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The Debate in Structural Linguistics:
how it may impact the information systems field

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Abstract: This paper argues that the use of concepts in IS research which have been borrowed from references disciplines may present difficulties when the concept is only partially imported into our IS research. The paper provides a glimpse into the ongoing debate in one of those IS references disciplines, namely linguistics. The debate between Chomskyan structural linguists and linguists developing the notion of emergent grammars is briefly described. Finally, the paper provides insight as to how that debate may impact our field.

Introduction

Most research disciplines borrow ideas, theories and metaphors from each other. This is one of the vibrant mechanisms that has propelled human knowledge into its present state of geometric expansion. In the initial stages of the "borrowing" process, it is not uncommon for one field to borrow only half of an idea from another field. Transporting an entire well-developed theoretical set from one field is an immense and cloudy undertaking.

The discipline of information systems is building its foundations on a broad base of reference disciplines. These include not only computer science, engineering, cognitive psychology and management science, but also systems science and linguistics. Systems science and linguistics overlap to the extent that authorities choose to present systemic or structural views of human language. Concepts borrowed from basic research in structural linguistics can be appealing as a theoretical or metaphorical basis for information systems research because of the rich analogies between information system artifacts and human grammars. Grammars are constructed to enable efficiency, clarity and richness of written and verbal human expression and communication. Indeed, information systems are constructed for a very similar purpose, although perhaps more consciously and instrumentally.

Among the figures who dominate the background intersection of systems science and linguistics that underlies ongoing work in information systems is Noam Chomsky. Chomsky's work remains central in the development of structural linguistics. In information systems, this work, particularly the notion of a 'deep structure' offers compelling explanatory and modeling power to aid our understanding of how information systems evolve. An example of organizational behavior research that arises from these ideas is (Drazin and Sandelands, 1992) and examples of IS research that have revolved around these ideas include (Leifer, et al., 1994), and (Wand and Weber, 1995).

We are concerned however that as the information systems community borrows some of these linguistic concepts we are presently borrowing only half of a theoretical set, and we should, at the very minimum, be aware that there is another half yet to come. Structural theories of linguistics are by no means uncontested in their home discipline. A dialectic has arisen between structural theorists and the opposing views held by theorists of emergent linguistics. Since related IS research has generally been founded only on structural linguistics, there is an important gap in our thinking, e.g. the other half of current linguistic theory. This gap represents the already-developed critique and alternative assumption ground offered by emergent linguistics. In this paper we present a summary of these two contradictory positions in linguistics and point to some possible implications should IS researchers admit these contrasting views of language to the discourse in information systems development (ISD).

Structural Linguistics
Modern structural linguistics may be traced to Saussure (Hawkes, 1977) who saw language as abstract structures or relations governing speech. Language and speech were considered separate entities. For structural linguists a language is a set of rules/lexical items/ lexical entities that define a set of abstractions called grammar; language is a set of rules. Other important ideas in structural linguistic theory include: deep structure, surface structure, generative grammars, universal grammar, linguistic competence and linguistic performance. But the meaning of these concepts are not accepted without question or debate as structural linguists are themselves divided along the lines of internalized language (I-language) versus externalized language (E-language). The I-language linguists (arising from Chomsky) approach language as an internal property, a system of linguistic knowledge possessed by an individual speaker. Their work focuses on what a speaker knows about language and where that knowledge originates rather as opposed to the structure of the language that language. E-language linguists, on the other hand, assume language is a social event which depends heavily on context, on social knowledge and on interaction. Language is a real-world, real-time phenomena rather than a predetermined product of human biological traits. Chomsky's differentiation between competence and performance is important to understanding the debate. Performance deals with language use (E-language). Competence deals with the innate ability to have and use language (I-language). (Cook and Newson, 1996)

But Chomsky has little interest in linguistic performance. Because for him communication and speech is not the primary purpose of language. Rather he sees communication as one of several purposes including: establishing human relations, clarifying thought, creative mental activity and the like. He sees none of these as privileged but prefers the notion that language serves "essentially for the expression of thought." (Chomsky, 1979, p. 88) Chomsky abstracts part of the communicative process, reifies it and calls it language and thus makes it an autonomous entity.

Chomskyan linguists assume a static model as language is a fixed inventory of reproducible categories and the rules by which those categories are created and applied. For them the structure is in the mind not the text. So to find the structure one needs to look into the mind of the language user and understand the structural components (or

model) that allows language use. Chomskyan linguists assume that language arises from a biological and innate linguistic competence comprised of a set of preexisting mental structures that enable people to possess and employ language. These, 'Deep structures' are a class of abstract underlying linguistic principles or structures in which rules link a deep structure to a less deep structure until the surface, e.g. the performance of language is reached. The surface is the point at which no more rules apply. Thus the task of linguistic theory is to assemble a set of testable hypotheses about language.

The Chomskyan structuralist deduces surfaces structures on basis of hypothetically derived set of rules arising from the underlying innate principles of linguistic knowledge. This leads to one of the primary goals of Chomsky's linguistic program, namely the derivation of a Universal Grammar (UG) which is a system of principles, conditions and rules that are elements or properties of all human languages...the essence of human language. (Chomsky, 1976, p. 29)

Thus the Chomskyan view is mentalistic; it holds that language consists basically of a set of abstractions studied as principles, rules and a generative grammar.

The generative grammar is a set of rules that assigns structure to sentences. The assignment of structure to sentences is an ex post assignment after the idea and the categories of the sentence parts have been preconceived in the human mind. (Chomsky, 1980, p 220)

There exists, however, within the linguistic discourse a radically different characterization of grammar as a real-time, dynamic and inherently social versus biologically determined phenomena. This position is described in the following section.

Emergent Grammar
An alternative viewpoint eliminates structure as a serious basis for linguistics. Those who hold this viewpoint worry that structural linguists abstract only a trivial part of the communicative process and reify it, thereby making language an autonomous entity. This perspective sees grammar as an evolving response to an environment or to discourse. . They reject the principle assumption underlying UG, e.g. that language is a biological inheritance; an innate, natural linguistic competence in the human organism. To the emergent theorist there are no biological foundations to language except the ability to make vocalizations. Grammar is not based categories of structure but rather on human ability to use previous utterances as basis of new utterances.(Baker and Hacker, 1984)

Any appearance of structure in grammar arises from certain regularities in the reference to previous utterances. Language is in constant flux as it is used in practice. In this view structure does not precede actual individual uses of the language system but is constantly being renegotiated by individual users of the language system. Modifications found to be necessary in the real-time use of the language are added to the cumulative structure of the system in a constant process of feedback. Thus grammars, like language, are emergent. (1987; Hopper, 1988)

Emergent theory inverts the structural linguistic notion of the synchronic language in which each component can be seen simultaneously and studied independently as it interacts with other elements in a holistic fashion. Emergent theory sees structure as fragmented and distributed. Language is moving towards systematicity without ever reaching stasis. The appearance of structure is momentary regularity, distributed over time, and is not simultaneously present for all users or for study. The development of language is a continuous, real-time process.

Structure, Emergence and IS
Thus far, in the IS community, our view of structure and emergence in information systems has been most dramatically influenced by only part of linguistic theory: the I-language theory of structural linguistics. The contextual linguists who subscribe to E-language theory or emergence theory have not influenced information systems theory to the same extent.

Let us illustrate this point by considering an IS as a language system. From problem formation and requirements elicitation all the way through data modeling, specification generation and code development we are dependent on creating descriptions of systems. Those descriptions depend upon forms of grammar, that is set of rules and regularities which customarily govern how the forms and elements (lexicons) of a language are put together and used. In a way it governs how meaning is expressed or even what is expressible. Our systems descriptions whether as English prose, data models, object models or low-level function calls all depend on or make certain grammatical assumptions. One of those assumptions is that of the inherent stability of the grammar itself. That is, that the notion of a grammar, which though we may acknowledge to be changeable over time, is in the short term, at least, fixed.

This is expressed in the area of information systems major research and in the creation of systems development methodologies as finding ways of modeling and specifying systems which are robust and relatively immune to change. We strive to build low maintenance systems which are specified "right." We build systems based on data models because they are thought to be more stable and to change less often than process models of a system.

It is as if there are ideal information structures within organizations awaiting discovery, in a vein similar to I-language structural grammar. This leads us to focus on analytical discovery of these structures. Once discovered, the high cost of this analytical discovery is justified by the expectation of the durability of information systems constructed to match this innate organizational grammar. Hence, current information systems theory values high-cost analysis and low-cost maintenance.

Thus two general approaches to the understanding and development of systems can be distinguished. The first approach accepts units, rules and meanings as prerequisites to the construction of a stable, bounded system which function as the basis for communication between users. A second approach is to think of the system as being in constant flux as it is used in practice. In this view of a system, structure does not precede actual individual uses of the system but is constantly being renegotiation by individual users of the system

and modifications found to be necessary in practices are added to the cumulative structure of the system in a constant process of feedback.

Because structure can be view in this sense as constantly in the process of change 'structure' is therefore an emergent property of the interaction rather than a structural prerequisite to acts of communication. Is it an emergent property rather than a structural property called emergent. This gives rise to a key question namely: Which key areas of systems development are affected if it turns out that the search for stable structures, to which we anchor such notions as information requirements, entities and relationships, methods and tools, proves to be futile.

Assumptions drawn from the alternative camps of the linguistic debate would provide the theoretical basis for an opposing view of information systems development. If we instead focus on the emergent nature of information systems requirements (e.g., that all requirements are an evolving response to both previous requirements and the external environment), then our values shift toward an emphasis on maintenance rather than analysis of any imaginary innate structures. In other words, low-cost analysis and high-cost maintenance would profile the most successful information systems.

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