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Epistemology and Indexicality in Navajo, Tibetan and English

How is the structure of our language related to the concepts that we can express? This project explores the relationship between the structure of complex sentences and the conceptual combinations that they express, by integrating experiments on child language acquisition with field work on languages whose means of expressing the relevant concepts are quite different from those of English.

The type of complex sentence that we're interested in contain a Subject, a verb, and another sentence, for example "Mary thinks that the candy is in the green box" or "Bill said that the candy is in the green box." The simple sentence "The candy is in the green box" expresses a fact about the location of the candy. In the complex sentences, "the candy is in the green box" doesn't express where the candy actually is, but only where Mary thinks or Bill said it is. Children younger than about 4 have trouble understanding this kind of complex sentence; they seem to have trouble understanding that someone might think or say something false. Yet at the same age these children understand pretend, deception and correction. Studies of child language acquisition suggest that it's not the concept being wrong or lying that confuses them, but the syntax of sentence embedding.

Indexicality has to do with words whose reference depends on who says the sentence. For example "I" refers to whoever says the sentence. "Here" refers to a location near whoever says the sentence. In Navajo, the word that means "I" in a simple sentence can refer to the subject of a complex sentence. For example, a Navajo sentence that literally translates as "John said I drove to Flagstaff" can mean that John said he, John, drove to Flagstaff. English pronouns behave like this in quotes, but it has been clearly shown that the Navajo cases are not quotes.

The study of Theory of Mind is notoriously difficult. Even defining what constitutes "Theory of Mind" is a challenge. Is How do beliefs and knowledge differ from desires? Does a child's use of epistemic language necessarily reveal an understanding of other minds? When a child asks a question, does this mean she understands that other minds contain information that her mind does not yet contain? Recent advances in the study of linguistic embedding provide an exciting new window into the triggers for the development of the understanding of other minds. However, languages differ in the syntactic constructions they use to express mental processes and epistemological attitudes. Some languages (such as Tibetan and Navajo) use non-embedding particles or verbal suffixes to express certain concepts that would be expressed in English with embedding predicates or adverbial phrases.

We believe that concrete progress can be made on these fascinating but difficult questions. We propose to conduct in-depth field work on constructions in Navajo and Tibetan which pose a potential challenge to current theories of the syntax/semantics/discourse interface, and which promise to illuminate the path through which children acquire the language relevant to "Theory of Mind". In particular, we will examine two sub-systems of grammar whose interpretation seems to require a switch in perspective: indexical expressions, which switch interpretation depending on the discourse role of the various discourse participants, and evidential morphemes,

which mark how the speaker of the discourse knows the information being conveyed. We focus on these two because adult mastery of them requires an understanding of multiple perspectives, but the nature of the understanding required for each is a priori quite different.

The data we are interested in involve complex interactions and perspective switches, which are extremely difficult to present verbally. This problem arises in very similar ways in both field work and acquisition experiments. Along with the standard sort of printed materials, we plan to develop filmed short (1-2 minute) scenarios that portray false beliefs and varying perspectives. These videos will be suitable for either child language experiments or field work. It will also be possible to adapt them to any language, or for nonverbal tests. These materials will allow us to elicit judgments about grammaticality, but also about ambiguity and appropriateness in a given context.

Our research team combines expertise in language acquisition, theoretical linguistics, language pedagogy, culture and philosophy. Roeper and deVilliers have an extensive track record in language acquisition, including research funded by an NSF grant on the acquisition of WH-movement. That project was the foundation of virtually all research now being done on the topic. They are currently collaborating on an NIH-funded project that applies their theoretical results to the creation of materials to diagnose language disorders in children who speak non-standard dialects. This project has already yielded a dialect-neutral evaluation instrument, which

1.1 Intellectual Merit

The intellectual merit of our proposal is quite broad: we will gather new data about complex constructions in understudied languages, we will contribute to the theoretical literature on the syntax of embedding and the “left periphery” of the clause, and we will make new discoveries about the various abilities that allow children to master complex syntax and Theory of Mind.

There are major gaps in what is known about the syntax of natural language constructions involving attitude and perspective. Are there syntactic projections for point of view, modality, illocutionary force, evidentiality, etc.? Recent work by and in the wake of Cinque(1999) suggests that there may be syntactic projections in the “left periphery” of the clause for evidential heads, as well as for speech act, mood, evaluative mode, etc. What are the constraints on such projections? Does the relative scope of these projections reflect some hierarchical organization of nonlinguistic cognition? How do languages differ in the grammaticization of such categories? Our research in the syntactic component of the project is aimed at discovering how syntactic projections are constrained. Following Speas(2004), we will be looking not only at the specific constructions, but at how these constructions interact with other subsystems, such as agreement, adjunction, tense and aspect. The acquisition component will add to our understanding of the relationship between syntax and Theory of Mind, not only for English but for languages that are syntactically very different from English.

As we begin to address these questions in typologically-varied languages, we find that we need increasingly subtle methods for eliciting judgments about complex sentences in complex contexts. Researchers interested in how children acquire the grammar related to Theory of Mind have begun to develop tools that can get at just the subtle distinctions that we are interested in. By combining field work with acquisition studies, we will be able to refine the materials for both field work and acquisition studies, discover new questions to ask in studies of English, and develop a better solid understanding of the crosslinguistic constraints on clause-level projections.

We will be looking at constructions in Navajo and Tibetan that provide explicit grammatical representations of concepts that are not explicitly represented in the grammar of English. These languages have a wealth of intriguing constructions for expressing attitude and perspective, which have been studied in only a preliminary way. The presence of these syntactic constructions in Navajo and Tibetan raises the possibility that some covert representation of the same concepts might exist in English. We propose to construct language acquisition experiments based on the premise that we can learn about the grammar of one language by looking for subtle manifestations of some grammatical phenomenon that we have found in another language. This approach will allow us to learn more about interface between Theory of Mind and grammar.

1.2 Broader Impact

First, the ability to understand the mind of another is at the core of all human social dynamics. Our research will contribute to cross-cultural understanding of differences in the way knowledge can be represented. Both of the languages we are studying in the field work component of our project are languages spoken by underrepresented minority populations. Our research will help to enhance the visibility of these groups, and underline the importance of preserving their language and culture. Second, research on the understanding of other minds is directly relevant to the diagnosis of language disorders, in particular in distinguishing language disorders from cognitive disorders. de Villiers' previous research has already been found to have applications to the education of Deaf children, especially those growing up without exposure to Sign Language. Third, the materials that we will develop will have the potential to be used in a variety of settings outside of academia. Prof. Parsons-Yazzie will be applying the results of our study of Navajo to her Navajo Language classes at NAU, and Speas will be sharing the results with bilingual teachers at the Navajo Language Academy. Garfield will disseminate our results to those who are concerned with preserving Tibetan language and culture. Finally, . The scenarios we are designing could be adapted for use by language educators, in order to teach complex sentences. The nonverbal videos that we develop will be useful for diagnosing subtle language disorders and also for use in language-teaching classrooms.

2. The Acquisition of Embedding and Theory of Mind

A growing body of work in child language acquisition and psychology suggests that children differ from adults in their understanding of the thoughts and beliefs of others, that is, they are said to “lack Theory of Mind” before a certain age. Wellman, Cross and Watson (2001) have revealed a consensus that children develop an awareness that other people might have *false* beliefs around the age of four years, give or take six months. Wellman and some others believe that children undergo a conceptual change at this point, from a psychological theory based primarily on *desire* as the motivator of human action, to one that accords *beliefs* a causal role. Others, such as Leslie (1991;1994), contend that the child has the concept of belief innately, but that certain triggering environments and the maturation of supporting processing skills are needed before the child exhibits the concept. de Villiers and de Villiers(2000) found that the best predictor of when children in English pass “false belief” tasks is the success on a linguistic task involving embedded false complements. This suggests an interesting correlation between the acquisition of syntactic embedding and the acquisition of an understanding of other minds.

A recurring issue in trying to compare the results of such studies is that there is wide debate on exactly what constitutes “Theory of Mind.” Although most cognitive theorists acknowledge that mature Theory of Mind entails the understanding of others’ false beliefs (Dennett, 1978), there are many earlier component processes such as reading intentions and desires, understanding true beliefs, and understanding ignorance versus knowing. It has been clear since Piaget first discussed the “3-mountain problem” that mastery of Theory of Mind involves at least 3 distinct abilities: a. switching perspectives; b. appreciating alternative perspectives; c. coordinating multiple perspectives simultaneously. Yet even this 3-way distinction may not be fine-grained enough. For example, the type of perspective switch involved in understanding person deixis (“I” refers to whoever utters it) is slightly different from the type involved in spatial deixis. (“this box” requires understanding of near vs. far as well as understanding of person switch). Appreciating alternative spatial perspectives (“The ball is *behind* the box”) doesn’t require an understanding that minds differ, rather, it requires the assumption that anyone in my position will perceive things as I do. That is, a child who did not understand that someone could hold a belief that is false might nonetheless understand that the world looks different from different spatial viewpoints. Appreciating alternative opinions (“The candy is yucky”) does require an understanding that minds can differ. Piaget argued that young children were marked by egocentrism, that is, wedded to their own point of view visually, emotionally and so on. But others have pointed out that infants might be recognizing perspective when they mimic gestures, since mimicking involves a transformation of body direction. Furthermore, children who fail “false belief” tests are nonetheless able to pretend that they are someone other than who they really are. They ask questions, which shows that they must have some notion that others’ minds possess information that they do not have. Thus, although there is a general consensus that coordinating multiple perspectives simultaneously is the fundamental change that makes it possible for a child to understand false belief, (Perner et al, 2002), it is clear that neither the target state nor the stages preceding it is well-understood.

Since this ultimate stage involves manipulating multiple perspectives, it is not surprising that this conceptual stage correlates with the ability to manipulate embedded sentences. We intend to explore how the computational abilities are related to the development of concepts about the minds of others. For example, we don’t know why the ability to engage in pretend play doesn’t allow a child to “pretend” to be another character, and pass false belief tests by assuming the perspective of the character. Furthermore, looking at the variety of syntactic constructions reveals that it may be a mistake to assume that “perspective” is a single cognitive notion.

DeVilliers and others (J.G.de Villiers (in press), P.A. de Villiers (in press), de Villiers and de Villiers (2000, 2003), de Villiers and Pyers (2002)) have found evidence regarding both DPs and CPs that full mastery of the syntactic properties of mental verbs and their syntactic complements is the best predictor of success on false belief tests. In their view, the complete syntactic structure includes a “point of view” feature on the CP, which is also found on DPs. A communication or mental verb can signal a shift in point of view, from that of the speaker to that of the Subject. There are several different syntactic devices that are affected by point of view. These include deictic pronouns: (*I/you, my/your* etc.), deictic place terms (*this/that, here/there*) deictic prepositions (*in front, behind*), deictic time terms (*soon, yesterday, next*) attitudinal adjectives and adverbs (*yucky, damned, nice, tasty; clearly, luckily, sadly*) designations known incompletely (the classic cases of opacity, where *Oedipus knows he married Jocasta*, but does

not know *Jocasta = his mother*) and designations believed falsely (eg: the man thinks he is wearing *a hat*, but it is *a toy dog*.)

When a sentence containing one of these devices is embedded under a verb of speech or thought, ambiguity arises as to whether the relevant perspective is to be the speaker or the subject. A child who hears “Pat thinks the ball is in this box” must work out whether ‘this’ means ‘near the speaker’ or ‘near Pat.’

Regardless of the syntactic mechanisms used, understanding expressions denoting mental processes and attitudes requires an understanding of switches in perspective and other minds.

In our field work on Navajo and Tibetan, we will study Navajo constructions that involve perspective switches and deixis and Tibetan constructions that mark epistemological attitudes without syntactic embedding. We find that the study of Navajo pronouns illuminates the stages that all children go through to acquire deictic expressions, and the study of Tibetan evidentials similarly bears on our questions about the acquisition the understanding of false belief. Thus, the field work will feed the goal of our work in language acquisition, which is to illuminate the path of development of children's knowledge of language expressing mental processes and their understanding of false beliefs and other minds.

The language acquisition experiments will begin with basic experiments on deixis in simple and embedded sentences in English, and will then adapt these experiments and explore the acquisition of parallel structures in child Tibetan. In conjunction with our field work on evidentials in adult Tibetan, we will carry out experiments on parallel constructions in child English.

Field workers and language acquisition researchers encounter many of the same obstacles in trying to learn about complex structures and subtle judgments. The data we are interested in involve complex interactions and perspective switches, which are extremely difficult to present verbally. We plan to develop scenarios that portray false beliefs and varying perspectives, which can be used for either child language experiments or field work. In addition, we will be creating video material that can be adapted to any language, or can be used for nonverbal tests. These materials will allow us to elicit judgments not only about grammaticality, but also about ambiguity and appropriateness in a given context.

Research on the relationship between syntax and Theory of Mind gives us new ways of distinguishing linguistic disorders from other cognitive difficulties. Our research will also contribute to our understanding of 2 languages spoken by underrepresented minority populations. The materials that we develop will have the potential to be used in a variety of settings outside of academia, including language classrooms, testing for communication disorders and dialect-neutral language assessment.

The goal of this project is to explore linguistic constructions in Navajo and Tibetan that express epistemological attitude. encode the link between mental processes and human behavior. developing a new synthesis between linguistic field work and language acquisition studies, we will The field work will In conjunction with field work on these languages, we will conduct language acquisition experiments that are designed to illuminate the path of development of

children's knowledge of language expressing mental processes and their understanding of false beliefs and other minds.

The field work will explore constructions in Navajo and Tibetan which differ radically from English (and each other) in Our research on Navajo and Tibetan will contribute to the theoretical literature on the syntax of embedding. Based on the premise that we can learn about the grammar of one language by looking for subtle manifestations of some grammatical phenomenon that we have found in another language, we will construct language acquisition experiments. The PIs in this project combine expertise in language acquisition, syntax, Psychology and Philosophy, and we will be actively collaborating with native-speaking experts in Tibetan and Navajo.