Evidential Paradigms, World Variables and Person Agreement Features

Margaret Speas

(to appear in Italian Journal of Linguistics)

0. Introduction

Person marking spells out the relation between a given argument and a discourse role. It has long been observed that agreement paradigms spell out a very restricted subset of the logically-possible discourse roles, and that person features are hierarchically organized. (See Benveniste 1956, Harley and Ritter 2002.) In this paper, I will explore the idea that these restrictions on agreement have a parallel in the domain of evidential morphemes. I will argue that evidential morphemes are person agreement morphemes. I claim that evidential agreement paradigms specify the same restricted set of syntax-discourse relations as standard nominal agreement, but the argument specified by evidential agreement is a "world argument" rather than a nominal argument. The presence of a world argument in syntax will be supported by showing that worlds have syntactic properties parallel to those of entities (pronouns) and times (tenses). I will show how this view clarifies the relationship between modals and evidentials, and suggests interesting ways of restricting the inventory of possible projections in the left periphery of the clause.

1. Evidential morphemes

In some languages, such as Makah (Jacobsen 1986), Quechua (Weber 1986), Tibetan (Delancey 1986) and Akha (Thurgood 1986), it is obligatory to mark whether the information conveyed by a sentence is known through personal experience, various types of evidence, or hearsay. In some languages, these *evidential* morphemes are obligatory.

(1) a. wiki-caxa-***w*** 'It's bad weather (directly exp.)' Makah

b. wiki-caxa-***k'u*** 'It was bad weather'

c. wiki-caxa-k-***pid*** 'It looks like bad weather (inference from physical evidence)'

d. wiki-caxa-k-***qad'i*** 'It sounds like bad weather'

e. wiki-caxa-k-***wa.d*** 'I'm told there's bad weather'

f. wiki-caxa-k-it-***wad*** 'I'm told it was bad weather'

(2) a. wañu-nqa-paq-***mi*** 'It will die (I assert)' Quechua

b. wañu-nqa-paq-***shi*** 'It will die (I was told)'

c. wañu-nqa-paq-***chi*** 'It will die (perhaps)'

(3) a. K'o_ gis yi-ge bri-pa-***red*** 'S/he wrote a letter (it seems)' Tibetan

s/he ERG write-Perf-EVID

b. K'o_ gis yi-ge bri-pa-***so*** 'S/he wrote a letter (I saw it happen)'

s/he ERG write-Perf-EVID

(4) a. NO-màq àj Oq̄-à_ dì- **é** 'You(pl) will beat him' Akha

you-PL he-OBL beat-NONSENSORIAL

b. NO-màq àj Oq-à_ dì-**_à** 'You(pl) will beat him (I see it now)'

you-PL he-OBL beat-VISUAL

c. NO-màq àj Oq̄-à_ dì **-nja** 'You(pl) will beat him (I guess from

you-PL he-OBL beat-NONVISUAL sound of beating)'

Until Cinque (1999), evidential morphemes were generally taken to have few if any interesting syntactic properties. The category of evidentiality was generally taken to be semantically defined, and therefore structurally heterogeneous. Crosslinguistic generalizations were explained in terms of their basic meanings and the "mental map" of the concepts they might

express.(Anderson (1986)) Under this view, there was no reason to expect any restrictions on the number and type of categories of evidence that a language might mark with an evidential morpheme. However, a survey by Willett (1988) found that those languages that have a morphological paradigm for evidentiality never grammaticize more than four basic evidential categories**:**

(5) **Basic categories of evidentiality (Willett 1988:57)**:

personal experience >> direct (eg. sensory) evidence>> indirect evidence >> hearsay.

Languages may include tense distinctions in the paradigm, such as the distinction seen above in Makah between *wiki-caxa-k-**wa.d*** 'I'm told there's bad weather' and *wiki-caxa-k-it-**wad*** 'I'm told it was bad weather'. However, it appears that the types of evidence that can be expressed in an evidential paradigm is limited to the four categories in (5).

Willett treats the categories in (5) as pragmatic categories, and posits that they are arranged in a pragmatic hierarchy. We can see intuitively that this hierarchy corresponds to how reliable the speaker feels the evidence to be. The problem is that such a pragmatic account does not predict that the restriction to only four categories. This restriction is surprising, given the range of ways that notions about knowledge sources and reliability can be expressed when adverbs, modal auxiliaries or propositional attitude predicates are used to express them. (*It must be bad weather, I deduce that it's bad weather, My lumbago tells me it's bad weather, I guess it's bad weather; Apparently it's bad weather, It seems to be bad weather, I see it's bad weather, It could be bad weather, The radio said it would be bad weather, etc.)* Furthermore, it does not seem likely that some general criterion of cultural salience or relevance could restrict the categories in an evidential paradigm. As Speas (2004) has pointed out, one can think of all sorts of

pragmatically and culturally salient ways that a speaker might know something, none of which are ever expressed within an evidential paradigm. This suggests that evidentiality involves a restricted system rather than simply with the expression of pragmatically salient sources of evidence.

The nature of the hierarchy is also suggestive. Speas shows that the very same allegedly pragmatic categories in the very same hierarchical arrangement show up in descriptions of the appropriate domains for logophoric pronouns. For example, Culy (1994) proposes that the predicates which allow logophoric pronouns in their complements fall into the following hierarchy:

(6) logophoric predicate hierarchy: (Culy 1994:1062)

speech >> thought > > knowledge >> direct perception.

Some languages allow logophoric pronouns only within the complements of verbs of speech. If a language allows logophoric pronouns in the complement of other types of verbs, it will allow those pronouns in all "higher" types as well. Culy considers this logophoric hierarchy to reflect the interaction of three variables of "reliability": whether the speaker directly perceived the event or state denoted by the matrix predicate, whether the truth of the report is presupposed and whether the Subject has direct evidence about the report. However, as Speas (in press) points out, Culy's proposal predicts a larger inventory of logophoric possibilities than are actually attested.

Speas suggested that the evidential/logophoric categories correspond to the four highest projections in the structures of Cinque(1999), and argued that the paradigm of evidential and logophoric categories arises from different possibilities for indexing and incorporation of the heads of those four projections. Based on extensive crosslinguistic data on adverb order and

affix order, Cinque determined that the extreme left periphery of the clause contains projection for the following heads:

(7) Cinque's 4 highest heads:

Category	**Description**	**Representative Adverb**
Speech Act Mood:	type of speech act	frankly, confidentially
Evaluative Mood:	speaker's evaluation of the reported event or state	unfortunately, luckily, surprisingly
Evidential Mood:	the nature of speaker's evidence for truth of proposition	allegedly, reportedly
Epistemological Mode:	speaker's degree of certainty about the proposition	obviously, apparently

These heads seem to correlate with the logophoric and evidential hierarchies in the following way:

(8)

Cinque's projection	logophoric category	evidential category
Speech Act Mood	speech	hearsay
Evaluative Mood	thought	indirect evidence
Evidential Mood	know	direct evidence
Epistemological Mode	direct perception	personal experience

Speas' proposal assumed the existence of Cinque's projections, and claimed that a variety of patterns of head movement resulted in the four evidential categories. The most obvious problem with that approach is that begs the question of why there are these and only these four functional heads. It seems to replace one stipulation with another. Another problem is that the overlap between Cinque's projections and the evidential categories is not as straightforward as this account assumes. For one thing, an evidential morpheme should head the Evidential Mood Phrase, yet Speas' account has features from all four projections combining to yield the evidential paradigm. For another thing, the correlation between Epistemological Mode and personal experience evidentials is dubious. Epistemological Mode is for Cinque the locus of epistemic modals, but the meanings of epistemic modals involve inference, not personal experience.

The heads in (7) are the ones in Cinque's system that involve the interface between the sentence and the pragmatic context. The factors that might figure in a pragmatic context are potentially infinite, yet Cinque's typological study strongly suggest that natural language encodes only a small subset of the possible pragmatic factors, and that the encoded features are arranged hierarchically. Thus, although Speas' specific account is problematic, the basic idea that evidential paradigms are subject to syntactic constraints remains compelling.

The idea that there are syntactic representations of discourse-related information such as 'source of information,' 'speech act' and the like has been controversial since it was first proposed by Ross (1970). The argument has always been that projections of information about the discourse are not sufficiently constrained, therefore the relevant data should not be accounted for by means of syntactic mechanisms.[1] Therefore, if Cinque and others are right in reviving a

version of Ross's proposal, it is obviously essential that we investigate the nature of the constraints on such structures.

One way to learn more about the nature of the constraints on evidentials is to compare them a category with which they overlap: modals. Some of the meanings of modal auxiliaries seem to overlap with the meanings expressed by evidential morphemes. In fact, it has been common to treat evidentials as a type of epistemic modality. Yet, there has been a great deal of confusion about how and where to draw the line between the two. In the following section, I will show that a comparison between the two categories highlights the agreement-like nature of evidentials and suggests a way to restrict the typology of pragmatic projections.

2. Modals and Evidentials

The modal-like properties of evidentials have often been pointed out. Boas (1911)(cited in Jacobsen 1986) classified a Kwakiutl evidential as one of the "modalities of the verb." Izvorski(1997) analyzes indirect evidentials as a type of epistemic modality. Rooryck (2001) notes that evidentials and epistemic modals[2] both involve a 'source of information' and both involve some type of evaluation of the information. Sometimes direct or indirect evidentials are translated into English with epistemic 'must'. However, most authors also draw attention to differences between epistemic modals and evidentials (see for example de Haan 1998). Modals, unlike evidentials, can be deontic as well as epistemic. Evidentials, unlike modals, have categories for personal experience and hearsay in addition to inference. These differences have to do with the fact that evidentials seem to be more closely linked with the speech act than epistemic modals are (see Garrett 2001), and the fact that evidentials express <u>the nature of the evidence</u> that a speaker has for inferring that the sentence uttered is true.

We can see this if we look at the distinction between direct and indirect evidentials. We might loosely translate both of the Makah sentences (9)c and (9)d as 'It must be bad weather'; they both express inference, but are distinguished by whether the epistemic judgment is based on directly observed evidence or more circumstantial evidence.

(9) c. wiki-caxa-k-***pid*** 'It looks like bad weather (inference from physical evidence)'

roughly: "Judging from the things I see, it must be bad weather"

d. wiki-caxa-k-***qad'i*** 'It sounds like bad weather'

roughly: "Judging from what I hear, it must be bad weather"

In other words, what evidentials express is not an epistemic judgment per se, but rather a characterization of what evidence the speaker uses to make an epistemic judgment. Izvorski (1997) proposes that indirect evidentials are propositional operators, which assert roughly the same thing as an epistemic modal, but also include a presupposition about the available evidence:

(10) The Interpretation of EVp: (Izvorski 1997)

a. assertion: _ p in view of the speaker's knowledge state

b. presupposition: Speaker has indirect evidence for p.

I think that such an approach is on the right track, but it applies to only one of the four evidential categories, and it does not address the question of why the paradigm of evidential morphemes is limited to just four categories. In order to extend this approach to the other evidentials, we would need to posit four different morphemes, each of which happened to trigger a different presupposition. This predicts that we could have many morphemes, triggering many different presuppositions about the type of evidence.

What is important in Izvorski's proposal is the idea that evidentials specify something about the nature of the speaker's knowledge. Izvorski adopts the theory of Kratzer (1981, 1991), in which the interpretations of modals requires reference to a *modal base.* The modal base is a function that assigns to every possible world a certain set of propositions, which is the set of propositions 'in view of which' the modal judgment is made. An epistemic modal base will assign to every possible world the set of propositions known in that world. The nature of the modal base is expressed in (10) with the phrase 'in view of the speaker's knowledge state.' What evidential morphemes do is further specify the worlds that are relevant for evaluating a given proposition.

I would like to adopt Izvorski's proposal that evidential morphemes specify the nature of the modal base, but I claim that the range of possible specifications is not unlimited, random, or a matter of pragmatic happenstance. Rather, I will argue that evidentials specify how the modal base is related to the *speaker* and the *discourse*. The limits on the paradigm of evidentials follows from the geometry of the features that they spell out.

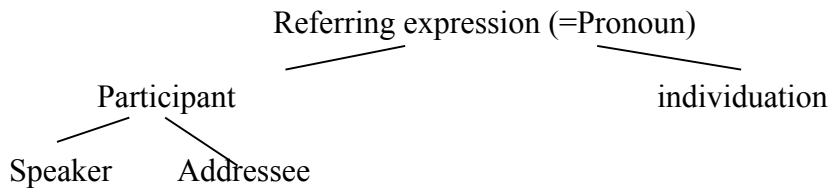
I follow Harley and Ritter(2000)'s theory of person features, in which person features are not primitive, but are configurationally defined, in terms of the features [+/- speaker], [+/-discourse][3]. In Harley and Ritter's theory, these features are pronominal, that is, they are features of pronouns, which indicate the role of a pronoun in the discourse. I claim that evidential paradigms spell out the same features, but apply to a modal base. They specify how the modal base is related to the speaker and to the discourse, and as such are a species of agreement, expressing a species of person features.[4]

In Harley and Ritter's theory, the distinctions among persons are derived from a configurational representation of the relationships among possible participants in a discourse. In

their view, "speaker" is best thought of not as a stipulated role, but as the most prominent participant in the discourse. Conceptually, we could imagine a multi-faceted communication scene, with many different types of players. As soon as we try to encode some such concept grammatically, however, configurational constraints come into play, and the only possible "roles" are those that receive a configurational definition. In other words, agreement features do not encode any old concept about discourse participants; they spell out various nodes in a hierarchical representation, whose shape is constrained by basic principles of the computational component.

In Harley and Ritter's framework, person marking distinguishes those who are <u>participants in the discourse</u> from all others. First and Second person pronouns spell out features that are dominated by the *participant* node. The interpretation of *participant* features is dependant on discourse. Third person pronouns refer to individuals that are not participants in the discourse, and such pronouns spell out features that are dominated by a node that they label *individuation.* The *individuation* node dominates features whose interpretation is not indexical – gender, number, animacy, etc.

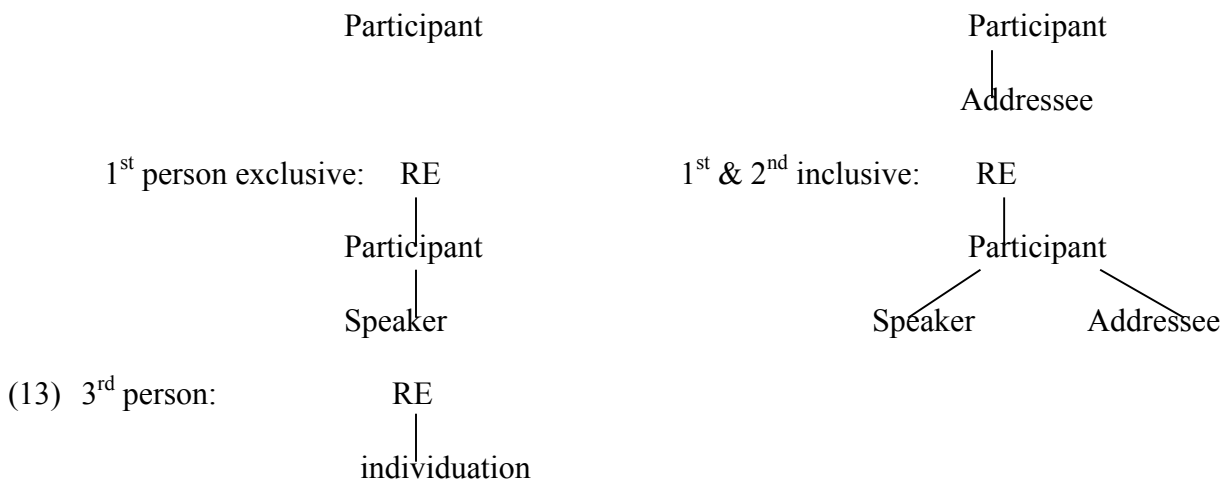
(11)



Harley and Ritter 2002:508

Each node in the feature geometry corresponds to a possible category of pronoun (or agreement). They propose that the correspondences between these nodes and the traditional person categories is as follows:

(12) 1st person: RE 2nd person: RE



Harley and Ritter treat first person singular pronouns as the spellout of just the Participant node, and use the representation with the Participant and Speaker nodes for pronouns that are traditionally classified as 1st person exclusive plural.[5] Second person pronouns spell out the Addressee node (which like the Speaker node can only occur as an expansion of the Participant node). Third person lacks a participant node altogether.

This system is designed to predict the inventory of existing person paradigms. Under this view, person agreement expresses a relation between the discourse and an argument. Pronoun systems are constrained by this feature geometry, and the feature geometry maps to conceptual categories much as phonetic feature geometry maps to the articulatory system.

I would like to propose that evidential morphemes spell out agreement a relation between the discourse and the world(s) in which the sentence is to be interpreted, and that the possible inventory of such relations is constrained by a feature geometry that is parallel to the geometry of pronominal person features.

First, assuming that evidential morphemes specify the modal base, let us informally discuss the four evidential categories in terms of the speaker and the discourse.

A. *personal experience*: Sentences with personal experience evidentials convey that the speaker knows a proposition to be true based on his/her unique "internal" experience. In other words, the modal base specified by a personal experience evidential is knowledge which can be known (as such) *only by the speaker*. Delancey (1986) notes that traditional grammars of Tibetan describe the ego evidential as "first person". He shows that while these evidentials share some properties with first person agreement, they cannot be strictly classified as agreement, since they need not actually have first person subjects. Sentences with first person subjects often do convey personal experience information, but sentences like (14) can also be marked with an ego evidential, as long as the information reported is known only through the speaker's own experience.

(14) *bod-la* *g-yag* *yod*

Tibet-loc yak personal experience[6]

'There are yaks in Tibet/My yaks are in Tibet/I have yaks in Tibet'

Garrett points out that in Tibetan, "a major use of ego [=personal experience] evidentials is in statements that express self-knowledge or attitudes *de se*."(2001:117)[7] Thus, the modal base specified by the evidential morpheme *yod* is "[+speaker]". It is the set of worlds of the speaker's perspective. These are things known uniquely by the speaker, because no one else can have the speaker's perspective.[8]

B. *direct:* Sentences with direct evidentials convey that the proposition is to be evaluated with respect to sensory data such as seeing or hearing. Garrett shows that direct evidentials in Tibetan must involve situations that are "observable." He cites the observation of de Haan (1999) that "when a speaker uses a visual evidential…he or she is saying that the action was witnessed personally because it occurred in the same deictic sphere as the location of the speaker." (Cited in Garrett 2001:56) The difference between personal experience and direct evidence is that

direct evidence is acquired through some means other than internalized experience, but the evidence is in principle available to anyone within the same deictic sphere as the speaker. For example, the difference between personally experiencing bad weather and having direct evidence for bad weather is that anyone in the world in which the weather is taking place would be able to see the raindrops, or hear the howling wind, whereas no one else can have my experience of being in the rain. Thus, the modal base specified by a direct evidential includes anything that is in the same deictic sphere as the speaker but is not the speaker's internalized experience. In other words, it is the sister of the [+speaker] node.

C. *indirect:* A sentence with an indirect evidential conveys that the speaker believes a proposition to be true based on some inference. Actually, in order to make the inference, there must be some facts about the world that the speaker has experienced. What an indirect evidential indicates is that the evidence does not directly imply that the proposition is true, but requires a mental process to arrive at that conclusion. In other words, indirect evidence in a sense involves facts about the world plus some part of the speaker's epistemic state. Garrett analyzes the Tibetan indirect evidential as a "performative epistemic modal".

The indirect evidential in many languages is often translated into English using epistemic 'must', and As Kratzer (1991) points out, we use an epistemic modal not to express pure necessity, but to indicate that the relevant modal base for an inference of necessity is not just internal personal experience or obvious observation. (15)a is a weaker assertion than (15)b because its interpretation includes a modal base and an inference of necessityabout the relationship between the modal base and the proposition.

(15) a. John must be the culprit.

b. John is the culprit.

Thus, the modal base for a sentence with an indirect evidential is some facts about the world plus some aspects of the speaker's epistemic state. In other words, it is parallel to the "participant" node in Harley and Ritter's person geometry.

D. *hearsay:* Sentences with hearsay evidentials convey that the knowledge was acquired in some context other than the current discourse context. It is knowledge that was reported by someone else, and is not within the current deictic sphere. For example, sentences in Navajo stories often end with the hearsay particle jiní[9] 'they say', indicating that the information comes from narrative tradition, not from the speaker's experience or the discourse context. Thus, the modal base specified by a hearsay evidential is some set of things known in some context, but not necessarily in the present one. Note that at least in Navajo, the hearsay particle is often marking information known in general, not just information told to the speaker by some specific individual. In other words, the modal base is impersonal, outside of the present deictic sphere, and is parallel to the 'individuation' node in Harley and Ritter's person geometry.

(16) T'áá áyídígi yílk'id jiní. Navajo

just nearby-at hill-extends hearsay

'Not far away there was a ridge' (Midgette 1987:198)

(17) Summary: evidential modal bases

a. *personal experience*: knowledge that is known (as such) only by **the speaker.**

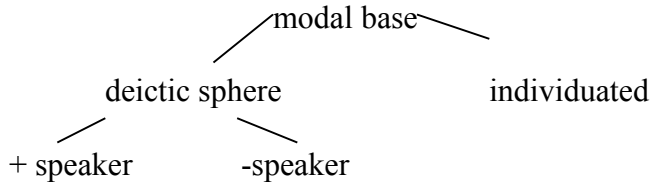
b. *direct:* in the same deictic sphere but **not speaker's internal experience**

c. *indirect:* **facts** about the world **plus speaker's internal experience** (of making an inference)

d. *hearsay:* knowledge **outside of the present deictic sphere**

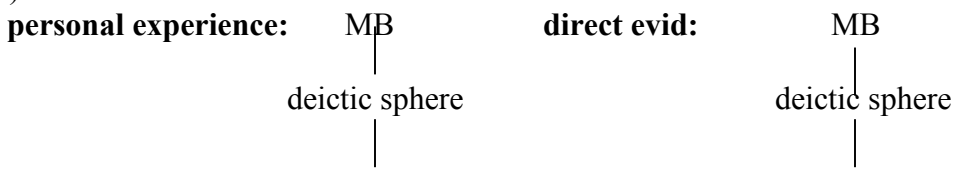
I propose that evidential features spell out one of the nodes in the structure in (18) This structure distinguishes knowledge available in the deictic sphere from knowledge acquired elsewhere, and further distinguishes knowledge available only to the speaker from knowledge acquired through some means other than internal experience.

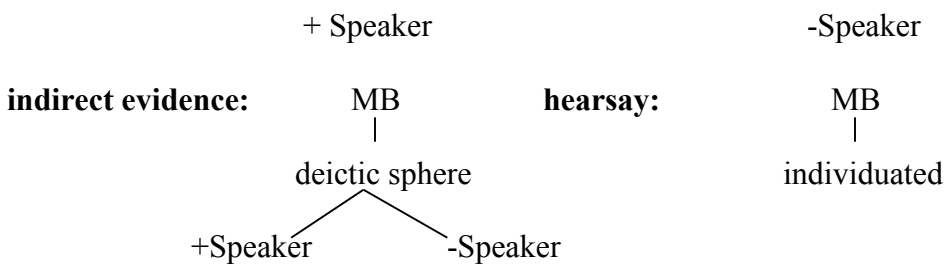
(18)



This configuration makes distinctions that are parallel to those made by person agreement. With pronominal person, there is a paradigmatic opposition between individuals that are part of the present deictic sphere (participants) vs. those that are not, and between the +speaker participant and the – speaker participant. The configuration in (18) encodes a paradigmatic opposition between a modal base that consists of information within the current deictic sphere and other information, and between the speaker's internal epistemic state and other information within the deictic sphere. I use the term "individuated" simply to maintain the parallel with Harley and Ritter's terminology. The "individuated" category is simply interpreted as evidence obtained outside the present deictic sphere. The four different evidential categories can be characterized in a way parallel to Harley and Ritter's person categories, as follows:

(19)





Just as Harley and Ritter's feature geometry makes certain predictions about possible pronoun systems, the feature geometry in (18) predicts that certain types of evidential paradigms are impossible. Since the [+/- Speaker] features are daughters of the "deictic sphere" node, it is not possible to have specific morphemes marking [+/- Speaker] unless the deictic sphere node is present. This makes the following predictions:

(20) a. If a language has a specific morpheme for personal experience, it will also have a morpheme for indirect evidence.

b. If a language has a specific morpheme for direct evidence, it will also have a morpheme for indirect evidence.

This means that systems of obligatory evidential morphemes such as those in (21) would be impossible, while those in (22) are possible.

(21) *personal experience, hearsay

*personal experience, direct evidence

*direct evidence, hearsay

*personal experience, direct evidence, hearsay

(22) personal experience, indirect evidence

personal experience, indirect evidence, hearsay

personal experience, direct evidence, indirect evidence

indirect evidence, hearsay[10]

In Harley and Ritter's system, the [+Speaker] node is in some sense "more prominent" than the [-Speaker] node, and they suggest that no language can have the [-Speaker] node without also having the [+Speaker] node. If this holds also of the evidential system, then we further predict that no language could have an evidential paradigm like those in (23).

(23) *direct evidence, indirect evidence

*direct evidence, indirect evidence, hearsay

*direct evidence, hearsay

These predictions are similar to those made by the implicational hierarchy of Willett (1988), but they allow a few possibilities that his hierarchy would rule out. Recall that he finds the evidential categories to be organized into a markedness hierarchy:

personal experience >> direct (eg. sensory) evidence>> indirect evidence >> hearsay.

This hierarchy would predict that no language could have a system that marked just personal experience and indirect evidence, but such systems do exist. In fact, this is the opposition that is generally made in languages with a binary evidential system. It would also predict that no language could have a three-way system marking personal experience, indirect evidence, and hearsay, but this seems to be what is found in Quechua, as shown in the examples in (2).

Thus, evidential paradigms do not encode just any pragmatically salient source of information. They encode a restricted set of features that are parallel to pronominal person features.[11] Evidential features specify the modal base rather than an individual, but both pronominal person and evidential "person" features are grammaticized expressions of the relationship between a sentence and the discourse context. Pronominal agreement distinguishes among individuals within the discourse context, and evidential agreement distinguishes among

sets of worlds relevant to the discourse context. In both cases, the paradigm is restricted to those features that spell out a node in a configurational structure that encodes only two oppositions: [+/- Speaker] and [+/- deictic sphere (discourse context)].

3. A world argument?

I have claimed above that evidential morphemes are a type of agreement, which specify features of the modal base. I have further claimed that the geometry of these features is parallel to the geometry of person features. If evidential morphemes are parallel to person agreement, this would mean that the modal base is represented at some level as a kind of argument, which can check agreement. In this section, I will argue that there are good reasons to suppose that along with syntactic representations of times, individuals and events, there is a 'world argument' in syntax, at least at the level of Logical Form. Of course, it is common to assume that semantic representations include world variables. It is generally assumed that these do not play a role in syntax. However, there have been proposals that associate syntactic Mood with a variable of type w. In particular, von Stechow (2002) argues against Schlenker's (2001) claim that LF requires operators over context (Kaplanian "Monsters") by showing how a theory containing variables of type s (world) can capture the Schlenker's facts[12]. My goal is to support von Stechow's view by showing that insofar as locality properties are syntactic, the syntax must include world arguments, which are the specifiers of a head containing evidential "agreement."

The world argument that I am proposing denotes the set of possible worlds within which the proposition expressed by a sentence is to be evaluated[13]. In this sense, its denotation is similar to what Karttunen (1974) and Heim (1992) call a "context" or "context set." The context set is a subset of the worlds within which a proposition might actually be true. I'm using the term

"world argument" rather than "context argument" for two reasons. First, the argument I am proposing is distinct in nature from the "context" proposed by Schlenker (2001). Schlenker argued that sentences contain Kaplanian "monsters," or operators that affect the character of an utterance based on context. I disagree that the relevant operator (or argument) is a monster[14], and I follow von Stechow (2001) in assuming that nothing is needed beyond the standard variables, including a world variable. Second, the set of worlds within which a sentence is to be evaluated may be distinct from(or at least, a subset of) the context in which the sentence is uttered. For example, if Mary says "In view of these grades, I must be a genius," the utterance context is those worlds in which Mary is the speaker, etc. The set of worlds within which the sentence is to be evaluated contains those worlds where Mary has these grades. Sometimes the utterance context is by default the world within which an utterance is to be evaluated, but often the two are distinct. My claim, then, is that the syntax of each sentence includes a world argument, which denotes the set of worlds within which the sentence is supposed to be evaluated. In my examples, I will represent the set of worlds in terms of the set of propositions that determine those worlds.

The evidence for a world argument comes from the fact that the world within which a sentence is to be interpreted shows the same locality conditions and restrictions on interpretation that pronouns and tense do. Partee(1973), Kratzer (1998) and others have observed that there are important parallels between tenses and pronouns. These observations, among others, have led to an analysis of the syntax of tense that treats it as a functional head with time arguments, rather than as an adjoined operator. For example, Stowell(1996), following Zagona(1990), treats tense as a dyadic predicate with arguments denoting the Event Time and a Reference Time. In this section, I will show that the properties of tense that led to this sort of analysis hold equally of the

grammar of expressions whose denotation has to do with sets of possible worlds. I will call such expressions "W's".[15] Like tenses and pronouns, W's can have bound variable, pronominal, controlled, de se, de re and indexical interpretations. These interpretations also show the locality effects that we would expect if they involved a syntactically projected argument.

3.1 Bound Variable Worlds

A bound variable pronoun is one whose interpretation co-varies with some assignment of values to an operator, as in (24)a. As Partee(1973) pointed out, tenses can also have readings that co-vary with an assignment of values to an operator, as in (24)b.

(24) a. bound variable pronoun: *Every woman visited **her** mother.*

b. bound variable tense: *Whenever I visit Boston, I **am** nervous.*

A bound variable world, then, would be one whose interpretation co-varies with some assignment of values to an operator. This is what we find in sentences like (25), where the modal base for the embedded sentence co-varies with assignments of values to the quantificational matrix subject.

(25) a. Every boy thinks he must be stupid.

b. Every contestant believed that she must have won.

The set of propositions on which the conclusion "x must be stupid' is based in (25)a is different for every boy. (25)a, means that every boy has gone through some process of inference wherein some epistemic modal base led him to conclude that he is stupid. The content of this modal base will co-vary with the assignment of values to boys. Jim might think "Based on my report card full of F's, the fact that I can't understand basic algebra and the fact that I can't read anything but comic books, I must be stupid." Jason might think "Based on the fact that I don't understand what Chomsky's saying in 'Derivation by Phase' despite having read it 3 times, I

must be stupid." Joe might think "Based on the fact that I thought for a while that Tiffany might actually go out with me, I must be stupid." Similarly, in (25)b, Contestant #1 might think "I entered first, and my father is one of the judges, so I must have won," contestant #2 might think "I knew all the answers and no one else did, so I must have won," and contestant #3 might think "I had a dream about winning last night, so I must have won." "What is known" is different for each contestant.

(26)	Boy 1:	[must in view of]	[I got all F's]	[I'm stupid]
	Boy 2:	[must in view of]	[I erroneously thought Tiffany might go out with me]	[I'm stupid]
	Boy 3:	[must in view of]	[I can't understand 'Derivation by Phase']	[I'm stupid]

Thus, it seems that the modal base in the embedded sentence may be interpreted as a bound variable. The binder for the relevant world/modal base variable in (25) is the epistemic world of the Subject's mental state, which is introduced by the attitude predicate.

To get this bound variable W reading, it's not enough just to have a quantified subject. First of all, we can find sentences that have such a reading without a quantified subject, such as those in (27).

(27) a. Every year I become more convinced that the undergraduates must be cheating.

b. Whenever a boy asks Mary out, she thinks he must be an idiot.

In (27)a, the reasons for my thinking that the undergraduates are cheating are different every year – in fact, they accumulate from one year to the next. In (27)b, Mary may have different

reasons for thinking each different boy is an idiot. As long as there is something in the sentence to bind a W variable, the sentence can have a bound variable W reading.

Moreover, the bound variable W reading shows locality conditions parallel to those of pronouns. The sentences in (28) do not have the bound reading.[16] In (28), the modal base for 'must' is some set of propositions known to the speaker. We get the bound variable W reading only in embedded sentences, where the embedded W is c-commanded by a higher W. This indicates that the embedded world variable is bound by a matrix world argument.

(28) a. Every boy must be stupid.

b. Every novel that we read must have been written by a genius.

Further evidence that syntactic binding is involved comes from the fact that the bound W reading does not arise if the predicate that introduces the epistemic state doesn't c-command the modal. In (29)a, 'thinks' and any argument it introduces fails to c-command out of the conditional clause, and hence the world relevant for the modal is the speaker's epistemic state, not every boy's epistemic state. In (29)b, the two world arguments are in different sentences, and hence the world relevant for the modal is what is known by the speaker, and is not bound. This would follow if 'thinks' introduces a world argument, which can bind an embedded world argument only if it c-commands that embedded argument.

(29) a. If every boy thinks he failed the exam, he must be stupid.

b. Every boy failed the exam. He must be stupid.

(30) a. Every boy [(w_i) thinks [he [(w_i) must be stupid]]]

b. [If every boy [(w_i) thinks he failed the exam]] [he[(w^*_i) must be stupid.]

Thus, the locality properties of the "bound W" readings are the same as those properties of pronouns and tenses that have led to a syntactic analysis of bound variable phenomena.

3.2 Pronominal worlds

Partee and Kratzer pointed out that like pronouns, tense can have a linguistic antecedent, be free, or be coreferent[17]. Work by Abusch(1988),Ogihara(1989),Stechow(1994),Abusch(1997) add that tenses can have de se or de re readings, as shown in (31).

(31) a. Linguistic antecedent for tense:

On Tuesday, Mary (past) finished her paper.

b. Free tense:

Mary (past) finished her paper.

c. Coreferent tense:

When she (past) got home, Mary (past) took her shoes off.

d. de se/de re tense:

Mary thought it was raining.

de se reading: Mary thought "It is raining"

de re reading: Mary thought "It was raining"

The world introduced by a modal can similarly have a linguistic antecedent, be free or anaphoric and have de se or de re readings. In (32)a, 'judging by your expression' is a linguistic antecedent for the modal base: it makes explicit what set of propositions are to be considered as 'what is known' for interpreting 'must'. In a sentence like (32)b the modal base is free. The claim is taken to be based on knowledge that the speaker has, or on facts that are salient in the conversation.

(32) a. Judging from your expression, you must be upset.

b. Iraq must have nuclear weapons.

A sentence like (33) can have an interpretation with "coreferent Ws". For example, suppose you've gone to the train station and you know it's about time for John's train. You see a train, and you could say (33), which could be paraphrased as "In view of my knowledge about the train schedule and the fact that this train is coming now, that must be John's train and he must be nearly here. The modal bases for the two instances of 'must'can be the same.[18] When they are the same, this is similar to the case in (32)a. The only difference is that the coreference in (33) is between two covert world arguments, whereas in (32)a a single covert world argument is coreferent with an overt phrase.

(33) That must be John's train, so he must be nearly here.

Is there some principle parallel to Binding Principle B that requires a world argument to be free in some domain? It seems that there is.[19] In a sentence like (34), the adverb 'apparently' may be thought of as a kind of evidential, and there is also an epistemic modal. Suppose we paraphrase 'apparently p' as 'in view of some set of evidence, it is apparent that p.' Interestingly, (34) cannot have a reading where the evidence that leads the speaker to think 'John must be upset' is apparent is the same as the modal base for *must*. In fact, it is a bit difficult to get an epistemic reading for the modal. However, we can imagine a situation in which we know that Mary rushes around trying to make peace when she infers that John is upset. We see Mary rushing around, and so we say (34) meaning "It is apparent based on Mary's behavior that based on some evidence Mary has, John is upset."

(34) Apparently, John must be upset.

=It is apparent based on some set of evidence that there is *another* set of evidence indicating that John's upset.

NOT: Based on some set of evidence, John is upset and that's apparent.

→ Evidence for 'apparently' *must be disjoint from* evidence for 'must'

Thus, W's must be locally disjoint. As with pronouns, this disjointness requirement only holds within a given clause. The judgments are delicate, since it's odd to talk of one set of evidence leading us to infer two different things, but it seems to me that sentence (35) can have a reading in which the evidence that makes Mary's belief apparent to me is the same as the evidence on which the embedded modal is based. For example, I may have tried to talk to Mary and found that we have little in common, and that she seemed hurt and angry. Based on this information, I infer that we are not friends any more and it is apparent that Mary believes this.

(35) Apparently, Mary believes that we must not be friends any more.

De se readings of pronouns are those that refer not to an individual but to an individual's self-representation. For example, 'John knows that his pants are on fire' has the de se reading, where what John knows is "My pants are on fire." It also has a de re reading, which could arise if the speaker knows that the pants are John's, but John does not. In the de re reading, what John knows is "Those pants are on fire".

It is generally claimed[20] that controlled null pronouns have only the de se reading. Kratzer (1998) argues that de se readings of tenses, in which the tense refers to the subject's internal representation of time, arise because tenses, like pronouns, can have null forms, whose features are supplied by a higher controlling tense.

(36) a. controlled null pronoun: John wants PRO to be a great pitcher. (de se reading only)

b. controlled null tense: John thinks (erroneously) that it's 10 o'clock. (non-absurd reading: 'it'= the time John thinks it is, not the time it actually is)

Kratzer points out that in a sentence like (36)b., what John thinks is that the time he's experiencing is 10:00. Although the speaker may know it's actually 1:00, the sentence doesn't mean that John thinks 10:00 is 1:00. John's epistemic state is such that the present time is 10:00.

A de se reading of a world argument would be one that refers to the subject's self-representation. It would contrast with a reading in which the relevant world argument did not involve inferences based on something other than internal epistemic state. It seems to me that sentences like those in (37) have two different readings, which reflect this de se/de re contrast.

(37) a. Mary believes that Iraq must have nuclear weapons.

b. Tommy believes that Ms. Jones must be at the door.

Sentence (37)a has one reading where Mary's belief comes from her own process of deduction. She has evaluated the evidence, and has deduced that in view of that evidence Iraq must have nuclear weapons. We may call this the "de se W reading", because the belief arose from Mary's own reasoning.[21] This sentence also has a reading where Mary holds the belief because she trusts someone else's assertion that Iraq must have nuclear weapons. For example, Mary may have heard George Bush say "Iraq must have nuclear weapons," and believed what he said. In such a context, the modal base for the embedded *must* is not some set of propositions that Mary mulls over to deduce that Iraq has nuclear weapons. Rather, the modal base is whatever set of propositions led George Bush to conclude that Iraq must have nuclear weapons. We may call this the "de re W reading," because the modal base for *must* is not related to Mary's own reasoning. Similarly, we can imagine a scenario where (37)b would be true but the modal base for *must* would not be Tommy's epistemic state: Tommy's mother may have told him that Ms. Jones is at the door, and he believes her, although he has no idea who Ms. Jones is, and has not made a modal judgment of his own. This would be the de re W reading. In the de se W reading,

the embedded modal base is controlled by the Subject's epistemic state. In the de re W reading, the embedded modal base is free.

Some predicates do not allow the de re W reading for their complements. For example, the modal base for epistemic *must* in the complement of *think* can only be the epistemic state of the Subject. We see this in (38). (38)a can only mean that Mary has gone through her own process of deduction, and thinks "In view of such and such evidence, it follows that Iraq has nuclear weapons." (38)b can only mean that Tommy is thinking "In view of such and such evidence, it follows that Ms. Jones is at the door."

(38) a. Mary thinks that Iraq must have nuclear weapons.

b. Tommy thinks that Ms. Jones must be at the door.

Apparently, then, *think* introduces a world argument, identified with the Subject's epistemic state, and selects for a complement whose world argument is <u>controlled</u> by the Subject's epistemic state.[22]

Factive predicates do not involve this sort of control. The complement of a factive predicate must be true in the discourse context, not just in the Subject's mental state. For example, in sentence (39)a, the embedded sentence must be true in the same worlds as the entire sentence. In (39)b, the modal base for the embedded 'must' is not related to Mary's epistemic state; it is some set of propositions known to the speaker. In other words, the world relevant for evaluating the embedded sentence is the world in which the sentence is uttered. The factive predicate does not introduce a new world argument, so the "matrix world" is the default one.

(39) a. Mary regrets that Iraq has nuclear weapons.

b. Mary regrets that Iraq must have nuclear weapons.

3.4 Indexical Worlds

An indexical pronoun is one whose denotation is anchored to the context within which it is uttered. For example, the pronoun 'I' refers to whoever is uttering the sentence in which the pronoun appears. An indexical tense is likewise anchored to the context of utterance. For example, present tense denotes the time of utterance. An indexical W would be an item in the syntactic representation of a sentence that denotes some set of propositions (i.e., uniquely determines a set of worlds) relative to the context of utterance.

One example of a morpheme whose denotation is a set of propositions anchored to the utterance context is found in Ngiyambaa, where there are morphemes that have been described by Palmer (1986:92) as "triggered by what was said before." The morpheme **baga**, which Palmer glosses as "counter-assertion", is used if the speaker's assertion is contrary to what has just been said.

(40) wa_a:y-**baga**:-dhan-du _udha-nhi

NEG-**COUNTER.ASST**-EVID-2.NOM give-PAST

'But rumour has it you *didn't* give (anything)'

. It is normally assumed that such morphemes specify felicity conditions rather than denoting something about worlds or speech contexts. The Ngiyambaa morpheme is similar in meaning to connective *but* in English. *But* is widely assumed to have the same basic truth-conditional meaning as *and*, with the differences having to do with implicatures. However, Bach (1999)[23] demonstrates that the alleged "conventional implicatures" are actually part of what is said, and he notes that the import of 'but' can vary with context. Consider for example, a sentence like (41).

(41) Mary gave John a book, but Bill was angry.

The import of 'but' is to negate some implicatures. The identity of those implicatures will depend on the context in which the sentence is uttered. In one context, 'Bill was angry' could be contrary to the implicature "*Bill is happy when someone gives John something"*. In another context, the same clause could be contrary to the implicature "*Mary will appease Bill by giving John a book"*. In yet another context, it could be contrary to the implicature "*Everyone is happily giving John things."* What 'but' means is "contrary to the implicatures triggered in the context of utterance." Assuming that implicatures are sets of propositions, it follows that 'but' is an indexical W.[24]

4. Conclusion

I have argued that evidential morphemes spell out agreement with a world argument. By treating these morphemes as a species of agreement, we predict the restrictions on the set of possible evidential features. I have further argued that the world argument shows the same binding and locality properties as pronouns and tense. Insofar as locality properties are syntactic, world arguments must be syntactically represented.

This approach captures the similarities and differences between evidentials and modals: evidentials agree with the modal base, represented here as the world argument. If this is right, then we may take evidentials to spell out features of Cinque's Epistemic Mood head, just as AGR spells out features of the Tense head. Whether this could lead to a reduction in the inventory of functional heads remains to be seen, given the ordering restrictions on evidential and epistemic adverbs that Cinque observes. I conclude that a promising research direction would be to look more carefully at restrictions on other paradigms and interactions between adjacent functional heads.

Department of Linguistics

University of Massachusetts

Amherst, MA 01003 USA

pspeas@linguist.umass.edu

Bibliographical References

Abusch, D (1988), Sequence of Tense, Intensionality and Scope. *WCCFL* 7.

Abusch, D (1997), "Sequence of Tense and Temporal de re." *Linguistics and Philosophy* 20.1:1-50.

Bach, Kent (1999) 'The myth of conventional implicature.' *Linguistics and Philosophy* 22.4:327-366.

Benveniste, Emile (1956) "La Nature des Pronoms", *For Roman Jakobson: Essays on the Occasion of his Sixtieth Birthday,* compiled by Morris Halle, Horace G. Lunt, Hugh MacLean and Cornelius H. van Schoonveld. The Hague: Mouton. pp. 34-37 (1971). Translated as, "The Nature of Pronouns". In *Problems in General Linguistics*. Coral Gables, Florida, University of Miami Press.

Bianci, Valentina.(2001) 'On Person Agreement.' paper presented at the Eleventh Colloquium on Generative Grammar, Zaragoza, April 2001.

Boas, Franz. (1911) 'Introduction' in Boas, ed. *Handbook of American Indian languages, Part I.* Smithsonian Institution Bureau of American Ethnology, Bulletin 40. Washington: Government Printing Office. 1-83.

Chafe, Wallace and Johanna Nichols, eds.(1986) *Evidentiality: The Linguistic Encoding of Epistemology*, Norwood NJ, Ablex Publishing Corporation.

Cinque, Guglielmo (1999), *Adverbs and Functional Heads: A Cross-Linguistic Perspective*. Oxford, Oxford University Press.

Culy, Christopher (1994). 'Aspects of Logophoric Marking.' Linguistics **32**: 1055-1094.

de Haan, Ferdinand. (1999) 'Evidentiality and Epistemic Modality: Setting the Boundary'. *Southwest Journal of Linguistics,* 18.1. 85-101.

Delancey, Scott. (1986) "Evidentiality and Volitionality in Tibetan," in Chafe and Nichols (1986).

Demirdache, H. and M. Uribe-Etxebarria (2000), "The Primitives of Temporal Relations," in Martin, Michaels and Uriagereka (2000:157-886).

Di Sciullo, Anna Maria. (1999. "The Local Asymmetry Connection" Liina Pylkk←nen, Angeliek van Hout and Heidi Harley, eds., *Papers from the UPenn/MIT Roundtable on the Lexicon. MITWPL* 35. Cambridge, MA MIT. . 25-48.

Garrett, Edward. (2001) *Evidentiality and Assertion in Tibetan.* Doctoral Dissertation, UCLA.

Hale, Ken and Jay Keyser. (1999) "Bound Features, Merge and Transitivity Alternations." Liina Pylkk←nen, Angeliek van Hout and Heidi Harley, eds., *Papers from the UPenn/MIT Roundtable on the Lexicon. MITWPL* 35. MIT. Cambridge, MA. 49-72

Hale, Ken and Jay Keyser. (1998) "The Basic Elements of Argument Structure." Heidi Harley, ed., *Papers from the UPenn/MIT roundtable on Argument Structure and Aspect. MITWPL* 32. MIT. Cambridge, MA. 73-118.

Harley, Heidi and Elizabeth Ritter. (2002) "Person and number in pronouns: A feature-geometric analysis." *Language*. 78.3. 482-526.

Heim, I. (1992). "Presupposition Projection and the Semantics of Attitude Verbs." Journal of Semantics 9: 183-221.

Izvorski, R. (1998) 'The present perfect as an epistemic modal' in A. Lawson and E. Cho, eds. *Proceedings of SALT 7.*

Jacobsen, William H. (1986) "The Heterogeneity of Evidentials in Makah." in Chafe and Nichols (1986, pp. 3-28.

Karttunen, Lauri.(1974)"Presupposition and linguistic context.' *Theoretical Linguistics* 1:181-194.

Klein, W. (1994) Time in Language. London, Routledge.

Kratzer, A. (1991) 'Modality.' in A. von Stechow and D. Wunderlich, eds. *Semantics: An International Handbook of Contemporary Research*. Berlin: de Gruyter. 639-650.

Kratzer, A. (1998) More Structural Analogies between Pronouns and Tenses. SALT VIII, MIT.

Kratzer, A. (1977) "What 'must' and 'can' must and can mean." Linguistics and Philosophy 1: 337-355.

Ogihara, T. (1989) Temporal Reference in English and Japanese, University of Texas.

Martin, Roger, David Michaels and Juan Uriagereka, eds.(2000), *Step by Step*, Cambridge MA, MIT Press.

Palmer, F.R. (1986) *Mood and Modality.* Cambridge University Press, New York.

Partee, B. (1973) "Some Structural Analogies Between Tenses and Pronouns in English." Journal of Philosophy 70: 601-609.

Percus, Orin (2000) 'Constraints on some other variables in syntax.' *Natural Language Semantics* 8.3: 173-229.

Pica, P. and J. Rooryck (1999). Configurational Attitudes. Semantic Issues in Romance Syntax. J. a. E. T. Lema. Amsterdam, Benjamins.

Rooryck, Johan.(2001) 'Evidentiality: State of the Article.' GLOT International.

Ross, John R. (1970) On Declarative Sentences. In *Readings in English Transformational Grammar,* ed. R. A. Jacobs and Peter S. Rosenbaum. Waltham, Mass.: Ginn.

Quer, Josep. (2001) 'Interpreting Mood.' *Probus* 13, 81-111.

Schlenker, P. (2003). "A plea for monsters." Linguistics and Philosophy 26(1): 29-120.

Speas, Margaret. (2004) "Evidentiality, Logophoricity and the Syntactic Representation of Pragmatic Features." Lingua 114.3, pp. 255-276.

Stechow, A. v. (1994) Tense in Intensional Contexts: Two Accounts of Abusch's Theory of Tense. the Workshop on Recent Developments in the Theory of Natural Language Semantics.

Stechow, A. v. (2002) 'Binding by Verbs: Tense, Person and Mood under Attitudes.' Talk given at NELS 33, MIT. ms., Universitat Tubingen, available at http://vivaldi.sfs.nphil.uni-tuebingen.de/~arnim10/.

Stowell, T. (1996). The Phrase Structure of Tense. Phrase Structure and the Lexicon. L. Zaring and J. Rooryck. Dordrecht, Kluwer Academic Publishers: 277-291.

Tenny, Carol and Peggy Speas. 2003. "Configurational Properties of Point of View Roles in DiSciullo, ed. Asymmetry in Grammar. Benjamins. pp. 315-344.

Terry, J. M. (2001). Perfect and Perfective Aspects in African-American English. University of Massachusetts. Amherst.

Thurgood, Graham.(1986) The Nature and Origins of the Akah Evidential System. in Chafe and Nichols. (1986:214-222.

Weber, David J. (1986) 'Information Perspective, Profile and Patterns in Quechua.' in Chafe and Nichols (1986) 137-158.

Willett, Thomas. (1988) A Cross-Linguistic Survey of the Grammaticization of Evidentiality.

Studies in Language 12:51-97.

Woodbury, Anthony C. (1986) Interactions of Tense and Evidentiality: A Study of Sherpa and English. In W. Chafe and J. Nichols, ed. *Evidentiality: The Linguistic Encoding of Epistemology*. Norwood, New Jersey: Ablex Publishing Corporation: pp. 188-202.

Zagona, K. (1990). Times as Temporal Arguments. University of Washington.

---

[1] See Tenny and Speas (2001) for a discussion of Ross's proposal.

[2] He also includes 'evaluatives', which indicate the speaker's view about whether the information conveyed is good, bad, surprising, etc.

[3] Their term is 'discourse participant'.

[4] Rooryck(2001) notes that the "source of information" for an evidential either does or does not involve the speaker. "As such, it refers to the grammatical category person."(p. 126) He suggests that when the speaker is the source of information, there is a first person feature in the Evidential Mood head, but he doesn't discuss how the other evidential categories might be related to person.

[5] They claim that the apparent plurality of 1st person exclusive is not a manifestation of number features, but results when the additional contrast between default participant and speaker is added to the paradigm space.

[6] Garrett glosses this as "ego", and says that the first translation, 'There are yaks in Tibet,' which is the translation suggested by Delancey (1986), is not accurate enough.

[7] Garrett treats this category as a default case.

[8] Some difficult questions arise about how de se readings of pronouns are related to the speaker's unique knowledge. Suppose I look in a mirror not knowing that it's a mirror rather than a window. Presumably I may have unique personal knowledge that the individual I see is beautiful, although I am not aware that the knowledge is about me. In addition, I may gain knowledge about myself either through personal experience or through inference. For example, I may know I am sick because of how I feel, or I may know I'm sick because I took my temperature, the doctor informed me, etc. In Tibetan, one may say "I am sick + personal experience evid.", which conveys that I know of my sickness through internal evidence, or "I am sick + direct evid", which conveys that I have deduced that I am sick.

[9] Interestingly, *jin*í is literally the fourth person form of the verb 'said', but its use is more like a discourse particle.

[10] In Harley and Ritter's system, a configuration with just an opposition between "participant" and "individuation" triggers an inference that the participant is the default participant, i.e., the speaker. It is unclear whether some parallel inference would result in an evidential system that distinguished between "deictic sphere" and "individuation."

[11] For Harley and Ritter, the configuration of features that is specified as [+speaker] is actually 1st person exclusive rather than first person singular. First person singular has no specification for [+speaker]. This seems a bit odd, but if they are right then my analysis of personal experience evidence gives it a configuration parallel to 1st person exclusive.

[12] See also Bianci (2001) and Quer (2001) for interesting discussions of the logophoric properties of Mood.

[13] von Stechow's definition of Indicative is as follows, with g an assignment and c a context:

Let _ be a variable of type s. We define …Indicative: $\| _^{ind} \|^{g,c} = g(_)$, if $g(_) = w_c$. Undefined otherwise.

My proposal may just be an unsophisticated version of his, but I'm not sure. I will assume that something like the semantics he gives will give the correct result for interpreting the world argument.

[14] Schlenker's claim is based on the fact that some languages allow the denotation of embedded indexicals to be anchored to an embedded context rather than to utterance context. For example, in Navajo, the embedded first person sentence (i) can refer to the subject, Kii.

(i) ***Kii chidí nahá_nii'*** ***ní***

K car 3sgO.Perf.1sgS.buy 3.say

'Kii$_i$ says he$_i$ bought a car.'

(Lit: 'Kii says I bought a car')

However, Kaplan defined a monster as an operator that makes the truth of a sentence contingent on context, and the meaning of (i) is not contingent on the context within which the sentence is uttered. In any utterance context, the first person pronoun is bound by the Subject of the predicate of speech. This situation can only arise with verbs whose subject have a speaker-type theta role. As von Stechow (2001) such sentences involve locally-constrained binding of indexicals, but do not require monsters.

[15] Because there is no cover term, parallel to 'tense/aspect' and 'pronoun', for expressions whose denotations have to do with worlds, I will use the term 'W' somewhat loosely, to refer to a syntactic category whose interpretation is identified with sets of worlds. I'm using this loose terminology in order to set aside the question of exactly how many grammatical categories there are whose denotation systematically involves worlds or sets of worlds. See Speas and Tenny

(2002) for a suggestion that a Klein-style analysis of tense and aspect can be extended to world- or context- related expressions. They argue that the modal base should be thought of as a "topic context", related by a functional head to the "utterance context" and the "event context."

[16] I think it may be possible to construct a context in which the speaker is considering a range of modal bases, in which case you might get a bound variable reading for these sentences. For example, suppose we were having a discussion of novels, and it was clear from context that I had gone through a different thought process for each one. I might say (28)b and have different reasons associated with my deductions about the authors of the various novels. Such a context would be one in which the default world in which the sentence is to be interpreted is quantified over.

[17] Partee (1973) calls the coreferent reading 'anaphoric'. I'm avoiding this term since the requirement that the two tenses be coreferent in (31)c comes from the complementizer 'when' rather than from the structural relationship between the tenses. The two tenses are not coreferent in a sentence like 'After she got home, Mary took off her shoes.'

[18] Since this is a case of coreference and not binding, they need not be the same: (x) could instead mean "In view of my knowledge of the train schedule and the fact that this train whose schedule I'm pointing to is owned by John, that must be John's train, and in view of my knowledge that John planned to arrive at about the same time that the schedules were posted, he must be nearly here.

[19] See also Percus(2000) , who argues that world variables obey a binding theory parallel to that of nominals.

[20] Ken Safir (p.c.) points out that this generalization is not always true, as in sentences like the following:

a) I shouted at Bill [PRO] to leave, but he didn't hear me.

b) John is blissfully unaware of [PRO] being such an asshole.

c) [PRO] Being/Serving as/Setting a cautionary example just comes naturally to Homer.

d) This key will serve [PRO] to unlock the door.

It would be interesting to explore whether the properties that allow these sentences to have a de re reading for the controlled pronoun also hold of "controlled world arguments."

[21] It may be misleading to use the term 'de se', both for the reading I'm discussing here and for the readings of tense discussed by Kratzer and Abusch. As Ken Safir has pointed out to me, one can make assertions involving conscious self-reference based on knowledge acquired in all different ways. As mentioned in note 8, I may gain knowledge about myself through indirect evidence or hearsay and still know that it is about myself. However, it is important to note that the characterization of a modal base as "de se" does not imply that all pronouns within it must also be de se in reference. The features of linguistic categories in general do not have to be shared by non-head daughters. For example, the phrase "my mother" is third person singular, but that doesn't prevent the pronoun 'my' from being first person singular. Perhaps more to the point, the in a sentence like "Oedipus thinks that that he married his mother", the phrase "his mother" has the same de re referent whether the pronoun 'his' is interpreted de re or de se. So, there is nothing to prevent a sentence with de re pronouns in it from having a "de se world" interpretation.

[22] Interestingly, the world argument of the complement of *believe* also seems to be controlled when the complement is non-finite. (iia) can have the reading where Mary shares the belief of someone she trusts (the "de re world" reading), but (ia) lacks this reading, as evidenced by the

oddness of (ib). These cases also suggest that the embedded clause has a world argument even if there is no overt modal.

(i) a. Mary believes Iraq to have nuclear weapons.

b. #...although she has never really thought about it herself.

(ii.) a. Mary believes that Iraq has nuclear weapons.

b. ok: …although she has never really thought about it herself.

[23] Thanks to Chris Potts for bringing this paper to my attention.

[24] It may also be useful to think of overt performative predicates as introducing an indexical world argument. The underlined verbs in (i) are referring to the act being performed in the discourse in which they are uttered. However, it's not clear that what the predicates are anchored to is a world or set of propositions. They seem rather to be anchored to an event.

(i) a. I now <u>pronounce</u> you man and wife.

b. I hereby <u>christen</u> this ship The Queen Elizabeth II.