [30] theory of instrumental action suggests that status attainment can be viewed as a product of strategic relationship choices and social behavior rather than a fixed product of social network properties. In this framework, individuals negotiate their environments to maximize access to resources and opportunity for personal gain [48]. Questions remain however about systematic differences in the ability to comprehend complex social environments.

Lin and Dumin [31] focused on access to social resources (or, social capital) through an individual's connections to different positions in their networks. They identified ties to others as either strong (family), moderate (friends), or weak (acquaintances) and found that weak tie affiliations with high status members of social groups provided better opportunities to prestigious jobs and other social resources. These weak ties were particularly instrumental for low status network members. Stefanone et al. [49] also explored social network connections and found that individuals with an internal locus of control were more likely to strategically develop and manage their social networks in terms of strong and weak tie connections.

This evidence suggests that some individuals are more capable than others at strategically managing their relationships. In fact, the idea of social intelligence was first proposed almost 100 years ago, operationalized as the particular ability to understand individuals and social situations that is distinct from general intelligence [50]. While the concept was intriguing, interest and research waned as the concept was pronounced too vague to be effectively studied [11]. Since then, researchers have focused on more specific elements of social intelligence, such as the burgeoning field of emotional intelligence [43]. Ferris, Perrewe, and Douglas [14] discuss a related construct—social effectiveness—which is a combination of cognitive and behavioral abilities that allow individuals to understand and effectively interact with other people.

Throughout these efforts, the focus has remained on the individual's ability to understand others and how the self relates to others. However, little research has been conducted from a macro-, or *network*-level perspective on social intelligence. A more comprehensive understanding of social effectiveness (and ultimately situational network awareness) would derive from understanding both the *structure* and *balance* of relationships between others in one's network. The concept of network awareness has been developed in such a tradition.

The first step in understanding network awareness is identifying a set of traits associated with strategic behavior and 'outward focused' cognitive resources. Evidence that the ability to successfully navigate social situations with less familiar members of social networks varies systematically can be found in existing research on self-monitoring.

2.1. Self-Monitoring

Self-monitoring is a social skill-based trait defined as "self-observation and self-control guided by situational cues to social appropriateness" [45, p. 526], and has been a key factor in understanding why some people are better able to navigate social situations than others [46]. Further, self-monitoring is concerned with the level of "active construction of public self to achieve social ends" [19, p. 546]. Skill at negotiating social situations may reflect skill at gauging the expectations and reactions of others to the self, and altering behavior in order to gain desired responses and, ultimately, to achieve social goals.

Self-monitoring is a trait categorization, wherein high self-monitors mold themselves to the expectations and demands of each social situation, and low self-monitors attempt to present themselves in a fashion that is "true to themselves" in every social situation they encounter [27; 45]. High self-monitors are better able to adapt to changing social situations [i.e., 32; 47]. Snyder describes the goals of self-monitoring as acting and responding appropriately to situations, masking inappropriate emotions and responses, and communicating accurately through self-presentation. High self-monitors have been shown to be better able to pace conversations [12], and take a more active role in conversations [26]. They are also better at reciprocating self-disclosures [44], part of the uncertainty reduction process that is essential to relationship development [6].

In sum, the ability of high-self monitors to achieve their goals is attributed to their prowess at using their social knowledge to their own benefit. Understanding how others tend to communicate and behave should also prove strategically beneficial in goal attainment.

2.2. Other-Based Reciprocity

The concept of reciprocity features throughout many disciplines, including sociology, economics, political science, anthropology, psychology, and animal behavior [1; 13; 24; 51]. The norm of reciprocity is a fundamental principle of social exchange theory which posits that the (anticipated) reciprocal exchange of resources is central to the development of interpersonal relationships, and which generalizes to the development of social and economic systems. For instance, each reciprocated favor or act of kindness strengthens the relationship between two people, and increases both the likelihood and magnitude of future beneficial exchanges [3; 22]. Although some research highlights the importance of positive affect as the causal mechanism for reciprocity [20].

Individuals range in their *reciprocity beliefs*, or the extent to which they subscribe to the reciprocity norm [9]. People with strong reciprocity beliefs are more conscientious of and more likely to engage in reciprocal exchange. For example, they are more likely to reciprocate with their communication partners in instances such as returning favors [16].

However, in terms of strategic behavior, the ability to identify the reciprocity beliefs of others is an important skill. The ability to identify the status and operation of reciprocal exchanges among other individuals in one's social network is linked to social capital [2] and may play an important role in more general strategic behavior. Badawy et al. [2] termed this construct *understanding of other-based reciprocity*.

Individuals who score high in other-based reciprocity understand the reciprocity beliefs and behaviors of others. In other words, they know which members of their networks are more or less likely to reciprocate acts such as favors or kindnesses. Considering the reciprocity norm dictates that individuals invest their resources in others who are able and willing to return those [23], an accurate assessment of other-based reciprocity is strategically beneficial. Other-based reciprocity has also been found to have a positive relationship with self-monitoring [2]. However, a construct connecting an outward focused attention, captured by self-monitoring and other-based reciprocity, to a generalized social awareness is still lacking.

To fill this conceptual gap in the literature, we draw upon network awareness which taps an individual's

ability to comprehend and process the structure of unfamiliar interpersonal relationship networks which surround them.

2.3. Network Awareness

In order to gain the greatest access to potentially rewarding relationships, individuals must be able to accurately perceive, interact with, and predict the behavior of others in their networks. Recall that network awareness is composed of more than an individual's knowledge of how he or she stands in relation to the other members of their social network. Network awareness is defined as the individual's understanding of the structure of their social network *and* the relationships within it [2]. The construct of network awareness suggests that individuals who best gauge the relationships between other members of their social networks are better able to negotiate their self-presentation and interactions with others, not only in relation to individuals, but also in relation to the network as a whole. For example, network awareness enhances the ability of high self-monitors to acquire the kind of bridging social capital that can result in better job offers or other benefits and opportunities [2]. This suggests that network awareness, as well as understanding other-based reciprocity, and the tendency to self-monitor, all contribute to an individual's comprehensive understanding of dynamic social networks.

These variables operate in predictable ways to explain perceptions of online bridging social capital [2]. Bridging social capital reflects links to diverse social ties which facilitate connections between otherwise disparate social groups [22], and is itself an outcome of strategic network-level behavior. This provides individuals access to new, non-redundant opportunities that may not be present in homogenous networks. Badawy et al. [2] found that understanding other-based reciprocity mediates the relationship between self-monitoring and bridging capital, and the relationship between other-based reciprocity and bridging capital is moderated by network awareness. Building on this study, we aim to explore the utility of the network awareness measure in predicting the ability to focus on, process, and encode information about the structure of interpersonal relationships in novel social situations.

In sum, network awareness is associated with a generalized 'social attention' such that high network-aware individuals dedicate cognitive resources toward the surveillance of their social environment and comprehension of its structure. Network-aware individuals attribute value to social network-related information and resources, *and are motivated* to seek and process such information. Operationalized as an individual trait, individuals with high network awareness should dedicate these cognitive resources in all social situations. Thus, we hypothesize that when confronted with a novel social situation, individuals with greater network awareness will exhibit better understanding of the dynamics and structure of relationships among its actors. Further, because individuals high in network awareness likely have a history of successfully navigating complex social situations, they should also exhibit more certainty in their understanding and interpretation of novel social situations. The first step in further developing the network awareness construct is demonstrating that network awareness is associated with knowledge about relationship structures. Thus,

H1a: Network awareness has a positive relationship with understanding the structure of interpersonal relationships in novel social situations.

Obviously we are confronted with a range of social situations that vary based on their complexity. Consequently, individuals who understand the structure of relationships that surround them should develop more effective understanding of interpersonal relationships in novel social situations regardless of the complexity of those social situations. Thus, as a corollary to H1a,

H1b: Network awareness has a positive relationship with understanding interpersonal relationships even in more complex social situations.

Consistent with the argument above about the additive benefits of self-monitoring and other-based reciprocity, we propose that

H2: Self-monitoring and understanding other-based reciprocity interact such that individuals who exhibit both of these traits demonstrate the most effective understanding of interpersonal relationship structure in novel social situations.

In addition to understanding interpersonal relationships in novel social situations, network aware individuals should report that they are *confident* in their ability to gauge group situations and relationships between others, as well as their knowledge of the rules and norms that guide effective social behavior. Confidence should also be high because this trait represents conscious and effortful strategy, rather than an unconscious or implicit intuition-based skill.

We expect that these individuals in particular have been successfully processing information about their social environments for some time, consistent with the trait perspective on human behavior which argues that traits are stable and consistent across time and social situations. Thus, we propose the following hypothesis:

H3: Network awareness has a positive relationship with the certainty with which individuals interpret the structure of interpersonal relationships in novel social situations.

4. Methods

One hundred and eighty participants (M_{age} = 35.9 *SD* = 10.5; 52% Female) took part in the study. Data was collected using Amazon Mechanical Turk (MTurk), an online marketplace for recruiting workers and participants for tasks. The workforce draws from over 100,000 potential participants who are compensated financially [5]. MTurk samples are generally more ethnically and socio-economically diverse than college or other Internet samples [5] while at the same time being comparable on a number of personality traits [21]. Data collected using MTurk samples has also reliably replicated both experimental and social scientific research [38; 39].

Our participants were drawn from Master level workers, who are considered elite level workers who have demonstrated accuracy and consistency across a large number of tasks. Our participants were financially compensated for their time and all procedures had Institutional Review Board approval.

4.1. Design and Procedure

Participants were informed that they would take part in a study examining personality traits and online behavior. After indicating their consent, participants were exposed to stimulus materials.

The experiment was a between-groups design where participants were randomly assigned to conditions (stimulus complexity: high/low). Prior to viewing the clip, participants were instructed to imagine that they were present in the room as the scene took place, and to treat the encounter like a social situation in which they will see those people again and may have to interact with them.

Subsequent to viewing the clip, participants were given a 23-item quiz about the characters and relationships presented in the clip. Following the quiz, all participants completed a survey with scale items measuring self-monitoring, other-based reciprocity, and network awareness. Participants also provided a range of demographic information, and indicated whether or not they were familiar with the characters in the video. Upon completion of the survey, participants instructed to enter their MTurk ID in order to receive compensation.

Stimulus materials. The stimulus materials consisted of two short (4.5 minute) video clips taken from two movies: *Who's Afraid of Virginia Woolf?* (1966) and *Key Largo* (1948). These video clips (see Figures 1 and 2) were selected so as to present participants with verbal *and* visual information about social exchange processes between characters.

Figure 1. Screen shot of stimulus material.

Figure 2. Screen shot of stimulus material.

The researchers were careful to evaluate the social network complexity among characters in both movies, and determined that *Key Largo* presented more complex network dynamics than *Virginia Wolf*. The scene from *Key Largo* included seven characters present and represented the high social complexity condition, while the scene from *Who's Afraid of Virginia Woolf?* included 4 characters and represented the low social complexity stimulus.

These particular films were chosen so as to decrease the likelihood that participants would be already familiar with the scenes and characters. The clips from these two films were also chosen to minimize entertainment and distraction – they were black and white, did not feature special effects, overt music scores, or current famous actors.

Performance and *certainty* were measured through a 23-item quiz relating to the stimulus clip. The questions addressed individual character traits, and their past, present, and future relationships with other characters portrayed in each video clip. Questions also assessed dyadic, triadic, and group-level interpersonal

relationships as to address varying levels of relationship complexity, and were balanced so that the sets of questions for each stimulus measured the same kinds of relationship knowledge across conditions. Answer options included *yes*, *no*, and *I don't know*. Sample items include "Curley has been violent toward Gaye before," and "Martha and Nick will have an affair."

Performance was measured as the sum of correct responses, and 'certainty' was determined by the sum of 'I don't know' responses such that higher certainty is indicated by fewer of these responses. All scale items were measured with 7-point Likert-type responses where 1 = Strongly Disagree and 7 = Strongly Agree, unless otherwise noted.

Self-monitoring was measured using the 6-item social sensitivity sub-scale (α = .88) of the Revised Self-Monitoring Scale [25]. Sample items include "My powers of intuition are quite good when it comes to understanding others' emotions and motives" and "I can usually tell when I've said something inappropriate by reading it in the listener's eyes."

Understanding of other-based reciprocity was measured using the other reciprocity scale adapted by Badawy et al. [2] to capture understanding of other-based reciprocity (α = .87). Sample items are "I know when a friend will undergo personal costs to help someone who helped that person before," and "I know when a friend will do a boring job in return for someone's previous help."

Network awareness was measured using a modified version of Badawy et al.'s [2] original scale, which was comprised of 5 items, including "I know who knows who among my friends," "I know which of my friends who are actually friends," "I know which of my friends do not like each other," "My friends generally know each other," and "I know who among my friends doesn't know each other" (α = .86). The scale was modified to address the more general operationalization of friends, rather than Badawy's original work which focused on online social network friends.

5. Results

Manipulation check. The two videos were pre-tested to ensure that they did indeed differ in perceived social complexity. A separate sample of participants (N = 42) rated the extent to which they found the scene to be "easy to follow and understand." The *Who's Afraid of Virginia Woolf* clip was rated as significantly easier to follow and understand (M = 4.52, SD = 1.89) than the *Key Largo* clip (M = 3.36, SD = 1.53), $t(41) = 2.22$, p = .03 95%, CI: [.11, 2.22].

Table 1. Descriptives and correlations.

		M	SD	1	2	3	4	5	6
	Demographics								
1	Age	35.87	10.48						
2	Sex	52%F							
	Traits								
3	Self-Monitoring	5.18	1.28	-.20**	.00				
4	Network Awareness	5.41	1.02	-.14	.05	.50***			
5	Other-based Reciprocity Beliefs	5.21	.94	-14	.01	.49***	.53***		
	Quiz Performance								
6	Performance	11.96	4.11	.03	-.01	.052	.17*	.03	
7	Certainty	4.42	4.07	.03	.03	.16*	.35***	.22**	.57***

Note. N = 180. Descriptive statistics for Performance and Certainty variables are presented on untransformed variables; Correlations are based on transformed variables; *p < .05, **p < .01, ***p < .001.

Table 2. Regression models.

	Performance	Certainty
Predictor	β	
Sex	-.017	-.133
Age	.050	.047
Stimulus complexity	.442***	-.149*
Self Monitoring	-.005	-.026
Other-based Reciprocity Beliefs	-.083	.061
Network Awareness	.206**	.318***
F	*9.88* (6, 172)***	*5.24* (6, 172)***
Adj. R^2	.23	.16

Note. *p < .05, **p < .01, ***p < .001.

Data preparation. Performance was summed frequency of number of correct answers across the 23 items, and certainty was the summed frequency of 'don't know' responses. Summed frequencies showed a positively skewed distribution, so a square root transformation on non-zero data was performed on both variables. These transformed variables were used in all subsequent analyses.

Traits and performance. An exploratory factor analysis revealed that the self-monitoring, other-based reciprocity, and network awareness measures load on distinct dimensions. The final factor solution converged on 3 dimensions (KMO = .908; Bartlett's χ^2 = 2685.31, p < .001) explaining about 67% of the total variance.

Multiple regression analyses assessed the impact of network awareness, self-monitoring, and other-based reciprocity beliefs on indicators of performance and certainty on the quiz, controlling for age and sex. Regression results are presented in Table 2. Quiz performance was positively predicted by both stimulus complexity (β = .44, p < .001) and network awareness (β = .26, p < .001). Certainty, as measured by the extent of 'don't know' responses, was similarly predicted by stimulus complexity and network

awareness. Analyses revealed no interaction effect between network awareness and stimulus complexity on performance or certainty. In other words, network awareness predicts performance and certainty when viewing both high and low social complexity situations. This is support for hypotheses 1a and b, and 3.

A moderated mediation model was then tested to examine the indirect effects between self-monitoring and quiz performance as mediated by network awareness and other-based reciprocity beliefs. Mediation analyses were tested using the bootstrapping method with bias-corrected confidence estimates [34; 41], with the 95% confidence interval of the indirect effects obtained with 5000 bootstrap resamples [42]. The first step of the mediation confirmed that self-monitoring positively predicts network awareness (b = .38, $p < .001$), as well as other-based reciprocity beliefs (b = .35, $p < .001$). While there is no direct effect of self-monitoring on performance or certainty, this does not preclude the possibility of mediation effects [42]. Analyses indicate a significant indirect effect of self-monitoring on quiz performance, an effect that is mediated by network awareness (95% CI: .02, .12). Finally, a moderated mediation model tested the extent to which the path between self-monitoring and quiz performance, as mediated by network awareness, varied as a function of stimulus complexity. The conditional indirect effects were equal across the two groups (95% CI: -.04, .13), suggesting this particular mediation path held across different social complexity situations. This evidence partially supports hypothesis 2.

6. Discussion

This study set out to further develop and evaluate the concept of network awareness as a set of ability-based traits, distinct from existing measures of other-orientedness such as self-monitoring, and which can predict individuals' facility in understanding and mobilizing their social networks. In the tradition of the cognitive-structural approach [8] and cognitive social structures [28], we extend previous research that links network awareness and access to social capital [2] and we show that the effects of such awareness can be observed not just in self-reported benefit (e.g., *perceived* social capital) but also in actual performance-based behavior contexts as assessed by the experimental design used herein. Because we employ novel and real time social situations as stimuli, we operationalize the likelihood of attending to and ability to process such social situations as *situational* network awareness. This represents a departure from recent research on network awareness [2].

The present study first established both discriminant and convergent validity between other-based reciprocity and network awareness, and the related but distinct construct of self-monitoring. Therefore while self-monitoring correlates with both other-based reciprocity and network awareness, exploratory factor analysis confirmed that they are in fact three distinct factors. We argue that while all three constructs involve attention directed to one's social environment, the network awareness constructs capture the distinct and motivated desire to understanding the structure and reciprocity flows in one's social network, and the situational network awareness construct is reflected in the spontaneous understanding of novel and real time interactions.

This distinctness was also demonstrated in each construct's predictive validity for the performance-based outcomes measured in this study. An experiment was designed and executed to assess how the combination of traits associated with network awareness perform when predicting network comprehension in a controlled, experimental context. Recall that these variables were hypothesized to demonstrate systematic relationships with the ability to interpret novel and complex social situations, *and* that network awareness is associated with increased confidence in those interpretations. The results presented herein generally support these hypotheses.

We found that network awareness predicted individuals' ability to understand novel social networks across both high and low social complexity conditions. The experimental protocol was designed to present naive participants with novel social situations which varied in relational complexity in an attempt to evaluate their innate ability to focus on, encode, and retrieve information about the interpersonal relationships communicated essentially in real time. This ability was operationalized as performance on a quiz designed to assess a range of interpersonal relationship variables. The quiz itself was carefully designed to address intrapersonal, dyadic, and triadic relationship variables, balanced across both stimuli.

The results show that network awareness is associated with performance on the quiz, regardless of whether individuals view high or low social complexity stimuli. The results also demonstrate that the influence of self-monitoring on this ability occurs only indirectly, via network awareness. Self-monitoring therefore did not predict quiz performance directly, nor did it moderate the relationship between network awareness and performance. This does not mean however that self-monitoring does not interact with network awareness to predict social performance

in different contexts. The sensitivity to the expressive behavior of others may enhance the influence of network awareness in situations where individuals are immersed in a social context and where they must interact with the actors within in. The fact that we did not find a significant relationship between network awareness, self-monitoring, and performance in the present study may be due to lack of possibility for participants to actually interact with the actors they were assessing. In other words, participants likely function differently in real time communicative scenarios with feedback, etc. With the pressure to interact with others functionally eliminated, self-monitoring may not have played as strong of a role as network awareness in the ability to interpret relationships between others.

Self-monitoring is central to the ability to accurately interpret relationships between strangers, which enables people to quickly reposition themselves to appropriately reflect behavior that is expected of them. Based on this connection, we anticipated a relationship between self-monitoring and network awareness such that people who are high in both traits would be able to best assess new situations and understand the social rules of the environment in which they find themselves.

Our results also indicate a relationship between network awareness and certainty in providing answers about social relationships, as measured by how often participants answered questions with "I don't know." This finding suggests that not only are people who are high in network awareness better able to determine relationships between others in novel social situations, but they are also more confident in their ability to do so. Research into a causal relationship between network awareness and the decision to expend cognitive energy on assessing social networks provides room for expansion on this finding. Indeed, it will be important to specify the multiple factors that underlie enhanced performance in these contexts, including the role of individuals self efficacy beliefs and motivation. Need for cognition [40] for example predicts an individual's enjoyment and desire to engage in effortful cognitive activities. A similar tendency may be manifested in the domain of network awareness as outlined in this manuscript, and may underlie individual differences in motivation to analyze and understand their social worlds.

The positive relationship between stimulus complexity and performance suggested that participants who watched the more socially complex stimulus clip generally performed better on the quiz. There are several possible reasons for this surprising finding. Firstly, it may be the case that the more socially complex stimulus clip provided a more optimal level of arousal (historically referred to as the optimal stimulation level, [29]), which engaged participants and positively impacted learning and performance. Or, the higher complexity stimulus video may present an optimal level of *desirable difficulty* [37] wherein more challenging situations actually function as stimulation and ultimately individuals tend to demonstrate better performance. Another possibility is that the low social complexity stimulus, while having a smaller number of characters present, was more complex in other ways, such as the dramatic characterization and emotion expression that may have obscured the underlying narrative. This is certainly a limitation of the current study and one which future research in situational awareness will be able to address through the development of materials that systematically vary in social complexity, and range from very simple situations and network structures to greater complexity. Future research will also have the task of developing standardized and validated objective measures of social network structure and comprehension measures.

This study is a significant expansion of previous research in several ways. First, we build on the theoretical work of Casciaro et al. [8] and Krackhardt [28] who were the first to differentiate between global and local network perception accuracy. These authors are careful to note that consistent with the cognitive-structural perspective we adopt here, our perceptions of the social structures and dynamics that surround us affect our attitudes and behavior, regardless of the social reality that surrounds us. While their research focused on formal social network structure and dynamics that emerged from long-term professional relationships, situational network awareness is distinct because it focuses on the ability to process and evaluate novel, real time social situations.

Second, we demonstrate that network awareness is an ability-based trait that, in addition to predicting self-reported benefit [2], can be actually observed in an objective social performance context. Further, while Badawy et al.'s [2] network awareness measure was framed in *online social networks* and social media, the current work demonstrates that the more general operationalization of network awareness as understanding the network structure and dynamics of simply their 'friends' (opposed to online friends) predicts network understanding.

There are limitations associated with the use of the video vignettes. As mentioned earlier in the discussion section, participants can not interact with the characters in the stimulus material. Also, the videos are old and participants may be confounded by generational and cultural differences associated with language and other behavior associated with that period.

The next stage of this research program will address whether digital and social media play a role in the development of network awareness as a skill. There may be differences between heavy and light social media users and network awareness because of the broader scope and increased complexity of such mediated networks. In addition, we plan on evaluating the effectiveness of developing and instituting a training protocol to evaluate the potential of teaching individuals to attend to and evaluate real time social situations.

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