The use of certainty and the role of topic and comment in interpersonal information seeking interaction

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Problem Statement

The cognitive aspect of IS involves both the certainty and uncertainty aspects of a user need. Certainty refers to what a user knows or what she thinks she knows such as her experience, knowledge, beliefs, goals and plans. Whereas uncertainty refers to what the user is aware of not knowing, thus needs to find out, that is often called an information need or a cognitive gap [Dervin, 1983]. The certainty and uncertainty constitute in the user's perception of her IS situation. Uncertainty is defined in terms of certainty of what she perceives regarding to the situation. Users employ certainty in order to point out what they don't know and thus need to find out, uncertainty. Uncertainty has been focused on as an information need in many studies in the field of information. The certainty aspect, however, has not been explicitly addressed even though it is inherent to human cognition that is the source of IS behavior. Therefore, it is proposed to investigate the certainty aspect of a user need in an IS interaction by looking at how users employ what they know when they point out what it is that they want to know.

The communicative domain of IS underlies the use of language in articulating the user's meaning and perception of the need situation. That is, the perception of a user is communicated to the source person through language in a meaningful way that is intended to enable the source person to understand the need and provide information to the user. It is necessary to look at the linguistic articulation as a way to understand the internal cognition of user perceptions. The linguistic articulation is a means to connect the user need to information contents and to share a meaning between a user and a source person. Therefore, in this study it is also proposed to look at the linguistic description of a user in the IS interaction with a source person.

The linguistic articulation is composed of two dimensions, "topic" and "comment" which provide a simplified but working model for information (and information need) dimensions. Topic here means what a person is talking about. It is the subject that the person wants to communicate. Comment relates or situates the topic to an individual perspective and context so that it constitutes a meaningful utterance. Both are necessary for any meaningful articulation. In traditional information retrieval, the topic component has been used to represent information contents as a matching criterion. Information is represented in terms of what it is about, such as a keyword or subject heading and retrieved via the topic aspects of a user query. In specifying their need, however, users try not only to share what it is they need to find out, (i.e., topic), but also to share what it means to them, such as, why they need it, what they feel about it, how it would fit in their situations, what they have tried, etc. Comment aspects include personal value, task or problem, and stages in the IS process as well as situational factors. It is called "comment," rather than a context or a situation, in contrast to a topic because comment linguistically includes the broader user's perspective than situation. This study will provide identifiable dimensions of comment

from the users' descriptions of their need that can be employed as an alternative criterion to topic on which the traditional matching between a user need and information content has been based.

Background Concepts

Most cognitive research in the field takes the uncertainty aspect of user cognition into account to represent the concept of information need. In much research, information need is called uncertainty [Dervin, 1983], [Kulthau, 1993], anomalous state of knowledge (ASK) [Belkin, *et al.*, 1982], Cognitive gap [Dervin, 1983], [Dervin & Nilan, 1986] or visceral need [Taylor, 1968] . That is, the notion of uncertainty presents a lack in cognitive resources of a user, emphasizing a cognitive state of 'not knowing' (or 'not being informed'). In the concept of certainty, a user's knowledge or cognition is considered. In the review of cognitive research, Allen described the user's knowledge such as general world knowledge, task knowledge, system knowledge and domain knowledge [Allen, 1991] but there is no agreed upon conceptual definition and, when employed, has been applied in different ways. In spite of the general consensus on the importance of certainty aspects such as a user's knowledge, perception and belief [Belkin 1990, 1984], [Wilson 1984, 1981], there is little existing literature that empirically deals with the notion of how what a user knows affects IS. The closest examples would be the redundancy corollary [Kulthau, 1993] and the candidate answer [Pomerantz, 1995]. Kulthau explained her uncertainty principle using redundancy corollary that a user's knowledge or experience enables a user to identify relevant information in terms of whether it is redundant or unique. Candidate answers provided by the user at the time an information request makes use of what a user already knows in the search. These merely provide clues to support the role of certainty.

Given that certainty is involved in user perception of information need, this study explores and seeks out a balance between what is known in the contents of information and in the user's perception. There has been a mismatch in research in system design and user studies in general because one is centered on what has been known about content whereas the other is focused on what is not known by the user. There is a need to empirically investigate the concept with a coherent and systematic conceptual definition at a higher level abstraction to encompass the user's perception of experience and the user's projection of the situation into the future. This study is an attempt to bridge the gap between research in system design and in user behavior by specifically looking at the dimension of comment as a source of supplementing matching criteria for information retrieval.

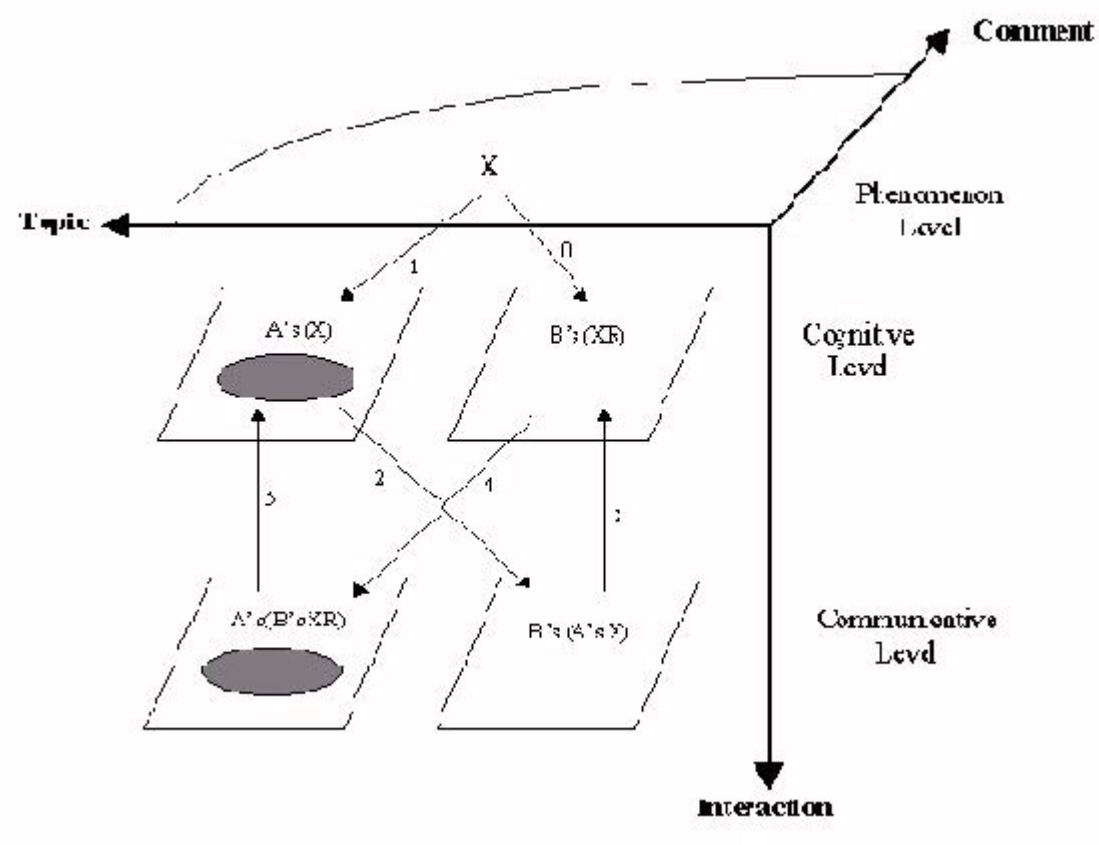
The topic and comment are at the level of social interpersonal communication behavior, which can provide shared basis for system implications while the certainty and uncertainty alone are specific and subjective to an individual user. This study deals with human interpersonal interaction as a kind of IS process where the user and the source communicate as the most universally available and original form of human communication. IS, in its fundamental sense, is a human problem of making sense and sharing it. The terms topic and comment are from earlier functional linguistics as the two necessary components of a linguistic utterance [Hymes, 1974]. They are applied in this study to represent two dimensions of an information need from the user's articulation of the need. As mentioned above, topic has been adapted in information field as matching criteria between a user need and information content. Lately, topic matching has been questioned as insufficient for effective information retrieval [Mizzaro 1997], [Green, 1995], [Froelich, 1994], [Harter, 1992] , [Saracevic, 1991]. The topical basis is getting too a cured criterion, especially in the recent advancement with more complicated technology and overload of information contents in the computerized systems and network environment. In fact, many relevance studies have pointed that topical relevance alone is not a complete criteria, and provided relevance

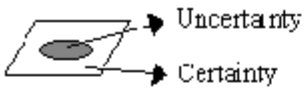
criteria other than topical basis such as user-based, situational, and psychological relevance, mostly based on the user's perception of the need situation [Park, 1994], [Bruce, 1994], [Barry, 1994, 1993], [Schamber, 1992]. In this sense, there is a need to explore the IS interaction to provide alternative matching criteria to supplement the topical dimension. This study attempts to explore the comment dimension from the user's linguistic articulation of a need. The alternative criteria from user comments are proposed on a theoretical basis of linguistic functions rather than an ad hoc approach.

Conceptual Framework

A conceptual framework was developed in order to provide a coherent and structured conceptual basis for the research questions and for designing the research methodology. A simplified process of person-to-person IS interaction is first described as the contextual basis for the study on which the conceptual framework is developed. The interaction starts when a user comes to a source person such as medical or health practitioner or job counselor, with a need or a problem in her mind. First, she talks about her problem or asks questions and the source tries to help the user. The source may ask questions in order to understand the user's need but in general it is assumed that the user has questions and the source provides answers. Second, the source creates her own understanding of the user problem then, using her past experience and resources, the source provides what she knows. Last, the user evaluates what the source has provided comparing it to her original need. She may be satisfied or she may have another question but at some point she would end the interaction.

The conceptual framework incorporates the major concepts in the study within the contextual basis of interpersonal IS process, described above. Fig. 1 provides a way to develop an observable construct in the context of the study. As IS is not only a mental and cognitive process but also a social and linguistic process, language is used as a means to convey the meaning resulting from the mental process. At the phenomenal level, information is assumed to be represented in terms of topic and comment dimensions because information is represented in linguistic form. At the cognitive level, the individual perception is focused on certainty and uncertainty depending on the person's awareness. The communicative level includes the other levels but is more focused on the use of language. At the communicative level, the perception is expressed with a linguistic articulation so that it is available to the other person. Language is the means of bridging the cognitive and communicative levels where it is possible to share mental pictures.





A: User
B: Source
X: Object or referent of interaction
(X): Orientation (Information Need)
(XR): Resources or potential information for X
Process 1: User realises a need
2: User articulates and specifies the need
3: Source understands the user need and matches resources
4: Source provides potential information
5: User evaluates the information

Fig. 1 - Conceptual Framework

Research Questions

A general research question is: "what is the meaningful description of employing certainty and uncertainty (C/U) aspects of a user need with linguistic use of topic and comment (T/C) in an interpersonal IS interaction?

Under the general research question, specific research questions are:

1. What are the characteristics of employing certainty in relation to uncertainty in an IS interaction (at the cognitive level)?
2. What are the descriptions of the comment dimension (as distinguished from topic) in the articulation of a user's information need specification that can be identified across information users (at the linguistic level)?
3. Are there attributes of the comment dimension in association with the specific use of certainty characteristics, which are, defined in RQ 1 and RQ 2? (Certainty is described at the level of linguistic communication.)

4. Are there behavioral patterns of employing certainty vs. uncertainty (C/U) or comment vs. topic (T/C) overall in articulating information need specifications that are identified across the users as general strategies?
5. Is the conceptual framework defined in the study useful in exploring IS phenomena?

Methodological Approach

The nature of this study requires a descriptive approach to the phenomena. The methodology takes a user-based method incorporating a modification of Dervin's Sense-Making approach in an attempt to understand users' cognition and perceptions from their points of view [Dervin, 1983]. The user-based approach allows a researcher to create a perspective constructed from descriptive accounts of users from their own perspectives. The methodological design relies on indirect observation of users' internal perceptions from observable articulations of information need. A conceptual construct called a "frame" [Goffman, 1975] was adopted as a way of looking at the internal cognitive behaviors. A frame is what a user "views" internally in her mind at the time of IS interaction.

The researcher generates a frame of a user based on what the user provides via articulation and subsequent description. A frame consists of an utterance which is an operationalization of an articulation a user makes in the IS interaction with a source person that is assumed to represent the user perception. An utterance is what a user is saying in an IS interaction with a source person. It is observable to the researcher and allows a reasonable inference of the user's internal cognition. But an utterance may only represent a part of a frame because not all of the user's meanings are articulated at once. Some important meaning may remain unstated in the interaction. These withheld meanings can be further articulated by debriefing questions after the interaction. That is, the researcher will interview the user after the interaction employing the transcript of the user's utterance in the interaction. Fig. 2 shows a simple graphic denotation of method design of the study.

Operationally a frame is defined as what a user articulates at specific points in time during IS interaction that will consist of an utterance and additional descriptions from a debriefing interview. An utterance is what is said by a user in between what the source person says in the interaction. Since the focus of the study is on individual perception, the unit of analysis is a unit of meaning within an individual, i.e., an utterance.

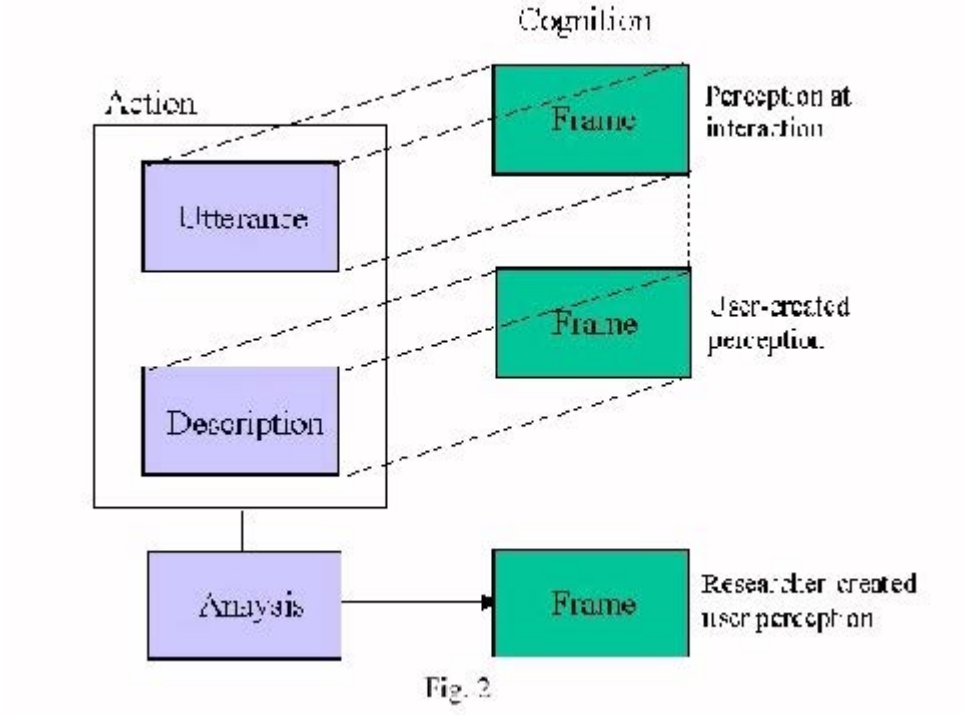


Fig. 2

Setting and Samples

The setting of the study is a face-to-face IS interaction between a user and a source person in a real situation for any kind of IS. A real situation was chosen because IS should be understood as a natural human behavior which occurs in daily life. It is more important to obtain unobtrusive data in a more naturalistic way for this type of exploratory study rather than to control other factors in a more artificial context. Respondents will be recruited from Syracuse University classrooms for their own IS for either personal or class project situations with a little monetary reward for their time.

Data Gathering

The procedure for data gathering consists of 3 phases. Phase 1 is audio recording of the user and source interaction. The interaction will be audio recorded and then transcribed. Phase 2 is a debriefing interview with the user. The user will be asked general questions about the IS situation and asked to clarify each utterance of hers in the interaction. Phase 3 will be a content analysis of open-ended data gathered in phases 1 and 2. The first set of data yielded in phase 1 will provide the basis for the following method with the IS interaction transcript. At phase 2, the second set of data will be a descriptive account of users. At this stage, the researcher would have to rely on the user's ability to recall the interaction and to provide an accurate account rather than making something up. The utterances from the first set of data will be used as a reference to help respondents' recall the process and organize their description. The interview will ask a set of questions for each utterance so that the user clarifies each utterance as certainty or uncertainty aspect and describes their utterance as either topic or comment. The debriefing will allow the researcher to provide additional description of the user frame rather than making up rationales or motivations justifying the user's actions. At phase 3, the raw data from open-ended question will be refined for data reduction and representation by the researcher's coding process.

Data Analysis

The analysis of data follows data representation in order to examine the conceptual typology proposed in the study by answering the research questions. The method of data analysis is consistent with the conceptual research aims and methodological approach. This study stands in between the "exploratory descriptive" and "organized descriptive" studies [Simon, 1985 pp51-72] as it is based on a working framework of conceptual structure but also relies on inductive exploring of the concepts and relationships among them. The results of data analysis should yield a various form of description to illuminate patterns in user's IS behaviors. The analysis is dependent on the results of content analysis which reversibly depends on the general data analysis method. The plan for data analysis is based on each research question.

For the RQ1, the user answer for the aspects of certainty or uncertainty of their utterance at phase 2 will be described using simple descriptive statistics. The content analysis for the user's description of employing certainty and uncertainty will be compared across the users. The certainty is operationalized in terms of past experience, present value, future anticipation and interactional learning according to Nilan and Rosenbaum (1990). For RQ2, same procedures apply for the topic and comment. Topic is operationally defined as the subject of the need situation. The concept of comment is defined as user's description of how the statement (utterance) is related to the topic. For RQ3, the relationship between the two concepts certainty vs. uncertainty and topic vs. comment will be related across users. For RQ 4, the sequence of user frames in terms of the concepts of certainty vs. uncertainty and topic vs. comment will be examined and compared across users. RQ5 is addressing the question of evaluation that can be answered after the interpretation of data analysis. If RQs 1-4 confirm the idea of using certainty and comment, the relationship among concepts or the sequence pattern across users then it will indicate that the conceptual framework is valid.

In conclusion, this research is expected to provide a meaningful description of certainty and uncertainty in a user's IS situation, attributes of comment dimension and clues for patterns in interpersonal IS interaction across users. The generalization of the results would be limited to the population of the study but the implications for human behavior might be applied to other user groups because the concepts of certainty and uncertainty and topic and comment are fundamental to human behavior and valid to any kind of context.

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