
Frameworks for studying information behaviour: A unit theory specification of Granovetter's strength of weak ties¹

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Granovetter's theory of the "strength of weak ties" (SWT) posits that an individual's social network is comprised of weak and strong ties, but that it is through weak ties that new information and resources are received since strong ties usually possess the same information as the individual. This paper explains how SWT can be specified as a unit theory from its metatheoretical form for studying information behaviour. It is based on PhD research which used SWT and ethnographic methods to investigate the role of nurses in linking the elderly with community resources.

Introduction

The study of information behaviour (IB),² that is, how people need, seek and use information in different contexts, has undergone many changes in recent decades, including the "paradigm shift" of the 1980s in which user-focused paradigms were advocated over the traditional systems-centred approach (Dervin and Nilan 1986). Despite recognition that IB research has matured in terms of academic norms, the field has been criticized for its lack of theoretical growth, weak specifications of metatheories to unit theories, weak conceptual relationship to earlier studies, lack of concentration on group level variables, and need for greater use of interdisciplinary approaches and methodologies (Vakkari forthcoming). In partial response to these criticisms this paper draws upon Vakkari and Kuokkanen's (forthcoming) structuralist interpretation of Wagner and Berger's (1985) work on theoretical activity and growth to explain how Granovetter's (1973, 1982) theory of the "strength of weak ties" (SWT) can be specified as a unit theory from its metatheoretical form for studying IB. Despite SWT's integral connection to diffusion theory and potential for understanding information-seeking — as noted by Schwartz (1994) and Cronin (1982) — no substantial research has applied Granovetter's theory within a library and information science (LIS) context.

Following an overview of recent work in LIS on analyzing theoretical growth, this paper explains how SWT was specified as a unit theory to investigate the role of community health nurses in linking the elderly with community resources.

Analyzing theoretical growth in LIS

In a recent article Vakkari and Kuokkanen (forthcoming; cf. Vakkari 1994; Vakkari forthcoming) advocated the use of a structuralist interpretation of Wagner and Berger's (1985) conception of sociological theories for analyzing theoretical activity and growth in LIS on the grounds that the product of the collective research effort in our discipline (and, indeed, any discipline) is linked to the degree to which theoretical growth is said to be occurring. They recommended using particular methods or tools designed for the systemization and formalization of theories that enable us more easily to discern how LIS theories are linked together and have built upon each other, and to identify new concepts for exploration with respect to a given phenomenon. To support their argument, Vakkari and Kuokkanen use structuralist theory and set theory — analytical tools borrowed from the philosophy of science — to reconstruct (specify) an IB theory³ from its metatheoretical form to a unit theory. Their exercise illustrated how these tools enable systematic mapping of theoretical growth through: (1) stating the metatheory's key concepts and relations, (2) revealing its implicit restrictions, and (3) facilitating the derivation of additional hypotheses from its axioms by showing the mechanisms which interconnect its concepts. The result of their specification — as with any specification, they argue — is the identification of future prospects for developing the IB metatheory, IB studies, and information science in general.

Despite the attractiveness of the potential outcomes of Vakkari and Kuokkanen's approach to analyzing theoretical growth in LIS, it may not be used extensively. This is mainly because their method of analysis involves a lengthy process that many researchers may not be willing to undertake, and moreover, perhaps, because Vakkari and Kuokkanen's approach entails analyzing LIS theories as set-theoretic structures (i.e. "theories are seen as mathematical structures which are applicable to empirical phenomena") that require the analyst be fluent or adept in the use of set theory and stating mathematical proofs, which, given the non-mathematical nature of most IB research, will serve for many as a deterrent.

This is not to say, however, that we should dismiss Vakkari and Kuokkanen's method. The very fact that they found it necessary to develop their approach warrants that we give it serious consideration and explore ways in which we can use or adapt their approach to strengthen our own use of theories within LIS and specifically, within the area of IB. Thus, the aim of this paper is to illustrate, in the form of an exercise, how one may adapt Vakkari and Kuokkanen's approach, using

natural language instead of set notation, to analyze the feasibility of using social network theory to frame an IB investigation. Specifically, this paper will show how SWT was used to investigate the role of community health nurses in linking with elderly with local services for the purpose of identifying new concepts for exploration and elaboration. This exercise is carried out in a series of nine steps taken from Vakkari and Kuokkanen's own example of how they specified an IB theory from its metatheoretical form to a unit theory form. But before getting to the exercise involving SWT, it is necessary to provide a brief overview of some earlier work on which Vakkari and Kuokkanen based their approach.

Wagner and Berger

The basis for Vakkari and Kuokkanen's structuralist approach for analyzing theoretical growth in LIS is found in the work of Wagner and Berger (1985; cf. Berger, Wagner and Zelditch 1989, 1992; Kuokkanen and Savolainen 1994; Lawler and Ford 1993; Vakkari forthcoming) who proposed a framework for classifying three types of theoretical activity (metatheories, unit theories, and theoretical research programs) and two types of theoretical relations (basic and special) that, taken together, indicate different forms of theoretical growth. These types of theories and relations are briefly explained below in terms of Vakkari and Kuokkanen's usage.

Metatheories⁴ broadly consist of two types of theories: orienting strategies and working strategies. Orienting strategies consist of "ontological, epistemological, and conceptual presuppositions of a very general nature [that] are not so much about processes like information seeking occurring in a social world as they are about the ways of thinking about those processes" (Vakkari forthcoming). In this sense, they include theories that are "conceptualized in such abstract and general terms that [they] can be applied to any kind of concrete social system." Dervin's (1992) sense-making approach is an example of a LIS metatheory in this light. Working strategies, on the other hand, are "relatively specific and concrete conceptions about how to do the work of science that orient the theorist to a specific set of substantive questions," and in this sense, is a general model of the research object (Vakkari and Kuokkanen forthcoming). LIS examples of working strategies include Kuhlthau's (1991) model of the information search process, and Leckie, Pettigrew, and Sylvain's (1996) model of professionals' information seeking. Since neither orienting nor working strategies are about particular social structures, processes or groups, they cannot be tested empirically and thus it is difficult to observe theoretical growth on this level. To do so, one must first look to unit theories.

Unit theories are formed by specifying a metatheory's general concepts to fit the particular concrete setting that the researcher wishes to study. They include "a set of concepts and a set of assertions that relate those concepts in an account of some social phenomena," such as the IB of a particular group within a certain setting or situation (Vakkari and Kuokkanen forthcoming). In this sense, unit theories are "concerned with the actual presentation and evaluation of theoretical statements [propositions, axioms, causal models], rather than with the determination of which theoretical statements should be presented and evaluated" (Wagner and Berger 1985, 702). Since unit theories contain specific research questions, their claims can be tested empirically — either directly or indirectly — and conflicts between them can be frequently resolved through appeal to fact or reason (703). Thus, whereas metatheories prescribe how to construct and evaluate theories, it is their unit theories that are evaluated as particular theoretical constructions and it is this testing of unit theories that enables one to determine whether theoretical growth or progress has occurred where growth is a direct consequence of increasing empirical support (703). In short, the degree to which one may claim a unit theory is developed increases with the number and variety of the theory's propositions that are supported by empirical observation and which contradict those of alternative unit theories. Yet, because activity among unit theories focuses on linkages between theory and data, one must also examine the relations between theories, the theory-theory linkages, in order to fully describe and understand the theoretical growth process (704).

Theoretical research programs, Wagner and Berger's third type of theoretical activity, are "sets of interrelated unit theories along with the research relevant to evaluating them" that focus on "the context of interrelated theories within which unit theoretical work occurs" (704-5). Wagner and Berger claim that by "study[ing] the interrelations among unit theories in a theoretical research program, we see that the change, growth, or development among those theories is a multifaceted activity, that growth takes different forms that are manifested in different types of theoretical relations between unit theories" (705). They describe five types of relations, grouped as either basic or special, that may occur — either in series or in combination — among unit theories in a theoretical research program where each reflects a distinct mode of theoretical growth. Basic relations include: (1) theory elaboration, when an old theory is made more general or specific by introducing a newer one that increases its scope, rigor, precision or empirical adequacy; (2) theory proliferation, when the basis for one theory is used to create a new theory that is concerned with a different sociological phenomenon or data base; and (3) theory competition, when a new theory is created for the purpose of capturing part (or all) of another theory's explanatory domain (707). Wagner and Berger claim

that "this sort of collective and systematic effort to develop theoretical knowledge creates the much larger unit of a theoretical research program," where "each elaboration, proliferation, or competition constitutes a step in the development of the program's anatomy, and together they define the nature of the interrelations among the unit theories" (710). They add that by "using these concepts [one] can isolate and describe three basic types of theoretical research programs, defined according to which relation is the basic mode of development in the anatomy of the program" (710). Thus, they designate programs that are developed on the basis of elaboration as *linear*, those that are based on proliferation as *branching*, and those based on competition as *competing*. Both Vakkari and Kuokkanen (forthcoming) and Wagner and Berger (1985) go on to explain how metatheories are used (in conjunction with their unit theories) for analyzing theoretical growth based on these types of relations.

In their structuralist interpretation of Wagner and Berger's work, Vakkari and Kuokkanen (forthcoming) analyze LIS theories as set-theoretic structures for which they devised structuralist theory-elements to correspond with Wagner and Berger's set of unit theories, and structuralist theory relations to correspond with the latter's system of theory relations. While a specification of SWT as a unit theory in set-theoretic terms is beyond the scope of this paper, Vakkari and Kuokkanen's approach is followed in the sense that one can describe relations between a metatheory and a unit theory-instead of strictly between unit theories — and also in respect to the general steps they used for unit theory specification (though they did not isolate each step). These steps will be explained, following a brief overview of Granovetter's SWT, to illustrate how one can adapt Vakkari and Kuokkanen's approach for specifying a metatheory as a unit theory for studying information behaviour using natural language.

Granovetter's theory of the strength of weak ties

Granovetter's theory of the strength of weak ties⁵⁻⁶ is a metatheoretical framework — in the sense of a working strategy — used heavily in social network research that focuses on the principle of intransitivity and the diffusion of information.⁷ In essence, where a tie is a relationship between individuals, the theory's basic postulate states that an individual's social network is comprised of weak ties (e.g. acquaintances) and strong ties (e.g. family, close friends), but that it is through weak ties that new information and resources are received since strong ties usually possess the same information as the individual. Thus, weak ties are said to be more instrumental than strong ties in the flow of information and other resources.

The principle of transitivity, which is "the tendency for one's friends' friends to be one's friends as well," figures predominantly in SWT (Granovetter 1982, 120).

Whereas transitivity is a feature of strong ties, it is not expected of weak ones since it is likely that if A is loosely acquainted with B and B is loosely acquainted with C, then A and C probably do not even know each other. In other words, one would not expect to interact with the acquaintances of one's acquaintances. It is the intransitivity of the relationships between A and A's weak ties that make weak ties pivotal in the flow of new information: the premise is that people who are strongly linked to A tend to know only the same things and same people as A, and it is only through weak ties that new ideas and connections with new people can be made. Moreover, as Granovetter (1973, 1366) explained, whatever is to be diffused can travel greater social distance (i.e. path length) and thus reach a larger number of people when passed through weak ties instead of strong.

Another SWT proposition concerns local bridges, defined as: "ties between two persons that are the shortest, and often the only, plausible routes by which information might travel from those connected with one to those connected with the other" (Granovetter 1982, 120). Granovetter asserts that "while not all weak ties should be (local) bridges, all such bridges should be weak ties — an argument central to the assertion that weak ties serve crucial functions in linking otherwise unconnected segments of a network" (120). Thus, according to SWT, weak ties are more likely to be local bridges than strong ties and therefore are of special value in the flow of new information and resources.

But strong ties also play an important role in the flow of information: whereas "weak ties provide people with access to information and resources beyond those available in their own social circles; [it is] strong ties who have greater motivation to be of assistance and are typically more easily available" (113). As evidence, Granovetter pointed to the work of Weimann (1980) who found that "the speed of flow, credibility, and especially influence are all greater through strong ties," and that while "weak ties provide the bridges over which innovations cross the boundaries of social groups, the decision making is influenced mainly by the strong-ties network in each group" (121).⁸

SWT as a metatheory

In Vakkari and Kuokkanen's terms, Granovetter's SWT is a metatheory in the sense of a working strategy because it includes key concepts (e.g. tie strength, bridgingness) and describes their interrelations on a general and abstract level. It provides orienting assumptions about the phenomenon (interaction and communication between people) which tell how the social processes under study are suggesting a problem focus, that is, the sharing of information between individuals or within groups. Thus, SWT suggests that researchers should concentrate on this key problematic. On the other hand, SWT also supplies

researchers with a metatheoretical core, which directs how to conceptualize the key constructs within the problem focus. In the case of SWT, the strong and weak ties are basic conceptualizations as well as tie instrumentality and local bridges.

While Granovetter proposed SWT and stated its key concepts, much of its development was undertaken by Kim (1986) who elaborated on the working strategy (in Vakkari and Kuokkanen's sense) by conceptualizing it at the dyad-level in her PhD dissertation at Stanford under Everett Rogers. Working from Granovetter's basic postulates and with data from four earlier studies, Kim developed the working strategy (and thus created a new working strategy) by introducing new concepts that enriched SWT's structure. She also specified the working strategy into unit forms by stating the interrelations between those concepts, by suggesting ways the concepts could be operationalized, and by inferring predictions. Her elaboration of Granovetter's working strategy into a revised working strategy focused on three key concepts: tie strength, instrumentality, and bridgingness, and their relations for which she devised eighty-eight propositions or empirically testable predictions. As a result of her elaboration of Granovetter's working strategy into a second, more developed working strategy Kim also made further suggestions as to the types of problems on which researchers should focus and she explicated the relations between the working strategy's key concepts. However, even in its elaborated working strategy form SWT still needs to be specified as a unit theory in order to be tested empirically and to contribute to our ability to analyze theoretical growth in this area.

SWT as a unit theory for framing information behaviour investigations

A PhD thesis on the role of community health nurses in linking the elderly with local resources will be used to illustrate how Kim's elaboration of SWT as a working strategy can be specified as a unit theory for investigating IB based on Vakkari and Kuokkanen's work. In specifying a concrete social setting, and concepts and relations that are particular to the study, this exercise will result in a unit theory that proliferates on both Granovetter's original working strategy and Kim's elaboration of it as a revised working strategy in the sense that the working strategy is being adapted for use in another discipline in a new problematic area of research. Not all of the concepts and relations specified in Kim's elaboration of SWT are borrowed for the example since not all were particularly germane to the research problem, which is a common feature of most specifications of any metatheory. The exercise is undertaken as a series of nine steps that were derived from Vakkari and Kuokkanen's example of how to specify an IB theory from its

metatheoretical form to a unit theory. Note that in this exercise the term "working strategy" refers jointly to Granovetter's expression of SWT and Kim's elaboration of it as a revised working strategy.

Step 1. State working strategy's key concepts, relations, and assertions

The SWT working strategy contains three key concepts:

- WSC_1 tie strength;
- WSC_2 instrumentality;
- WSC_3 bridgingness,

where WSC_1 (tie strength) is determined to be either weak or strong based on the relations of time, sentiment, interactions and functions (Table 1); WSC_2 (instrumentality) is the "degree to which dyadic partners serve as a main means to achieve individual goals by providing needed resources to each other" (Kim 1986, 49), which is based on the relations of scope and directionality (Table 2), specific transmission potential of one dyadic member to the other (that is, the likelihood of one's seeking specific resources from the other and the likelihood of the other giving those specific resources), and content (Table 3); and WSC_3 (bridgingness) is the degree to which a dyad links two or more broadly defined groups or personal networks, and similar to instrumentality, is measured according to its scope and directionality with respect to size, diversity, integrativeness, and openness.

**Table 1. SWT Working Strategy Concept (WSC₁): Tie Strength
Based on Kim's (1986) Elaboration of SWT**

RELATION	DEFINITION	MEASUREMENTS
Time	Temporal aspects of an interpersonal tie	• tenure of relationship (stability) • average duration of interactions • quality of time spent together
Sentiment	Affective states of a relationship (liking, caring, feeling of closeness)	• degree of attraction • degree of closeness (intimacy) • degree of commitment • mutuality of above
Interactions	Behavioral states of a relationship (communication and other activities)	• average frequency of interaction • number different interaction contents (content multiplexity) • quality of interactions • motivation for interaction (intrinsically vs extrinsically; commitment vs convenience) • symmetry in choice of each other as a dyadic partner (reciprocity)
Functions /Roles	Contents/foci of activities, and roles for which an interpersonal relationship exists (role-multiplexity)	• number bases for which tie exists • relationship type (ascribed vs achieved) • symmetry (friends, siblings, colleagues) vs complementarity (parent-child, boss-subordinate, teacher-student)

Table 2. SWT Working Strategy Concept (WSC₂): Instrumentality - Scope and Directionality Based on Kim's (1986) Elaboration of SWT

SCOPE/DIRECTIONALITY	DEFINITION
Specific-asymmetric	Serves 1 member as means to achieve specific goal
Specific-symmetric	Serves both partners as means to achieve specific goal
General-asymmetric	Instrumental in many different ways to only 1 member
General-symmetric	Serves both partners as means to achieve many goals

Table 3. SWT Working Strategy Concept (WSC₂): Instrumentality - Content Based on Kim's (1986) Elaboration of SWT

CONTENT	DEFINITION	ATTRIBUTES
Information	Not Given	• Type (private/personal vs public/casual) • Availability/scarcity • How it is obtained (passively vs actively) • Uses (e.g. obtaining new info vs verifying old info)
Influence	Way of causing an effect on the attitudes, opinions, behaviours of others through intentional action	• Type • Availability • Way produced
Other Assistance Examples ->	• emotional help • nonmaterial help • material assistance	• Type • Availability • How obtained

Given an egocentric network in which the focal person is called "Ego" and the second member of the dyad "Alter," the SWT working strategy asserts that:

1. Both strong ties and weak ties exist within Ego's and Alter's personal networks.
2. Strong ties are homophilic in nature and bound by the principle of transitivity, such that "the stronger the tie connected two individuals, the more similar they are, in various ways" (Granovetter 1973, 1362). Thus, if Ego is strongly tied to Alter and Alter is strongly tied to X, then Ego is also close to X. As a result,

people who are strong ties tend to have the same information and resources as Ego.

3. Weak ties tend to be heterophilic in nature and are bound by the principle of intransitivity, such that if Ego is weakly tied to Alter and Alter is weakly tied to X, then Ego is very weakly tied to X and probably may not even know X. As a result, people who are weak ties tend to have information and resources that Ego does not have, and thus weak ties are pivotal in the flow of new information into Ego's network.
4. The shortest path in sociometric distance for new information to flow into Ego's network is through a weak tie, and weak ties who provide the shortest path for new information to flow into Ego's network are known as local bridges such that "only *bridging* weak ties are of special value to individuals" (Granovetter 1982, 112).
5. Local bridges comprised of weak ties will be maintained over time whereas local bridges made of strong ties will be eliminated.
6. Whereas weak ties provide people with new information, the value of strong ties is that they "have greater motivation to be of assistance and are typically more easily available" (Granovetter 1982, 113). Strong ties have greater influence with Ego and their opinions may be sought by Ego before he/she accepts any information obtained through weak ties.

Step 2. Model working strategy's key concepts and relations

The working strategy's key concepts (tie strength, tie instrumentality, bridgingness) are modelled in Figure 1. In the model, the relationship between Ego and Alter is represented by their tie, which serves as the path through which information and other resources flows between them. Since the flow of resources is through the tie, the concept of instrumentality (WSC_2) is placed on the tie, while the concepts of tie strength (WSC_1) and bridgingness (WSC_3) are seen as connected to Alter since Alter's tie strength (weak or strong) and degree of bridgingness are said to affect Alter's instrumentality to Ego. In this sense, one can say that the degree of Alter's instrumentality to Ego is a function of Alter's tie strength plus Alter's degree of bridgingness, which can be written as:

$$WSC_2 = f(WSC_1, WSC_3)$$

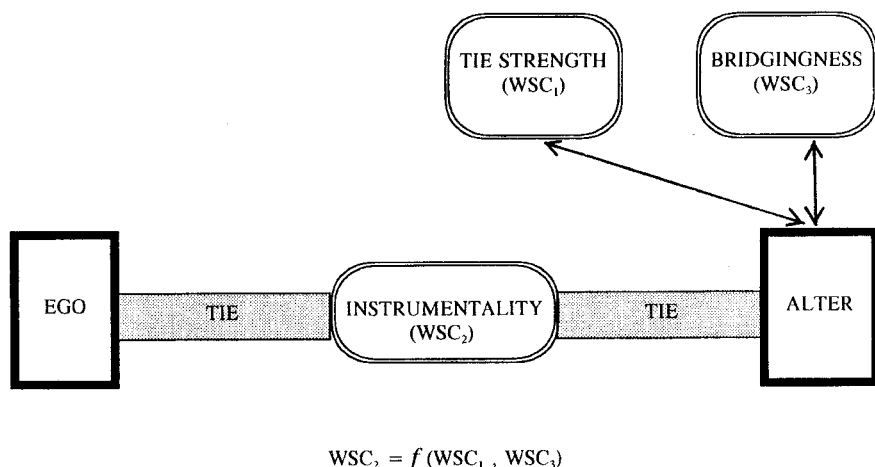


Figure 1
Model of SWT Working Strategy's Key Concepts and Relations

Step 3. State problem area in terms of study's concrete setting

The purpose of this research is to investigate the role of community health nurses in linking seniors with community resources through the provision of human services information (HSI).⁹ Studies have shown that while human services help seniors recover from illness and continue living in their own homes, paradoxically, many are unaware of existing services and go without needed help (Neary 1993; Ontario Ministry of Culture and Communications 1992; Tinker et al., 1994). Thus, despite their strong needs for HSI, seniors are "information poor" and in serious danger of not receiving services. Research also suggests certain members of a senior's social network may promote or hinder access to human services (Chapleski 1989; Chatman 1992; Ward, Sherman and LaGory 1984). Since community health nurses regularly see seniors at footcare clinics, they are in a key position to link seniors with community services by providing information and referral. However, virtually no research has investigated this role of the community health nurse, especially within the setting of her interaction with seniors at footcare clinics.

*Step 4. State study's research questions*¹⁰

What is the relationship between the nurse's position in the senior's social network and the senior's use of HSI provided by the nurse?

Components:

1. Is the nurse a weak tie?
2. Does the nurse provide the senior with HSI?
3. Does the senior actively seek HSI from the nurse or is he/she a passive recipient?
4. Does the senior obtain this HSI from strong ties?
5. If not, then does the nurse provide the shortest route for HSI to flow from the community to the senior?
6. Does the senior use the HSI provided by the nurse?
7. Does the senior confer with strong ties before using the nurse's HSI?
8. How does the HSI provided by the nurse help the senior and how is it important?
9. Is the relationship between the nurse and the senior characterized by general-asymmetric instrumentality in the direction of nurse → senior?
10. Is the nurse-senior relationship maintained over time?
11. What types of resources, for which situations, does the senior receive from other members of his/her network?
12. What is the strength of these other ties?

Step 5. State study's expectations/hypotheses

It is expected that the nurse is a weak tie in the senior's social network who provides HSI that the senior cannot obtain through his/her strong ties (e.g. family members, close friends). More specifically, it is expected that:

1. The senior has problems and situations for which he/she requires HSI and access to other resources.
2. The nurse is a weak tie in the senior's social network.
3. The nurse provides the senior with HSI.
4. The senior actively seeks this HSI from the nurse.
5. The senior cannot obtain this HSI from strong ties.
6. The nurse provides the shortest route for HSI to flow from the community to the senior.
7. The senior confers with strong ties before using HSI.
8. The senior's strong ties are instrumental in providing other types of resources.
9. The HSI provided by the nurse helps the senior deal with his/her problem.

10. The relationship between the nurse and the senior is characterized by general-asymmetric instrumentality in the direction of nurse → senior.
11. The nurse-senior relationship is maintained over time.

Step 6. Model unit theory's key concepts

The twelve research questions were divided into seven unit theory concepts:

UTC₁ Senior's problems/situations that require HSI and other resources

UTC₂ Nurse's position in the senior's social network

UTC₃ Nurse's information giving

UTC₄ Senior's seeking and use of HSI from the nurse

UTC₅ Other people's positions in the senior's social network

UTC₆ Other people's information giving

UTC₇ Senior's seeking and use of HSI from other network members

These concepts are modeled in Figure 2. In the model, the senior is seen as having problems or situations that create needs (UTC₁) for which he/she seeks and uses HSI and other resources from the nurse and from other members of his/her social network. The senior's IB toward the nurse (UTC₄) is related to the senior's information needs (UTC₁), the nurse's position in the senior's social network (UTC₂) and her information giving (UTC₃), while the senior's IB toward other people in his/her network (UTC₇) is seen as a function of the senior's information needs (UTC₁), their network position (UTC₅) and their information giving (UTC₆). In this sense, one can write the senior's IB toward the nurse (or, the "IB of a dyad") as:

$$UTC_4 = f(UTC_1, UTC_2, UTC_3)$$

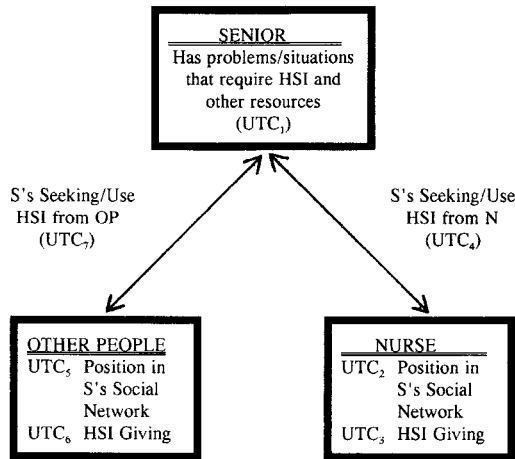
and the senior's IB toward other members of his/her network as:

$$UTC_7 = f(UTC_1, UTC_5, UTC_6)$$

If we consider the senior's social network IB as comprised of his/her IB toward the nurse plus that toward other people in his/her network, then the senior's overall social network IB can be expressed as:

$$S's\ SN\ IB = f(UTC_4, UTC_7)\ or,$$

$$S's\ SN\ IB = f(UTC_1, UTC_2, UTC_3, UTC_5, UTC_6)$$



$$UTC_4 = f(UTC_1, UTC_2, UTC_3)$$

$$UTC_7 = f(UTC_1, UTC_5, UTC_6)$$

Figure 2
Model of Unit Theory's Key Concepts and Relations

Step 7. Specify study's detailed concepts and relations

The seven unit theory concepts (and their corresponding research questions) were paired with one or more concepts from the SWT working strategy (Table 4). The relations within each unit theory concept are specified in terms of the working strategy in Table 5. While Table 5 shows that the unit theory concepts of nurse's and other people's positions in the senior's social network (UTC_2 , UTC_5) are fully subsumed under the working strategy's concepts of tie strength (WSC_1) and bridgingness (WSC_3), it also indicates that the working strategy does not fully subsume the unit theory concepts concerned with the IB notions of information need, seeking, giving, and use. For example, there is no SWT concept that accounts for the unit theory concept of information need (UTC_1), while the SWT concept of instrumentality (WSC_2) only partially accounts for the unit theory concepts of how the senior seeks and uses HSI and other resources (UTC_4 , UTC_7) and how the nurse and other people give information (UTC_3 , UTC_6).

Table 4. Specification of Research Questions with Unit Theory Concepts and SWT Concepts

RESEARCH QUESTION	UT CONCEPT * (UTC _n)	SWT CONCEPT (WSC)
1. Is nurse a weak tie?	2	Tie Strength ₁
2. Does nurse give HSI?	3	Instrumentality ₂
3. Does senior actively seek HSI from nurse?	4	Instrumentality ₂
4. Does senior obtain HSI from strong ties?	6	Instrumentality ₂
5. Is nurse shortest route for HSI to flow?	2, 5	Bridgingness ₃
6. Does senior use HSI?	4	Instrumentality ₂
7. Does senior confer with strong ties first?	4	Instrumentality ₂
8. How does the nurse's HSI help senior?	1, 4	Instrumentality ₂
9. Does relationship have general-asymmetric instrumentality: nurse → senior ?	3, 4	Instrumentality ₂
10. Is relationship maintained over time?	2	Tie Strength ₁
11. What resources, for which situations, are received from other ties?	1, 7	Instrumentality ₂
12. What is the strength of these other ties?	5	Tie Strength ₁

UTC₁ senior's problems/situations that require HSI and other resources; UTC₂ nurse's position in the senior's social network; UTC₃ nurse's information giving; UTC₄ senior's seeking/use of HSI from nurse; UTC₅ other people's positions in senior's social network; UTC₆ other people's information giving; and UTC₇ senior's seeking/use of HSI from others.

Table 5

UTC ^{CONCEPT*}	SWT CONCEPT	RELATION
UTC ₁	NONE	<u>LIS perspective</u>
UTC ₂	Tie Strength (WSC ₁) Bridgingness (WSC ₃)	<u>Time</u> : Length known each other, length of interactions <u>Interactions</u> : Frequency, content number/types, motivation, symmetry <u>Functions/roles</u> : Number/types bases for tie (role multiplexity), type of relationship <u>Sentiment</u> : Degree/mutuality of closeness/commitment between members <u>Bridgingness of nurse tie</u> (general network accessibility provided by nurse)
UTC ₃	Instrumentality (WSC ₂) (Only partially given in SWT WS)	<u>Scope/direction</u> : Specific transmission potential (likelihood nurse gives HSI), type of referral (simple/complex), strategies for getting senior to accept/use HSI, how identified senior's HSI need, reason provided HSI in certain way, way(s) thought HSI helps, how obtained HSI
UTC ₄	Instrumentality (WSC ₂) (Only partially given in SWT WS)	<u>Likelihood that senior seeks HSI from nurse for specific problem</u> (part of "nurse's specific transmission potential"): whether senior actively/passively seeks HSI from nurse, nature of HSI (private/public, personal/casual, availability) <u>LIS perspective</u> : Whether/how senior used HSI, whether/how HSI helped, what seniors did with HSI (if anything) before using it (conferred with family members)
UTC ₅	Tie Strength (WSC ₁) Bridgingness (WSC ₃)	Use relations similar to #2 above for tie strength and bridgingness
UTC ₆	Instrumentality (WSC ₂) (Partially given)	Use relations similar to above for instrumentality
UTC ₇	Instrumentality (WSC ₂) (Partially given)	Use relations similar to above for instrumentality

UTC₁ S's problems that require HSI; UTC₂ N's position in SN; UTC₃ N's info giving; UTC₄ S's seeking/use of HSI from N; UTC₅ other people's positions in SN; UTC₆ other people's info giving; and UTC₇ S's seeking/use of HSI from others.

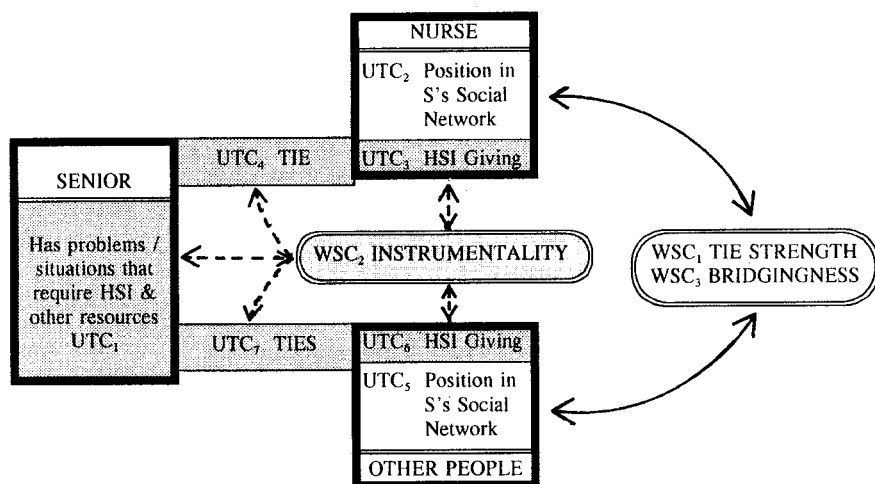


Figure 3
Model of Specified Unit Theory's Key Concepts and Relations

Step 8. Model unit theory's detailed concepts and relations

The detailed specification of the unit theory's concepts and relations in terms of the SWT working strategy is shown in Figure 3. Here, the entity "Ego" has been replaced by "Senior" and "Alter" by "Nurse" while the entity "Other people in the senior's social network" has been introduced. As with Figure 1, a tie (through which flows HSI and other resources) is used to represent the relationship between the senior and the nurse, but a second tie is added to indicate the multiple relationships between the senior and other members of his/her social network. The working strategy's concepts of tie strength (WSC₁) and bridgingness (WSC₃) are

combined in a single box which is linked using solid lines to the unit theory concepts of the nurse's and other people's positions in the senior's social network (UTC_2 , UTC_5) because it was shown through the specification in Step 7 (Table 5) that:

$$UTC_2 = f(WSC_1, WSC_3), \text{ and} \\ UTC_5 = f(WSC_1, WSC_3)$$

Table 5 also indicated that the unit theory's concepts of the senior's seeking/use of HSI from the nurse (UTC_4), the senior's seeking/use of HSI from other people (UTC_7), the nurse's information giving (UTC_3) and other people's information giving (UTC_6) are linked to the working strategy's concept of instrumentality (WSC_2) to which one may also add the unit theory concept "senior's information/resource needs" (UTC_1) since it was shown in Figure 2 that information need is related to information seeking and use. In Figure 3 these relations between the unit theory and the working strategy are indicated by shaded areas and broken lines (as opposed to solid lines) because, as will be discussed in Step 9, the working strategy concept of instrumentality only partially accounts for these unit theory concepts of information need, seeking, giving, and use.

Step 9. Look for emerging concepts that were not part of the working strategy but emerged through specification

According to Table 5 and Figure 3 one can conclude that the working strategy's concepts of tie strength (WS_1) and bridgingness (WS_3) are a function of the unit theory's concepts of nurse's position in the senior's social network (UTC_2) and other people's positions in the same (UTC_5), such that (from Step 8):

$$UTC_2 = f(WSC_1, WSC_3) \\ UTC_5 = f(WSC_1, WSC_3)$$

Since (from Step 6)

$$UTC_4 = f(UTC_1, UTC_2, UTC_3) \\ UTC_7 = f(UTC_1, UTC_5, UTC_6), \text{ then}$$

$$UTC_4 = f(UTC_1, UTC_3, WSC_1, WSC_3) \\ UTC_7 = f(UTC_1, UTC_6, WSC_1, WSC_3), \text{ and}$$

S's SN IB = $f(UTC_4, UTC_7)$, which can be rewritten

$$S's\ SN\ IB = f(UTC_1, UTC_3, UTC_6, WSC_1, WSC_3)$$

However, the specification further indicated that the SWT working strategy does not fully subsume the unit theory concepts of "senior's information resource needs" (UTC_1), "senior's seeking HSI from the nurse/other people" (UTC_4, UTC_7) and "nurse's/other people's information giving" (UTC_3, UTC_6). Table 5 suggests that what is missing from the working strategy's conceptualization may be found in LIS, that is, theory developed in LIS on how people need, seek, use, and give information. If the working strategy concept of "instrumentality" is to subsume all these other unit theory concepts, then it must be enriched by adding concepts from IB. In this sense, the senior's IB toward the nurse (IB of a dyad) and toward other people can be rewritten to indicate that the working strategy concept "instrumentality" has been enriched or elaborated such that it now subsumes the unit theory concepts of information need, seeking, giving, and use:

$$UTC_4' = f(UTC_1', UTC_3', WSC_1, WSC_3), \text{ and} \\ UTC_7' = f(UTC_1', UTC_6', WSC_1, WSC_3)$$

Moreover, one can say that the senior's interpersonal IB within his/her social network is:

$$S's\ SN\ IB' = f(UTC_1', UTC_3', UTC_6', WSC_1, WSC_3)$$

In Berger and Wagner's (and, Vakkari and Kuokkanen's) terms, this exercise in specification has resulted in: (1) a proliferation of the SWT working strategy because it was specified for use in a concrete social setting in a different discipline, and (2) an elaboration of the working strategy's key concepts because the concept of instrumentality was enriched by adding aspects of IB, specifically, information need, seeking, use, and giving. In other words, the specification indicated that the enriched concept of instrumentality together with the working strategy concepts of tie strength and bridgingness comprise an individual's IB within his/her social network. By adding the IB concepts of information need, seeking, giving, and use, the working strategy was elaborated upon and a unit theory was derived that can be tested empirically among nurses and seniors. The empirical testing of the unit theory within this concrete social context will either support or refute the newly derived hypotheses that instrumentality is related to information need, seeking, giving, and use. Hence, the specification will result in a small step toward marking theoretical growth within the larger SWT metatheory, IB research, and information science in general.

In sum, the primary concepts that emerged through the specification relate to the concrete social setting in which the unit theory was based, that is, the notions of information giving, information need, seeking and use. These can all be considered under the greater concept of information behaviour; however, enmeshed with this is the concept of information itself, which as one can see from the specification has been largely ignored in the larger structure of the working strategy, but was operationalized in the unit theory.⁹ Neither Granovetter nor Kim at any point actually defined "information." In this respect, an elaboration of SWT as a unit theory specification in an LIS setting can greatly contribute to the working strategy by conceptualizing "information" and the different aspects of "information behaviour." For example, in LIS terms "instrumentality" can be equated with information giving and the uses and usefulness of that information to the user. Though it is not expected that the specification of such concepts as "nurse information giving" or "senior's use of nurse's HSI" will be adopted verbatim in other specifications of the metatheory (just as one would not expect all concepts to be borrowed in any specification of any metatheory), it is possible that aspects of those concepts could be useful in specifying other unit theories that are developed for use in other concrete social settings. For example, principles of information giving that may result from empirical investigations of the concept of "nurse information giving" may be useful in specifying a concept of "information giving" in other settings, such as reference service in public libraries or information giving by government officials.

In showing that no "new" concepts emerged from the specification to suggest that key concepts from the working strategy have been omitted, the exercise illustrated that the unit theory specification made optimal use of the working strategy's key concepts. By mapping the working strategy's concepts against those developed for the unit theory, one can see that the appropriate relations from the working strategy have been included in the specification and adapted for use in the study's concrete setting.

Discussion and conclusions

The purpose of this paper was to demonstrate how one could specify Granovetter's SWT as a unit theory for studying IB based on Vakkari and Kuokkanen's approach to theoretical analysis. The exercise was useful in two respects. First, it helped to identify ways in which my use of SWT for studying the flow of HSI between nurses and seniors resulted in an elaboration of the working strategy concept "instrumentality" with respect to information need, seeking, giving, and use, as well as how information is defined. These are areas to which one would expect an LIS application of SWT would contribute and illustrates how such an importation of a

working strategy into another discipline causes conceptual elaboration of the working strategy. As a result, the exercise was useful in discerning areas in which the working strategy is conceptually weak and thus how my specification of it as a unit theory can contribute to the larger working theory, and it assisted me in determining whether my application made optimal use of the potential explanatory/predictive power of the working strategy for specifying particular concepts within the concrete setting of seniors seeking HSI from nurses. Second, the exercise illustrated that one can apply Vakkari and Kuokkanen's approach to analyzing theoretical growth and yield valuable results without using structuralist theory and set theory; instead, one can bypass the mathematical proofs and still achieve worthwhile results using natural language. It would seem the key to success within this approach lies in the careful specification of the metatheory's concepts and relations in terms of a unit theory through the ordered structuring of a series of steps.

While this exercise does not do justice in explaining or demonstrating the complexities of Vakkari and Kuokkanen's approach for analyzing theoretical activity and growth in LIS, it is hoped that it has in some way intimated some of the potential their method holds for strengthening our use of theories and future efforts at theory building.

Notes

- ¹ I am indebted to Pertti Vakkari for his many helpful suggestions while preparing this manuscript.
- ² Wilson (in press) prefers "information behaviour" to other terms — such as "information-seeking behaviour" and "user needs" — because it embraces a range of behaviours, including seeking.
- ³ In their example of how to reconstruct a theory Vakkari and Kuokkanen use an IB model proposed by Byström and Järvelin (1995).
- ⁴ Wagner and Berger (1985, 700) originally defined metatheories as "discussion *about* theory: about what concepts [they] should include, about how those concepts should be linked, and about how theory should be studied. Similar to Kuhn's paradigms, [they] provide guidelines or strategies for understanding social phenomena and suggest the proper orientation of the theorist to these phenomena." They recently extended this definition to include working strategies (Berger, Wagner and Zelditch 1992).
- ⁵ Granovetter based SWT on Rapaport and Horvath (1961) and his PhD Dissertation at Harvard (1970) on how people seek job information. He first described SWT as a tool for linking micro and macro levels of sociological theory (1973), but later (1982) described it as a theory and described its key concepts.
- ⁶ Liu and Duff (1972) also published an article on SWT about the same time as Granovetter though he is generally credited with devising the theory.
- ⁷ Rogers (1979; 1981) incorporated parts of SWT into his work on diffusion theory.
- ⁸ According to Granovetter, network populations comprised of the socially-disadvantaged (e.g. seniors, minorities) are information poor because they rely mostly upon strong ties for information, and because their weak ties are not bridges; instead, they are just acquaintances of friends and neighbours and "the information they provide [does] not constitute a real broadening of

opportunity" (1982, 112). Research indicates that the density of strong ties in such networks is very high, and conversely, the density of weak ties is very low which forces the use of strong ties (Lomnitz 1977; Stack 1974).

⁹ Defined as anything one finds useful for informing oneself about programs and services that help ordinary citizens deal with problems associated with daily living. Derived from Buckland's definition of information-as-thing (1991, 351) and Kahn's (1979) and Sales' (1994) definitions of human services.

¹⁰ While it is unnecessary to include a description of the study's methodology for the purpose of unit theory specification, note that data for this study were primarily collected using structured observation and in-depth interviews with nurses and seniors at footcare clinics. At each clinic a particular nurse was observed as she interacted with different seniors during their treatments for incidents of nurse information-giving. Following each incident, an independent in-depth interview was conducted with the nurse and the senior regarding the nurse's referral, and again with the senior about a month later. A total of twenty nurse-senior dyads were established by observing nurse-senior interactions at over thirty clinics in southwestern Ontario. The use of ethnographic methods for studying social networks has been advocated by Mitchell (1974; 1986) and Rothenberg (1995).

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