EVALUATING NETWORK THEORY AND CONSTRUCTIVISM BASED ON THE TEN CRITERIA FOR EVALUATION

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Introduction

Over the past few decades, scholars have devoted themselves to elaborate new theories on human communication studies. A number of theories have been introduced into the field of communication science by scholars of various academic fields, including anthropology, sociology, psychology, linguistics, and mathematics. However, few attempts have been made to evaluate individual theories, focusing on their strengths and weaknesses. This paper, thus, aims at dealing with the subject, limiting its discussion on the following two theories: Network Theory and Constructivism. Using the criteria which will be presented later, the present study attempts to review the two theories and to elicit strong and weak points implicit in them.

The Criteria for Evaluating Theories

On conducting our investigation, we would like to employ the criteria for evaluating a theory presented by Littlejohn (1992) and Infante, Rancer, & Womack (1993). The former deals with criteria in relation to explanation, while the latter pays its attention to criteria with respect to prediction. The former consists of 6 items, while the latter is composed of 4. Neuliep (1996) summarizes the contents of the two works as below:

Table 1 Criteria for evaluating a theory

Criteria related to explanation	Criteria related to prediction
1. Organization of concepts	1. Heuristic
2. Scope of concepts	2. Testable
3. Summary of concepts	3. Anticipatory
4. Focus of concepts	4. Observable
5. Clarification of concepts	
6. Parsimony of explanation	

Neuliep (1996, pp. 60-61) explains the individual concepts displayed in Table 1 as the following. See Table 2.

Table 2 Neuliep's (1996) explanation on the concepts displayed in Table 1

Criteria related to explanation

1. Organization of concepts: While identifying the concepts, the explanation should also present them in a well-organized manner, ... Theorists frequently rely on models, for example, to organize their concepts.
2. Scope of concepts: Scope refers to the range of concepts encompassed by the explanation. Most explanations, for example, should attempt to explain more than a single concept.
3. Summary of concepts: The explanation should offer a complete account of its concepts, including their definition and any past related research.
4. Focus of concepts: The theory should point out the more relevant and significant concepts that deserve special attention.
5. Clarification of concepts: An important job of the theorist is to spell out how the concept can be applied in the everyday lives of its users.
6. Parsimony of explanation: In essence, the explanation should be simple.

Criteria related to prediction

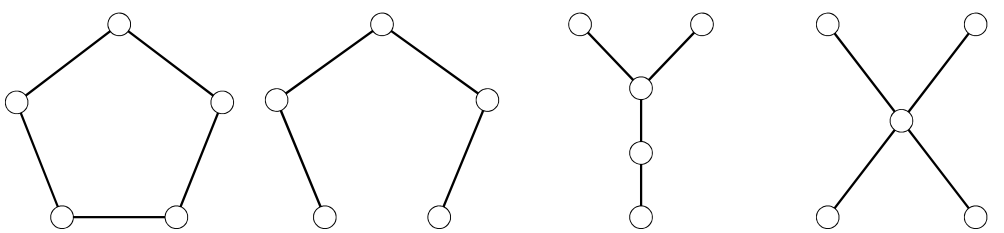
1. Heuristic: Heuristic prediction generates research and give other theorists new insights into the topic area.
2. Testable: Theoretical predictions should be testable; that is, subject to verifiability and falsifiability.
3. Anticipatory: Theoretical predictions should explicitly state what is to be expected given a certain set of theoretical statements.
4. Observable: The observable criteria ... simply means that whatever is predicted can be observed in some way.

In accordance with the criteria presented above, the following sections will evaluate network theory and constructivism. The procedure of our inquiry will follow the order exhibited in Table 2.

Evaluating Network Theory

Organization of concepts

Reading primers of network theory, introductions of group dynamics, and handbooks of organizational communication network makes us notice that the concepts of network theory are well-organized. It is apparent that the great majority of these materials fully explain the concepts of network in a visualized, well-organized manner, using simple models. The most frequently cited network model is Leavitt's (1951) small group network model. See Figure 1.



From Leavitt, H.(1951). Some effects of certain communication patterns in task-oriented groups. *Journal of Abnormal and Social Psychology, 46,* p.42.

Figure 1. Network models presented by Leavitt

Symbol marks [○] in the diagrams show individuals, while each bar connecting the symbol marks indicates the established network between the two individuals. As shown in Figure 1, an abstract concept of "network" can be visually explained by the exhibited diagrams called sociogram. The great majority of researchers of network theory have agreed on expounding connections between individuals by the use of sociogram. We can reasonably conclude that the first criterion is fully upheld by network theory.

Scope of concepts

Network theorists have attempted to explicate how individuals in a group or in a society are connected. In addition, scholars such as Rogers & Rogers (1976), and Rogers & Kincaid (1981) have made intensive efforts to elaborate roles of individuals[(1)] embedded in networks. Their works have contributed to authorize the terms describing network roles such as gatekeeper, opinion leader, bridge, liaison, cosmopolite, and isolate. Moreover, network theory has enabled researchers to elucidate complicated human behavior. Regarding

network as independent variables, dependent variables, and intervening variables, researchers have tried to demonstrate the reasons why individuals embedded in a specific network employ a patterned behavior. It is fair to say that network theory has succeeded in describing more than a single concept. We can reasonably assure that network theory meets the second criterion. However, the authors assume that further research should be needed to investigate cognitive and affective aspects concerning network role, for the studies of network role so far have with the subject mainly from a functional viewpoint.

Summary of concepts

Since the 1930s, a considerable number of scholars have made constant efforts to refine network theory, including its theorizing, definition of concepts, and its applicability, introducing new concepts into the theory. Table 3 indicates the overall summary of communication studies on network theory.

Table 3 The vicissitudes of network studies since the 1930s

Studies regarding network as metatheory		Studies regarding network as cross-cultural/ intercultural communication theory
Moreno (1934)	1930s	
Moreno (1940)	1940s	
Studies regarding network as general communication theory		
	1950s	
Bavelas (1950) Leavitt (1951) Blau (1954) Homans (1958)		
		Mitchell (1959)
	1960s	
		Gans (1962)
		Barth (1963), Vogel (1963)
Coleman (1966), Coleman, Katz, & Manzel (1966) Lawrence & Lorsch (1967)		
		Bar-Yoseph (1968)
Barnes (1969), Harary (1969)		Barth (1969)
	1970s	
Davis (1970) Lorrain & White (1971)		Shuter (1970), Ayabe (1970)

Kincaid (1972)

Boissevain & Mitchell (1973)
Granovetter (1973) Laumann (1973)
Boissevain (1974) Granovetter (1974)
Mears (1974)
Burt (1975)
MacDonald (1976)
Rogers & Rogers (1976)

Blau (1977)
Schwartz & Jacobson (1977)
Burt (1978) Sailer (1978) Wolfe (1978)
Freeman (1979) Jablin (1979)

Boissevain (1974) Mayer & Mayer (1974)

Rico-Androdos (1975)
Burnstein (1976)
Kincaid & Yum (1976)
Rogers & Shoemaker (1976)
Yamakura (1977)

Alba (1978) Korzeny & Farace (1978)

1980s

Burt (1980) Farace & Mabee (1980)
Bernard & Killworth (1980)
Aldrich & Whetten (1981) Tichy (1981)
Cook (1982) Granovetter (1982)
Lin (1982) Lincoln (1982)

Burt (1983) Feldman & Brett (1983)
Laumann (1983)
McCallister & Fischer (1983)
Imai (1984)
Eisenberg, Monge, & Farace (1984)
Blair, Roberts, & McKechnie (1985)
Fombrun (1986) Imai (1986)
Kaneko (1986) Sato (1986)
Krankhardt & Porter (1986)
Monge & Contractor (1987)
Imai & Kaneko (1988) Kaneko (1988)
Brown (1989) Karino (1989)

Rogers & Kincaid (1981) Sato (1981)
Deal & Kennedy (1982)
Knoke & Laumann (1982)
Moore & Alba (1982)
Rogers (1983) Yum & Wang (1983)

Moore & Alba (1982)
Eisenberg, Monge, & Miller (1984)
Barnett & Rice (1985) Richards (1985)

Mizuruchi (1987) Sato (1987)
Kanai (1988a) Kanai (1988b)
Kanai (1989)

1990s

Hiramatsu (1990)
Hioki (1991)
Cook & Whitemeyer (1992)
Krankhardt (1992) Nohria (1992)
Ibarra (1993) Rice (1993)
Wolfel (1993)
Galaskiewicz & Wasserman (1994)
Knoke (1994) Kumon (1994)
Marsden & Friedkin (1994)
Sudou (1995) Yasuda (1995)

Kanai (1990)

Shimada (1993) Wellman & Tindall (1993)
Yamakura (1993)
Okumura (1994)
Miyamoto, morishita & Kimizuka (1994)

Otani (1995)
Takada, Mintz, & Schwartz (1996)
Yasuda (1996)

The studies listed on the left side of Table 3 regard network theory as general communication theory. The majority of them take on an inductive character. In other words, those listed have contributed directly or indirectly to the theorization of network paradigm. On the contrary, studies categorized into the right side of Table 3 regard network theory as cross-cultural/ intercultural communication theory. The majority of them take on a deductive character. These are the examples of practical application of network theory.

Among these studies in the table, the studies conducted by Moreno (1934), Bavelas (1950), Leavitt (1951), Granovetter (1974), and Rogers & Rogers (1976) directly served to theorize network paradigm. These masterpieces concerning network studies have helped researchers to conduct heuristic studies, which has conduced to the refinement of network theory. It can be said that current network theory does exist, owing to its constant refinements given by a large number of studies presented above. It can also be said that network theory sufficiently fulfills the third criterion.

Focus of concepts

Our discussion regarding the third criterion has shown that a large quantity of network studies have so far been conducted. In addition to the works of scholars, since the 1980s, General Social Survey (GSS), one of the most large-scale social surveys in the United States, has started to employ network questionnaires in its question items. This indicates that network theory has remarkably attracted public attention. We can infer from the facts that the theory provides significant concepts which deserve special attention.

Clarification of concepts

Network theory suggests a notion that individuals are born into social networks; they communicate with each other, play a peculiar role, and make decisions within social networks in which they are embedded. In other words, network theory serves to explain interconnectedness among individuals, that is, our everyday interactions. We can apply the theory to our everyday lives in every context including our family life, school life, and organizational life. Some scholars tested the theory in the laboratory settings, especially in its initial stage of theorizing in the 1950s. However, the great majority of the researchers have applied the theory in our everyday lives. Network theory has served as an excellent analytic tool for researchers to examine common communication phenomena in our everyday lives. Therefore, it can be deduced that the theory satisfies the fifth criterion.

Parsimony of explanation

Network theory tries to illustrate patterned connections among individuals in a very simplified manner, focusing upon who sends messages to whom. The linking pattern among individuals, as noted earlier, is represented in a sociogram. In this sense, it seems that network theory fulfills the sixth criterion. However, one may say that explaining human connections with sociograms fails to grasp a number of significant items of information about the connections except one item "who sends messages to whom." For instance, sociograms fail to depict the contents of messages, how messages were communicated (i.e., directly or indirectly), and cognitive phases of the connection, that is, how the connected individuals regard each other (i.e., friends or temporary acquaintances). Although network theory meets the sixth criterion, it is also patent that network theory needs more refinement to overcome the weak points referred to above.

Heuristic

A numerous number of studies pertaining to network theory have so far been done. In Table 3, which was presented earlier, the authors summarized 111 studies regarding network theory. It should be noted that these works are nothing but the small part of the iceberg that shows above the surface. This fact tells the heuristic character of network theory. As stated before, the theory enables scholars to conduct network researches in any context. Moreover, network theory serves as a multi-purpose analytic tool to investigate not only human connections but also interconnectedness of every tangible and intangible objects. For example, a natural scientist may employ a network view of thinking to explain the relationships among different kinds of atoms. Likewise, a linguist may use a sociogram to illustrate the relationships among words in a language. This flexible character of network view of thinking is one of the reasons why network theory has stimulated researchers in various kinds of academic fields into heuristic network studies. With this, the seventh criterion can be fully supported by network theory.

Testable

Network theory has subjected itself to verification and falsification of the theory. As noted earlier, network theory was originally produced as general communication theory in its initial stage of theorizing, especially in the 50s and the 60s. It was achieved by scholars such as Bavelas (1950) and Leavitt (1951). These researchers attempted to discover universal rules of human interaction especially in a laboratory setting. Afterwards, researchers such as Barth (1969), Rogers & Kincaid (1981), and Yum (1982) tried to verify the theory in

cross-cultural and intercultural settings, in the 70s and the 80s. Some researchers have verified the theory and have pointed out its usefulness, based on both qualitative and quantitative data. Network theory has also met a number of criticisms. It has, however, positively integrated criticisms against the theory, transforming them into the refinement and improvement of the theory. Seeing that network theory still evolves at the beginning of 21st century through verification and falsification, we can conclude that the theory satisfies the eighth criterion.

Anticipatory

Network theory does not negate a researcher's anticipation. For example, it is possible for a researcher to draw a hypothetical network structure without conducting a research. The works of Harary (1969) and Burt (1980) are typical examples of hypothetical level of inquiry. However, seeing that the majority of network studies attempt to figure out network patterns among individuals or network roles of individuals without drawing hypotheses, it seems fair to say that network theory does not positively accept anticipation of researchers. Besides that, results of some network studies show that two researchers sometimes acquire quite different network data and draw different conclusions, even if they enter the same research setting. Therefore, it can be inferred that network theory does not fully fulfill the ninth criterion.

Observable

Observability is one of the strongest points of network theory. Based on network data, both qualitative and quantitative, researchers are able to visualize connections among individuals which are intrinsically invisible. Network theory enables researchers to represent invisible human interactions in an observable sociogramic form. It is all right to say that network theory meets the final criterion. However, as pointed out in our discussion of the sixth criterion "Parsimony of explanation," sociograms are able to illustrate limited phases of human connection, that is, who sends messages to whom. The authors assume that further improvement is needed to visualize invisible factors (i.e., how messages were communicated, and how the connected individuals regard each other).

Summary

Having made an evaluation on network theory employing the ten criteria, we can now summarize the strong and weak characters with respect to the theory. Our discussion made it clear that network theory satisfies seven of the ten criteria. Among the ten criteria, it

becomes apparent that network theory especially excels in the following three criteria: organization of concepts, summary of concepts, and heuristic. To sum up, network theory has the following strong points. First, the theory enables researchers to explain the concept of "network," which is relatively abstract and intangible, in a clearly visualized, well-organized manner, using simple models called sociogram. This is the strongest aspect of the theory. Without models, a theory cannot be persuasive in its explanation. Second, the theory helps researchers to clarify the concepts in relation to human connection with authorized terms. For example, no scholars would interpose an objection to use the terms such as network, opinion leader, and social network. Constant and intensive efforts made by a considerable number of network scholars have contributed to authorize the terms regarding network theory. The third strong point of network theory is its heuristic character, which shares a complementary relationship with testability. Recall the author's earlier indication that 111 studies in Table 1 are nothing but the small part of the iceberg that shows above the surface. This fact displays the heuristic and testable character of network theory. These two characteristics have led researchers to devote themselves to network studies.

On the other hand, network theory has the following weak points. First, it fails to grasp a number of significant items of information about human connections except one item "who sends messages to whom." As mentioned earlier, it is common for the great majority of network researchers to use sociograms when they explain the linking patterns of individuals. However, sociograms fail to depict the details of messages, how messages were communicated (i.e., directly or indirectly), and cognitive phases of the connection, that is, how the connected individuals regard each other (i.e., friends or temporary acquaintances). The second weak point of network theory is its instability of the results. As we have said, network theory does not positively accept anticipation of researchers. The review of the network studies indicates that two researchers sometimes acquire quite different network data and draw different conclusions, even if they enter the same research setting. This tells us that human network is not static, but dynamic, which often falsifies researchers' anticipation. Having done with our evaluation on network theory, we will now proceed to an evaluation on constructivism.

Evaluating Constructivism

Organization of concepts

Unlike network theory, constructivism focuses on the inner structure of human cognition

and its influence on human behavior including communication. Neuliep (1996) summarizes the notion of constructivism as follows:

> Central to the constructivist theory is the principle that human behavior is guided and directed by cognitive (i.e., mental) processes called interpretive schemes. ... Interpretive schemes are composed of personal constructs. According to the theory, people do not directly experience reality but perceive and filter it through personal constructs. (p.199)

As the assumptions presented above imply, constructivists attempt to figure out the mechanism of how an individual's cognitive system influences on his or her communicative behavior. Constructivists assume that an individual's cognitive system dynamically changes, from simple to complex. One may say that something profound can be found in the assumptions, however, it cannot be denied that the basic notions expressed by constructivists are relatively too abstract, complicated, and hard to grasp. Furthermore, contrary to network theorists, no constructivists have ever exhibited pictorial models to explain the concepts of constructivism such as interpretive schemes, personal constructs, and cognitive complexity. This is the weakest point of this theory. These facts make us become aware that the concepts related to constructivism are not fully well-organized. We can reasonably conclude that the first criterion is not sufficiently supported by constructivism.

Scope of concepts

Constructivists have made efforts to elucidate the relationship between cognitive complexity and its influence on human behavior. The theorists regard the former as independent variables, and the latter as dependent variables. For example, constructivists assume that an individual with simple cognitive systems is likely to send simple messages, while an individual with complex cognitive schemes tends to transmit complex messages. Moreover, the theory attempts to examine cultural influence on individuals' cognitive schemes (although few researches based on constructivism have so far been conducted in corss-cultural or intercultural settings). It is fair to say that constructivism deals with more than a single concept. It seems, therefore, clear that constructivism fulfills the second criterion.

Summary of concepts

It has been only a few decades since constructivism was introduced into the field of communication studies. The concept of constructivism was originally brought into the field

of communication studies by Delia (1976), referring to the works of Kelly (1955) and Crockett (1965). Scholars such as O'Keefe and Burleson followed the theory. Table 4 shows the historical flow of communication studies concerning constructivism.

Table 4 The vicissitudes of studies related to constructivism since the 1950s

	1950s	
Kelly (1955)		
	1960s	
Crockett (1965)		
Studies regarding constructivism as general communication theory		Studies regarding constructivism as cross-cultural/ intercultural communication theory
	1970s	
Delia (1972)		
Delia, Clark & Switzer (1974)		
Delia (1976)		
Delia (1977) Clark & Delia (1977)		
Delia & Clark (1977)		
O'Keefe & Delia (1979)		Delia, Kline, & Burleson (1979)
	1980s	
Hale (1980)		
O'Keefe, & Sypher (1981)		
Applegate (1982) Hale (1982)		
Delia, O'Keefe, & O'Keefe (1982)		
O'Keefe & Delia (1982)		
O'Keefe (1984)		
Hale (1986) Burleson (1987)		
O'Keefe (1988)		

What the table makes clear is that constructivism is still in its initial stage of theorizing. As indicated in the table, few attempts have ever been made by scholars to test the usefulness of the theory in intercultural or cross-cultural settings. As Applegate & Sypher (1988) point out, constructivists insist that "what is needed is not a theory of intercultural, cross-cultural, or interracial communication" (p. 41). It seems obvious that further researches will be needed for the maturity of constructivism. We can infer from these that constructivism does not sufficiently satisfy the third criterion.

Focus of concepts

In our previous discussion pertaining to the third criterion, the authors have implied that the quantity of studies about constructivism is not sufficient. We cannot, thus, conclude that the notion of constructivism is widely appreciated by communication scholars. Furthermore, it seems that the basic notions expressed by constructivists are relatively too abstract and complex. Some scholars may find it difficult to comprehend the notion of constructivism, and advocate that the theory is not worth paying attention to. Nevertheless, it seems manifest that the theory provides the significant concepts which deserve special attention, for the theory deals with important elements such as human cognition. The authors would like to conclude that the theory fulfills the fourth criterion. However, we also would like to insist that more efforts must be done by constructivists to elaborate abstract and complicated terms of constructivism by using simple words or pictorial models accessible to non-constructivists.

Clarification of concepts

Applegate & Sypher (1988) demonstrate the basic standpoint of constructivism as follows: "what is needed is not a theory of intercultural, cross-cultural, or interracial communication, but at base, a coherent theory of communication whose focus of convenience encompasses the impact of historically emergent forms of group life on the various forms and functions of everyday communication" (p. 41). As stated in this quotation, constructivism direct its attention to our everyday communication. For example, the works of Delia and Clark (1977), Delia, Kline, & Burleson (1979), Hale (1982), and O'Keefe (1984) focused their attention on the subjects' everyday communication, from which they attempted to examine the relationships between cognitive complexity and communicative acts. Properly used, we can utilize constructivism as an excellent analytic tool to investigate our communicative behavior in our everyday lives. In this sense, it is appropriate to say that the fifth criterion can be upheld by the theory.

Parsimony of explanation

Touched upon earlier, constructivism aims to explore the relationship between individuals' cognitive scheme and its influence on communicative behavior. In most cases, the results of practical researches are displayed in a numerical form as in Table 5.

Table 5 Mean level of communicative adaptation for the age X cognitive complexity interaction

Age	Noncomplex	Complex
6	9.40	14.00
8	21.00	24.60
10	20.00	35.60
12	28.80	34.80

The table above was taken from Delia & Clark (1977, p. 334). In this research, the subjects were categorized into two groups according to their cognitive schemes. The noncomplex group refers to a group of subjects whose cognitive schemes are not complex, while the complex group refers to a group of subjects with complex cognitive schemes. Afterwards, the processes of cognitive development of the subjects were measured, which was displayed in the table. The numerals in the table positively relate to cognitive complexity; the larger the numerals, the more subjects' cognitive schemes become complex. It seems reasonable that constructivism succeeds in presenting cognitive development of the subjects in a simplified manner. In this regard, we can deduce that constructivism fully satisfies the sixth criterion.

Heuristic

As the second criterion indicates, constructivists do not direct their attention to intercultural communication or cross-cultural studies. This is one of the reasons why constructivism does not stimulate researchers outside of constructivists group into heuristic studies of constructivism. Contrary to network theory, constructivism cannot be utilized for various purposes. Constructivists should increase the range of its use, if they wish to be widely accepted by scholars outside of constructivists group. Conducting intensive researches in intercultural and cross-cultural settings may be a starting point. From taking these points into consideration, we cannot infer that the seventh criterion is upheld by constructivism.

Testable

Constructivists have employed an authorized survey method such as content analysis on conducting researches. In most cases, researchers of the theory measure the degree of respondents' cognitive complexity through the analysis of the descriptive documents written by the respondents being asked to describe something. In case the participants

depict the object (i.e., a person) with simple and concrete words (i.e., tall, fat), they are looked upon as people with noncomplex cognitive systems. On the other hand, the participants protlaying the same object with abstract words (i.e., honest, kind) are deemed as individuals with complex cognitive system. The transcribed data of interviews are also used. The survey method indicated above is far from complicated and easy to conduct. Therefore, it can concluded that the theory satisfies the eighth criterion.

Anticipatory

Constructivism aims at investigating the current state of cognitive schemes of an individual (i.e., simple or complex). Repeating this line of research allows researchers to present the processes of cognitive systems of an individual (and individuals) dynamically in a numerical form, as displayed in Table 5. To sum up, what constructivism goes for is to grasp the current status of the object, rather than verifying hypotheses antecedently drawn by researchers. It seems that constructivism does not positively accept researchers' anticipation. We can deduce from taking this into considerationthat constructivism does not match the ninth criterion.

Observable

Constructivists represent the developmental processes of individuals' cognitive systems in a numerical form, as shown in Table 5. It helps scholars to comprehend one aspect ofcognitive system. However, it is manifest that this numerical form of representation fails to expound the notion of individuals' cognitive systems in a observable, clearly visualized fashion. This is one of the weakest points of constructivism. Constructivism, therefore, does not meet the final criterion. Further improvement is needed to satisfy this criterion. The authors assume that perception models given by Sitaram (1985)[(2)] will help constructivists to express the notion of individuals' cognitive schemes in a visualized manner.

Summary

An evaluation on constructivism based on the ten criteria made it clear that the theory satisfies five of the ten criteria. Let us summarize the strong and weak aspects of the theory. Among the ten criteria, it became patent that constructivism specifically excels in the sixth criterion, namely, parsimony of explanation. To sum up, constructivism has the following strong points. First, constructivism enables researchers to explore individuals' cognitive schemes and their influence on communicative behavior, and to present the cognitive development of individuals in a simplified, numerical fashion.

Second, in addition to this point, the theory excels in testability. Constructivists have employed an authorized survey method such as content analysis, a method fully accessible to all researchers, to measure the degree of respondents' cognitive complexity on conducting researches. This accessibility is the second strong point of constructivism.

On the other hand, our discussion also made it clear that constructivism has the following negative points. First, no constructivists have so far succeeded in offering pictorial models to explain such concepts as interpretive schemes, personal constructs, and cognitive complexity, which leads to an impression that the fundamental notions of constructivism are abstract and hard to incomprehensible. Further improvement is needed to expound the notion of individuals' cognitive systems in a observable, clearly visualized manner.

Second, constructivism does not stimulate researchers outside of constructivists group into heuristic studies based on the theory. Because constructivists do not pay their attention to intercultural communication or cross-cultural studies. However, it seems apparent that researchers are able to utilize the theory for various purposes in cross-cultural or intercultural settings. Given an example, it is possible for a linguist to illustrate different perception styles manifested in American and Japanese Sign Language, with reference to the theory. Such an analysis will help researchers to uncover the characteristics of cognitive system employed by the users of the two languages. Besides that, as the work of O'Keefe (1984) indicates, constructivism allows researchers to illustrate how individuals within a work group perceive other co-workers. It is possible to conduct this line of studies in cross-cultural or intercultural settings, which will stimulate researchers in various fields of communication studies to engage in heuristic studies of constructivism. At all events, constructivists should enlarge the range of its use beyond intracultural communication studies.

Lastly, constructivism is not suited for prediction. It seems clear that constructivism does not positively accept researchers' anticipation. The review of the related studies of constructivism shows that constructivism goes for investigating the current state of cognitive schemes of an individual, namely, what constructivism seeks is to grasp the present status of the object, rather than verifying hypotheses antecedently drawn by researchers.

Conclusion

In this paper, we have reviewed network theory and constructivism based on the ten criteria for evaluation. Whole discussion presented here enabled us to discover the strong

and weak characters of the two theories. Finally, Table 6 indicates the results of our findings.

Table 6 The strong and weak points of network theory and constructivism

Criteria related to explanation		
	Network theory	Constructivism
1. Organization of concepts	◎	△
2. Scope of concepts	○	○
3. Summary of concepts	◎	△
4. Focus of concepts	○	○
5. Clarification of concepts	○	○
6. Parsimony of explanation	△	◎
Criteria related to prediction		
	Network theory	Constructivism
7. Heuristic	◎	×
8. Testable	○	○
9. Anticipatory	△	×
10. Observable	△	×

Note. ◎ = fully satisfy the criterion
○ = satisfy the criterion
△ = mostly satisfy the criterion, but need more improvement, or do not fully satisfy the criterion
× = do not satisfy the criterion

First, it is not far from the truth to say that network theory is well-balanced. As displayed in Table 6, the theory fulfills seven of the ten criteria. In addition, a considerable number of scholars have made intensive efforts to refine network theory since the 1930s, including its theorizing, definition of concepts, and its applicability. Such efforts by scholars have contributed to the maturity of the theory.

On the other hand, it cannot be inferred that constructivism is well-balanced, for the theory meets only half of the ten criteria as seen in Table 6. Furthermore, no constructivists have so far succeeded in providing pictorial models to explain the basic concepts of constructivism such as interpretive schemes, personal constructs, and cognitive complexity. It seems fair to say that the basic notions of the theory has not yet fully elaborated by scholars, which leaves us an impression that the concepts of constructivism are not wholly well-organized. Intensive efforts by constructivists must be done to refine the theory, including definition of basic notions, and its applicability. Without such efforts, the theory would not reach its maturity.

Second, closer attention to the strong characters of network theory and constructivism makes us realize that we can conduct a rich and rewarding research with the employment of the two theories simultaneously. Recall that network theory excels in illustrating the linking patterns of individuals in a form of sociogram. However, sociograms fail to depict the cognitive phases of human connection, that is, how the connected individuals regard each other (i.e., friends or temporary acquaintances). To overcome this, we can utilize constructivism. Remember that constructivism enables us to figure out how an individual takes others. Suppose we conduct a research on American-based companies and Japanese-based counterparts, with the purpose of identifying the characteristics of employees' communicative behavior between the two sample groups. Combining network theory and constructivism view of thinking will get us to understand various phases of communicative acts of the subjects. Network view of thinking will help us to display linking patterns of employees explicit in the two sample groups by drawing sociograms, as shown in Figure 2.

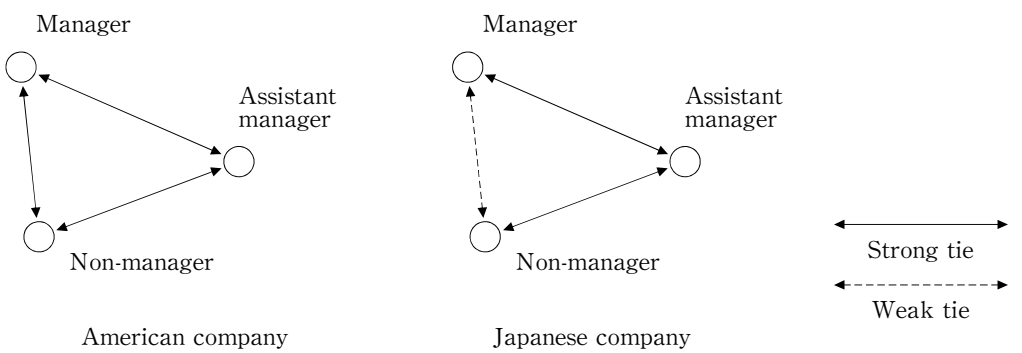


Figure 2. A hypothetical communication network model in a triadic setting

Besides this, conducting questionnaire survey applying to constructivism view of thinking will allow us to illustrate perception styles of employees in the two sample groups, as given in Table 7.

Table 7 The hypothetical results of Questionnaire Item X by nationality

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
Japanese company (n=55)	0 (0%)	0 (0%)	7 (6.3%)	1 (0.9%)	36 (32.1%)	7 (6.3%)	1 (0.9%)	0 (0%)	3 (2.7%)
American	0	0	4	0	7	43	2	0	1

company (n=57)	(0%)	(0%)	(3.6%)	(0%)	(6.3%)	(38.4%)	(1.8%)	(0%)	(2.7%)
Total (n=112)	0 (0%)	0 (0%)	11 (9.9%)	1 (0.9%)	43 (38.4%)	50 (44.7%)	3 (2.7%)	0 (0%)	4 (3.6%)

Note. (A)＝Father (B)＝Mother (C)＝Brothers or sisters (D)＝My sons or daughters (E)＝Friends (F)＝Temporary acquaintances (G)＝Competitors (H)＝Enemies (I)＝Other
$X^2 = 48.609$ $df = 8$ $p < .01$

Our hypothetical questionnaire item asked the respondents to match their colleagues to one item among the following nine items in order to comprehend how employees perceive other co-workers: (A) Father (B) Mother (C) Brothers or sisters (D) My sons or daughters (E) Friends (F) Temporary acquaintances (G) Competitors (H) Enemies (I) Other. Table 7 shows the results of the hypothetical questionnaire item X in a form of cross-total-table. The hypothetical results of the statistical analysis indicates that there is a significant difference regarding the item X between workers in Japanese and the U.S. companies at the significant level of .01 ($X^2 = 48.609$, $df = 8$, $p < .01$). The results of the item question showed the respondents in American and Japanese companies perceive their co-workers differently. As shown above, it seems obvious that combining network theory and constructivism view of thinking will greatly help us to understand various phases of communicative acts of the target subjects.

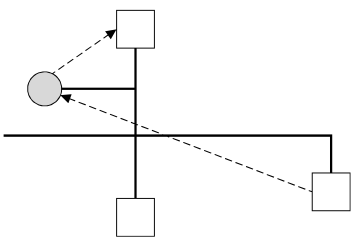
In the present study, we have attempted to evaluate network theory and constructivism. Positive and negative points of the two theories were also elicited. Much has been said in our inquiry. However, our research draws several implications. First, we should evaluate the two theories with the employment of other criteria, which may lead us to reach a different conclusion. And, we also need to evaluate other theories, for the present study challenged only two theories. Second, further examinations are needed to grasp potential strong and weak points of the two theories we have studied. Although the authors concluded that network theory is well-balanced and constructivism is not, further investigation may lead us to notice potential weak points of the former and potential strong points of the latter. Third, it will be of great value for us to try to find the effective combination of two different theories, on conducting researches. As the authors pointed out, it seems apparent that combining network theory and constructivism view of thinking will greatly help us to understand various aspects of communicative acts of the target subjects. The authors also assume that it is possible to combine relational development

theory and network theory, social exchange theory and constructivism.

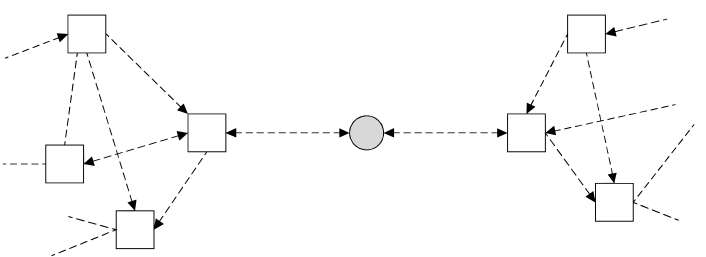
Notes

（1） Rogers (1976, p. 133) explains the individual communication network roles as follows.

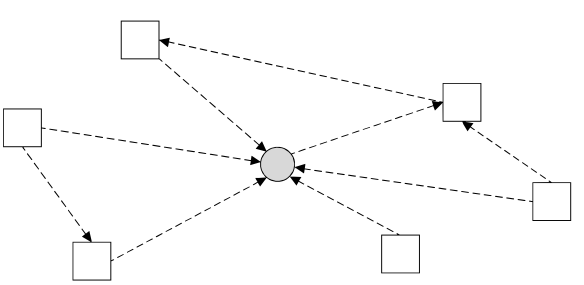
〈Gatekeeper〉
- an individual who is located in a communication structure so as to control the messages flowing through a communication channel



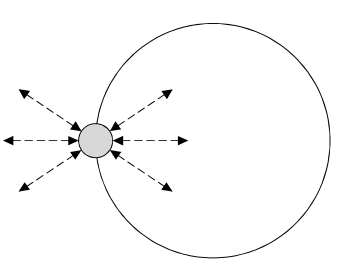
〈Liaison〉
- an individual who interpersonally connects two or more cliques within a system, without himself belonging to any clique



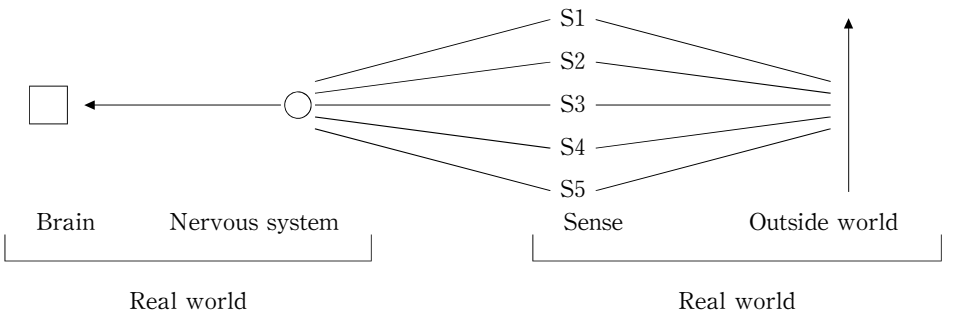
〈Opinion leader〉
- an individual able to informally influence other individuals' attitudes or overt behavior with relative frequency



〈Cosmopolite〉
- an individual who has a relatively high degree of communication with the system's environment



（2） Following model is one of the perception models presented by Sitaram (1985. p. 91)



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