

A Modular Approach to Evidentiality

Ash Asudeh

University of Oxford/Carleton University

Ida Toivonen

Carleton University

Proceedings of the LFG'17 Conference

University of Konstanz

Miriam Butt, Tracy Holloway King (Editors)

2017

CSLI Publications

pages 45–65

<http://csli-publications.stanford.edu/LFG/2017>

Keywords: evidentiality, glue semantics

Asudeh, Ash, & Toivonen, Ida. (2017). A Modular Approach to Evidentiality. In Butt, Miriam, & King, Tracy Holloway (Eds.): *Proceedings of the LFG'17 Conference, University of Konstanz* (pp. 45–65). Stanford, CA: CSLI Publications.

Abstract

Evidentiality is a well-established morphosyntactic category that has also received a lot of attention in the semantics literature over the last 15+ years. However, it has received scant attention in Lexical-Functional Grammar, despite the fact that LFG's modular Correspondence Architecture is particularly well-suited to illuminating the phenomenon. In particular, the theory makes possible an account of evidentiality that does not merely conflate the semantic category of evidentiality with its morphosyntactic realization, but which also does not create false equivalences between languages that mark evidentiality morphosyntactically and those that do not. In other words, it enables an account in which we can differentiate languages that morphosyntactically mark evidentiality from those that do not. Yet at the same time it also allows us to capture semantic commonalities between morphosyntactically marked evidentials and expression of evidentiality in languages, like English, that do demonstrate semantic evidentiality, but which do not have a dedicated morphosyntactic paradigm of *evidentials*. In this paper, we will first consider languages with obligatory, fully grammaticalized evidentiality. We then turn to English as an example of a languages that has the means to express evidentiality, but without fully grammaticalized or obligatory marking.

1 Introduction

Evidentiality is by now a well-established morphosyntactic category (Aikhenvald, 2004; Faller, 2002, 2012; Garrett, 2002; Murray, 2010; Matthewson & Glougie, In Press), with the earliest attestation often attributed to Boas (1911). Sample definitions include:

- (1) Evidentials are devices used by speakers to mark the source and reliability of their knowledge. (Chafe & Nichols, 1986)
- (2) Evidentiality is a linguistic category whose primary meaning is source of information. (Aikhenvald, 2004)
- (3) Evidentials are expressions which indicate a speaker's source of justification for the speech act being made. (McCready, 2015)

Languages such as Tariana (Aikhenvald, 2003, 2004), Cherokee (Aikhenvald, 2004), Cheyenne (Murray, 2010, 2017), Quechua (Faller, 2002), and Tuyuca (Barnes, 1984) have fully grammaticalized evidentiality marking: Regular declarative statements carry mandatory morphological marking that indicates the type of information source upon which the statement is based.

Not all languages have such mandatory, morphological evidentiality marking. However, all languages have some means of marking sources of evidence

[†]We would like to thank the editors, the anonymous reviewers, and the audience at the LFG conference in Konstanz, as well as the conference organizers. We would also like to thank the audience at a recent presentation at the Department of Linguistics at the University of Rochester, where some of these ideas were presented in a broader context. Lastly, we would especially like to thank Lisa Sullivan, our collaborator on the experimental work reported here, Nicole Sierra, and Raj Singh, for comments and suggestions. Any remaining errors are our own.

or certainty about evidence, some examples from English being *apparently, someone told me that...*, *I saw that...*. In this paper, we try to develop an analysis that captures the commonalities between different types of evidentiality marking, while maintaining the important distinction between grammaticalized and non-grammaticalized evidentiality.

We first turn to a simple analysis of grammaticalized evidentiality, in general, and present sample analyses of grammaticalized evidentiality in Tariana and Cherokee, in particular. We then turn to non-grammaticalized evidentiality, with a focus on certain English verbs and some empirical studies that we and our collaborators have done on them. We lastly present a sample analysis of non-grammaticalized evidentiality in English.

2 Grammaticalized evidentiality

Many languages — about a quarter of the world’s languages, according to Aikhenvald (2004) — overtly mark every statement for the type of evidence that the statement is based on. This type of obligatory evidentiality is typically marked with overt morphology and we call it *grammaticalized evidentiality*.

The Northwest Amazonian language Tariana, described in Aikhenvald (2003), is an example of a language with complex grammaticalized evidentiality marking. The Tariana evidentiality marking is illustrated by the following examples (from Aikhenvald 2003):

- | | |
|--|---|
| <p>(4) tjinu niwahã-ka dina
dog bit-VISUAL him
‘The dog bit him (we have seen it).’</p> | <p>(6) tjinu niwahã-sika dina
dog bit-INFERENCE him
‘The dog bit him (he has a scar and I can make an inference).’</p> |
| <p>(5) tjinu niwahã-mahka dina
dog bit-NON.VIS.SENSORY him
‘The dog bit him (we have heard the noise).’</p> | <p>(7) tjinu niwahã-pidaka dina
dog bit-REPORTED him
‘The dog bit him (someone told me).’</p> |

The evidential morphemes in (4–7) mark direct visual evidence (*-ka*), direct non-visual evidence (*-mahka*), inferred evidence (*-sika*), and reported evidence (*-pidaka*).¹

Cherokee (Aikhenvald, 2004) displays a different evidentiality system, which makes fewer distinctions than Tariana and simply distinguishes between firsthand evidence (*-ʌʔi*) and non-firsthand evidence (*-eʔi*):

¹Tariana actually has two inferential evidentials, which Aikhenvald (2004) calls the *inferred* evidential (*-nihka*) and the *assumed* evidential (*-sika*). These two evidentials only occur in past tense and we believe they can be distinguished with the VISUAL feature (following suggestions by Aikhenvald on the distinct nature of the inferences involved), but we do not try to further distinguish them here.

- | | | | |
|-----|---|-----|---|
| (8) | <p>a. wesa u-tlis-λ?i
cat it-run-1STH.PAST
'A cat ran (I saw it running.)'</p> <p>b. uyo ges-λ?i
spoiled be-1STH.PAST
'It was spoiled (I smelled it)'</p> | (9) | <p>a. u-wonis-e?i
he-speak-NON.1STH.PAST
'He spoke (someone told me)'</p> <p>b. u-gahnan-e?i
it-rain-NON.1STH.PAST
'It rained (I woke up, looked out and saw puddles of water)'</p> |
|-----|---|-----|---|

In languages such as Cherokee and Tariana, evidentiality is grammaticalized: It is an obligatory morphosyntactic category, on a par with tense and aspect. We propose that grammaticalized evidentiality is encoded at f-structure as well as at semantic structure. We discuss evidentiality at f-structure in section 2.1 and evidentiality at semantic structure in 2.2.

2.1 Evidentiality at f-structure

An f-structural analysis of grammaticalized evidentiality is motivated by cross-linguistic evidence that evidentiality is an active morphosyntactic feature that interacts with other syntactic features at f-structure. Aikhenvald (2004, Chapter 4) provides a thorough overview of how evidentiality interrelates with other morphosyntactic categories. In Takelma, for example, evidentiality is one of six tense/mood markers, and it is mutually exclusive with other tenses (Aikhenvald, 2014, 241). Also, in both Qiang (LaPolla, 2003; Aikhenvald, 2004) and Cheyenne (Murray, 2017, 34–38), the use of evidentials is restricted in subordinate clauses. The Qiang and Cheyenne facts motivate functional equations such as $\neg(\uparrow \text{CF EVIDENTIAL})$, where CF is a place holder for the grammatical function of the relative/conditional/dependent clause and EVIDENTIAL is a bundling feature that hosts evidential features (more details below).

Aikhenvald (2004, Chapter 2) provides a typological summary of grammaticalized evidentiality. Based on this summary, we propose that evidential languages make use of (a subset of) the following grammatical evidentiality f-structure features: [DIRECT \pm], [VISUAL \pm], [REPORTED \pm]. These three binary features go a long way towards capturing evidentiality marking cross-linguistically, although more features may prove necessary in order to cover the full typology. For example, some languages might call for a grammatical AUDITORY feature, which would then have to be added to our system. Further potential additional candidates are QUOTATIVE and SENSORY features. Nevertheless, grammaticalized evidentiality is quite restricted.

We will use the examples from Tariana (4–7) and Cherokee (8–9) above to illustrate how the features of our simple feature system combine to reflect different evidentiality markers.

The f-structural features of Tariana evidentiality morphology are given in (10):

(10)	1. Visual evidence	<i>-ka</i>	[DIRECT +]	[VISUAL +]
	2. Non-visual sensory evidence	<i>-mahka</i>	[DIRECT +]	[VISUAL -]
	3. Reportative evidence	<i>-pidaka</i>	[DIRECT -]	[REPORTED +]
	4. Inferred evidence	<i>-sika</i>	[DIRECT -]	[REPORTED -]

The Tariana morphemes *-ka* and *-mahka* both indicate that the speaker has directly experienced the event expressed by the statement. The difference is that *-ka* indicates that the event was seen, and *-mahka* indicates that the event was not seen but instead directly experienced with one of the other senses (perhaps it was heard). The morpheme *-pidaka* and *-sika* are both used when the speaker has not directly experienced what the sentence expresses. *-pidaka* is used to convey something learned through a report, whereas *-sika* indicates that the information was inferred from some indirect evidence that was not reported.

The f-structural features of Cherokee evidentiality morphology are as follows:

(11)	1. Firsthand evidence	$\Lambda?i$	[DIRECT +]
	2. Non-firsthand evidence	$e?i$	[DIRECT -]

The bipartite system of Cherokee distinguishes between what has and what has not been experienced firsthand. A positively valued [DIRECT] feature specifically indicates firsthand experience, and a negatively valued [DIRECT] features indicates non-firsthand experience.

The Tariana and Cherokee f-structural evidentiality features given in (10–11) serve to illustrate how our simple feature system can be used to model grammaticalized evidentiality cross-linguistically. Languages of course have the means to express much more nuanced details about information sources than our simple feature system conveys. This is done by means other than grammaticalized morphology and is modelled in the lexical entries and semantics (see sections 2.3 and 2.4), not with syntactic features in the f-structure. We next turn to the semantic content of these features.

2.2 Evidentiality at semantic structure

The evidentiality features in section 2.1 also express semantic content. We capture this content as modifiers on events in Glue Semantics (Dalrymple, 1999, 2001; Asudeh, 2012; Asudeh & Toivonen, 2012; Lowe, 2015). We introduce two new semantic structure features, EVIDENCE and EVIDENCE-HOLDER. The feature EVIDENCE is a secondary event variable that allows us to capture a relationship between the matrix event and another event that forms the evidentiary basis for the claims about the matrix event. EVIDENCE-HOLDER is a term from Murray (2017) that encodes the individual who bears a relationship to the evidential proposition (e.g., the person who witnessed the matrix event). Following Murray (2017), it is a kind of impure indexical² that normally defaults to the speaker. We define the semantics of the features [DIRECT ±], [VISUAL ±], and [REPORTED ±] as follows. Note that according to our proposal, the feature DIRECT is a kind of primary

²It is an ‘impure’ indexical because it flips interpretation in interrogatives, unlike pure indexicals.

feature that contributes a second meaning constructor that existentially closes off the secondary EVIDENCE event variable, while also allowing the features VISUAL and REPORTED to modify the information source event.³

- (12) a. [DIRECT +]
 $\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \leq \text{WITNESS}(e) :$
 $[(\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$
- $\lambda P \lambda e \exists e'. P(e)(e') :$
 $[(\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap \uparrow_{\sigma}$
- b. [DIRECT -]
 $\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \not\leq \text{WITNESS}(e) :$
 $[(\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$
- $\lambda P \lambda e \exists e'. P(e)(e') :$
 $[(\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap \uparrow_{\sigma}$
- (13) a. [VISUAL +]
 $\lambda P \lambda i \lambda e \lambda e'. \mathcal{P}(i)(e)(e') \wedge \text{see}(e') \wedge i \leq \text{EXPERIENCER}(e') :$
 $[(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$
- b. [VISUAL -]
 $\lambda P \lambda i \lambda e \lambda e'. \mathcal{P}(i)(e)(e') \wedge \neg \text{see}(e') \wedge i \leq \text{EXPERIENCER}(e') :$
 $[(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$
- (14) a. [REPORTED +]
 $\lambda P \lambda i \lambda e \lambda e'. \mathcal{P}(i)(e)(e') \wedge \text{report}(e') \wedge i \leq \text{EXPERIENCER}(e') :$
 $[(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$
- b. [REPORTED -]
 $\lambda P \lambda i \lambda e \lambda e'. \mathcal{P}(i)(e)(e') \wedge \neg \text{report}(e') \wedge i \leq \text{EXPERIENCER}(e') :$
 $[(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$

We use the operator \leq to capture membership in a plurality (see, e.g., Link, 1983); i.e., the term $i \leq \text{WITNESS}(e)$ indicates that i is among the witnesses of event e .

We define the predicate on events WITNESS as follows:

$$(15) \quad \forall x \forall e. x \leq \text{WITNESS}(e) \leftrightarrow \exists e'. [x \leq \text{EXPERIENCER}(e') \wedge \text{STIMULUS}(e') = e]$$

³As discussed in detail by Murray (2017), the evidential claim is actually a kind of conventional implicature, in the sense of Potts (2005), since it cannot be directly denied or challenged. We leave this detail aside here and note that it could easily be captured in an LFG setting using either the technique of Arnold & Sadler (2010) or that of Giorgolo & Asudeh (2011).

The EVIDENCE-HOLDER (normally the speaker) thus fails to be a witness under one of two conditions: Either there is no secondary event such that the event under consideration is the STIMULUS of that event (i.e., the event under consideration was not witnessed) or there is such a secondary event, but the evidence holder did not experience it themselves (i.e., the evidence holder was not a witness, even if others were).

We next apply these semantic definitions of the features to sample analyses of Tariana and Cherokee. In what follows we capture the requirement that clauses must generally be marked for evidentiality in Tariana and Cherokee introducing a predicate *evidence* in the meaning language terms for roots such that $evidence(e', e)$ is true iff event e' is evidence for the occurrence of event e .

2.3 Grammaticalized Evidentiality: Tariana⁴

2.3.1 Lexicon

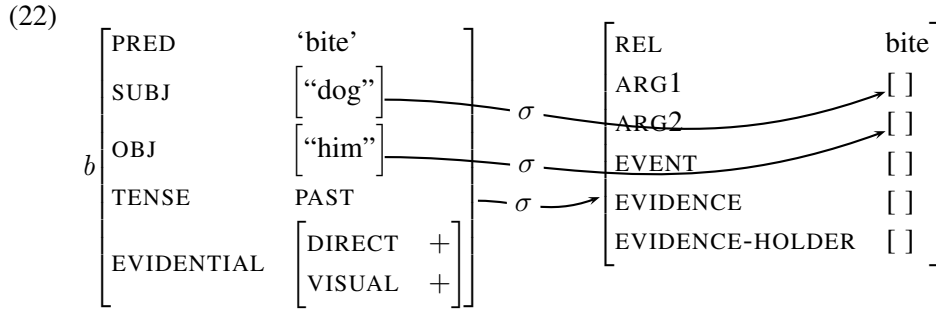
- (16) *niwahã-* (↑ PRED) = ‘bite’
 (↑ EVIDENTIAL)
 $\lambda y \lambda x \lambda e \lambda e'. bite(e) \wedge AGENT(e) = x \wedge PATIENT(e) = y \wedge evidence(e', e) :$
 $(\uparrow_{\sigma} ARG2) \multimap (\uparrow_{\sigma} ARG1) \multimap (\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}$
 (*speaker* : (↑_σ EVIDENCE-HOLDER))
- (17) *-ka* (↑ EVIDENTIAL DIRECT) = +
 $\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \leq WITNESS(e) :$
 $[(\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} EVIDENCE-HOLDER) \multimap (\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}$
 $\lambda P \lambda e \exists e'. P(e)(e') :$
 $[(\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} EVENT) \multimap \uparrow_{\sigma}$
 (↑ EVIDENTIAL VISUAL) = +
 $\lambda P \lambda i \lambda e \lambda e'. \mathcal{P}(i)(e)(e') \wedge see(e') \wedge i \leq EXPERIENCER(e')$
 $[(\uparrow_{\sigma} EVIDENCE-HOLDER \multimap (\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} EVIDENCE-HOLDER) \multimap (\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}$
- (18) *-mahka* (↑ EVIDENTIAL DIRECT) = +
 $\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \leq WITNESS(e) :$
 $[(\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} EVIDENCE-HOLDER) \multimap (\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}$
 $\lambda P \lambda e \exists e'. P(e)(e') :$
 $[(\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} EVENT) \multimap \uparrow_{\sigma}$
 (↑ EVIDENTIAL VISUAL) = -
 $\lambda P \lambda i \lambda e \lambda e'. \mathcal{P}(i)(e)(e') \wedge \neg see(e') \wedge i \leq EXPERIENCER(e')$
 $[(\uparrow_{\sigma} EVIDENCE-HOLDER \multimap (\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} EVIDENCE-HOLDER) \multimap (\uparrow_{\sigma} EVENT) \multimap (\uparrow_{\sigma} EVIDENCE) \multimap \uparrow_{\sigma}$

⁴We assume throughout that something like the theory of argument structure of Asudeh & Giorgolo (2012) and the mapping theory of Findlay (2016) and Asudeh et al. (2014) are operating in the background, such that we have a connected semantic structure and such that Glue meaning constructors make reference to arguments in semantic structure that are mapped from grammatical functions in f-structure. Nothing crucial hinges on this.

- (19) *-pidaka* $(\uparrow \text{EVIDENTIAL DIRECT}) = -$
 $\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \not\leq \text{WITNESS}(e) :$
 $[(\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$
 $\lambda P \lambda e \exists e'. P(e)(e') :$
 $[(\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap \uparrow_{\sigma}$
 $(\uparrow \text{EVIDENTIAL REPORTED}) = +$
 $\lambda P \lambda i \lambda e \lambda e'. \mathcal{P}(i)(e)(e') \wedge \text{report}(e') \wedge i \leq \text{EXPERIENCER}(e')$
 $[(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$
- (20) *-sika* $(\uparrow \text{EVIDENTIAL DIRECT}) = -$
 $\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \not\leq \text{WITNESS}(e) :$
 $[(\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$
 $\lambda P \lambda e \exists e'. P(e)(e') :$
 $[(\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap \uparrow_{\sigma}$
 $(\uparrow \text{EVIDENTIAL REPORTED}) = -$
 $\lambda P \lambda i \lambda e \lambda e'. \mathcal{P}(i)(e)(e') \wedge \neg \text{report}(e') \wedge i \leq \text{EXPERIENCER}(e')$
 $[(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{EVENT}) \multimap (\uparrow_{\sigma} \text{EVIDENCE}) \multimap \uparrow_{\sigma}$

2.3.2 F-structure and semantic structure

- (21) *tjīnu niwahāka dina*
 ‘The dog bit him (we have seen it).’



2.3.3 Glue proof (conclusion)⁵

- ⋮
- (23) $\frac{\exists e \exists e'. \text{bite}(e) \wedge \text{AGENT}(e) = \text{dog} \wedge \text{PATIENT}(e) = \text{antecedent}(\bar{x}) \wedge \text{evidence}(e', e) \wedge \text{speaker} \leq \text{WITNESS}(e) \wedge \text{see}(e') \wedge \text{speaker} \leq \text{EXPERIENCER}(e') : b_{\sigma}}{\quad}$

⁵The term $\text{antecedent}(\bar{x})$ stands for whatever mechanism resolves anaphoric reference, whether it is the simple direct variable binding of Dalrymple (2001) and Asudeh (2004, 2012) or the much more sophisticated PCDR approach of Haug (2014), as adapted to an LFG setting by Haug et al. (2017), or something else.

Note that, as a result of the meaning postulate that defines WITNESS in (15) above, there will be a further entailment that the STIMULUS of the seeing event is the biting event.

2.4 Grammaticalized Evidentiality: Cherokee

2.4.1 Lexicon

$$(24) \text{-gahnan-} \quad (\uparrow \text{ PRED}) = \text{'rain'}$$

$$\lambda e \lambda e'. \text{rain}(e) \wedge \text{evidence}(e', e) :$$

$$(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}$$

$$(\text{speaker} : (\uparrow_{\sigma} \text{ EVIDENCE-HOLDER}))$$

$$(25) \text{-}\Delta\text{?i} \quad (\uparrow \text{ DIRECT}) = +$$

$$\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \leq \text{WITNESS}(e) :$$

$$[(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$$

$$(\uparrow_{\sigma} \text{ EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}$$

$$\lambda P \lambda e \exists e'. P(e)(e') :$$

$$[(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap \uparrow_{\sigma}$$

$$(26) \text{-e?i} \quad (\uparrow \text{ DIRECT}) = -$$

$$\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \not\leq \text{WITNESS}(e) :$$

$$[(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$$

$$(\uparrow_{\sigma} \text{ EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}$$

$$\lambda P \lambda e \exists e'. P(e)(e') :$$

$$[(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap \uparrow_{\sigma}$$

2.4.2 F-structure and semantic structure

$$(27) \text{ugahnane?i}$$

'It rained (I woke up, looked out and saw puddles of water)'

$$(28) \left[\begin{array}{ll} \text{PRED} & \text{'rain'} \\ \text{SUBJ} & \left[\begin{array}{ll} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \end{array} \right] \\ \text{TENSE} & \text{PAST} \\ \text{EVIDENTIAL} & \left[\begin{array}{ll} \text{DIRECT} & - \end{array} \right] \end{array} \right] \xrightarrow{\sigma} \left[\begin{array}{ll} \text{REL} & \text{rain} \\ \text{EVENT} & [] \\ \text{EVIDENCE} & [] \\ \text{EVIDENCE-HOLDER} & [] \end{array} \right]$$

2.4.3 Glue proof (conclusion)

$$(29) \frac{\vdots}{\exists e \exists e'. \text{rain}(e) \wedge \text{evidence}(e', e) \wedge i \not\leq \text{WITNESS}(e) : r_{\sigma}}$$

3 Non-grammaticalized evidentiality

We have so far focused on grammaticalized evidentiality. However, evidential codings are not necessarily part of grammaticalized morphosyntax; evidential and non-evidential languages alike have at their disposal a variety of ways to express sources of information. Speakers mark sources through the use of phrases such as *I heard that...* and *According to Karim...*, and also adverbs such as *reportedly* and *seemingly*. Languages with grammaticalized evidentiality can use lexical means in addition to their morphosyntactic evidentials. Languages without grammaticalized evidentiality express evidentiality lexically, often in subtle and sophisticated ways (see, e.g., Patrick & Van Bogaert 2007; Faller 2017). Non-grammaticalized evidentiality partially overlaps with grammaticalized evidentiality, and it is not always obvious whether a marker is grammaticalized or not (see, e.g., Van Bogaert & Leuschner 2015 and the papers in Diewald & Smirnova 2010). We capture the commonalities between different types of evidentiality at semantic structure and with Glue proofs. English does not have true grammaticalized evidentiality as defined by Aikhenvald (2004). However, we will discuss English copy-raising and perceptual resemblance verbs as an example of non-grammaticalized evidentiality.

3.1 English copy-raising and perceptual resemblance verbs

This section concerns English copy-raising verbs (*seem*, *appear*) and perceptual resemblance verbs (*look*, *sound*, *smell*, *taste*, *feel*). The copy-raising verbs and perceptual resemblance verbs share a common alternation where one alternant has the structure in (30) and the other the structure in (31):

- (30) Non-expletive subject + verb + like/as if/as though + finite clause containing a pronominal copy of the matrix subject

Example: *Jenny looks like she has been playing football.*

- (31) Expletive subject + verb + like/as if/as though + finite clause

Example: *It looks like Jenny has been playing football.*

The verbs *seem*, *appear*, *look*, etc. also have other uses, but we limit our discussion to the uses in (30–31) here.⁶ Copy-raising verbs differ from perceptual resemblance verbs in that perceptual resemblance verbs refer to specific senses, whereas copy raising verbs are more general. Also, copy raising verbs demand a pronominal copy in the subordinate clause but perceptual resemblance verbs do not (Asudeh & Toivonen, 2007, 2012; Asudeh, 2012). These distinctions are not important to the points made in this paper.

Copy-raised/non-expletive subjects (the main subject of examples of the type in (30)) are interpreted as the perceptual source (PSOURCE) of evidence for the proposition denoted by the subordinate clause (Rogers, 1972; Asudeh & Toivonen, 2007, 2012).⁷ Example (32) indicates that the evidence that Sarah is tired comes from Sarah herself. This is not necessarily true for example (33), where the fact

⁶For a recent thorough overview of perception verbs, see Poortvliet (2017).

⁷This seems similar to what Murray (2017) calls the *evidential base*.

that Sarah is tired could be inferred from some other source of evidence than Sarah herself. For example, perhaps a messy living room could be evidence that Sarah is tired.

- (32) Sarah looks like she's tired. (33) It looks like Sarah is tired.

This subject-as-perceptual-source generalization led Asudeh & Toivonen (2012), Rett & Hyams (2014), and Chapman et al. (2015a,b) to suggest that copy raising encodes *direct evidentiality*, but we will argue below that these verbs in fact encode *indirect evidentiality*. However, why think that these verbs encode evidentiality at all? How much do copy-raising and perceptual resemblance verbs (we'll refer to the full class of verbs as PSOURCE verbs here) have in common with what is traditionally called evidentiality marking?

Chafe (1986) characterizes evidentiality as follows: “‘Evidentiality’ can be used broadly to cover any linguistic expression of attitudes toward knowledge.” The PSOURCE verbs convey that the evidence for the subordinate clause is indirect (as will be discussed), and they also say something about the type of evidence – visual (*look*), aural (*sound*), unspecified (*seem*), etc. According to Chafe's definition, and also the definitions of evidentiality given in the introduction, these verbs would be classified as evidentiality marking elements. However, according to stricter definitions, PSOURCE verbs would not be considered evidentiality markers. As noted above, Aikhenvald (2004, Chapter 1) restricts linguistic evidentiality to obligatory marking, and PSOURCE verbs are of course never obligatorily used. Furthermore, Anderson (1986) posits that evidentials are not themselves the main predication of the clause; instead, they are an additional specification added to a statement. PSOURCE verbs would then not be evidential markers, as they can stand as main predicates.

In what follows, we assume that PSOURCE verbs mark evidentiality broadly construed, but they are not grammaticalized, morphosyntactic, mandatory evidentials such as those found in Tariana and Cherokee. The evidential contributions of PSOURCE verbs are seen in the lexicon and at semantic structure, not at f-structure. We argue below that copy raising and perceptual resemblance actually mark *indirect*, not direct evidentiality.

3.2 The evidentiality of perceptual resemblance verbs

The indirect evidentiality of verbs such as *seem like*, *look like*, etc., becomes apparent when they are contrasted with other verbs. Compare (34) to (35–36), for example:

- (34) Sara saw Margaret laugh. (36) Margaret looked to Sara like she laughed.
(35) It looked to Sara like Margaret laughed.

Examples (34–36) all convey that Sara has visual evidence that indicates that Margaret laughed. In example (34), Sara directly saw the event of Margaret laughing. Sara has *direct* evidence that Margaret laughed. In (35–36), Sara saw something

which led her to infer that Margaret laughed. Sara has *indirect* evidence that Margaret laughed. It is possible to continue (35–36) with *...but Margaret was in fact not laughing*. This is contradictory in the context of (34), as expected, since (34) indicates that there was direct evidence that Margaret laughed. It is not possible to see Margaret laugh if she is not laughing (barring unusual situations such as hallucinations), but it is possible that it might look (from afar, perhaps) like Margaret is laughing, although she is in fact not laughing. The verbs *see* and *look like* thus encode visual and direct/indirect information, characteristics that are familiar from the literature on evidentiality. Similarly, *hear* and *sound like* both encode aural information, but they differ in that *sound like* signals indirect information whereas *hear* signals direct information when it is used in example like *I heard Carmela praise Sue*. When *see* and *hear* are used with a *that*-complement (e.g., *I heard that Carmela praised Sue*), the evidence for the information in the complement can be either direct or indirect.

Example (36) further specifies that the visual indirect evidence that Margaret laughed came from Margaret. This kind of identification of the *specific* source of evidence is not common for true evidentials (Doran, 2015), but it does seem to occur sometimes. In Maaka, for example, evidential markers can be attached to NPs, and the implication is that there is evidence from the NP that hosts the morpheme (Storch & Coly, 2014):

- (37) làa nàmaa-**dìyà** sáy minè-póDí-ní gè-gòrkù-wà
 child this-JOINT:VIS must 1pl-remove:TEL-OBJ-3sg:MASC LOC-village-DEF
 ‘This child [whom we can both see], we must chase him from the village.’

Storch & Coly (2014) explain: “...the suffix *-dìyá* [...] indicates that both speakers and hearer know or see the participant in question.” See also Gutiérrez & Matthewson (2012) for a discussion of evidential determiners in Nivacle and St’át’imcets. These determiners mark the familiarity of the referents of noun phrases.

The evidentiary information signalled by perceptual resemblance examples such as (36) is quite complex. Even though there is only *indirect* evidence for the subordinate clause, that evidence may *directly* come from the subject. In (36), Sara has indirect evidence that Margaret laughed. Sara got this evidence from a perception of Margaret. The evidence in these examples comes from the subject, but, especially with the verb *sound*, the speaker does not necessarily have direct evidence from the subject. In the attested example in (38), for example, the speaker has not directly heard Dinah:

- (38) “I hope we can also arrange a walk with our dogs as I would love to meet Dinah —
she sounds like she is a real character.” (www)

In this case, the speaker has not heard Dinah directly. However, based on what the speaker has heard *about* Dinah, it is reasonable to infer that she is a real character.

Examples similar to (38) led Heycock (1994) and Landau (2011) to reject the subject-as-PSOURCE hypothesis. We believe that the hypothesis is in fact correct,

but the verb *sound* allows for a bit of a roundabout interpretation. *X sounds like . . .* is felicitous even if the speaker has not directly heard X. Hearing a description of X is enough. Heycock points out that example (39) is acceptable in context (40):

(39) Your car sounds like it needs tuning very badly.

(40) Context: In a long distance call, Y has just described to X the bizarre noises that Y's car is making.

It is indeed acceptable, but that does not refute the subject-as-PSOURCE hypothesis. The sentence is acceptable because the speaker has received reported evidence about the engine of the car. In context (40), (39) can be paraphrased as: "Based on what I heard from you about your car, I come to the conclusion that the car needs tuning very badly." Note that in the same context, sentence (41) would not be felicitous:

(41) #Your mechanic sounds like he needs to tune your car.

If we accept the subject-as-PSOURCE hypothesis, the unacceptability of (41) is unsurprising (Asudeh & Toivonen, 2012). In order for (41) to be acceptable, there would need to be some direct aural evidence from or previous mention of a mechanic, but there hasn't been in the given context.

Additionally, Rett & Hyams (2014) and Chapman et al. (2015a,b) provide experimental evidence supporting the subject-as-PSOURCE hypothesis. In the following section, we present a further experiment that supports the direct/indirect distinction in examples like (34–36) above.

3.3 Experiment

There is an important relationship between reliability/trustworthiness and evidentiality: direct evidentiality is considered more reliable information than indirect evidentiality (see, e.g., Faller 2002; Aikhenvald 2004, Chapter 10; McCready 2015; Lesage et al. 2015; Matthewson 2015; Matthewson & Glougie In Press). If *see/hear* signal direct evidence and *look/sound* signal indirect evidence, then the *see/hear* statements should convey that the evidence is more reliable, more certain than when *look/sound* is used. Sentences like (34) should therefore be taken as clearer evidence than (35–36) that Margaret laughed. Together with Lisa Sullivan, we tested this hypothesis in a series of simple experiments with native English speakers (Asudeh et al., 2017). These experiments are described briefly below.

We wanted to test whether and how participants' truth value judgements of subordinate clauses differed depending on the matrix clause. For example, do participants judge it more likely that Sue decorated the office when presented with (42–43) than when presented with sentences of the other types (44–47)?

- | | |
|--|---|
| (42) Pete saw Sue decorate the office. | (44) It looked like Sue was decorating the office. |
| (43) Pete heard Sue decorate the office. | (45) It sounded like Sue was decorating the office. |

- ing the office. (47) Sue sounded like she was decorating the office.
- (46) Sue looked like she was decorating the office.

In order to test this, we conducted offline psycholinguistic experiments using the methods of Lesage et al. (2015). In an anonymous web-based questionnaire, native speakers of English were asked to rate the likelihood that a sentence is true, given that another sentence is true. The instructions were: “You will be asked to read pairs of sentences. Assume that the first sentence is true and judge the likelihood of the second sentence using a 5 point scale (where 1 = ”I have no idea” and 5 = ”It is true”).” To illustrate: for the examples in (42–47), participants would be asked to judge how likely it was that Sue decorated the office.

We analyzed the results of 69 voluntary participants. We excluded non-native speakers and participants that did not complete the survey. The results of our study are presented below. Perceptual resemblance examples with a non-expletive subject are coded as *cr-look* and *cr-sound*, whereas expletive-subject alternants are coded as *it-look* and *it-sound*.

		Example	Mean	SD
(48)	<i>see</i>	“Ron saw the kids playing”	4.59	0.69
	<i>cr-look</i>	“The kids looked like they were playing”	3.54	0.96
	<i>it-look</i>	“It looked like the kids were playing”	3.59	0.85

An analysis of variance (ANOVA) on these scores yielded significant variation among conditions, ANOVA $F(2,206) = 34.3$, $p < 0.01$. A post hoc Tukey test showed that *see* differed significantly from both *it-look* and *cr-look* at $p < 0.01$. However, *it-look* and *cr-look* were not different from each other (Tukey HSD post hoc test: $p = 0.93$).

		Example	Mean	SD
(49)	<i>hear</i>	“Paul heard the dog barking”	4.49	0.74
	<i>cr-sound</i>	“The dog sounded like it was barking”	3.86	0.94
	<i>it-sound</i>	“It sounded like the dog was barking”	3.84	0.79

An analysis of variance (ANOVA) on these scores yielded significant variation among conditions, ANOVA $F(2,205) = 13.89$, $p < 0.01$. A post hoc Tukey test showed that *see* differed significantly from both *it-sound* and *cr-sound* at $p < 0.01$. However, *it-sound* and *cr-sound* were not different from each other (Tukey HSD post hoc test: $p = 0.996$).

In sum, *see/hear* examples were ranked higher than *look like/sound like* examples. Furthermore, perceptual resemblance examples with a non-expletive subject were ranked the same as expletive-subject alternants. We interpret the results as being consistent with the hypothesis that perceptual resemblance verbs do not encode direct evidence: even if it looks like Sue is tired, it is not certain that Sue actually is tired.

Our study replicated the study in Lesage et al. (2015), and further showed no difference between expletive-subject examples and non-expletive-subject examples. However, we had two worries. The first was that perhaps our stimuli were

somehow problematic. The second was that perhaps our method was not sensitive enough to detect a difference between expletive-subject examples and non-expletive-subject examples. We therefore conducted one additional study using the same method as the study above but different stimuli, as well as two additional studies using a two alternative forced-choice (2AFC) method. There was a total of 631 participants in the follow-up studies. The results of the follow-up studies were consistent with the study above (for details, see Asudeh et al. 2017).

4 Non-grammaticalized evidentiality in English

We now turn to an analysis of non-grammaticalized evidentiality in English, given the considerations of the previous section. In addition to the fact that the Tariana and Cherokee grammaticalized evidentials above were associated with bound morphemes whereas English has non-grammaticalized lexical evidentiality, there is another key difference: In English, the claim of indirect evidence, captured by the WITNESS predicate, concerns the event in the *like*-complement of the verb, not the matrix event. That is, in order to capture the fact that a matrix non-expletive subject in copy raising and perceptual resemblance is directly perceived while allowing the complement clause itself to constitute indirect evidence, we treat the matrix subject as the PSOURCE (Asudeh & Toivonen, 2007, 2012) but apply the WITNESS function to the complement event, rather than the matrix event. Lastly, it should be noted that the evidentiary basis in English PSOURCE verbs is reversed in the *evidence* predicate, since it is the matrix event that serves as evidence for the claim in the complement clause. For example, in the sentence *John sounds like he is upset*, it is the sound of John that serves as evidence of the fact that he is like he is upset.

In the lexical entries in section 4.1 below, we have made explicit the mappings from grammatical functions to arguments in semantic structure for clarity. The shared ARG1 in the semantic structure below is a consequence of the standard raising equation in the entry for *sounds* and the equalities mapping the SUBJ grammatical functions of *sounds* and *like* to their respective ARG1s in semantic structure. The full Glue proof for example (53) is given in the appendix.

Notice that the material in the second and third meaning constructors in the lexical entries for *sounds* and *seems* are identical to the information contributed by the grammaticalized evidentiality feature [DIRECT –] above. This captures the commonality between non-grammaticalized evidentiality in English copy-raising verbs (e.g., *seems*) and perceptual resemblance verbs (e.g., *sounds*), on the one hand, and grammaticalized evidentiality in languages like Tariana and Cherokee, on the other. Moreover, notice that the optional identification of the speaker as the EVIDENCE-HOLDER in these lexical entries also parallels the information in the Tariana and Cherokee verb entries above. Thus, we have achieved analogous semantic treatment of (relevant aspects of) English, Tariana, and Cherokee, while maintaining the morphosyntactic difference between English and Tariana/Cherokee in the f-structure, as promised above.

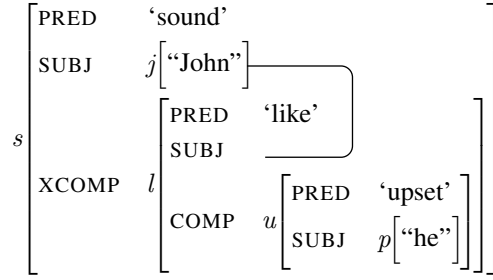
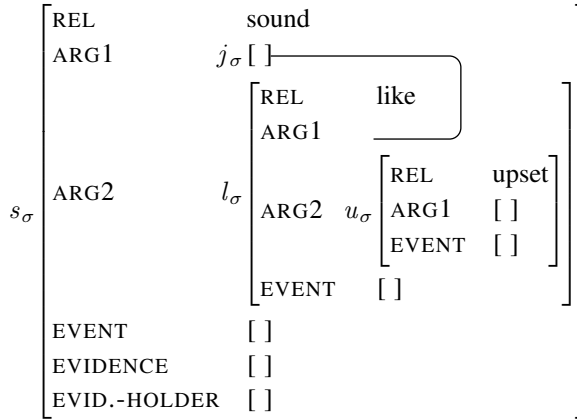
4.1 Lexicon⁸

- (50) *sounds* (\uparrow PRED) = ‘sound’
 (\uparrow SUBJ) = (\uparrow XCOMP SUBJ)
 (\uparrow SUBJ) $_{\sigma}$ = (\uparrow_{σ} ARG1)
 (\uparrow XCOMP) $_{\sigma}$ = (\uparrow_{σ} ARG2)
 $\lambda x \lambda P \lambda e \lambda e'. sound(e) \wedge \text{PSOURCE}(e) = aural(x) \wedge P(x)(e') \wedge$
 $evidence(e, e') :$
 $(\uparrow_{\sigma} \text{ ARG1}) \multimap [(\uparrow_{\sigma} \text{ ARG1}) \multimap (\uparrow_{\sigma} \text{ ARG2 EVENT}) \multimap (\uparrow_{\sigma} \text{ ARG2})] \multimap$
 $(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}$
 $\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \not\leq \text{WITNESS}(e') :$
 $[(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{ EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}$
 $\lambda P \lambda e \exists e'. P(e)(e') :$
 $[(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap \uparrow_{\sigma}$
 (*speaker* : (\uparrow_{σ} EVIDENCE-HOLDER))
- (51) *seems* (\uparrow PRED) = ‘seem’
 (\uparrow SUBJ) = (\uparrow XCOMP SUBJ)
 (\uparrow SUBJ) $_{\sigma}$ = (\uparrow_{σ} ARG1)
 (\uparrow XCOMP) $_{\sigma}$ = (\uparrow_{σ} ARG2)
 $\lambda x \lambda P \lambda e \lambda e'. seem(e) \wedge \text{PSOURCE}(e) = x \wedge P(x)(e') \wedge$
 $evidence(e, e') :$
 $(\uparrow_{\sigma} \text{ ARG1}) \multimap [(\uparrow_{\sigma} \text{ ARG1}) \multimap (\uparrow_{\sigma} \text{ ARG2 EVENT}) \multimap (\uparrow_{\sigma} \text{ ARG2})] \multimap$
 $(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}$
 $\lambda P \lambda i \lambda e \lambda e'. P(e)(e') \wedge i \not\leq \text{WITNESS}(e') :$
 $[(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap$
 $(\uparrow_{\sigma} \text{ EVIDENCE-HOLDER}) \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}$
 $\lambda P \lambda e \exists e'. P(e)(e') :$
 $[(\uparrow_{\sigma} \text{ EVENT}) \multimap (\uparrow_{\sigma} \text{ EVIDENCE}) \multimap \uparrow_{\sigma}] \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap \uparrow_{\sigma}$
 (*speaker* : (\uparrow_{σ} EVIDENCE-HOLDER))
- (52) *like* (\uparrow PRED) = ‘like’
 (\uparrow SUBJ) $_{\sigma}$ = (\uparrow_{σ} ARG1)
 (\uparrow COMP) $_{\sigma}$ = (\uparrow_{σ} ARG2)
 $\lambda x \lambda e' \lambda P \lambda e. P(e) \wedge x \leq \text{PARTICIPANTS}(e') \wedge e \sim e' :$
 $(\uparrow_{\sigma} \text{ ARG1}) \multimap (\uparrow_{\sigma} \text{ EVENT}) \multimap$
 $[(\uparrow_{\sigma} \text{ ARG2 EVENT}) \multimap (\uparrow_{\sigma} \text{ ARG2})] \multimap (\uparrow_{\sigma} \text{ ARG2 EVENT}) \multimap (\uparrow_{\sigma} \text{ ARG2})$
 $\lambda p. p : (\uparrow_{\sigma} \text{ ARG2}) \multimap \uparrow_{\sigma}$

4.2 F-structure and semantic structure

- (53) John sounds like he is upset.

⁸The operator \sim in the lexical entry for *like* is a similarity operator between events; see Asudeh (2012).

(54) **F-structure**(55) **Semantic structure**4.3 **Glue proof (conclusion)**

$$\vdots$$

$$(56) \quad \frac{}{\exists e \exists e'. \text{sound}(e) \wedge \text{PSOURCE}(e) = \text{aural}(\text{john}) \wedge \exists e''. [\text{upset}(e'') \wedge \text{EXP}(e'') = \text{ant}(\bar{x}) \wedge \text{john} \leq \text{PARTICIPANTS}(e') \wedge e'' \sim e'] \wedge \text{evidence}(e, e') \wedge \text{speaker} \not\leq \text{WITNESS}(e') : s}$$

5 **Conclusion**

It is a commonplace in the literature on evidentiality to bemoan conflation of grammaticalized evidentiality and non-grammaticalized evidentiality (see, for example, Aikhenvald 2004 for particularly extensive discussion). We agree that it would be a mistake to conflate true evidentiality with mere “evidential strategies” (Aikhenvald, 2004; Murray, 2017). But it also seems unsatisfactory to make no connection between grammaticalized and non-grammaticalized evidentiality. We have attempted to both maintain the divide and bridge it by: 1. Defining a small stock of f-structure evidential features for grammaticalized evidentiality; 2. Associating these features

with semantic content; 3. Associating that same semantic content appropriately with non-grammaticalized evidentiality. Our semantics here has been only rudimentary and does little to capture the true subtleties of evidential semantics (see Murray 2017 for a recent thorough treatment using Update Semantics). Yet it is sufficient to demonstrate that, in a modular architecture, the very same semantic information can be directly associated with morphosyntactic features such that the grammar can make reference to these features (grammaticalized evidentiality) or can be captured directly in lexical entries without introduction of such features, such that there are no morphosyntactic interactions with the rest of the grammar (non-grammaticalized evidentiality).

Our treatment of evidentiality can be compared to standard LFG/Glue analyses of tense (Butt et al., 1996; Dalrymple, 2001; Frank & Zaenen, 2002; Bary & Haug, 2011). Tense is an interpreted grammatical feature and as such it is modelled in the lexicon, in f-structure, in morphological structure (Butt et al., 1996; Frank & Zaenen, 2002), and also in the semantics (Bary & Haug, 2011). But the morphosyntactic tense features that occur in the f-structure are restricted to syntactically relevant aspects, and additional temporal information occurs in the Glue meaning language. This information is much less restricted. For example, words like *yesterday* or *two weeks ago* can be added to a sentence in addition to a grammatical past tense marker. This leads to an overlap between f-structure and semantics, potentially reflected in the semantic structure, but the overlap is not complete. In the same way, there is a partial overlap between f-structure and semantic structure with regards to evidential marking in languages with grammaticalized evidentiality. However, the f-structural evidentiality features are heavily restricted to represent only morphosyntactically relevant information, whereas the evidential information at semantic structure, and in the Glue meaning language that works with features from this level of structure, is richer and more flexible. For example, a REPORTED evidential feature in the f-structure can be complemented lexically by information about where the report came from, and this information would be modelled in semantic structure.

References

- Aikhenvald, Alexandra Y. 2003. *A grammar of Tariana, from Northwest Amazonia*. Cambridge: Cambridge University Press.
- Aikhenvald, Alexandra Y. 2004. *Evidentiality*. Oxford: Oxford University Press.
- Aikhenvald, Alexandra Y. 2014. The grammar of knowledge: A cross-linguistic view of evidentials and the expression of information source. In Alexandra Y. Aikhenvald & R. W. Dixon (eds.), *The grammar of knowledge*, 1–51. Oxford: Oxford University Press.
- Anderson, Lloyd B. 1986. Evidentials, paths of change, and mental maps: Typologically regular symmetries. In Wallace Chafe & Johanna Nichols (eds.), *Evidentiality: The linguistic coding of epistemology*, 273–312. Norwood: Ablex Publishing Corporation.
- Arnold, Doug & Louisa Sadler. 2010. Pottsian LFG. In Miriam Butt & Tracy Holloway King (eds.), *Proceedings of LFG10*, 43–63. Stanford, CA: CSLI Publications.
- Asudeh, Ash. 2004. *Resumption as resource management*: Stanford University dissertation.
- Asudeh, Ash. 2012. *The logic of pronominal resumption*. Oxford: Oxford University Press.
- Asudeh, Ash & Gianluca Giorgolo. 2012.

- Flexible composition for optional and derived arguments. In Miriam Butt & Tracy Holloway King (eds.), *Proceedings of the LFG12 Conference*, 64–84. Stanford, CA: CSLI Publications.
- Asudeh, Ash, Gianluca Giorgolo & Ida Toivonen. 2014. Meaning and valency. In Miriam Butt & Tracy Holloway King (eds.), *Proceedings of the LFG14 Conference*, Stanford, CA: CSLI Publications.
- Asudeh, Ash, Lisa Sullivan & Ida Toivonen. 2017. Evidentiality and reliability in English copy raising. Presented at the Linguistic Society of America, Austin, TX.
- Asudeh, Ash & Ida Toivonen. 2007. Copy raising and its consequences for perception reports. In Annie Zaenen, Jane Simpson, Tracy Holloway King, Jane Grimshaw, Joan Maling & Christopher Manning (eds.), *Architectures, rules, and preferences: Variations on themes by Joan W. Bresnan*, Stanford, CA: CSLI Publications.
- Asudeh, Ash & Ida Toivonen. 2012. Copy raising and perception. *Natural Language and Linguistic Theory* 30(2). 321–380.
- Barnes, J. 1984. Evidentials in the Tuyuca verb. *International Journal of American Linguistics* 50(3). 255–71.
- Bary, Corien & Dag Haug. 2011. Temporal anaphora across and inside sentences: The function of participles. *Semantics & Pragmatics* 4(8). 1–56.
- Boas, Franz. 1911. Introduction. In *Handbook of American Indian languages*, 1–84. Washington: Government Printing Office.
- Butt, Miriam, María-Eugenia Niño & Frédérique Segond. 1996. Multilingual processing of auxiliaries within LFG. In Dafydd Gibbon (ed.), *Natural language processing and speech technology: Results of the 3rd KONVENS Conference*, 111–122. Berlin: Mouton de Gruyter. Reprinted in Sadler & Spencer (2004, 11–22).
- Chafe, Wallace. 1986. Evidentiality in English conversation and academic writing. In Chafe & Nichols (1986) 261–272.
- Chafe, Wallace & Johanna Nichols. 1986. *Evidentiality: The linguistic encoding of epistemology*. Norwood, NJ: Ablex Publishing Corporation.
- Chapman, Cassandra, Diane Doran & Daniel Schmidtke. 2015a. The locus of evidentiality in English. Presented at The Annual Meeting of the Canadian Linguistics Association, Ottawa.
- Chapman, Cassandra, Diane Doran & Daniel Schmidtke. 2015b. Testing the constraints on evidentiality in English: A forced-choice acceptability judgement task. Presented at Experimental Approaches to Semantics, Barcelona.
- Dalrymple, Mary (ed.). 1999. *Semantics and syntax in Lexical Functional Grammar: The resource logic approach*. Cambridge, MA: MIT Press.
- Dalrymple, Mary. 2001. *Lexical Functional Grammar*. San Diego, CA: Academic Press.
- Diewald, Gabriele & Elena Smirnova (eds.). 2010. *Linguistic realization of evidentiality in European languages*. Berlin/New York: Walter de Gruyter.
- Doran, Diane. 2015. *The semantics of copy raising*. McMaster University MA thesis.
- Faller, Martina. 2002. *Semantics and pragmatics of evidentials in Cuzco Quechua*: Stanford University dissertation.
- Faller, Martina. 2012. Evidential scalar implicatures. *Linguistics and Philosophy* 35(4). 285–312.
- Faller, Martina. 2017. Reportative evidentials and modal subordination. *Lingua* 186–187. 55–67.
- Findlay, Jamie Yates. 2016. Mapping theory without argument structure. *Journal of Language Modelling* 4(2). 293–338.
- Frank, Anette & Annie Zaenen. 2002. Tense in LFG: Syntax and morphology. In Hans Kamp & Uwe Reyle (eds.), *How we say WHEN it happens: Contributions to the theory of temporal reference in natural language*, Tübingen: Niemeyer. Reprinted in Sadler & Spencer (2004, 23–66).
- Garrett, Edward. 2002. *Evidentiality and assertion in Tibetan*: UCLA dissertation.
- Giorgolo, Gianluca & Ash Asudeh. 2011. Multidimensional semantics with unidimensional glue logic. In Miriam Butt & Tracy Holloway King (eds.), *Proceed-*

- ings of the LFG11 Conference, 236–256. Stanford, CA: CSLI Publications.
- Gutiérrez, Analía & Lisa Matthewson. 2012. Evidential determiners: Best (sensory) evidence. In *The proceedings of SULA 6: The Semantics of Under-Represented Languages in the Americas*, 63–79.
- Haug, Dag, Mary Dalrymple & John Lowe. 2017. Integrating LFG's binding theory with PCDRT. Ms., University of Oslo and University of Oxford.
- Haug, Dag Trygve Truslew. 2014. Partial dynamic semantics for anaphora: Compositionality without syntactic coindexation. *Journal of Semantics* 31(4), 457–511.
- Heycock, Caroline. 1994. *Layers of predication*. New York: Garland.
- Landau, Idan. 2011. Predication versus aboutness in copy-raising. *Natural Language and Linguistic Theory* 29(3), 779–813.
- LaPolla, Randy J. 2003. Evidentiality in Qiang. In Alexandra Y. Aikhenvald & R. W. Dixon (eds.), *Studies in evidentiality*, 63–78. Amsterdam/Philadelphia: John Benjamins.
- Lesage, Claire, Nalini Ramlakhan, Ida Toivonen & Chris Wildman. 2015. The reliability of testimony and perception: Connecting epistemology and linguistic evidentiality. In *Proceedings of the 37th annual meeting of the cognitive science society*, 1302–1307. Austin, TX: Cognitive Science Society.
- Link, Godehard. 1983. The logical analysis of plurals and mass terms: A lattice-theoretical approach. In Rainer Bäuerle, Christoph Schwarze & Arnim von Stechow (eds.), *Meaning, use, and interpretation of language*, 302–323. Berlin: Walter de Gruyter. Reprinted in Link (1998, 11–34).
- Link, Godehard. 1998. *Algebraic semantics in language and philosophy*. Stanford, CA: CSLI Publications.
- Lowe, John J. 2015. Complex predicates: An LFG+Glue analysis. *Journal of Language Modelling* 3(2), 413–462.
- Matthewson, Lisa. 2015. Evidential restrictions on epistemic modals. In Luis Alonso-Ovalle & Paula Menéndez-Benito (eds.), *Epistemic indefinites*, 141–160. Oxford: Oxford University Press.
- Matthewson, Lisa & Jennifer Glougie. In Press. Justification and truth: Evidence from languages of the world. In Masaharu Mizumoto, Stephen Stich & Eric McCready (eds.), *Epistemology for the rest of the world*, Oxford: Oxford University Press.
- McCready, Eric. 2015. *Reliability in pragmatics*. Oxford: Oxford University Press.
- Murray, Sarah E. 2010. *Evidentiality and the structure of speech acts*: Rutgers dissertation.
- Murray, Sarah E. 2017. *The semantics of evidentials*. Oxford: Oxford University Press.
- Patrick, Dendale & Julie Van Bogaert. 2007. A semantic description of French lexical evidential markers and the classification of evidentials. *Rivista di Linguistica* 19(1), 65–89.
- Poortvliet, Marjolein. 2017. *Perception and predication: A synchronic and diachronic analysis of Dutch descriptive perception verbs as evidential copular verbs*: University of Oxford dissertation. In progress.
- Potts, Christopher. 2005. *The logic of conventional implicatures*. Oxford: Oxford University Press.
- Rett, Jessica & Nina Hyams. 2014. The acquisition of syntactically encoded evidentiality. *Language Acquisition* 21(2), 173–198.
- Rogers, Andy. 1972. Another look at flip perception verbs. In *Papers from the Eighth Regional Meeting of the Chicago Linguistic Society*, 303–315.
- Sadler, Louisa & Andrew Spencer (eds.). 2004. *Projecting morphology*. Stanford, CA: CSLI Publications.
- Storch, Anne & Jules Jacques Coly. 2014. The grammar of knowledge in Maaka (Western Chadic, Nigeria). In Alexandra Y. Aikhenvald & Robert M. W. Dixon (eds.), *The grammar of knowledge*, 190–208. Oxford: Oxford University Press.
- Van Bogaert, Julie & Torsten Leuschner. 2015. Dutch ('t) *schijnt* and German *scheint*('): On the grammaticalization of evidential particles. *Studia Linguistica* 69(1), 86–117.

