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Social embeddedness of persuasion: effects of cognitive social structures on information credibility assessment and sharing in social media

Dongyoung Sohn[a] and Soyoung Choi[b]

[a]Department of Media & Communication, Hanyang University, Seoul, Korea; [b]eMFORCE Inc., Seoul, Korea

ABSTRACT

Implicit in prior research has been the assumption that any judgment about the credibility and value of information is made in an individualistic and socially isolated fashion. This assumption is no longer tenable in a social media environment wherein people are exposed to a great deal of information selectively fed to them by others with whom they have relationships. The current study examines the moderating effects of cognitive social structures manifested in the minds of social media users. The findings reveal that consideration of individuals regarding source expertise for credibility assessment and information-sharing decisions varies depending on their particular online social circumstances and how the individuals perceive these circumstances. This suggests that the manner in which people assess and share information in the social media environment is partly a function of how they make sense of their local social worlds.

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Introduction

Multiple types of social networks, including families, friendships, cultural and professional relationships, have always been integral to the life of human beings. Thanks to the recent proliferation of social media like *Facebook* and *Twitter*, the possible range of interpersonal contacts has dramatically expanded from that of previous times, resulting in increased communication of news and information beyond immediate social and geographic proximity. As of the first quarter of 2017, there are two billion monthly active Facebook users, more than a quarter of the world population. In the United States alone, 72% of all Internet users are reported to use Facebook through which the majority of them read news on a regular basis (Barthel and Shearer 2015). As peer-to-peer communication has become essential to everyday life and increasingly popular worldwide, interests and concerns about the social processes and outcomes of information sharing online have also been increasing.

CONTACT Dongyoung Sohn dysohn@hanyang.ac.kr Department of Media & Communication, Hanyang University, 222 Wangsimni-ro, Seongdong-gu, Seoul, Korea.

Implicit in prior research has been the assumption that any judgment about the credibility of information and/or whether to share it is largely made in an individualistic and socially isolated fashion (Metzger, Flanagin, and Medders 2010). This assumption is no longer tenable in a social media environment wherein people are exposed to a great deal of information selectively fed to them by others with whom they have relationships (Sohn 2014; Sohn, 2009). Because messages, such as news, product-related rumours, or advertisements, are transmitted through social ties, their persuasive impact on the recipient may vary depending on how s/he views the *intermediate* social environment lying between the original source (e.g. a newspaper) and the self. It has indeed been found that individuals' resistance to persuasion tends to be greater when members of the surrounding network held congruent rather than incongruent prior attitudes (Neiheisel and Niebler 2015; Visser and Mirabile 2004). This implies that systematic considerations of social neighbourhoods surrounding individuals are more important than ever for grasping properly the processes and outcomes of persuasive communication in such a complex, networked environment.

Although a host of persuasion-related studies have been conducted to illuminate various aspects of social media (see for review Chu and Kim 2018; Knoll 2015), relatively little is known about how individuals interact with their local social networks to assess and decide to share the information they obtain therein (Sohn 2014; Sohn 2009). This is partly due to a prevalent perspective in communication/advertising research that portrays networks merely as conduits *mediating* the flow of information, analogous to an infrastructure like road systems for traffic flows (e.g. Shah et al. 2007; Rogers 2003; Katz and Lazarsfeld 1955). This mediation perspective tends to portray individuals as nuts and bolts of entire networks, largely neglecting the role of human agency. In other words, individuals are treated as passive beings merely exposed to, not actively engaging with elaborating the information given (Lee 2009; Southwell and Yzer 2007; Eveland 2004). As a result, most prior research efforts have been devoted to identifying and describing the underlying network structures because these are assumed to determine the patterns of communication.

As the interface of a computer contextualizes the way users access, utilize, and evaluate the contents therein, local social networks surrounding individuals serve as socially constructed interfaces that largely delimit what they can see and do. A major premise is, therefore, that the perception and sharing of information by individuals are influenced by the way they subjectively make sense of the surrounding social interfaces–the networks represented in their minds, namely *cognitive social structures* (Krackhardt 1987)[1] or networks. Because the ability to monitor relationships with others is essential to successful social lives, human behaviours are partly a function of the interpretation of surrounding social relations (Brands 2013; Festinger 1954; Lewin 1939). Prior research on information credibility has, however, focused mainly on the role of the attributes of online media, such as website features (e.g. Flanagin and Metzger 2007), system characteristics (e.g. Sundar 2008), or recency of updates (e.g. Westerman, Spence, and Van Der Heide 2014), while largely overlooking the role of local social ties through which individuals encounter and share information.

The current study represents an attempt to bridge this gap by illuminating the moderating roles of local social networks in persuasive communication contexts. More

specifically, this study aims to examine how individuals' schematic perceptions of the two key properties of local social networks – *cognitive network centrality* (i.e. the extent to which an observer or *ego* thinks s/he is central in the network) and *cognitive network homogeneity* (i.e. the observer's perceived degree of similarity among the network constituents) – systematically moderate the effects of source characteristics (e.g. expertise) on their credibility assessments of and intention to share information.

Linking cognition to social networks

Due in part to the growth of social networking services (SNSs), the term 'network' has become an integral part of our everyday vocabulary, allowing most people to view the social world as a complex web of connections. Across fields of inquiry, research efforts have been undertaken to elucidate the role of social networks in various contexts, such as knowledge sharing in organizations (Caimo and Lomi 2015; Reagans and McEvily 2003; Hansen 1999), civic participation (Huckfeldt 2014; Kwak, Shah, and Holbert 2004), and viral/word-of-mouth communications (Fang et al. 2018; Kim et al. 2018; Campbell 2013; Sohn 2009; Steyer, Garcis-Bardidia, and Quester 2006). Despite this ever-growing interest in both online and offline social networks, an issue that has received relatively little scholarly attention is how individuals' mental representations of surrounding networks affect their behaviours (Brands 2013).

Perceived or cognitive social networks might seldom be an issue for tiny networks in which egocentric views closely approximate actual relationship patterns. However, this is likely not the case for larger social networks containing great numbers of individuals and relationships. The bigger the network size, the greater the number of *weak ties* (e.g. acquaintances) likely to be included (Eveland, Hutchens, and Morey 2013), making it cumbersome to perceive and remember all the relations among them. Even with smaller networks, relations can sometimes be multiplex (i.e. a pair of actors may be tied as friends as well as business partners), which makes it difficult to accurately perceive all of the pertinent relations. Due to the cognitive limits imposed on an individual's ability to manage these interactions (Dunbar 2008), one's cognitive social network is likely to deviate substantially from the actual one. This suggests that individual behaviours in large online networks are likely dependent more on their subjective views rather than the true connection patterns of surrounding networks.

Then, how do we perceive the social networks of which we are a part? It is widely acknowledged that people tend to perceive objects and their surrounding environments through schematic categorization and arrangement (Fiske and Taylor 2013). When visiting a city or building with no prior experience or knowledge of it, people usually first find a central place (e.g. downtown plaza, main lobby) through the *centre–periphery* division (Tuan 1974) from which to determine current locations and future destinations. Similar things may happen when 'people "see" social affiliation' (Freeman 1992, p. 118). In a formal organization, employees may use the *linear-order schema* (De Soto 1960) to perceive their location in the hierarchy as well as their distance to key personnel, such as top executives and/or middle managers.

Freeman (1992) proposed that people tend to categorize or partition the patterns of affiliation among the individuals into groups or clusters, in which the degree of

regularity is often exaggerated. It has indeed been reported that individuals tend to exaggerate clustering within groups and distances between groups, making their perceived social networks more like *small worlds*–networks in which multiple dense clusters are loosely connected by a few brokers (Kilduff et al. 2008). Further, it has been found that people tend to think of their own relationships as denser and more balanced than is true and to perceive themselves as more central than they actually are, akin to the well-known *self-enhancement bias* (Kumbasar, Romney, and Batchelder 1994).

The previous findings suggest that people are attuned to seeing an environment, whether physical or social, in a hierarchical fashion in order to facilitate perceptual processes (Zitek and Tiedens 2012). In a similar vein, Briscoe et al. (2013) found through an experiment that individuals indeed use structural properties (e.g. centrality or geodesic distance) to judge credibility in a network, and that they perceive information as more credible when it comes from sources with higher, rather than lower network centrality. Since such a perception of an environment inherently occurs in an *ego-centric* fashion, we may postulate that one's perception of the local social environment may vary depending on his or her own perceived position within the network—the extent to which one's own position in a social environment is proximal (or distant) to others located at the centre or periphery, top or bottom. In other words, discerning the centre from the periphery in a network may allow people to fathom their own positions therein and thus develop *relational schemas* that frame their own subjective experiences of local social networks – what you experience in networks depends on where (you think) you stand.

Psychological distance and construal of information

When seeing a forest from a distant perspective, we do not normally focus on particular trees, but on the forest's silhouette or gestalt image as a whole whereas from a closer distance we begin to see more details. This means that the degree of specificity for perceiving an object (i.e. whether we see the entire forest or a particular tree) may be in a functional relationship with the perceiver's (psychological) distance to the object. Accordingly, *Construal-Level Theory* (CLT) posits that 'people use increasingly higher levels of construal to represent an object as the psychological distance from the object increases' (Trope and Liberman 2010, p. 441). Higher levels of mental construal correspond to greater attention to an object's abstract/central features (e.g. the silhouette of a mountain) than its concrete/peripheral features (e.g. trees or rocks). Hence, the more proximal the perception of an object, the more likely a person will attend to the concrete/peripheral attributes of an object. Indeed, Liviatan, Trope, and Liberman (2008) have found that, with greater interpersonal similarity (i.e. those who are socially closer), more weight is placed on the concrete/peripheral than the abstract/central features of information in judgment.

Similar results have been found in the context of power relations as well (Smith and Trope 2006). Research has shown that people endowed with social power within an organization (e.g. high ranking officers) tend to perceive greater psychological distance to others (Hogg 2001; Lee and Tiedens 2001) and thus become less accurate in recalling the relationship patterns among other people than do those with less power

(Simpson, Markovsky, and Steketee 2011; Grippa and Gloor 2009). Such an increase in psychological distance may be attributed to a hierarchical schema with which one locates the self apart from others in distinct partitions or groups. It is well known that people tend to think out-group members more different (hence distant) from themselves than in-group counterparts even when the group assignment is arbitrary (Tajfel and Turner 1979). This implies that individuals who think of themselves as occupying central positions in social networks (i.e. higher cognitive network centrality) may experience greater psychological distance to other members in networks than those occupying non-central positions (i.e. lower cognitive network centrality).

Distance perception to a network as a whole may correlate not only with the observer's perceived position, but also composition of the network, particularly how similar the network members seem to one another – the cognitive network homogeneity.[2] A network of individuals sharing similar characteristics (e.g. age, gender, preference) may facilitate one to conceive others as a homogeneous cluster or entity so as to label them like 'schoolmates' or 'colleagues.' If an observer or ego sees him/herself as being central in such a homogeneous network, it may be relatively easier to distinguish him/herself from the others (i.e. figuratively speaking, the individual is the only sun in the solar system). With such a *me-versus-them* dichotomy, the psychological distance to the rest of a network may become even greater, inducing the person to attend more to the abstract/central features of objects encountered therein. This attention shift might explain partly why individuals at central positions in networks tend to have a lower accuracy in recalling specific relationship patterns between others (Simpson, Markovsky, and Steketee 2011). Contrastingly, a person distant from the centre may feel relatively closer to the network as a whole, as greater similarity may exist between the self and the majority of people in the homogeneous network, which induces the person to attend more to the concrete/peripheral features.

In a network consisting of people with heterogeneous traits, on the contrary, it may be relatively more difficult to categorize others neatly under some labels due to greater variance/uncertainty resulting from the heterogeneity in others' network positions and characteristics. As a metaphorical example, when you are in the middle of a large crowd on a street, you may feel lost in a complete mess, especially if you are clueless about where you are in the crowd. Knowing that you are at the centre of the crowd may, however, substantially reduce uncertainty in such a situation. Likewise, a non-central person lacking topological anchors may have a more distal perspective of the network than someone regarding him/herself as occupying a central position. Due to the increased psychological distance and difficulty in attending to the particulars of other individuals, therefore, a non-central person in a heterogeneous network may consider relatively fewer peripheral features than someone regarding the self as occupying a central position.

In the persuasion literature, source expertise is usually regarded as a peripheral feature of a message as it is not directly related with what the message is mainly about (Brinol, Petty, and Tormala 2004; Petty, Cacioppo, and Goldman 1981; for review, see Pornpitakpan 2004). Situating the discussion in a social media context, we can hypothesize that the effects of source expertise, a peripheral feature of a message, on the message recipient's credibility judgment and sharing intention may vary

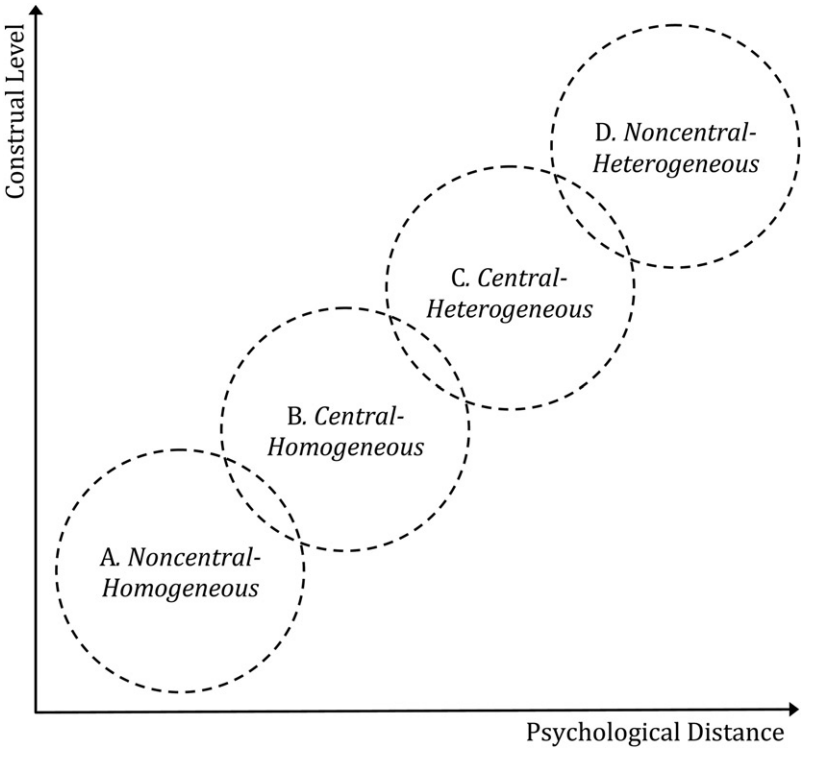


Figure 1. Psychological distance to networks and level of construal.

depending on the person's perceived position (i.e. cognitive network centrality) and composition of the network (i.e. cognitive network homogeneity) as follows.

> H1. In homogeneous networks, the impact of information source expertise will be greater for individuals who perceive themselves as being non-central than those who perceive themselves as being central.
>
> H2. In heterogeneous networks, the impact of information source expertise will be greater for individuals who perceive themselves as being central than those who perceive themselves as being non-central.

Figure 1 graphically illustrates the aforementioned hypothetical relationships between cognitive network structures and psychological distance. As interpersonal similarity decreases psychological distance (Liviatan, Trope, and Liberman 2008), homogeneous networks are placed on the lower left side (A and B), while heterogeneous networks are placed on the upper right side (C and D). Note that, although network centrality is known to increase psychological distance (i.e. $A \leq B$), we hypothesize this direction to be reversed in a heterogeneous network (i.e. $C \leq D$).

Methods

To test the hypotheses proposed, we conducted an online experiment. Undergraduate students at large universities in Seoul, Korea, were recruited via e-mail and received

one extra point in a course upon completion of the online experiment. Respondents who had never used Facebook were excluded through a screening question. The number of original participants who successfully completed the procedure was 285, but through an initial data cleaning we excluded 29 cases with missing values and/or those identified as severe outliers based on *studentized residuals* and *Cook's distance* scores greater than the conventional criteria. Thus, the total number of cases employed for statistical analyses was 256, male =109 (42.58%), female =147 (57.42%).

The participants were directed to an online experiment website and given brief instructions on the procedure. Upon agreeing to participate, they were asked to answer a series of questions regarding the social networking services (SNSs) they regularly used. The questions involved concepts such as how the participants perceived the characteristics of their own online social networks in terms of size (i.e. their number of friends), cognitive network density/closeness (i.e. the extent to which the network members seem socially close to one another), the subjective counting of subgroups existing in the networks, and cognitive network centrality and homogeneity. Some of the question items, which were originally written in English, were translated into Korean and checked by multiple experts in the relevant field to ensure compatibility.

Cognitive network centrality was measured using four 11-point semantic differential scales. First, participants were presented with a picture of a 'star' network, which is theoretically the most centralized network, wherein the person at the center is connected to everyone else while the rest of the network members are connected only to the person in the centre (Figure 2). Then, the participants were asked to compare and judge the extent to which their own networks resembled the star network presented. This method is analogous to the calculation of a group-level centralization index in network analysis (Wasserman and Faust 1994).

A star network is known to have the highest possible centralization index by maximizing the differences between the largest and smallest centrality scores of individuals (Freeman 1979). Hence, any network's degree of centralization can be expressed in comparison to that of the star network, with the conclusion being that the greater the deviation from the star network, the less centralized the network. In addition, three more items were used to measure the perceptions of each respondent regarding the extent to which 1) the other network members personally relied on the respondent, 2) the respondent influenced other members of the network, and 3) others had gotten to know one another due to the respondent. The four aforementioned items measuring cognitive network centrality were found to be internally consistent ($\alpha = 0.87$). To measure cognitive network homogeneity, an 11-point semantic differentials item anchored by similar/dissimilar was used. The single-item measure was found to be appropriate, particularly for assessing an individual's global perception of an issue or object (Gardner et al. 1998), such as a person's holistic impression of similarity among the members of a network.

After answering the questions, the participants were randomly exposed to either of the two versions of a fictitious message, identical except the expertise of the original information source. In the expert condition, the message was stated as originating from a university research laboratory, whereas it was said from the testimony of an

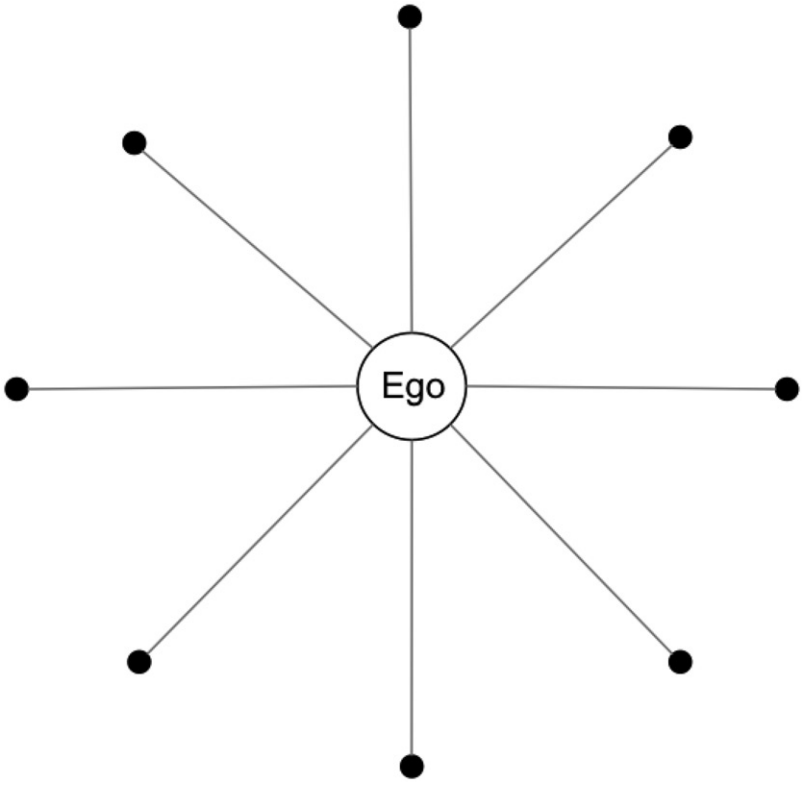


Figure 2. An Example of Star Network. This depicts an extreme case in which every member other than 'ego' is isolated from one another in a network, and wherein members must go through 'ego' to reach other members in the network. The larger the number of bypasses between *N*-1 alters, the less centralized the network.

ordinary consumer in the novice condition. The message was designed and presented in a format similar to the Facebook newsfeed, and the participants were instructed to imagine the following hypothetical situation, 'Suppose you have just encountered the information shown below on the newsfeed of your Facebook account.' The main content of the message was about the skin-rejuvenating effects of washing one's face using coffee powder. We chose the message because the most participants might find it relevant and plausible, but difficult to tell its validity so that they might attend more to the source expertise for credibility assessment.

After reading the message, the participants rated the credibility of the information on four 7-point semantic differentials scales, $\alpha = 0.88$, that were anchored by trustworthy/untrustworthy, biased/unbiased, intelligent/unintelligent, and honest/dishonest (McCroskey and Teven 1999). Participants were also asked about their intentions to share the information via the mechanisms of an SNS (e.g. by clicking the 'like' button) on two 7-point semantic differentials scales, $\alpha = 0.79$, anchored by unlikely/likely and improbable/probable (Sohn 2009). For the manipulation assessment, the participants rated the perceived degree of expertise of the information source given on a single 7-point scale. The participants in the expert condition were found to rate the degree of

expertise much higher (M_{expert} = 5.54) than participants in the novice condition, M_{novice} = 3.76, $F(1, 254) = 36.03$ $p < .001$. Thus, the manipulation was successful. In addition to the source expertise condition, the cognitive network centrality (median =4.75) and homogeneity of participants (median =4.0) were split at the median to conduct a *between-subjects* factorial analysis.[3]

Results

To analyze the data collected, we carried out a factorial MANOVA with three independent factors (source expertise, cognitive network centrality, and homogeneity) and two dependent variables (perceived credibility of and participant intention to share the information given). As there might have been systematic gender difference in responding to the messages used in the experiment (i.e. the skin-rejuvenating effects), we first examined the gender confounding possibility, but found no statistically significant gender differences for the dependent variables combined, $F(2, 253) = 0.86$, p = .43 as well as respectively for perceived information credibility, $F(1, 254) = 1.49$, p = .22, and information sharing intention, $F(1, 254) = 0.91$, p = .34.

Also, perceived degree of closeness of the members of a network (i.e. cognitive network density) was initially considered a possible covariate to be statistically controlled because the effect of cognitive network homogeneity might just be an artefact of *social coherence*—the socially closer the members are in a network, the more homogeneous they might seem to the observer.[4] The effects of perceived closeness, however, were not statistically significant when included as a covariate, $F(2, 246) = 1.14$ $p = 0.32$, and thus excluded and not considered further. A key assumption underlying MANOVA is that the variance–covariance matrices are equal across conditions. To determine whether or not this assumption was violated, we conducted Box's test. The results were not statistically significant, $M = 21.10$, $F = 0.98$, p = .49, indicating that the variance–covariance matrices did not differ across conditions.

Table 1 presents both the multivariate and univariate significance test results of the MANOVA. The multivariate main effects were found statistically significant for source expertise, $F(2, 247) = 3.23$, $p < .05$, and cognitive network centrality, $F(2, 247) = 3.68$,

Table 1. Results of multivariate and univariate analyses of variance.

		Univariate *F*			
	Multivariate *F*	Perceived credibility	*CI* [a] (*LL*, *UL*)	Information sharing	*CI* [a] (*LL*, *UL*)
Expertise	3.23*	5.72*	(0.13, 1.22)	0.01	(−0.58, 0.65)
Homo-geneity	0.53	0.17	(−0.69, 0.44)	1.07	(−0.95, 0.32)
Centrality	3.68*	0.00	(−0.62, 0.51)	6.22*	(0.12, 1.35)
E x H	3.71*	0.13	(−0.62, 0.91)	6.98**	(0.22, 2.01)
E x C	2.45***	4.58*	(0.11, 1.77)	0.04	(−0.21, 1.48)
H x C	0.92	1.37	(−0.29, 1.34)	14.34****	(−0.90, 0.77)
E x H x C	5.41**	5.50*	(−2.52, −0.31)	9.20**	(−3.09, −0.78)

Note: Multivariate $df = 2/247$; Univariate $df = 1/248$
*$p \leq .05$
**$p \leq .01$
***$p \leq .10$
****$p \leq .001$.
[a]95% confidence intervals for the factor coefficients estimated through the ordinary nonparametric bootstrapping ($n = 2000$).

$p < .05$, but not for cognitive network homogeneity, $F(2, 247) = 0.53$, $p = .59$. In the univariate analyses, the effects of source expertise were found significant for perceived information credibility, $F(1, 248) = 31.05$, $p < .001$, $\eta^2 = 0.10$, but not for information sharing intention, $F(1, 248) = 0.01$, $p = .92$. In contrast, cognitive network centrality had significant effects on information sharing intention, $F(1, 248) = 6.22$, $p < .05$, $\eta^2 = 0.04$, but not on perceived information credibility, $F(1, 248) = 0.00$, $p = .96$. That is, participants tended to find the message originating from the expert more credible than that of the novice source, $M_{expert} = 3.96$ vs. $M_{novice} = 3.14$, while those with higher cognitive network centrality tended to have greater information sharing intention than those with lower cognitive network centrality, $M_{central} = 3.72$ vs. $M_{noncentral} = 3.18$. Neither of the dependent variables was affected directly by cognitive network homogeneity.

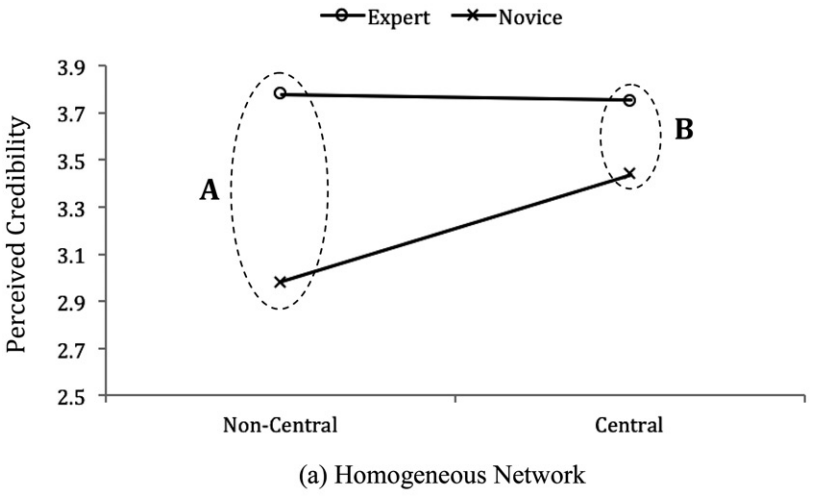
The multivariate two-way interaction between cognitive network centrality and homogeneity was not found statistically significant, $F(2, 247) = 0.92$, $p = .40$. However, the univariate analysis results, given in Table 1, show that the effect of the centrality–homogeneity interaction was significant only for information-sharing intentions, $F(1, 248) = 14.34$, $p < .001$, $\eta^2 = 0.036$, not for perceived information credibility, $F(1, 248) = 1.37$, $p = .24$. This shows that the effects of cognitive network centrality on the information-sharing intentions of participants varied depending on the degree of cognitive network homogeneity, but this was not the case with perceived information credibility. In addition, the multivariate interaction between source expertise and cognitive network homogeneity was found statistically significant, $F(2, 247) = 3.71$, $p < .05$, which again turned out significant only for information sharing intention, $F(1, 248) = 6.98$, $p < .01$, $\eta^2 = 0.002$. The source expertise-cognitive network centrality interaction, contrastingly, was found significant only for perceived information credibility, $F(1, 248) = 4.58$, $p < .05$, $\eta^2 = 0.002$ (Table 2).

While the two-way interaction patterns turned out somewhat mixed and ambiguous, interestingly, the three-way interaction effects were found to be statistically significant not only on the dependent variables combined, $F(2, 247) = 5.41$, $p < .01$, but also respectively on the perceived credibility, $F(1, 248) = 5.50$, $p < .05$, $\eta^2 = 0.018$, and sharing intentions, $F(1, 248) = 9.20$, $p < .001$, $\eta^2 = 0.03$. When the participants viewed networks as largely homogeneous, as shown in Figure 3(a), those who perceived themselves as being central in the networks (i.e. B in Figure 1) showed less difference in their perceptions of the credibility of information originating from expert and novice sources, $M_{expert} = 3.75$ vs. $M_{novice} = 3.44$, whereas the difference between the

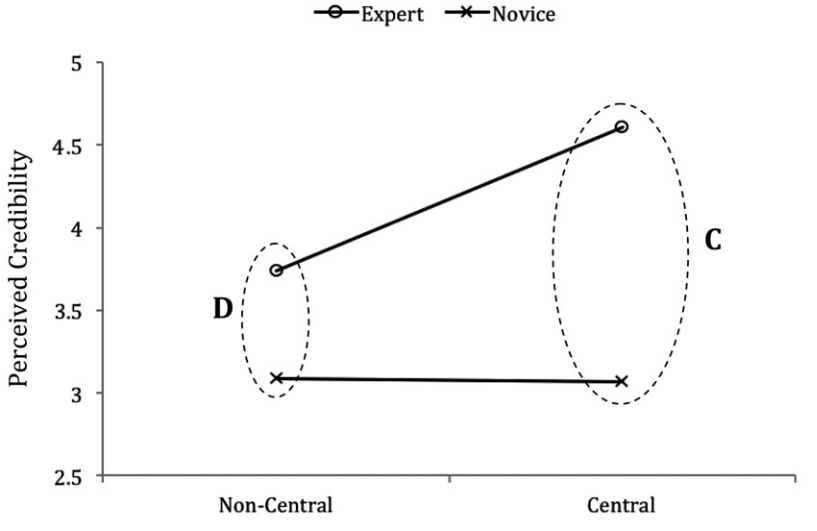
Table 2. Means and standard deviations for (a) perceived information credibility.

	Homogeneous		Heterogeneous	
	Central	Non-central	Central	Non-central
Expert	3.75(1.06)	3.78(1.10)	4.61(1.20)	3.74(1.18)
Novice	3.44(1.24)	2.98(1.18)	3.07(1.11)	3.09(1.20)
(b) Information sharing intention				
Expert	3.30(1.13)	3.92(1.43)	4.45(1.11)	3.08(1.17)
Novice	3.42(1.14)	2.74(1.21)	3.82(1.17)	3.05(1.48)

Standard deviation in parenthesis.



(a) Homogeneous Network



(b) Heterogeneous Network

Figure 3. Three-way interactions (perceived information credibility).

sources was greater among participants who viewed themselves as non-central (i.e. A in Figure 1), M_{expert} = 3.78 vs. M_{novice} = 2.98.

In the situation illustrated in Figure 3(b), however, this pattern was reversed—that is, when networks were viewed as heterogeneous, those who thought of themselves as having central network positions (i.e. C in Figure 1) tended to attend more to the information source's quality, M_{expert} = 4.61 vs. M_{novice} = 3.07, than did those who thought of themselves as having noncentral network positions (i.e. D in Figure 1),

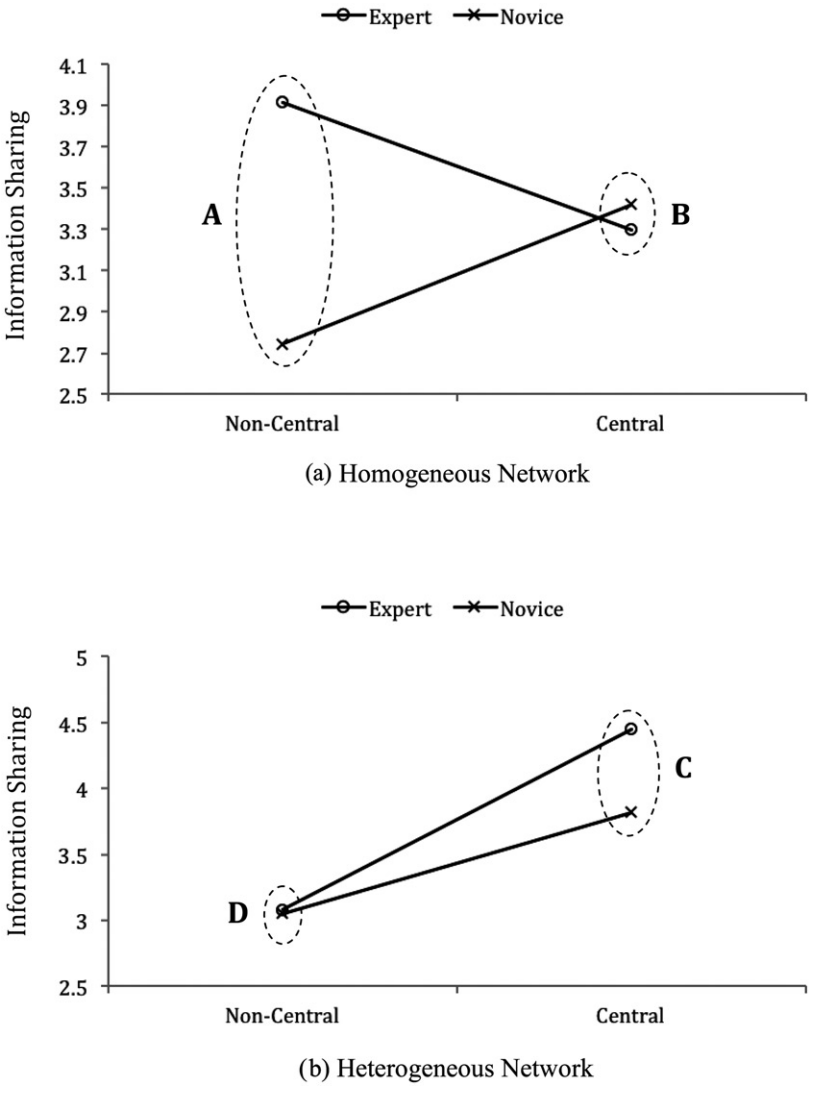


Figure 4. Three-way interactions (information sharing intention).

M_{expert} = 3.74 vs. M_{novice} = 3.09. This confirms the hypothesis that individuals who were (subjectively) central in heterogeneous networks tended to put greater weight on peripheral features like source expertise as their psychological distance was decreased than did their counterparts (i.e. the noncentral–hetero condition).

Similar but more pronounced patterns were found regarding information sharing intentions. As shown in Figure 4(a), participants who viewed themselves as non-central members of homogeneous networks (i.e. A in Figure 1) were more willing to share information from an expert than from a novice source, M_{expert} = 3.92 vs. M_{novice} = 2.74, whereas those who viewed themselves as central in the network (i.e. B in Figure 1) showed little difference in their willingness to share information from expert versus

novice sources, M_{expert} = 3.30 vs. M_{novice} = 3.42. In heterogeneous networks, consistent with the aforementioned findings, individuals who viewed themselves as noncentral (i.e. D in Figure 1) were found to be almost indifferent to source expertise, M_{expert} = 3.08 vs. M_{novice} = 3.05, while those who viewed themselves as central (i.e. C in Figure 1) were relatively more sensitive to the degree of source expertise, M_{expert} = 4.45 vs. M_{novice} = 3.82.

Comparing Figure 4(a) and 4(b) reveals that the expert-novice gap in response was largest for the noncentral-homogeneity condition (i.e. A in Figure 1), smallest for the noncentral-heterogeneity condition (i.e. D in Figure 1), and the other two conditions were in between. Overall the results were consistent with H1 and H2, and well aligned with the relations depicted in Figure 1. Participants who viewed themselves as non-central in heterogeneous networks might have a very distal perspective and thus be almost indifferent to source expertise, whereas those who viewed themselves as non-central in homogeneous networks might view the networks as proximal and thus discern more peripheral features like source expertise. Compared with non-central participants, however, the responses of participants viewing themselves as central were varied relatively less by the degree of network homogeneity, meaning that once people start to distinguish themselves from others in a network, their psychological distances might not be influenced as much by the similarity or dissimilarity of other network constituents.

In order to check the robustness of the results found above, an ordinary nonparametric bootstrapping of the model ($n = 2{,}000$) was conducted, and the 95% confidence intervals for the coefficients of all the predictors were estimated. As for the main effects on perceived information credibility, the confidence interval for source expertise did not include a zero value, $LL = 0.13$, $UL = 1.22$. As for the main effects on information sharing intention, contrastingly, the confidence interval for cognitive network centrality, $LL = 0.13$, $UL = 1.37$ did not include a zero value. This suggests that source expertise had robust main effects only on perceived information credibility, while cognitive network centrality only had an effect on information sharing intention. Furthermore, the bootstrapping results for two-way interaction terms were consistent with the original findings except the interaction between cognitive network homogeneity and centrality for information sharing intention, indicating that there might be more factors involved and we should be cautious when interpreting them. As for the three way interaction terms, no confidence intervals included a zero value for both perceived information credibility, $LL = -2.52$, $UL = -0.31$, and information sharing intention, $LL = -3.09$, $UL = -0.78$, confirming the robustness of the major findings.

Discussion and implications

No communication ever occurs in a social vacuum. Just as our everyday behaviours are shaped and often constrained by the physical places in which they are performed (e.g. rooms, streets, buildings), we communicate in various social settings that consist of direct and/or indirect relationships among people (Gifford 2013; Lewin 1939). Social media is a technological manifestation of such relationship-based communication, which is the global assemblage of the numerous local social networks everyone is

embedded into. In such a networked environment, the *topology of networks* becomes a crucial issue because what you see and experience is basically determined by which part of the networks you are embedded in. In this sense, social media is not just another channel or platform of communication, but 'the spatial distribution of psychological experience' (Tucker and Goodings 2014, p. 277). Local surroundings in social media may therefore play a critical role in determining not only which information you encounter, but also how you construe them.

The topological or spatial aspect of social networks has seldom been made explicit in most prior studies related to persuasion in social media, which focus primarily on the relationships between the characteristics of persuasive messages and the attributes of communicators, such as the degree of popularity or underlying motives (see Chu and Kim 2018; Knoll 2015 for review). The current study bridges the gap in the literature by demonstrating the moderating effects of cognitive social structures manifested in the minds of social media users. The findings indeed show that consideration of individuals regarding source expertise for credibility assessment and information-sharing decisions varies depending on their particular online social circumstances and how the individuals perceive these circumstances. In accordance with H1 and H2, more specifically, it was found that when individuals perceive surrounding networks as largely homogeneous, those who think of themselves as removed from the centre of a network (i.e. low cognitive network centrality) attend more to source expertise than do those who think of themselves as central (Figures 3(a), 4(a)). In a heterogeneous network, contrastingly, individuals who think of themselves as occupying a central position tend to attend more to peripheral/concrete features like the expertise of a source than those removed from the centre (Figures 3(b), 4(b)).

According to construal-level theory (CLT) (Trope and Liberman 2010), this might be interpreted as follows: Non-central individuals in homogeneous networks are likely to find the majority of other network members around to be relatively more similar in terms of network positions (i.e. most of them might also be non-central) and characteristics. The greater the interpersonal similarity, the less the social distance (Liviatan, Trope, and Liberman 2008), which may induce non-central members to perceive the entire network as proximal and thus attend more to peripheral/concrete features like source expertise. In heterogeneous networks, on the other hand, feeling removed from the centre of the network might be similar to being saturated among a large crowd of heterogeneous individuals with an ambiguous boundary, not knowing where it starts and ends. In such a situation, thinking of oneself as being central might serve as a psychological anchor, which reduces the topological uncertainty and thus helps individuals feel the network environment less complicated.

In summary, social media users are more likely to depend on source expertise for credibility assessments and sharing decisions when (1) (they think) they are central in heterogeneous networks or (2) non-central in homogeneous networks (i.e. the decrease in psychological distance). This implies that these individuals might be responsive to the clues or evidence indicating the quality of information sources, making them more active in spreading information from sources with established reputations. It also implies that they might be more likely to fall prey to unverified, false indications of source credibility (e.g. doctoral degrees, academic affiliations) and to

serve as channels for the spread of unreliable information, rumours, or fake news. In addition, peripheral features like source credibility are not as strongly considered when (1) individuals view themselves as central in homogeneous networks or (2) they view themselves as non-central in heterogeneous networks (i.e. the increase in psychological distance). This means, for example, that individuals who are central in a homogeneous network, or non-central in a network of heterogeneous friends might be less likely to spread rumours or fake news based primarily on some indicators of source credibility.

The overall results suggest that, unlike the implicit assumption that people assess information online in a socially isolated fashion, people actually tend to judge information relative to the amount of uncertainty present in their immediate social worlds. When topological clues or anchors regarding the position of individuals in a social network are clear and sufficient, individuals may see the network as being relatively closer to them and thus consider more peripheral features, like the quality of the source of information (e.g. the degree of expertise). On the contrary, greater uncertainty in a social environment (e.g. one is not the only sun in the solar system, or there are no prominent suns nearby) induces individuals to feel that the network is more distant from them and to seek more abstract/central features to elucidate the environment. Note that we do not assume that people consciously seek and analyze such social–environmental clues to assess information. Rather, we more reasonably posit that people use the available clues to make cognitive shortcuts, a process known as *heuristics* (Fiske and Taylor 2013).

Indeed, recent studies have suggested that people often make heuristics-based credibility judgments because it is very difficult to assess the credibility of all information encountered online in a cognitively intensive manner (Van Der Heide and Lim 2016; Metzger, Flanagin and Medders 2010; Hilligoss and Rieh 2008; Sundar 2008). For example, Metzger and her colleagues (2010) summarized the five major heuristics that people use in online environments—reputation, endorsement, consistency, expectancy violation, and persuasive intent. A question that remains is when and to what extent such heuristics are employed. Although systematic analysis of how heuristics are used is beyond the scope of the current study, our findings illuminate that the properties of an individual's local social environment may determine the extent to which the individual employs particular heuristics for credibility judgment.

In mass-mediated communication environments, including television and major portal sites, people may focus more closely on medium-related or site-related features or clues from which they can infer reputation, authority, consistency, expertise, and so forth. In social media, however, interpersonal relationships stand out as a prominent feature and thus become more visible than other features and clues. This does not necessarily mean that medium-related or site-related features are not important in the social media environment, only that the consideration by individuals of these types of features begins to have a contingent relationship with the fundamental social context. In other words, the manner in which people assess information credibility and decide whether or not to share information depends on the perceived degree of uncertainty in their social networks. This is consistent with the findings of Van Der Heide and Lim (2016) that individuals are more likely to use system-related cues for credibility

judgment when they are familiar with a platform, while those unfamiliar with it are more likely to rely on consensus heuristics.

Another important issue to note is that the moderating patterns found above were more apparent with regard to information sharing intention than information credibility assessment. This might be partly due to the well-known *actor-observer asymmetry* in perspective (Jones and Nisbett 1971): One as an observer tends to attend more to the intrinsic attributes of an object, hence less of the situational factors involved than as an actor (Fiske and Taylor 2013). That is, a person might have an observer perspective for assessing the validity and reliability of information, but switch to an actor perspective for deciding whether to share it with others, requiring greater consideration of situational and contextual characteristics (Sohn 2014). Local relationship patterns or structures in social media may be part of the information or clues people consider for making sense of the surrounding social settings, which is of relevance for enacting certain behaviour like sharing information. This suggests that the role of social contextual information merits more scholarly attention than before given that social media users are no longer passive observers but active communicators.

Network-based communication or advertising has recently attracted considerable attention from both academia and industry. In particular, companies are trying to identify influential individuals or *influentials* (Watts and Dodds 2007) like power-bloggers or mavens in social media through whom information can be diffused more widely and faster (Boster et al. 2011). Most previous research attempts have concentrated on measuring and identifying those influential individuals, but unfortunately we know little about the characteristics of networks surrounding influentials, let alone how they see and interact with the social environment (Smith and Fink 2015). Influential individuals are not passive amplifiers of messages in networks, but capable of actively engaging with evaluation and judgment by playing a gatekeeping role. Therefore, it is more important than ever not just to describe the actual network patterns/structures or users' personal characteristics, but also to engage in systematic inquiry into how individual users psychologically interact with local social networks so as to have a better understanding of the communication processes in social media.

Limitations

This study is subject to some important limitations that merit attention in future research. First, the measurement items of cognitive social network properties, such as centrality and homogeneity, need to be refined. Although in this study, individuals' perceptions of global similarity among members in networks were measured, people in reality may use multiple criteria to judge similarity, including lifestyle, political orientation, consumption patterns, and demographics. Thus, it is necessary to develop refined measures using specific criteria in order to examine how the role of cognitive network homogeneity varies depending on the criteria employed (e.g. similarities or differences in political and cultural homogeneity).

Second, more diverse properties of cognitive network centrality, such as closeness and betweenness, as well as their relationships with network size and density, need to be taken into consideration. In the star network shown in Figure 2, for example, 'ego'

is in direct contact with *N*-1 others, while the rest of the network must go through 'ego' to communicate. This means that 'ego' is the most proximate and most often used link between the rest of the network, which increases its closeness and betweenness centrality. Conceivably, the position of 'ego' may change depending on the network size and structure: the denser (or more clustered) a network is, the closer an individual becomes to others due to the creation of many shortcuts (Watts and Strogatz 1998). That is, the perceptions of individuals about closeness and/or betweenness centrality may vary depending on network density, which is assumed to be inversely related to network size (i.e. the larger the network, the less clustered it is). This study does not take into account the network size factor, but future studies should consider how network size is related to other structural indicators.

Although not examined in the current study, it is also important to note that the moderating effects of social networks may vary across issue domains–as for some politically and/or culturally sensitive issues, individuals may take into account more of the surrounding social relationships than for other relatively less sensitive ones. In product-related contexts, individuals may become more conscious of local social circumstances (e.g. what other friends like or dislike) with regard to some brands associated with socially desirable (or possibly undesirable) meanings or values like prestige, innovativeness, or environmental friendliness. This implies that there are some issue domains to which considering social network configurations might be of particular relevance. In future studies, therefore, it should be systematically examined how the degree of individuals' dependence on social context changes depending on the characteristics of the issues involved.

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Notes

1. In social network analysis, the term *cognitive social structure* (CSS) is used to refer to a particular method of measuring social relationships by way of several perceivers involved in a network or structure (Marsden 1990; Krackhardt 1987). CSS method is normally used in a sociocentric setting in which everyone in a network is enlisted and measured, not applicable to egocentric networks. In the current manuscript, therefore, we used the term only to refer to a person or ego's global perception of his or her local social network.
2. It is often the case that *homophily* and *homogeneity* are used interchangeably in the literature, but their meanings are different in social network analysis – homophily refers to the similarity between ego and alters, while homogeneity refers to the degree of similarity among alters (Perry, Pescosolido and Borgatti 2018). For clarity, we used only the term, homogeneity, to refer to the degree of similarity among the network constituents.

3. While the practice of median-split is often criticized for possible loss of information and statistical power, Iacobucci et al. (2015) found through simulations that the information loss is minimal to almost none for a median-split variable, compared to a continuous variable, and concluded that a factorial analysis using median-split variables could be useful particularly for analyzing group differences in a parsimonious way.
4. In network analysis, network density is interpreted in two ways depending on the measurement of social ties. With a binary measure showing whether a tie is present or absent, network density means just the proportion of ties existing as opposed to the maximally possible number of ties given certain number of nodes. With a continuous measure of tie strength, on the other hand, density is interpreted as a mean strength of ties (Marsden, 1990). In this study, we did not attempt to measure network density through the dyad census, but instead measured the respondent's perception of the overall closeness among the network members as a proxy measure of social coherence. The reason why we considered it as a covariate was because of the inherent relationship between social coherence and homophily/homogeneity – the socially closer, the similar individuals may become (i.e. conformity) or the other way around (i.e. social selection), which might confound the effects of network homogeneity examined in the current study.

Notes on contributors

Dongyoung Sohn (Ph.D., The University of Texas at Austin) is currently a professor in the Department of Media & Communication at Hanyang University, Seoul, Korea. His research interests include persuasive communication in social media and computational methods for studying social networks and collective behaviors.

Soyoung Choi (M.A., Hanyang University) is an analyst at eMFORCE Inc., a digital marketing group, Seoul, Korea.

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