

# Restriction on evidence in evidentiality: the part-whole relation between situations<sup>1</sup>

Yuto HIRAYAMA — *Osaka University / JSPS*

**Abstract.** Evidentials are traditionally defined as linguistic expressions that designate the specific type of evidence that the speaker has for the utterance (Willett, 1988; Aikhenvald, 2004). This paper deals with three indirect evidentials, the English adverb *apparently*, raising verb *seem*, and the Japanese auxiliary *yooda*. These three evidentials are not always felicitous even if the speaker has indirect evidence. This means that some semantic restriction is at work, independent of evidence-type specification. This paper raises empirical problems for previous studies on evidence encoded by evidentials (McCready and Ogata, 2007; McCready, 2014; Takubo, 2009; Krawczyk, 2012; Davis and Hara, 2014; Hirayama, to appear), and proposes an alternative account based on situation semantics (Kratzer, 2012; Elbourne, 2013).

**Keywords:** evidentials, evidence, situation semantics

## 1. Introduction

Evidentials are traditionally defined as linguistic expressions used to specify the evidence that the speaker's utterance is based on (Willett, 1988; Aikhenvald, 2004). For example, the use of indirect evidentials implies that the speaker does not witness the described event directly, but rather that she has acquired certain information that indirectly supports the truth of the prejacent. If this evidence-type specification is the only contribution of evidentials, it is predicted that indirect evidentials always sound felicitous when the evidence is indirect. However, this is not borne out. The three evidentials, the English adverb *apparently*, raising verb *seem*, and the Japanese auxiliary *yooda*, are felicitous in (1a), but not in (1b):

- (1) a. Context: You see puddles on the ground:  
(i) Apparently it rained.  
(ii) It seems that it rained.  
(iii) Ame-ga fut-ta yooda.  
rain-NOM fall-PAST yooda  
'It seems that it rained.'
- b. Context: You see falling raindrops from the window:  
(i) #Apparently there are puddles.  
(ii) #It seems that there are puddles.  
(iii) #Mizutamari-ga aru yooda.  
puddle-NOM exist yooda  
'It seems that there are puddles.' (Adapted from Davis and Hara, 2014)

In both examples, the speaker does not witness the event instantiating the prejacent proposition; that is, the speaker has indirect evidence in both cases. Nevertheless, only (1a) sounds felicitous. This means that the fact that there are puddles can serve as evidence for the inference that it rained, while the fact that it is raining does not serve as evidence for the inference that there

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are puddles. In other words, the evidence in (1a) satisfies a certain semantic condition that the evidence in (1b) does not.

This raises the question of what condition a piece of information has to satisfy in order to qualify as evidence, in addition to the indirectness requirement, an issue that has not been discussed so extensively in the formal literature on evidentials. Below, I will investigate the semantic condition imposed on the evidence and the prejacent. I will survey previous studies on this topic (the probabilistic approach: McCready and Ogata, 2007; McCready, 2014, the abductive approach: Takubo, 2009; Krawczyk, 2012, the causal approach: Davis and Hara, 2014, and the temporal approach: Hirayama, to appear), and point out the empirical problems relating to each.

The remainder of this paper is organized as follows. Section 2 addresses previous analyses of evidence (that is, a meaning component independent of evidence-type specification). I will examine McCready and Ogata (2007), McCready (2014), Takubo (2009), Krawczyk (2012), Davis and Hara (2014), and Hirayama (to appear), demonstrating that all of them are empirically inadequate. Section 3 presents my analysis through the framework of situation semantics (Kratzer, 2012; Elbourne, 2013). I propose a new constraint, and under my analysis, the evidentials become felicitous if the prejacent and the proposition describing the evidence (henceforth, evidence proposition) fulfill that requirement, as well as if they fulfill the restriction proposed in Krawczyk (2012) and Davis and Hara (2014). Section 4 concludes this paper and discusses its implications. There, I investigate the possibility of a more conceptually desirable form of analysis, suggesting that a generalization based on counterfactual description is a possible alternative to my proposal, but the question of how to formulate such an idea still needs to be solved. Finally I demonstrate that the applicability of the proposed semantics may be beyond the realm of indirect evidentials.

## 2. Previous studies

This section addresses a number of previous studies regarding the restrictions placed on the evidence of evidentials, as well as what semantic role the presence of evidence plays. The previous approaches reviewed in this section can be categorized into four types: the probabilistic approach (McCready and Ogata, 2007; McCready, 2014), the abductive approach (Takubo, 2009; Krawczyk, 2012), the causal approach (Davis and Hara, 2014), and the temporal approach (Hirayama, to appear). I will demonstrate that the probabilistic approach is not relevant to the contrast in (1), and that while the remaining three approaches can handle it, all of them still contain empirical problems.

### 2.1. The probabilistic approach

This subsection shows that McCready and Ogata (2007) and McCready (2014), in which the presence of evidence increases the probability of the prejacent being true, do not account for the contrast in (1). It should be noted that their analyses are not dedicated to capturing such a contrast; I claim that probability change is not the only restriction placed on the evidence.

Let us begin with McCready and Ogata (2007). They attempt to account for the facts about embeddability and modal subordination of Japanese evidentials, and propose a probabilistic dynamic logic for evidentials. In their framework, the Japanese indirect evidential *yooda* is de-

defined as a probabilistic function  $\Delta^i$ . The semantics of *yooda*-sentences is informally as follows, where  $\phi$  is the prejacent:

- (2)  $\Delta^i\phi$  is true given a world  $w$ , time  $s$ , and probability function  $\mu$  iff:
- a.  $\phi$  was less likely as determined by  $\mu$  at some time preceding  $s$  (before introduction of some piece of evidence  $i$ );
  - b.  $\phi$  is probable, but still not completely certain at  $s$  (given  $i$ );
  - c. the probability of  $\phi$  never decreased between the time the speaker became aware of the evidence  $i$  and  $s$  as a result of the same piece of evidence (i.e., the probability of  $\phi$  given  $i$  is upward monotonic).

(McCready and Ogata, 2007: 185; McCready, 2014: 159)

The time “the speaker became aware of the evidence” in (2c) corresponds to the Evidence Acquisition Time (EAT), following the terminology in Lee (2013) and Smirnova (2013). Therefore, the contribution of indirect evidentials in (2) can be paraphrased as follows: (i) observation of the evidence makes the prejacent likely but not certain, and (ii) any other piece of evidence obtained between EAT and the utterance time does not lower the likelihood of the prejacent.

However, McCready and Ogata’s (2007) analysis in (2) does not account for the contrast in (1), as pointed out by Davis and Hara (2014). In (1a), the speaker utters the sentence immediately after she perceives the evidence (puddles on the ground). Therefore, there is no other piece of evidence between EAT and the utterance, which allows us to ignore condition (ii) above. Since the presence of puddles increases the probability that it rained, both conditions (i) and (ii) are satisfied in (1a). However, they are also satisfied in (1b). The temporal distance between EAT and the utterance is the same as (1a) (the utterance is made immediately after EAT). Therefore, we can put aside condition (ii). The fact that raindrops are falling outside makes it highly probable that there are puddles, which satisfies condition (i). As such, the analysis in (2) predicts (1b) to be felicitous as well as (1a), contrary to the fact.

McCready (2014) provides another probabilistic approach, and is concerned with her earlier claim (McCready, 2010) that the evidence referred to by evidentials must be part of the speaker’s knowledge. She concludes that the evidence must be a piece of information that both makes the prejacent more probable and that the speaker believes that she knows. As the second condition is not relevant, I cite only the first condition:

- (3) Let  $p$  and  $q$  be the prejacent and the evidence proposition, respectively. Then,  
 $q$  is evidence for  $p$  iff  $P(p|q) > P(p|\neg q)$ , where  $P$  is a probabilistic function and  $(p|q)$  is the conditionalization of  $p$  on  $q$ . (Adapted from McCready, 2014: 175)

$P(p|q)$  stands for the probability that  $p$  is true given that  $q$  is true. Therefore, the requirement  $P(p|q) > P(p|\neg q)$  means that the prejacent  $p$  is more likely to be true if the evidence  $q$  holds than if it does not.

However, this probabilistic definition of evidence does not account for the contrast in (1). In (1a), the probability that it rained becomes higher if there are puddles than if there are not. In (1b), the existence of puddles becomes more probable if raindrops are falling outside than if they are not. Therefore, (3) predicts both examples in (1) to be felicitous.

Even if probabilistic considerations are needed in order to explain some other phenomena, we

need another constraint to capture the contrast between (1a) and (1b). The previous studies that will be reviewed in the following subsections account for such a contrast with restrictions that exist independent of probability change.

## 2.2. The abductive and causal approaches

This subsection reviews two previous approaches: the abductive approach (Takubo, 2009 ; Krawczyk, 2012) and the causal approach (Davis and Hara, 2014), both of which can account for the contrast in (1). After demonstrating how the two approaches capture the contrast, I will present some problematic data that both wrongly exclude.

Takubo (2009) and Krawczyk (2012) propose that indirect evidentials are felicitous only if the prejacent is the conclusion of abductive reasoning in which the minor premise is the evidence proposition (Takubo addresses Japanese evidentials such as *yooda*, while Krawczyk deals with *apparently* and evidentials in Central Alaskan Yup'ik). Abductive reasoning is a mode of inference represented as below, where the conclusion  $p$  is derived from premises  $p \rightarrow q$  and  $q$ . This inference is not logically valid (compared to deduction, which is logically valid), so it is called defeasible reasoning.

(4)	a.	Abduction	b.	Deduction (for comparison)
		Major premise: $p \rightarrow q$		Major premise: $p \rightarrow q$
		Minor premise: $q$		Minor premise: $p$
		Conclusion: $p$		Conclusion: $q$

Abductive reasoning is often called ‘inference to the best explanation’ in the sense that the conclusion best explains why the minor premise is true. Therefore, the argument of Takubo (2009) and Krawczyk (2012) can be paraphrased as the requirement that the prejacent of indirect evidentials must be the best explanation for why the evidence proposition is true.

Davis and Hara (2014) argue that *yooda* is only felicitous if the event described in its prejacent causes the evidence event. They give the following semantics to *yooda*:<sup>2</sup>

- (5) Let  $s$  be the semantic type of events/situations:
- a.  $\llbracket yooda \rrbracket^a = \lambda p_{\langle s, t \rangle} \lambda e_s. \text{PERCEIVE}(a, e) \wedge \exists q[q(e) \wedge \text{CAUSE}(p, q)]$ .
  - b.  $\text{PERCEIVE}(a, e)$  is true iff  $a$  perceived  $e$  in a manner compatible with the lexical restriction of *yooda*.
  - c.  $\text{CAUSE}(p, q)$  is true iff for some  $c$  in  $p$  and some  $e$  in  $q$ ,  $c$  causes  $e$ .
- (Davis and Hara, 2014: 191)

The PERCEIVE relation is responsible for the indirectness, or more precisely, the manner of acquisition of *yooda*. Because of this component, *yooda* is incompatible with some cases where the speaker directly perceives the evidence. (5c), which requires the prejacent event to cause the event described by the evidence proposition, thus derives the contrast in (1).

<sup>2</sup>In addition to the presence of the CAUSE relation, Davis and Hara (2014) argue that the use of *yooda* does not imply that the speaker is committed to the truth of the prejacent, and, therefore, that no modal component is involved in *yooda*. Although I do not agree with some of the judgments they present, Davis and Hara show statistical evidence for this claim. I will not commit to this issue, but will instead focus solely on whether their causal component is empirically appropriate.

Both the abductive and causal approaches straightforwardly derive the contrast in (1). In (1a), the prejacent (*it rained*) explains why the evidence proposition (*there are puddles*) is true, and the raining event causes the appearance of puddles. Meanwhile, in (1b), the prejacent (*there are puddles*) does not serve as an explanation for why the evidence proposition (*it is raining*) is true, nor the prejacent event (the appearance of puddles) causes the rain.

Winans (2016) proposes a linguistic diagnostic for the presence (or absence) of the explanation/causation relation, although Takubo (2009), Krawczyk (2012), and Davis and Hara (2014) do not employ it. Let *p* and *q* be the prejacent and the evidence proposition, respectively. Then, *p* explains/causes *q* if *Because p* can serve as an answer to the question “Why is *q* true?”. Employing this test, we can say that the prejacent successfully explains/causes the evidence proposition in (1a), while it does not in (1b). This is illustrated in the following, where (6a) and (6b) test the availability of the explanation/causation relation in (1a) and (1b), respectively:

- (6) a. A: Why are there puddles?  
       B: Because it rained.  
       b. A: Why is it raining?  
       B: #Because there are puddles.

Note that Davis and Hara (2014) criticize the abduction analysis in Takubo (2009), claiming that symbolic abduction as in (4a) cannot explain examples in which the prejacent and the evidence proposition are related with a bi-conditional, as in the following. In Vancouver, the sign “Bus Full” appears on the front screen of a bus only if the bus is full. Otherwise, it displays the destination. Therefore, we have the bi-conditional [*a bus is full*  $\leftrightarrow$  *it displays “Bus Full”*]. This makes the following two forms of abductive reasoning available:

- (7) a. Major premise: If a bus is full, it displays “Bus Full”.  
       Minor premise: A bus is displaying “Bus Full”.  
       Conclusion: That bus is full.  
       Major premise: If a bus displays “Bus Full”, then it is full.  
       b. Minor premise: A bus is full.  
       Conclusion: That bus is displaying “Bus Full”.

Under symbolic abduction analysis, which requires the prejacent to be the conclusion of abduction, the availability of these two directions predicts that both (8a) and (8b) should be acceptable, contrary to the facts.

- (8) a. (From outside of a bus, you see the “Bus Full” sign. You say:)  
       (i) Apparently that bus is full.  
       (ii) It seems that that bus is full.  
       (iii) Ano-basu-wa ippai-no yooda.  
             that-bus-TOP full-COP yooda  
             ‘It seems that that bus is full.’  
       b. (You are in a bus which is full of passengers. You say:)  
       (i) #Apparently the “Bus Full” is being displayed.  
       (ii) #It seems that the “Bus Full” is being displayed.  
       (iii) #Basu-ga-ippai-no hyoozi-ga de-tei-ru yooda.  
             bus-NOM-full-GEN-sign sign-NOM appear-PROG-PRES yooda  
             ‘It seems that the “Bus Full” sign is being displayed.’

In (8a), the prejacent and evidence proposition are *that bus is full* and *the “Bus Full” is being displayed*, respectively. The availability of the abductive reasoning in (7a) is compatible with the felicity of (8a). On the other hand, the prejacent and evidence proposition are reversed in (8b). The symbolic abduction in (7b) is also available, which should make (8b) felicitous, although it is not.

However, unlike Takubo (2009), Krawczyk (2012) does not employ symbolic abduction, instead postulating that the prejacent must explain the evidence proposition (in other words, she employs the primitive *explain*). Consequently, the contrast in (8) is not problematic for the abductive approach, because only (8a) survives Winans’s (2016) test as in the following:

- (9) a. A: Why is the “Bus Full” being displayed on that bus?  
       B: Because that bus is full.  
       b. A: Why is the bus full?  
       B: #Because the “Bus Full” is being displayed on it.

Therefore, the abductive approach that relies on the notion of *explain* accounts for the (in)felicity of the examples in (8), even though the analysis with symbolic abduction cannot distinguish between them. This means that the empirical coverage of the abductive approach is the same as that of the causal one proposed by Davis and Hara (2014).

There are several examples that both the abductive and causal analyses wrongly exclude. First, consider the following example:

- (10) (When you come home, your husband phones you and asks if your daughter Mary is home. You hear Mary singing from her room. You say to your husband:)  
       a. Apparently she is home.  
       b. It seems that she is home.  
       c. Kanojo-wa ie-ni iru yooda.  
           she-NOM home-in be yooda  
           ‘It seems that she is home.’

The prejacent is *she (Mary) is home*, and the evidence proposition is *Mary is singing in her room*. The abductive approach claims that Mary being home must explain why she is singing in her room, and the causal analysis requires the Mary-being-home event to be the cause of the Mary-singing event. Intuitively, these do not hold without special contextual settings, e.g. Mary loves singing but is a very shy person who cannot sing outside. However, such a special characterization of Mary is not needed in order for the three evidentials to be used here. Furthermore, this example does not pass Winans’s (2016) test:

- (11) A: Why is Mary singing in her room?  
       B: #Because she is home.

The second counterexample is the one in which the prejacent accompanies a circumstantial modal:

- (12) (You go to a vacant lot to play baseball, but you find other people occupying it. You say to yourself:)  
       a. Apparently I can’t use this vacant lot.  
       b. It seems that I can’t use this vacant lot.

- c. Kono-akiti-wa tuka-e-nai yooda  
 this-vacant.lot-TOP use-can-NEG yooda  
 'It seems that I can't use this vacant lot.'

The prejacent and the evidence proposition are *I can't use this vacant lot* and *others are occupying the vacant lot*, respectively. The prejacent does not explain why there are other people in the vacant lot, nor the prejacent event causes the evidence; rather, the opposite direction of explanation/causation seems to hold. Nevertheless, the evidentials are felicitous in (12). As expected, (12) does not pass Winans's test:

- (13) A: Why are others occupying the vacant lot?  
 B: #Because I/you can't use it.

Thus, the felicity of the evidentials in (10) and (12) is problematic in terms of both the abductive analysis (Krawczyk, 2012) and the causal analysis (Davis and Hara, 2014).

### 2.2.1. The temporal approach

Hirayama (to appear) deals with *yooda*, arguing that a temporal analysis is superior to the causal analysis proposed by Davis and Hara (2014) because it accommodates examples in (10) and (12), while also capturing the contrast in (1). Specifically, Hirayama (to appear) proposes that the initial moment that the prejacent becomes true, i.e.,  $\text{EARLIEST}(p)$ , comes at least as early as the initial moment that the evidence proposition becomes true (henceforth,  $\text{EARLIEST}(q)$ ).

Extending this idea to *apparently* and *seem*, the semantics proposed by Hirayama (to appear) is formalized as in the following:

- (14) Let  $q$  be the contextually salient proposition.
- a.  $\llbracket \text{apparently/seem/yooda} \rrbracket^c(p)(w)$  is defined only if  $\exists e[q(e) \wedge \text{PERCEIVE}(c_s, e) \wedge \text{EARLIEST}_w(p) \leq \text{EARLIEST}_w(q)]$  ( $c_s$  represents the speaker of the utterance).
  - b.  $\text{EARLIEST}_w(\llbracket p \rrbracket)$  is defined only if  $\{t: \llbracket p \rrbracket(t)(w')\}$  has a left boundary  $t'$  (be it open or closed) for some  $w'$  maximally similar to  $w$  (cf. Beaver and Condoravdi (2003)). If defined,  $\text{EARLIEST}_w(\llbracket p \rrbracket) = \text{um. } m \in t' \wedge m \leq \text{LEFTMOST}(t')$ .<sup>3</sup>

The  $\text{PERCEIVE}$  relation is interpreted in the same way as Davis and Hara (2014). The third conjunct in (14a) says that the earliest moment of the temporal denotation of the prejacent  $p$  must not come later than that of the evidence proposition  $q$ . The existential quantification of a maximally similar world  $w'$  in (14b) is postulated because otherwise the proposition embedded under the  $\text{EARLIEST}$  operator would be instantiated in the actual world (or more precisely, the evaluation world), and, as a result, the evidentials would be veridical.

Let us see how the definedness condition in (14a) captures the data presented so far. First, consider (1). It is part of our knowledge that rain precedes appearances of puddles. In (1a), the evidentials require that  $\text{EARLIEST}(p)$  (the moment it started to rain) come no later than

<sup>3</sup>This  $\text{EARLIEST}$  operator deviates from the traditional formulation in Beaver and Condoravdi (2003) and von Stechow (2009), among others. It avoids the undefinedness that occurs when a proposition with a quantificational past tense is embedded under the traditional  $\text{EARLIEST}$  operator (according to Sharvit, 2014) by referring to the left boundary of the temporal denotation of the prejacent.

EARLIEST( $q$ ) (the moment puddles appeared). This is compatible with our knowledge. In (1b), on the other hand, they require the opposite temporal relation: the appearance of puddles is required to occur at the same time as, or prior to, the moment it started to rain, which goes against our knowledge, hence (1b) is infelicitous.

Next consider the example of buses in Vancouver, that is, those of bi-conditionals. The “Bus Full” sign is never displayed before the bus becomes full, which is consistent with (8a), where EARLIEST( $p$ ) (the moment that the bus got full) must not be anterior to EARLIEST( $q$ ) (the moment that the sign appeared). However, (8b) is incompatible with our knowledge of buses in Vancouver; EARLIEST( $p$ ) is the moment that the sign appeared on the front screen. It is inevitably preceded by EARLIEST( $q$ ), that is, the moment the bus becomes full. Therefore, (8b) cannot satisfy the temporal restriction in (14a).

The temporal restriction in (14a) accommodates cases in which abductive/causal reasoning does not hold. Specifically, in (10), where the prejacent is *she (Mary) is home*, EARLIEST( $p$ ) is the moment she came home. This moment necessarily precedes EARLIEST( $q$ ), that is, the moment she started singing in her room. As such, the temporal restriction is satisfied.

The prejacent in (12) contains a circumstantial modal *can*. Given that the context does not refer to Mary’s permanent ability, the prejacent becomes true when both the facts available at the utterance situation and what is normally true jointly entail that she does not use the vacant lot. Formally, following the standard Kratzerian framework, the truth of the prejacent in (12) is determined relative to the modal base and the ordering source. Since *can* is a circumstantial modal, the relevant modal base is a fact-based one, as in (15b). I assume that the relevant ordering source is that of normality, as in (15c), because the utterance in (12) does not refer to the speaker’s physical ability nor to any rules or laws in the actual world (that is, the ordering source relevant in (12) seems to be neither ability-based nor deontic). Thus, (15a) represents the truth-condition of the prejacent in (12).

- (15) a.  $\llbracket I \text{ cannot use this vacant lot} \rrbracket = \lambda t. \lambda w. \forall w' [w' \in \text{MAX}_{g(w)}(\cap f(t)(w)) \rightarrow \text{I don't use the vacant lot at } t \text{ in } w']$ .<sup>4</sup>  
 b.  $f(w) = \{p: p \text{ describes a fact at } t \text{ in } w\}$ .  
 c.  $g(w) = \{p: p \text{ is what is normally true in } w\}$ .

(15a) says that the prejacent becomes true at an interval  $t$  in a world  $w$  iff the speaker does not use the vacant lot in all worlds that: i) are compatible with the facts available at  $t$  in  $w$ , and ii) are best-ranked in terms of normality in  $w$ . We normally assume that one does not use a place if others occupy it, so  $g(w)$  contains this proposition. In (12), others are actually occupying the vacant lot, so  $f(w)$  contains the proposition *others are occupying the vacant lot*. Therefore, the proposition *I do not use the vacant lot* is true in all worlds in which these two propositions are both true. Assuming that the truth of the propositions describing normality does not hinges on time, i.e., that the propositions in  $g(w)$  do not vary with the utterance time,

<sup>4</sup>The universal quantification in this formula arises due to the combination of the existential quantification by *can* and negation:

- (i) a.  $\llbracket \text{can } p \rrbracket = \lambda t. \lambda w. \exists w' [w' \in \text{MAX}_{g(w)}(\cap f(t)(w)) \wedge p(t)(w')]$ .  
 b.  $\llbracket \neg \text{can } p \rrbracket = \lambda t. \lambda w. \neg \exists w' [w' \in \text{MAX}_{g(w)}(\cap f(t)(w)) \wedge p(t)(w')]$ .  
 $= \lambda t. \lambda w. \forall w' [w' \in \text{MAX}_{g(w)}(\cap f(t)(w)) \rightarrow \neg p(t)(w')]$ .



(15) becomes true when the evidence proposition *others are using the vacant lot* is available. In other words,  $\text{EARLIEST}(p)$  corresponds to the initial moment that the evidence proposition is true, that is,  $\text{EARLIEST}(q)$ . Since the temporal restriction in (14a) allows the two moments to be simultaneous, it derives the felicity of (12).

However, the temporal analysis is too weak and cannot capture the deviance of the following example:

- (16) (You hung your laundry outside last night. Today, you wake up and see the roads are flooded. You infer that it rained so much during the night. You say without seeing the laundry you hung yesterday:)<sup>5</sup>
- a. #Apparently the laundry is wet.
  - b. #It seems that the laundry is wet.
  - c. #Sentakumono-ga nureteiru yooda.  
     laundry-NOM   wet       yooda  
     ‘It seems that the laundry is wet.’

In (16),  $\text{EARLIEST}(p)$  represents the moment that the laundry got wet last night. Given that the evidence proposition is *roads are flooded*,  $\text{EARLIEST}(q)$  is the moment that the roads got flooded. The former moment precedes the latter (we usually assume that the laundry outside gets watered before the roads are flooded). Therefore, the temporal requirement predicts (16) to be acceptable, contrary to the fact.

Note that the abductive and causal analyses capture the infelicity of (16). We have seen that in cases where abduction/causation hold, the prejacent must be the answer to the question of why the evidence proposition is true. (16) does not survive this test:

- (17) A: Why are the roads flooded?  
       B: #Because the laundry is wet.

Thus, all of the three previous approaches discussed above possess some empirical problems; the abductive and causal approaches are both too strong in that they exclude (10) and (12), while the temporal approach is too weak because it cannot explain why (16) is bad.

### 3. Proposal

I propose weakening the requirement in the abductive/causal analysis to accommodate both (10) and (12). Specifically, I argue that the indirect evidentials are also felicitous if no matter how a minimal situation that makes the evidence proposition true is extended, the extended situation contains a minimal situation where the prejacent is true, as well as if the explanation/causation relation holds between the prejacent and evidence proposition.

#### 3.1. Situation semantics

In situation semantics, propositions are evaluated relative to situations, rather than to possible worlds. Situations are parts of possible worlds, and situations that belong to the one and the same world are partially ordered by the part-whole relation, which I will represent with  $\sqsubseteq$ .

<sup>5</sup>I would like to thank Sanae Tamura (p.c.) for bringing up this context.

According to Kratzer (2012), a situation may contain thin particulars and universals (cf. Armstrong, 1978). As far as this paper is concerned, universals can be understood as properties or relations whose domain is that of individuals. A thin particular is whatever is left when we mereologically subtract the universals a particular instantiates (on the other hand, thick particulars are particulars together with the universals they instantiate). For example, there is a part of the world, i.e., a situation, that consists of John's thin particular and the property of being hungry that the thin particular instantiates. In this situation, the proposition that the individual is hungry is true. A situation does not necessarily contain all the universals instantiated by the particulars contained in that situation.

With these settings, we can define a part-whole relation between two situations:

- (18)  $s$  is a part of  $s'$ , represented as  $s \sqsubseteq s'$ , iff  $s$  and  $s'$  are parts of the same possible world, and  $s'$  contains all the thin particulars  $s$  does, instantiating all the properties and relations that they instantiate in  $s$ . (Adapted from Elbourne, 2013: 24)

Consider the following two situations. The first contains only John's thin particular and the property of being hungry that is instantiated by John. The second contains only John's thin particular and the properties of being hungry and tired both of which John instantiates. In this case, the first situation is a part of the second, according to (18). If  $s \sqsubseteq s'$ ,  $s'$  is often referred to as an *extension* of  $s$ . If  $s \sqsubseteq s'$  and  $s'$  contains some additional elements (that is,  $s \not\supseteq s'$ ),  $s$  is a proper part of  $s'$ , and is represented as  $s \subset s'$ .

The notion of *minimal situations* will be relevant in the following discussion. A minimal situation is defined relative to a proposition. If a situation  $s$  is a minimal situation for  $p$ , then  $p$  is true in  $s$  and  $s$  contains the smallest possible number of thin particulars, properties and relations that make  $p$  true. In other words, there is no situation in which  $p$  is true and which is also a part of  $s$ :

- (19) Let  $\text{MIN}(p)$  be the set of minimal situations for  $p$ .  
 $\text{MIN}(p) = \{s: p(s) \wedge \forall s'[p(s') \wedge s' \sqsubseteq s \rightarrow s' = s]\}.$  (von Fintel, 1994: 18)

To use Elbourne's (2013) example, a minimal situation in which John owns Flossy contains only their thin particulars and the relation of owning instantiated by them; no other particulars or universals involved.

Finally, note that a possible world is itself a situation, since  $s$  is a situation in a world  $w$  if and only if  $s \sqsubseteq w$ , and  $w \sqsubseteq w$ . Following Kratzer (2012), I use  $w_s$  to refer to the world of a situation  $s$ ; that is, the world of which  $s$  is a part. Given that worlds are situations, I use a semantic type  $s$  for situations including worlds.

### 3.2. Proposal: the extension requirement

Henceforth, I refer to preajacent/evidence situations as situations in which the preajacent/evidence proposition is true. I propose that *apparently*, *seem*, and *yooda* are also licensed if any extension of minimal evidence situations contains some minimal preajacent situation. I call this requirement the *extension requirement*.

The extension requirement, given the preajacent  $p$ , the evidence proposition  $q$ , and a situation  $s$ ,

represented as  $\text{EXT}(p, q, s)$ , is spelled out as below:<sup>6</sup>

- (20)  $\text{EXT}(p, q, s) = 1$  iff  
 $\forall s', s'' [[s' \in \text{MIN}(q) \wedge s' \sqsubset s'' \sqsubseteq w'] \rightarrow \exists s''' [s''' \in \text{MIN}(p) \wedge s''' \sqsubseteq s'']]$  for some  $w'$   
 maximally similar to  $w_s$ .

With this definition, I propose the semantics of the indirect evidentials as in (21). I tentatively adopt the explanation requirement (i.e. Krawczyk's (2012) proposal) for the sake of simplicity, and it should be noted that I stay neutral on whether the abductive analysis is empirically superior to the causal one.

- (21) Let  $q$  be a contextually salient proposition.<sup>7</sup>  
 a.  $\llbracket \text{apparently} / \text{seem} / \text{yooda} \rrbracket^a(p)(s)$  is defined only if  
 $q(s) \wedge \text{PERCEIVE}(a, s) \wedge [\text{EXP}(p, q, s) \vee \text{EXT}(p, q, s)]$ .  
 b.  $\text{EXP}(p, q, s) = 1$  iff why  $q(s)$  is explained if  $p(w_s)$  is true.

First, the evidence proposition  $q$  must be true (that is,  $q(s)$ ) because the speaker observes an instantiation of  $q$ . Both this and the  $\text{PERCEIVE}$  relation (as in Davis and Hara, 2014) guarantee that  $q$  is the evidence proposition. As is seen in the disjunction, the prejacent  $p$  and the evidence proposition  $q$  of the evidentials must fulfill at least one of  $\text{EXP}(p, q, s)$  and  $\text{EXT}(p, q, s)$ .

In order to show that the proposed semantics correctly accounts for all the data presented so far, I have to demonstrate that it rules out examples that the abductive approach does (i.e., (1b), (8b) and (16)), while also showing that it accommodates felicitous examples that the abductive approach does not ((10) and (12)); in other words, below we need not address examples that are ruled in under the abductive approach, because such examples satisfy  $\text{EXP}(p, q, s)$ , so whether or not they are consistent with  $\text{EXT}(p, q, s)$  does not have to be examined. I will illustrate that the infelicitous examples fulfill neither  $\text{EXP}(p, q, s)$  nor  $\text{EXT}(p, q, s)$ , and that felicitous examples that the abductive analysis wrongly predicts to be bad are compatible with  $\text{EXT}(p, q, s)$ .

Let us begin with (1b), repeated here as (22):

- (22) (You see falling raindrops from the window:)  
 #Apparently there are puddles.

As we saw above, this case does not satisfy  $\text{EXP}(p, q, s)$ ; the prejacent *there are puddles* cannot be an explanation for why the evidence proposition, *it is raining*, is true. Furthermore, neither does it not satisfy  $\text{EXT}(p, q, s)$ . In this example,  $\text{EXT}(p, q, s)$  requires that any extension of any minimal situation that makes *it is raining* true must contain a minimal situation in which *there are puddles* is true. In this case, there must be puddles in all situations that contain any minimal situation in which it is raining. What is contained in a minimal situation in which it is raining is a certain number of raindrops and the property of falling instantiated by them. A situation has to contain at least a puddle in order to make the prejacent *there are puddles* true. Therefore, there can be some situations that are extensions of a minimal evidence situation but do not contain a minimal prejacent situation. Consequently, (22) defies the extension requirement.

<sup>6</sup>As with the  $\text{EARLIEST}$  operator in Hirayama (to appear), existential quantification over maximally similar worlds is postulated to capture the non-veridicality of the evidentials.

<sup>7</sup>I do not commit to the assertive components of these evidentials.

A similar reasoning applies to the infelicity of (8b), which is repeated below as (23):

- (23) (You are in a bus which is full of passengers. You say:)  
#Apparently the “Bus Full” is being displayed.

Abductive analysis that does not rely on symbolic abduction correctly rules out this example; it defies  $EXT(p, q, s)$  since the appearance of the sign does not explain why the bus is full. Furthermore,  $EXT(p, q, s)$  is also not satisfied here. In this case, a minimal evidence situation contains only the bus’s front screen displaying “Bus Full.” Meanwhile, a minimal prejacent situation contains the entire bus and passengers on it (and the relation *be full of* instantiated by them). The  $EXT(p, q, s)$  requires that a minimal situation where the bus is full is contained in any extension of any minimal situation where the bus displaying “Bus Full”. However, situations that are not so large as to contain the entire bus cannot contain a minimal prejacent situation. As such,  $EXT(p, q, s)$  does not hold in (23) due to the existence of such situations.

Likewise, the oddity of (16), repeated below as (24), follows straightforwardly.

- (24) (You hung your laundry outside last night. Today, you wake up and see the roads are flooded. You infer that it rained so much during the night. You say without seeing the laundry you hung yesterday:)  
#Apparently the laundry is wet.

Even if the prejacent is true, that is, if the laundry is wet, it does not explain why the evidence proposition (*the roads are flooded*) is true. Therefore, (24) is incompatible with  $EXP(p, q, s)$ . It is also incompatible with  $EXT(p, q, s)$ . A minimal evidence situation only contains (relevant parts of) the roads and the property of being flooded. Some situation that is an extension of a minimal evidence situation does not have to contain a minimal prejacent situation, which makes *the laundry is wet* true; a situation is minimally required to contain the laundry and the property of being wet to make such a proposition true. Therefore (24) violates both  $EXP(p, q, s)$  and  $EXT(p, q, s)$ .

Next, let us turn to felicitous examples that the abductive analysis wrongly excludes (i.e., (10) and (12)) by demonstrating that they are all incompatible with  $EXP(p, q, s)$ , but satisfy the containment requirement. First, recall that the abductive analysis (as well as the causal one) rules out (10), repeated here as (25).

- (25) (When you come home, your husband phones you and asks if your daughter Mary is home. You hear Mary singing from her room. You say to your husband:)  
Apparently she is home.

As we saw in the previous section, this example does not satisfy  $EXP(p, q, s)$ , because it does not pass Winans’s test: the prejacent cannot be an answer to the question why the evidence proposition is true. Thus, the felicity of (25) is obtained only if it fulfills  $EXT(p, q, s)$ , and here it does. A crucial difference between the cases that does not satisfy  $EXT(p, q, s)$  and (25) is that in the former cases, the prejacent is not true in a minimal evidence situation. In (25), a minimal evidence situation is a situation where Mary is singing in her room. This makes the prejacent (*Mary is home*) true, because we just need (the thin particular of) the individual Mary, the relevant part of her home, and the relation of existing-in instantiated by the two entities in order to make that proposition true. In this case, all the three components are contained in

a minimal evidence situation, which automatically fulfills  $\text{EXT}(p, q, s)$  due to *persistence* of propositions assumed by Kratzer (2012):

- (26) A proposition  $p \in P(S)$  is persistent iff  $\forall s, s' \in S[s \sqsubseteq s' \wedge p(s) \rightarrow p(s')]$ , where  $P(S)$  is the power set of the set of all possible situations  $S$  (i.e.,  $P(S)$  is the set of all propositions).  
(Kratzer, 2012: 120)

This definition says that if a persistent proposition  $p$  is true in a situation  $s$ , it is true in all extensions of  $s$ . I assume, following Kratzer, that all propositions are persistent.<sup>8</sup> With this assumption, the prejacent becomes true in all extensions of evidence situations, because, once it is true in a minimal evidence situation, its persistence guarantees that it becomes true in all situations of which the minimal evidence situation is a part. Given persistence, if the prejacent is true in a situation, it means that the situation contains a minimal prejacent situation. Thus,  $\text{EXT}(p, q, s)$  is satisfied in (25), and the semantics proposed in (21) correctly predicts (25) to be felicitous.

Finally, the proposed semantics can capture the felicity of (12), where the prejacent accompanies the circumstantial modal *can*:

- (27) (You go to a vacant lot to play baseball, but you find other people occupying it. You say to yourself:)  
Apparently I can't use this vacant lot.

We have seen that abductive analysis (as well as causal analysis) cannot explain the felicity of (27), because the fact that there are others occupying the vacant lot cannot be explained even if the speaker cannot use it (and (27) does not pass Winans's test). Therefore, (27) is incompatible with  $\text{EXP}(p, q, s)$ , and we have to prove that it fulfills  $\text{EXT}(p, q, s)$ .

Since our current discussion is based on the framework of situation semantics, I relativize the denotation of the prejacent with possible worlds (that is, (15)) to the one with situations as follows (I ignore the time variable here for expository purposes):

- (28) a.  $\llbracket I \text{ cannot use this vacant lot} \rrbracket$   
 $= \lambda s. \forall s' [s' \in \text{MAX}_{g(s)}(\cap f(s)) \rightarrow \text{I don't use this vacant lot in } s']$ .<sup>9</sup>  
 b.  $f(s) = \{p: p \text{ is a relevant fact in } s\}$ .  
 c.  $g(s) = \{p: p \text{ is normally true in } s\}$ .

Therefore, the quantificational domain of *can*, that is,  $\cap f(s)$ , represents the set of situations that are compatible with the facts in  $s$  (that is, situations in which all relevant facts in  $s$  are available). Given this, (28a) is true in a situation  $s$  if and only if the proposition *I don't use the vacant lot* is true in all the situations that are compatible with all the facts in  $s$ , and which are best-ranked in terms of what is normally true in  $s$ . When  $f(s)$  contains the proposition *others are occupying the vacant lot*, the truth of (28a) in  $s$  minimally requires  $g(s)$  to contain a proposition such as *if*

<sup>8</sup>This assumption might appear to run counter to the semantics of sentences with universal quantifiers; even if all the people in Japan have the property of living in Japan, it does not ensure that all the people in the world have this property. This problem can be circumvented with contextual restrictions on quantificational domains (cf. von Stechow, 1994). For more details, see Section 5.3.4 of Kratzer (2012).

<sup>9</sup>This denotation is somewhat simplified compared to those proposed in Portner (2007) and Kratzer (2019), where modals are treated similarly to quantificational adverbs. I redact such a complication because it is not relevant to the current discussion.

*someone occupies a place, then you do not use it*, because these two propositions jointly entail that the speaker does not use the vacant lot.

What fact is available depends on the situation, so the output of the modal base  $f$  varies with the input situation. However, what is normally true depends on what possible world we are talking about, and it seems unproblematic to assume that what is normal does not vary among situations that belong to the same world, especially when it comes to conditionalized propositions such as *if someone occupies a place, then others do not use it*. Suppose that this proposition is normally true in some place that is a part of this world. It is not conceivable if that proposition loses its normality in another part of the same world. That is, some of the propositions that are normally true in a situation are also normally true in any part of the same world. I refer to such propositions as *situation-independent* propositions, whose formal definition is provided in (29):

- (29) A proposition  $p \in g(s)$  is situation-independent iff  
 $\forall s', q[[s' \sqsubseteq w_s \wedge s' \notin \text{MIN}(q)] \rightarrow p \in g(s')]$ .

In prose, if a situation-independent proposition is contained in the ordering source in  $s$ , then it is also contained in the ordering source whatever non-minimal situation (in the same world) it takes. The non-minimal requirement is needed because if  $p$  were normally true in minimal situations as well, minimal situations would no longer be minimal; such minimal situations would make it true that *normally*  $p$  is true. I assume that, at the very, least conditionalized propositions in  $g(s)$  are situation-independent.

Let us see how both the definedness condition in (28a) and situation-independence satisfy the extension requirement. In (27), the evidence proposition  $q$  is *others are occupying the vacant lot*. This proposition is true in all situations  $s''$  such that for all  $s' \in \text{MIN}(q)$ ,  $s'$  is a part of  $s''$  because of persistence. This means that for all such situations  $s''$ ,  $f(s'')$  contains  $q$ . Consequently, (20) in (12) winds up saying that a minimal situation in which the proposition *I cannot use the vacant lot* is true is contained in all situations (in the same maximally similar world) where others are occupying the vacant lot.

Here, the situation-independence of conditionalized propositions comes into play. The proposition *if someone occupies a place, then you do not use it* is normally true in our world, so it should normally be true in any maximally similar worlds. (29) ensures that this conditional proposition is contained in the set of normal propositions relative to all non-minimal situations in those worlds. Therefore, for all  $s''$  such that  $s' \sqsubseteq s''$  for all  $s' \in \text{MIN}(q)$ ,  $f(s'')$  at least contains the proposition *others are occupying the vacant lot*, and  $g(s'')$  at least contains *if someone occupies a space, then you do not use it* (the requirement  $s' \sqsubseteq s''$  ensures that  $s''$  is non-minimal, which means that the situation-independent proposition is a member of  $g(s'')$ ). We have seen that the truth of (28a) minimally requires these two propositions to be true. Therefore, no matter how a minimal evidence situation  $s'$  is extended to a larger situation  $s''$ , there is some minimal preadjacent situation that is contained in  $s''$ , because both  $f(s'')$  and  $g(s)$  at least contain *others are occupying the vacant lot* and *if others are occupying a place, then you don't use it*, respectively. This fulfills  $\text{EXT}(p, q, s)$ .

#### 4. Conclusion and prospects

It was shown that some evidentials put a semantic restriction on what information can count as evidence, in addition to their evidence-type specification. I examined the empirical coverage of previous studies, demonstrating that all of them run counter to problematic examples. I proposed weakening the abductive/causal analysis in Krawczyk (2012) and Davis and Hara (2014) with the extension requirement, and illustrated that the proposed semantics correctly derives the (in)felicity of all the examples discussed so far.

While the proposed analysis is empirically superior to previous analyses, it has still a conceptual drawback: previous analyses (that is, the abductive, causal, and temporal ones) attempt to derive the facts with one constraint, while the current proposal posits two requirements connected with a disjunction, which is stipulative unless there is a conceptual link between the two disjuncts.

The issue of how to subsume one of the two requirements under the other still persists, but there is a candidate that can be an alternative to the disjunctive constraint: Lewis's (1973) analysis of causation.<sup>10</sup> Roughly, Lewis's definition of causation between the cause *c* and effect *e* is that if *c* did not occur, then *e* would have not occurred. Substituting these two events with propositions instantiated by them, I propose the following counterfactual statement as a possible candidate (Note that although there are a lot of objections to defining causation as in (30), what is needed here does not correspond to the right analysis of causation):

- (30) *Apparently / seem / yooda* are felicitous where the following statement is acceptable:  
*if the prejacents were not true, then the evidence proposition would not be true.*

It should be noted that (30) consists of natural language, rather than of formal language, so its interpretation depends on our linguistic intuition.

The following shows that the generalization in (30) is compatible with (in)felicity of the examples we have seen so far:

- (31) a. Context: You see puddles on the ground:  
 Apparently it rained.  
 [✓ If it had not rained, then there would not be puddles.]  
 b. Context: You see falling raindrops from the window:  
 #Apparently there are puddles.  
 [# If there were not puddles, then it would not have rained.]
- (32) a. (From outside of a bus, you see the "Bus Full" sign. You say:)  
 Apparently that bus is full.  
 [✓ If that bus were not full, then "Bus Full" sign would not be being displayed.]  
 b. (You are in a bus which is full of passengers. You say:)  
 #Apparently the "Bus Full" is being displayed.  
 [# If the "Bus Full" were not being displayed, then the bus would not be full.]
- (33) (When you come home, your husband phones you and asks if your daughter Mary is home. You hear Mary singing from her room. You say to your husband:)

<sup>10</sup>Note that Davis and Hara (2014) do not adopt Lewis's definition of causation; rather, they leave the relation CAUSE as a primitive.

Apparently she is home.

[✓If Mary were not home, then Mary would not be singing in her room.]

- (34) (You go to a vacant lot to play baseball, but you find other people occupying it. You say to yourself:)

Apparently I can't use this vacant lot.

[✓If I could use this vacant lot, then others would not be occupying it.]<sup>11</sup>

- (35) (You hung your laundry outside last night. Today, you wake up and see the roads are flooded. You infer that it rained so much during the night. You say without seeing the laundry you hung yesterday:)

#Apparently the laundry is wet.

[#If the laundry were not wet, then the roads would not be flooded.]

Thus, we do not need to resort to a disjunctive constraint by positing the generalization in (30) as a semantic constraint on the indirect evidentials.

The counterfactual in (30) seems to have a conceptual connection to what is expressed in  $\text{EXP}(p, q, s)$  and  $\text{EXT}(p, q, s)$ .<sup>12</sup>  $\text{EXP}(p, q, s)$  requires that the prejacent  $p$  be the best-fit (or the most plausible) explanation for the evidence proposition  $q$ . Formally, it is unclear what it means for a proposition to be an explanation for another. However, we have a strong intuition that an explanandum/causee is not observed if what explains/causes it is unavailable.

As for  $\text{EXT}(p, q, s)$ , we have seen that it is satisfied (i) if a minimal evidence situation itself makes the prejacent true (as in (10), where  $p = \text{Mary is home}$  and  $q = \text{Mary is singing in her room}$ ), or (ii) if the truth of the prejacent minimally follows from the addition of what is normally true to the information available in a minimal evidence situation (as in (12), where  $p = \text{I cannot use this vacant lot}$  and  $q = \text{Others are occupying the vacant lot}$ ). In the case of (i), if the prejacent (that is, what is entailed) is false, then the evidence proposition (what entails the prejacent) automatically becomes false. In the case of (ii), it is plausible that propositions that are normally true in the actual world are all actually true in the same world unless otherwise specified (that is, if  $p$  is normally true, we assume that  $p$  is actually true unless something unexpected happens). This means that if a modalized prejacent is false in the actual world, we ordinarily assume that what is false is not what is normally true, but what is observed (i.e., evidence) on which the modal reasoning is based. Given that such observations are described by the evidence proposition, the falsity of the prejacent, in normal cases, winds up implying that the evidence proposition is not true.<sup>13</sup> Thus, we can say that the counterfactual statement in (30) is a plausible candidate to unify the two conditions.

However, the generalization in (30) relies on our intuition regarding a natural language sentence, rather than on the interpretation of formal meta-language. This is undesirable because we cannot see the formal relationship between evidentials' meaning and other semantic fields

<sup>11</sup>Lisa Matthewson (p.c.) commented that this counterfactual is acceptable, but not so obvious as the other good ones, as well as that it somehow requires a bit more reasoning.

<sup>12</sup>This and the next paragraphs do not address a formal relationship between (30) and the two constraints proposed in the previous section. Instead, it provides an intuitive motivation for why the empirical coverage of (30) is identical to that of the disjunctive constraint  $[\text{EXP}(p, q, s) \vee \text{EXT}(p, q, s)]$ .

<sup>13</sup>Of course, this reasoning does not always hold. This might play a role in the fact that (34) sounds a bit less acceptable than other counterfactuals as is alluded to above.



unless (30) is implemented with familiar semantic toolboxes. Therefore, one avenue for future research is to pursue how to formalize the descriptive generalization in (30).

Finally, given that the proposed semantics is independent of evidence-type specification, it is potentially applicable to evidentials with other evidence-types. In fact, it is compatible with typical direct evidence, which is expressed with the Tibetan direct evidential ‘*dug* (the data are from Kalsang et al., 2013):

- (36) a. Visual  
       bKra.shis stod.gos sngon po zhig.gyon ‘dug  
       Tashi shirt blue a wear ‘dug  
       ‘Tashi is wearing a blue shirt (and the speaker sees it).’  
       b. Auditory  
       dKun.dg’as gzhas gtang gi ‘dug  
       Kunga song sing IPFV ‘dug  
       ‘Kunga is singing (and the speaker hears it).’  
       c. Tactile  
       lug gi bal ‘di ‘jam.po ‘dug  
       sheep AGT/INST wool this soft ‘dug  
       ‘This sheep’s wool is soft (and the speaker feels it).’  
       d. Gustatory  
       ja la tsha min ‘dug  
       tea OBL salt NEG ‘dug  
       ‘There is no salt in the tea (and the speaker tastes it).’  
       e. Olfactory  
       spos de dri.ma zhim.po ‘dug  
       incense this smells good ‘dug  
       ‘This incense smells good (and the speaker smells it).’

As is seen in the description of what evidence is, in (36a), (36b), (36c), and (36e), the evidence proposition seems to correspond to the prejacent: in all these examples, the speaker perceives the event instantiating the prejacent (though the ways of perception differ). The extension requirement is satisfied if the prejacent and evidence proposition are identical, because minimal *p*-situations are contained in (or identical to) all extensions of all minimal situations in which *p* is true due to persistence. As for (36d), the evidence proposition seems different from the prejacent, because even if one tastes something and finds that it is not salty at all, she cannot know whether there is not salt in it or not; at the very least, we can safely say that the evidence proposition in (36d) is *the tea is not salty at all*. Although it is not clear whether the extension requirement is met, (36d) satisfies the abductive/causal requirement: the saltlessness of the tea is explained/caused by lack of salt in the tea. Thus, the proposed semantics of evidence can possibly be extended beyond indirect evidentials. Although its applicability is subject to future research, the semantics of evidence beyond evidence-types represents a perspective that has not been pursued by previous studies.

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