

Semantic building blocks: Evidential epistemic modals in English, German and St’át’imcets*

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1. Introduction

Our first author once had the pleasure of collaborating on a project with Tom Roeper, which investigated similarities between determiner semantics in Salish languages and in (a stage in the acquisition of) English (Matthewson, Bryant and Roeper 2001). That paper uncovered semantic parallels between elements in unrelated languages, and proposed a new way of looking at (at least a stage of) English from the perspective of an understudied language.

In somewhat the same spirit, this squib offers a new way of understanding the relation between epistemic modals in English and German, and evidentials in St’át’imcets (Lillooet Salish). We investigate the elements in (1), with an eye to finding common semantic building blocks (pieces of meaning) across the different items.

(1)

LANGUAGE	ELEMENT	TRADITIONAL GLOSS/ANALYSIS
English	<i>must</i>	epistemic modal ¹
German	<i>müssen</i>	epistemic modal ¹
German	<i>sollen</i>	epistemic modal / reportative
St’át’imcets	<i>kuʔ</i> ²	reportative
St’át’imcets	<i>k’a</i>	inferential

Traditional descriptions would group the cognates *must* and *müssen* together as

* Many thanks to Tom Roeper for his phenomenal and inspirational energy, his intellectual generosity, and his outstanding contributions to the field. We are very grateful to the St’át’imcets speakers who in earlier work provided the data cited here. Thanks also to Petra Schulz for helpful comments.

¹ *Must* and *müssen* both also have interpretations as root modals, e.g. as deontics. We set these aside here as not relevant for current concerns.

² In the St’át’imcets orthography, ‘ʔ’ represents a glottal stop. See Van Eijk and Williams (1981).

epistemic modals, and St'át'imcets *ku7* and *k'a* together as evidentials (elements whose primary contribution is about evidence source). German *sollen* displays cross-over behavior; it conveys reportative evidential meaning, but is also an epistemic modal (see Kratzer 1991, Faller 2007, among others).

Recent literature, however, has increasingly recognized parallels among the types of element listed in (1). According to this recent research, all the items in (1) contribute both epistemic modality and evidential information (see discussion and references in section 2). The questions then become what the core similarities are, what details differentiate them, and what we predict about a cross-linguistic typology of epistemic/evidential elements.

Here we argue that there are (at least) three semantic building blocks at play in (1). First, epistemic/evidential elements may or may not enforce an **inference requirement**. Second, they may or may not enforce a **reportative requirement**. And third, they may or may not **allow** that the prejacent proposition was the content of a **report**. Our findings are previewed in (2); see Matthewson and Truckenbrodt (2018) for a first brief formulation of some of these ideas.

(2)

ELEMENT	INFERENCE REQUIRED	REPORT REQUIRED	REPORT ALLOWED
<i>must</i>	√	x	x
<i>müssen</i>	√	x	√
<i>sollen</i>	x	√	√
<i>ku7</i>	√	√	√
<i>k'a</i>	√	x	x

Some interesting consequences of looking at things this way include that (a) English *must* and St'át'imcets *k'a* are parallel (differing only in modal force, but not in evidential information), (b) English *must* and German *müssen* are not completely parallel (differing in whether reports are allowed), and (c) a well-known distinction in the literature between different types of reportative evidentials can be reduced to whether or not they also encode an inference requirement (*sollen* vs. *ku7*).

In section 2 we provide background, in section 3 we present empirical evidence for our proposals, and in section 4 we briefly examine some theoretical and typological consequences.

2. Background

We assume that all the elements in (1) contribute epistemic modality, and in addition convey a not-at-issue evidential restriction. For the cases we investigate here, the evidential restriction pertains to inference, or a report, or both. In this section we introduce inferential and reportative evidential restrictions, and informally sketch a basic analysis for elements which combine epistemic modality and evidentiality.

In Willett's (1988) taxonomy of evidential categories, **inferential** evidentials cover evidence based on 'results' of the event, or on 'reasoning'. Here we assume that regardless of whether or not the speaker witnesses results of the event, reasoning on the part of the speaker is always required. This accords with De Haan's (1998) statement that '[t]he Inferential is used when the speaker is involving him- or herself with the evidence to a

certain degree. The speaker makes deductions on the basis of evidence' (cited in Faller 2002:67). More generally, it seems to us that the notion 'inferential' makes sense only in connection with an inference to a positive assessment of the truth-status of the prejacent. Since the speaker draws the inference, inferential evidentials entail some amount of speaker commitment to the prejacent, as stated in (3):

- (3) An inferential meaning commits the speaker to the prejacent to some extent.

The extent to which the speaker is committed to the truth of the prejacent varies with the strength of the modal: it could be anything from a very strong necessity modal (in which case inferring the prejacent is tantamount to inferring the **truth** of the prejacent), to an inferential possibility meaning, inferring the **possibility** of the prejacent. The St'át'imcets evidentials all allow variable modal strength/speaker commitment, as discussed in Matthewson, Davis and Rullmann (2007).

An example of an inferential evidential, St'át'imcets *k'a*, is given in (4). The speaker draws an inference, on the basis of observed evidence, to the possible or necessary truth of the proposition that Lenny is eating the cake.

- (4) [You saw cake in the fridge five minutes ago, and now it's gone. You know Lenny is in his room.]

Wá7=k'a ts'áqw-an'-as k=Lenny ti=kíks=a.
IPFV=INFER eat-DIR-3ERG DET=Lenny DET=cake=EXIS
'Lenny must/might be eating the cake.'

(St'át'imcets; Matthewson, Rullmann and Davis 2007:214)

Matthewson et al. (2007) provide a modal analysis for inferential *k'a*. Assuming a standard Kratzerian (1991) framework (and setting aside many important details), St'át'imcets *k'a* (*p*) roughly asserts that in all the (best) worlds compatible with the available evidence, *p* is true, and in addition conveys the not-at-issue information that the evidence for *p* is inferential. As just mentioned, this last part means that the speaker performed some reasoning process from the available evidence to the possible or necessary truth of *p*.

Such a modal analysis of evidentials paves the way for a parallelism between these elements and epistemic modals in languages like English or German. Sure enough, many authors have argued that epistemic *must* or *müssen* also encode an evidential requirement; see for example van der Auwera and Plungian (1998), Mortelmans (2000), Ehrlich (2001), Palmer (2001), Zaefferer (2001), Faller (2002, 2007), von Stechow and Gillies (2010), Kratzer (2012), Matthewson (2015), Lassiter (2016), Rett (2016), among others.³ In the next section, we will argue that both *must* and *müssen* encode specifically an **inferential** evidential requirement.

Turning now to reportatives, we see an example of the St'át'imcets reportative *ku7* in (5a) and a corresponding case with German *sollen* in (5b).

³ See also Giannakidou and Mari (2016), Goodhue (2017) for an opposing view.

- (5) [Speaker was told about her great-grandmother.]
- a. Mutátkwa7=**ku7** ku=úcwalmicw skwátsits-s.
 Mutátkwa7=**REPORT** DET=Indian name-3POSS
 ‘I was told that Mutátkwa7 was her Indian name.’ (Matthewson 2005:356)
- b. Emilia **soll** ihr Name gewesen sein.
 Emilia **REPORT** her name been be
 ‘I was told that Emilia was her name.’

As with inferential *k’a*, Matthewson et al. (2007) offer a modal analysis of *ku7*. Roughly, *ku7* (*p*) asserts in that all the (best) worlds compatible with the available evidence, *p* is true, and in addition conveys that the evidence for *p* comes from a report.

Sollen is also uncontroversially a modal as well as conveying reportative semantics; see for example Glas (1984), Diewald (1999), Mortelmans (2000), Faller (2007), Schenner (2008, 2010), Schwager (2008), Sode (2014), Bochnak and Csipak (to appear). However, *ku7* and *sollen* are a little different from each other. Specifically, *ku7* and *sollen* differ in whether there must be some level of speaker commitment to the truth of the prejacent. This is a well-known factor of variation among reportative evidentials; see Izvorski (1997), Faller (2002, 2007), Aikhenvald (2004), Murray (2010, 2017), Peterson (2010), Krawczyk (2012), among others. We return to this variation in the semantics of reportatives in the next section.

3. Evidence for our proposals

Our main claim is that epistemic/evidential elements may include an inferential requirement, a reportative requirement, or both.⁴ In addition, inferential elements may specify whether the evidence is allowed to include a report by a third person of the prejacent. With respect to the elements we focus on here, we claim that *must*, *müssen*, *k’a* and *ku7* are all inferential (but *sollen* is not), and that *müssen* allows inference from a report of the prejacent, but *must* and *k’a* do not.

3.1. Inferential modals

The fact that St’át’imcets *k’a* is inferential has been extensively supported by Matthewson et al. (2007), so we take it for granted here. For *must* and *müssen*, observe firstly that these modals are acceptable in contexts where the speaker infers from the available evidence that the prejacent must be true:

- (6) [I saw Maria going into the kitchen. The back door of the kitchen is obstructed from the outside. Nobody has said anything about Maria. I say:]
- Maria **muss** in der Küche sein.
 Maria **must** in the kitchen be
 ‘Maria **must** be in the kitchen.’ (Matthewson and Truckenbrodt 2018:277)

⁴ Or, of course, neither, but we don’t address other types of evidential restrictions here. See section 4 for a brief comment.

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If no inference is involved, *must* and *müssen* are unacceptable. This occurs either if the prejacent eventuality was directly witnessed, as in (7) (see von Fintel and Gillies 2010), or if the speaker does not draw any inference to the potential truth of the prejacent, as in (8).

(7) [I am looking at Maria who is in the kitchen. I say:]

- # Maria **muss** in der Küche sein.
- Maria **must** in the kitchen be
- # ‘Maria **must** be in the kitchen.’

(8) [I saw Maria going into the kitchen. The back door of the kitchen is rarely used, but surprisingly, I can now hear Maria’s voice outside in the garden. I say:]

- # Maria **muss** in der Küche sein.
- Maria **must** in the kitchen be
- # ‘Maria **must** be in the kitchen.’

Our claim that *must* requires inference is in accord with proposals by von Fintel and Gillies (2010), Matthewson (2015), Lassiter (2016) and Rett (2016).⁵ For *müssen*, Mortelmans (2000) and Zaefferer (2001) classify it as inferential, and Ehrich (2001:167) also proposes that it allows inferential readings: ‘from the available evidence ... the speaker infers p’ (Ehrich 2001:154).⁶

Finally we turn to the St’át’imcets reportative evidential *ku7*, and propose that it also has an inference requirement. (This has not been claimed before, except in a footnote in Matthewson and Truckenbrodt 2018.) We begin by observing that *ku7* is incompatible with the speaker being aware that the prejacent proposition is false:

(9) [You had done some work for a company and they said they put your pay, \$200, in your bank account. but actually, they didn’t pay you at all.]

- # Um’-en-tsal-itás=**ku7** i=án’was=a xetspqíqen’kst táola,
- give-DIR-1SG.OBJ-3PL.ERG=**REPORT** DET.PL=two=EXIS hundred dollar
- t’u7 aoz kw=s=7um’-en-tsál-itas ku=stám’.
- but NEG DET=NMLZ=give-DIR-1S.OBJ-3PL.ERG DET=what
- ‘[reportedly] They gave me \$200, but they didn’t give me anything.’
- (Matthewson et al. 2007:216)

Ku7 contrasts in this respect with German *sollen*, which is well-known not to require a speaker inference to the potential truth of the prejacent (Mortelmans 2000, Faller 2007, Schenner 2010, among others). The lack of speaker commitment with *sollen* is shown in

⁵ Mandelkern (to appear) argues that the indirect evidential contribution of *must* is only an implicature; *must* semantically conveys that there is a shared argument for the prejacent (he calls this a ‘Support’ requirement). Future research may reveal that these ideas are reconcilable with our current claims, because the Support mechanism seems to involve an inference process.

⁶ ‘Aus den ihm zur Verfügung stehenden Indizien ... schließt S auf p.’

(10).⁷

(10) [The man from customer service says that our telephone is broken, but I'm a bit of an expert, and I know that we only need a new modem without a loose connection. I say:]

Unser Telefon **soll** kaputt sein, aber das stimmt nicht.
 our telephone **REPORT** broken be but that is.true not
 'Our telephone is supposed to be broken, but that's not true.'

(Matthewson and Truckenbrodt 2018:279)

The contrast between (9) and (10) is well-known in the evidentials literature; see for example Krawczyk (2012:89-90), who writes that 'reportative evidentiality divides along two lines ... whether [the] speaker can felicitously utter a proposition marked with a reportative evidential and then subsequently deny belief in the propositional content or not.' AnderBois (2014) argues that the *sollen*-type of reportative, which allows the speaker to deny the truth of the prejacent, is far more widespread cross-linguistically than the *ku7*-type. He provides an analysis whereby reportatives allow **perspective shift**; the prejacent is in a sense asserted, but is attributed to the reporter rather than to the speaker.

AnderBois's approach views the *sollen*-type as the core case of reportatives, and this view necessitates an alternative explanation for *ku7*-type reportatives. AnderBois suggests that further testing with discourse contexts supporting perspective shift might allow the *ku7*-type to be assimilated to the *sollen*-type. While further testing is indeed needed, here we suggest an alternative explanation which shares AnderBois's insight that the default for a reportative evidential is to allow denial of the prejacent's truth. The idea is that 'pure' reportatives pattern like *sollen*, and only reportatives which are **also inferentials** will pattern like *ku7*. That is, an evidential element which combines both a reportative and an inferential restriction will require not only that the prejacent was reported by a third person, but also that the speaker draws an inference from the report to the potential truth of the prejacent.

3.2. Variation in whether reports are allowed

It is easy to establish which epistemic elements **require** reference to a prior report (*ku7*, *sollen*, and none of the others). It requires a bit more work to determine which elements **allow** that there was a report of the prejacent proposition. Starting with inferential *k'a*, it appears that *k'a* is not used when the prejacent was reported. In the nearly 250 tokens of *k'a* in the narratives in Matthewson (2005) and Callahan et al. (2016), none appear to rely

⁷ We cannot construct a minimal German contrast to the St'át'imcets example, because of a restriction on *sollen* that is orthogonal to the issues at hand: it cannot be used when the sentence subject is also the reporter (as is the case in (9)). This restriction on *sollen* is probably due to blocking by *wollen* 'want', which requires this coreference in its epistemic use. The epistemic use of *wollen* is illustrated in (i):

(i) Sie **wollen** mich bezahlt haben, aber sie haben mir nichts gegeben.
 they **want** me paidhave but theyhave me nothing given

'[According to them] They paid me, but they didn't give me anything.'

This blocking approach to the relation between *sollen* and *wollen* was advanced (for root readings) by Sode and Schenner (2013).

on reportative evidence.⁸

When it comes to *must* and *müssen*, we follow Matthewson and Truckenbrodt (2018) in proposing that these two elements actually differ in whether they allow the prejacent to have been reported. Starting with English, von Fintel and Gillies (2010) and Rett (2016) have argued that reports cannot serve as the evidence on which a *must*-claim is based. Matthewson (2015) argues that *must* can rely on a report, but crucially not on a report of the prejacent itself – in our terms, there must be an inference process. This claim is thus not in conflict with von Fintel and Gillies and Rett’s proposals. Mandelkern (to appear) provides support for the same idea with examples such as (11):

- (11) ??The website says the movie is at 7:30. So the movie **must** [be] at 7:30.
(Mandelkern to appear)

German *müssen* seems to be different. In the following two examples involving inference from a (written or oral) report, *müssen* is fine while *must* is degraded in the same contexts.

- (12) [I have read in a book that the Battle of Hastings was fought in 1066.]
Die Schlacht von Hastings **muss** 1066 stattgefunden haben.
the battle of Hastings **must** 1066 taken.place have
#‘The Battle of Hastings **must** have taken place in 1066.’
(Matthewson and Truckenbrodt 2018:280; English original from von Fintel and Gillies 2010:354)

- (13) [M tells me that when P proposed to her, he even went down on his knee. Later, I tell K:]
P **muss** sogar vor ihr auf die Knie gegangen sein.
P **must** even before her on the knee gone be
#‘P **must** have even gone down on his knee in front of her.’
(Matthewson and Truckenbrodt 2018:278)

Mandelkern (to appear) uses the fact that English *must* cannot depend on a report of the prejacent as an argument against it semantically conveying an evidential restriction (as proposed by von Fintel and Gillies). Mandelkern argues that an example like (11)

is surprising on an evidential approach, since testimony is, intuitively, indirect evidence (it is natural to say that you know that the movie is at 7:30, but that you know *indirectly*, via the website). An evidential approach thus must simply stipulate that testimony ‘counts as direct’ for the purposes of evaluating ‘must’.
(Mandelkern to appear)

We agree with Mandelkern that there is more to say about *must* than simply that its

⁸ For the time being, we rely on this corpus search, though the issue should ultimately also be pursued in terms of acceptability judgements with speakers.

evidence source must be ‘indirect’, and we are sympathetic to his proposal that *must* requires there to be a salient argument for the prejacent. However, the cross-linguistic difference shown above between *must* and *müssen* also suggests that the question of whether an epistemic necessity modal can rely on reports of the prejacent cannot be reduced to pragmatic mechanisms, as Mandelkern suggests. Instead, there is a need to semantically hardwire whether or not this is possible. In other words, the *must/müssen* contrast supports the idea that epistemic modals in languages like German and English bear lexical specifications for particular evidential contributions.

In sum, we argue that both *must* and *müssen* are inferential, but they differ in whether they allow the inference to rely on a report of the prejacent: no in English, yes in German.⁹

4. Consequences

Our results are summarized in (14). As the table format indicates, we propose that epistemic/evidential elements can fruitfully be categorized in terms of ‘semantic building blocks’ (pieces of meaning) such as ‘inferential’ and ‘reportative’.

(14)

	REPORTATIVE	NOT REPORTATIVE	
		REPORT ALLOWED	REPORT NOT ALLOWED
INFERENTIAL	<i>ku7</i>	<i>müssen</i>	<i>must, k'a</i>
NOT INFERENTIAL	<i>sollen</i>		

This point of view enables cross-linguistic parallels and points of variation to be brought out in sometimes new ways. For example, this perspective brings out just how parallel English *must* and St’át’imcets *k’a* are (they differ only in modal force, but not in evidential information).¹⁰ The partial **non**-parallel between English *must* and German *müssen* has consequences for whether aspects of the evidential meaning of epistemic modals must be semantically hardwired, or can be reduced to pragmatics (we believe, the former).

Finally, our angle offers an alternative view about the source of the difference between two types of reportatives, those which allow speaker denial of the prejacent, and those which don’t. In our system, plain reportatives will pattern like *sollen* in allowing denials, but reportatives which also encode an inferential requirement will not. Our proposal that some reportatives are also inferential, and that inferentials always involve some level of speaker commitment to the prejacent, captures AnderBois’s (2014) observation that inferential evidentials never seem to allow denial of the prejacent’s truth, and also accounts for the subset of reportatives which do allow such denials.

For reasons of space we do not take a stand here on how the pieces of meaning we are calling ‘semantic building blocks’ should be formally modeled. These could be implemented as semantic features, or perhaps as restrictions on a structured ‘kernel’ of relevant propositions in the approach of von Stechow and Gillies (2010) (see Matthewson

⁹ Ehrlich (2001) argues that *müssen* can have a reportative reading. Matthewson and Truckenbrodt (2018) argue that while *müssen* can rely on a report, its core meaning is inferential. For example, unlike *sollen*, *müssen* does not allow denial of the prejacent (cf. (10) above, which is bad with *müssen*).

¹⁰ As observed in footnote 9, fieldwork is required to confirm the claim that *k’a* cannot rely on a prior report of the prejacent. If this turned out to be wrong, *k’a* would parallel *müssen* rather than *must*.

2015 for an attempt to model different evidentials using a kernel-based analysis).

The table in (14) raises the question whether the empty cells are filled by other elements. There are certainly evidentials which are neither reportative nor inferential – for example, the St’át’imcets evidential *lákʷ7a*, which requires sensory evidence for the prejacent, disallows direct visual witness of the event, and allows speaker denial in the same way *sollen* does (Matthewson 2012). Whether *lákʷ7a* allows the prejacent to have been reported has not yet been tested, but there seems no reason to assume that either of the empty cells in (14) is in principle unavailable.

Our mini-typology in (14) also raises the larger question of how widely languages can differ with respect to whether they possess elements filling any, some, or all of the cells in the system. Future cross-linguistic research is required.

Finally, we raise the question of acquisition. For example, in a language that has more than one expression of this class, which one is predicted to be easier to acquire?¹¹ Simple reasoning might suggest that for reportatives, the *sollen*-type is the child’s first hypothesis, since positive evidence – denial scenarios like in (9) above – could trigger the child towards a *ku7*-type meaning. For non-reportatives, the *must*-type might logically be assumed as a first hypothesis, since positive evidence of the type in (12-13) can let the child know that inference based on a report is possible with the *müssen*-type.

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¹¹ Thanks to Petra Schulz for the idea to include this question. On the acquisition of evidentials, see for example Papafragou, Li, Choi and Han (2007), de Villiers, Garfield, Harper Gernet-Girard, Roeper, and Speas (2009), Rett & Hyams (2014), Ozturk & Papafragou (2016).

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