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# Formalizing Current Relevance

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**Abstract.** This article presents a way of formalizing the notion of Current Relevance based on the seminal work by Merin (1999). Its aim is to provide formalist linguistics with a valuable tool for accounting for the meaning of present perfects.

**Keywords:** perfect tenses, current relevance, probabilistic pragmatics, discourse topic

## 1. Introduction

Both functionalists and formalists have made important contributions to the literature on perfect tenses and their semantics. Unfortunately, here — as in other areas — there is little interaction between the two schools of thought. The key concept of functionalists when dealing with perfect tenses is the notion of CURRENT RELEVANCE. While formalists may sympathize with the basic intuition, the notion of current relevance itself has had little impact on their literature. The main reason seems to be that there has been strong doubt as to whether current relevance in particular or relevance more generally could ever be defined in a rigorous way.

The main point of this paper is that such rigorous definitions of relevance are at hand, even if they are not — or maybe cannot be — framed in traditional formats, based on (intensional) logic alone. The formalization proposed here is probabilistic in nature, and constitutes a relatively straightforward adaptation of ideas developed by Arthur Merin (1999, 2003). I will also argue that it naturally extends the “Perfect State” family of formalist proposals.

The paper is structured as follows: in section 1, the idea of current relevance for perfect tenses is introduced. Section 2 compares current relevance with general relevance, and discusses how current relevance frameworks can address certain difficult issues that arise in connection with perfect states, if they are seen as discourse topics. Section 3 introduces Merinian relevance, and proposes a formal account of current relevance based on conditional probabilities. Section 4 offers a brief speculation on how certain perfect readings could be conceived in this framework, and section 5 concludes the paper.

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## 2. Current vs. General Relevance

The basic intuition put forward in this paper is that current relevance is an instance of general relevance, as used in standard Gricean pragmatics, and more particularly, as has been studied in Sperber and Wilson (1995) or Merin (1999).

### 2.1. Current Relevance: The Idea

The basic idea of tenets of functionalist theories of perfects (see, e.g., Dahl and Hedin (2000); Bybee et al. (1994), and many others) is that a perfect tense, as opposed to a general past tense, conveys some idea of current relevance.

- (1) a. John has arrived.  
b. John arrived.

In (1), the situation in (1a) is assumed to have a special relevance for the current moment, which (1b) lacks. Evidence for this can be adduced in languages like German, where the simple past is distinctively odd in strong current relevance contexts:

- (2) a. #Mein Gott, warum verließest Du mich? [Matthew 27:46]  
My Lord, why forsake.PAST you me?  
“My Lord, why did you forsake me?”  
b. #Scheiße! Ich schaltete den Herd nicht aus! [adapted from Partee (1984)]  
Damn! I turn.PAST the stove NEG off!  
“I didn’t turn off the stove!”

Using a past tense in (2a) makes that sentence sound like an academic dispute with no bad feelings involved at the present moment. Similarly, if one is seriously worried about whether or not one’s house is on fire, the simple past tense is odd in (2b).

Formalists would agree with the basic intuition that current relevance is supposed to capture, but have rejected the notion itself. Instead, a panel of devices has been developed to account for such phenomena, namely i) reference points (e.g., Reichenbach, 1966); ii) perfect states (e.g., Nishiyama and Koenig, 2004; Schaden, 2009); and iii) perfect time spans, or Extended Now Intervals (e.g., Pickbourn, 1789; McCoard, 1978; Rothstein, 2006). In principle and in practice as well, there are authors using combinations of several of these. For instance, Portner (2003) mixes a perfect state and a perfect time span approach, and I myself have combined reference points and perfect states (see Schaden, 2009).

In any case, the formalists' devices are assumed to be present in a sentence with a perfect tense like (1a), but absent from sentences like (1b) with a simple past tense. There is however one important conceptual difference between formalist and functionalist accounts of perfect tenses: all formalist devices are discrete in nature (that is, either present or absent), whereas current relevance is in principle a fully gradable notion. This is a difference that is not often exploited, but see Schaden (2012).

In the remainder of the paper — for want of space, but also because it is not directly relevant to the main issue addressed —, I will simply presuppose that perfect state theories are on the right track, and integrate current relevance into this framework. Notice however that nothing in principle prevents this particular version of current relevance to be integrated within an Extended-Now/Perfect Time-Span theory, as long as this interval is associated with some additional propositional content.<sup>2</sup>

## 2.2. Current Relevance and Discourse Properties of a Perfect

As far as I am aware, Portner (2003) was the first to reframe the issue of the discursive implications of the use (or not) of a present perfect — which had already been studied in several flavors of Discourse Representation Theory —, and to explicitly point out the close connection between the notions of a perfect state and of a discourse topic. My aim is to point out that there is an obvious link between a perfect's discourse properties and the notion of current relevance (at least if one sees the latter as an instance of the more general pragmatic notion of relevance).

### 2.2.1. Perfects Without Current Relevance: Portner (2003)

Before I start exposing and criticizing Portner's approach concerning a modal pragmatics for perfects, let me clarify briefly the aim of this section. I wish to show that Portner's intuitions can be (formally) accounted for in terms of current relevance — which I think is independently a good idea. However, while it is quite clear that his ideas have not been worked out sufficiently in Portner (2003), I do not think that the general project of a modal characterization of perfect pragmatics is inherently flawed, nor that Portner's proposal could not be amended.

Portner's idea is that a proposition asserting the existence of an event description  $\phi$  containing an event  $e$  under the scope of a perfect operator<sup>3</sup> — added to a context set of propositions — will

<sup>2</sup>This requirement is not standard in Perfect Time-Span Theories, and certainly not commonly assumed. Yet, as we will see below (see section 3.2, p. 8ff.), propositional content not directly attributable to the main event's propositional characterization is necessary for this particular theory of current relevance to work.

<sup>3</sup>I will abbreviate henceforth by sloppily speaking about an event  $e$  or state  $s$ , when what is really at stake is a proposition of type  $\exists\{e|s\}[\dots]$

entail<sup>4</sup> a proposition containing a description of the perfect state  $s$ .

In order to understand this, let us look at an example discussed by Portner, involving a prototypical current relevance reading of a present perfect:

- (3) a. Mary has read *Middlemarch*.  
 b. Discourse Issue/Topic: We need to get an explanation of Eliot's style. Who can we ask?<sup>5</sup>

In (3a), the basic proposition  $E$  containing an event  $e$  is  $\text{read}(\text{mary}, \text{middlemarch})$ , and the perfect state's propositional content would be accommodated to  $\text{can\_explain}(\text{mary}, \text{eliot's-style})$ . Let us now look at the precise working of the inferential process. Following Portner (2003, 500), I assume the following propositions to be contained within the discursive Common Ground:

- (4) {If someone who isn't stupid reads an author's book, they understand her style; Mary is smart; George Eliot wrote *Middlemarch*}

As argued by Portner, adding (3a) to the common ground in (4) will entail that Mary understands Eliot's style, and so the discourse issue can now be resolved: we can or should ask Mary to explain Eliot's style to us, and she will give us the answer. This may involve adding additional accommodations to the context set, as exemplified in (5):

- (5) {If someone who isn't stupid understands an author's style, they can explain it; if we ask someone, they will respond; ... }

As we have now seen the basic outline of Portner's proposal, let us look at the current relevance version of the same story, and why it might be preferable.

<sup>4</sup>This may be a strengthening of Portner's position with which he may not agree. He writes (p. 501):

- (i) A sentence  $S$  of the form  $\text{PERFECT}(\phi)$  [sic!; should be  $p$ ] presupposes:  
 $\exists q[\text{ANS}(q) \wedge \mathbf{P}(p, q)]$ , where  $\text{ANS}$  is true of any proposition which is a complete or partial answer to the discourse topic at the time  $S$  is uttered.

$\mathbf{P}$  is a modal operator which he does not define. He only states that it "is similar to an epistemic must" (p. 499). However, Portner's explanation of the example we will discuss below *does* indeed use entailment (see Portner, 2003, 500), although he might not agree that this is generally the case. Be that as it may, it may be possible to explicitly state an appropriate modal operator, even if Portner (2003) has not done so.

<sup>5</sup>If you prefer to have the discourse topic stated as a set of propositions, this could be done roughly as follows:  
 $?x[\text{we\_can\_ask\_about\_Eliot's\_style}(x)]$

### 2.2.2. Why Current Relevance Might Be Preferable

Let us reconsider example (3a), assuming that we are dealing with the same discourse topic. One can say things like (6):

- (6) a. Mary has read *Middlemarch*, ...  
 b. ... but I don't know whether she will be able to help us.

(6) still contains, in some intuitive sense, a current relevance reading of the perfect in (6a). But there clearly is no entailment to the perfect state anymore, nor an equivalent, however rough, to an epistemic *must*. The continuations (7b-c) are infelicitous with sentence (7a).

- (7) Mary has read *Middlemarch*, but I don't know whether she will be able to help us.  
 a. #So, she must be able to explain Eliot's style.  
 b. #So, we {can; should} ask her about Eliot's style.

The question now is how and why could (7a) still be relevant? The intuitive idea is the following: we do not want to require something as strong as an entailment relation between the propositions characterizing the perfect state *s* and the event *e*, but merely that *E* has an *impact on the probability* of *S* to hold at the moment of utterance. And this impact on the probability of *S* is the current relevance of *E*.

In a context where the probability of other available people's ability to explain Eliot's style is close to or equal to 0, even a relatively low probability that Mary might help us would be an improvement. And to the degree that the probability of our getting the needed information is raised, (3a) is relevant in a given context.

In the next section, we will see how this basic idea can be formally implemented in a modified version of Merin's relevance theoretic pragmatics.

### 3. Merinian Current Relevance

The last 15 years have brought great advances in theoretical pragmatics, and at least two formal accounts of (general) relevance have been proposed,<sup>6</sup> namely by Merin (1999, 2003) and by Parikh (2009). Contrary to more standard versions of (neo-)Gricean pragmatics, these frameworks are based on decision (viz. game) theory, and make use of probabilities in order to capture phenomena of relevance.

<sup>6</sup>Neither formal account bears any close relation to *Relevance Theory* as formulated in Sperber and Wilson (1995).

Although it would be possible to base a definition of current relevance on Parikh (2009), I will adopt here a slightly modified version of Merin's notion of relevance. Merin's original proposal is an argumentative one, which tries to capture and to formalize Anscombe and Ducrot (1983). These French authors proposed a framework of pragmatics<sup>7</sup> which is based on the effects of opposing interests of speaker and hearer, rather than on their cooperation, as in (neo-)Gricean frameworks. Merin's theory of relevance is based on earlier work in philosophy by Carnap (1950) and Carnap and Bar-Hillel (1952) on informativity.

In my proposal, I will dispense tentatively with argumentation.

### 3.1. The Basic Idea

Merin's account of relevance is set in a probabilistic framework, which can be seen as an extension of standard, truth-conditional logics. The basic idea is that — given one's epistemic context, one can assign some kind of probability — that is, a number between 0 and 1 — to sentences like (8):

(8) The Austrian national football team is the best football team in the world.

In epistemic states conforming to reality, the probability assigned to (8) should be close to 0. Now, it is of course possible that a hearer's epistemic state does not allow him to assign a probability to (8), for instance, if he is not interested at all in football.

However, as with truth-conditional semantics — which is not interested in the truth or falsity of a proposition *per se*, but rather in entailment-*relations* between propositions — we are not interested here in the probabilities as such, but rather in some relations between probabilities, namely *conditional probabilities*, part of which is what Merin (2003) calls the *epistemic context change potential*.

In a very intuitive way, an agent proceeds as follows in order to evaluate the relevance of a proposition  $\phi$ : given his epistemic state, and facing a discursive issue (such as: “*Is the Austrian national football team the best football team in the world?*”) he evaluates how probable the state of affairs denoted by  $\phi$  is. The more the proposition  $\phi$  (assuming it is true) allows the speaker to resolve the discursive issue, the more relevant it is.

The basic tool used by Merin in order to assess relevance is the notion of *conditional probability* of the proposition given the discursive issue (which can be seen as yet another proposition), and which is noted  $P(\text{proposition}|\text{issue})$ . More formally, Merin (2003, 16) defines the relevance of a proposition  $E$  with respect to another proposition  $H$  and an epistemic context  $i$  — written  $r_H^i(E)$

<sup>7</sup>Actually, Anscombe and Ducrot (1983) reject the idea of separating semantics from pragmatics.

— as follows:

$$(9) \quad r_H^i(E) =_{\text{def}} \log \frac{P^i(E|H)}{P^i(E|\neg H)}$$

As is made clear in (9), Merin is interested in the odds distinguishing the conditional probability of the proposition  $E$  given  $H$  with respect to the conditional probability of  $E$  given  $\neg H$ , and not so much in the exact value of each conditional probability — which would very often be rather difficult to estimate with a sufficiently high degree of precision.

Let us look in more detail at the formula in (9).  $P(E|H)$  (viz.  $P(E|\neg H)$ )<sup>8</sup> notes the conditional probability of  $E$  on  $H$  (viz.  $\neg H$ ), that is the probability of  $E$  given  $H$  (or  $\neg H$ ). If we consider borderline cases, we will be able to see the relation of conditional probabilities to truth conditional semantics. If the union of the discourse issue  $H$  with the epistemic context  $i$  (considered as a set of propositions) entails the proposition  $E$ , then  $E$  will have a conditional probability of 1, i.e., will have to be true (see (10a)). On the other hand, if that union entails the negation of  $E$ , then the conditional probability of  $E$  will be 0 (see (10b)).

- (10)    a.    if  $H \cup i \models E$  then  $P(E|H) = 1$   
           b.    if  $H \cup i \models \neg E$  then  $P(E|H) = 0$

Let us walk through an example, where we have a proposition  $E$  in (11a), and a discursive goal  $H$  (11b), whose negation  $\neg H$  is spelled out in (11c):

- (11)    a.    [ $E$ :] The Austrian national football team failed to qualify for the European Football Championship in 2012.  
           b.    [ $H$ :] The Austrian national football team is the best football team in the world.  
           c.    [ $\neg H$ :] The Austrian national football team is not the best football team in the world.

In order to evaluate the relevance of (11a), we need to establish the conditional probabilities with respect to both  $H$  and  $\neg H$ . So, we will take the second part (i.e.,  $H$ ) as given, and then we will try to evaluate the probability of  $E$  under these circumstances.

<sup>8</sup>Written out properly, these conditional probabilities should always contain a superscripted  $i$  — that is, they should be  $P^i(E|S)$  and  $P^i(E|\neg H)$  —, since that probability has to be evaluated with respect to the epistemic state  $i$ . In order to avoid cluttering the text, I will omit henceforth the explicit reference to the epistemic state in the notation of conditional probabilities.



Let us start with  $(E|H)$ . We assume for the sake of the argument that (11b) is true, and we ask ourselves how probable it is that the best football team in the world should fail to qualify for the European Championships. Under normal circumstances, the best team in the world should qualify for such a competition, and so the conditional probability  $(E|H)$  should be rather low. We do not need to give an exact estimate; we simply note this low probability  $\varepsilon$ .

Now, we need an estimate for  $(E|\neg H)$ . Therefore, we assume now that  $\neg H$  is true. Under these circumstances, (11a) seems less strange, i.e., it is by far more probable. While it is again difficult to assign an exact probability to it, it should be clear that the probability assigned to  $P(E|\neg H)$  — call it  $\delta$  — is much higher than  $\varepsilon$ .

Now we can calculate the relevance of (11a) with respect to  $H$ : we simply need to fill  $\varepsilon$  and  $\delta$  into the formula in (9). We obtain thus a relevance score of  $\log \frac{\varepsilon}{\delta}$ , where  $\varepsilon < \delta$ . Therefore, the result of  $\frac{\varepsilon}{\delta}$  will be in the interval  $[0 < x < 1]$ , and its logarithm a negative number. In Merin's system, that means that it is *negatively relevant* (that is: an argument against the discourse issue). Therefore, the sentence (11a) is to the point, but undermines the claim  $H$ , and so, the speaker wishing to defend (11b) should refrain from using argument (11a).

Having thus seen how (general) relevance is implemented in Merin's theory, let us now see how *current* relevance can be defined in these terms.

### 3.2. Defining Current Relevance

The formalization of current relevance that I will propose in (13) is a relatively straightforward implementation of Merin's notion of relevance, differing essentially in that it ignores argumentativity and that it maps on the interval  $[0,1]$  instead of  $[-\infty, +\infty]$ . Just like in Merin's original formalization, we deal with a ratio between the conditional probability of a proposition  $E$  with respect to a discourse topic, which is now the proposition describing the perfect state, and the negation of the latter proposition.

Before presenting the formalization, let me first say a word about why Merin's approach fares particularly well with perfect state theories. The reason is the following: in a very simplified way, perfect state approaches will attribute truth conditions along the lines of (12) to sentences with perfects:

$$(12) \quad \exists e \exists s [e \prec n \wedge s \circ n \wedge \mathbf{P}(e) \wedge \mathbf{Q}(s)] \text{ where } n \text{ is the moment of utterance}$$

In (12), we can distinguish two parts, namely i) a first (main) proposition  $\mathbf{P}(e)$  describing an event  $e$  — which I will note  $E$  henceforth; and ii) a second proposition  $\mathbf{Q}(s)$  characterizing the perfect

state  $s$  — which I will note  $S$  henceforth.<sup>9</sup>

Since Merinian relevance is a relation between two propositions given an epistemic state, perfect state theories provide the basic ingredients for the relevance theoretic machinery to work on. This is not necessarily the case for reference point or perfect time span theories. However, if one assumes that the reference point or the perfect time span is saturated with some propositional content, the notion of current relevance defended in this paper can be applied to these families of theories as well.

But let us now look at the proposed definition of current relevance in a probabilistic framework:

- (13) The current relevance of a proposition  $E$  being a description of the event  $e$  (where  $e$  precedes the moment of utterance  $n$ ) with respect to a proposition  $S$  characterizing a perfect state  $s$  (where  $s$  overlaps  $n$ ) and with respect to an epistemic state  $i$  of an agent at  $n$  — written  $CR_s^i(E)$  — is defined as follows:

$$CR_s^i(E) = \begin{cases} 0, & \text{if } \mathbf{max}(\{P(E|S), P(E|\neg S)\}) = 0; \\ 1 - \frac{\mathbf{min}(\{P(E|S), P(E|\neg S)\})}{\mathbf{max}(\{P(E|S), P(E|\neg S)\})}, & \text{otherwise} \end{cases}$$

The outcome will always be a number in the interval  $[0, 1]$ , where 0 denotes the complete absence of current relevance, and 1 its absolute acme. Let us consider the formula more in detail. The first condition takes care of the limiting case where both conditional probabilities are 0, that is, certainly false. Let us look at the second condition. First of all, an event-description guaranteed to be true given both  $S$  and  $\neg S$  should be as irrelevant as if both were false, and this is derived by the formula (since  $1 - 1 = 0$ ). More generally, if the conditional probabilities of  $E$  given both  $S$  and  $\neg S$  are identical<sup>10</sup>, the current relevance score of  $E$  will be 0. The greater the difference between the two conditional probabilities, the higher the current relevance of an event will be. Conditional probabilities of 1 will be assigned to events which have probability 0 given  $s$  (or  $\neg s$ ), and a non-zero probability otherwise.

This will notably be the case for events in relation with their non-reversible resultant states, like *to die* w.r.t. *be dead*.

- (14) a. [E:] John has died.  
b. [S:] John is dead.

Assuming that John is dead, it will certainly be the case that John has died (thus,  $P(E|S) = 1$ ). Yet,

<sup>9</sup>So uppercase  $E$  and  $S$  are propositions, whereas lowercase  $e$  and  $s$  are individual situations (in the sense of Comrie (1976)), and thus of type  $\langle e \rangle$ .

<sup>10</sup>It does not matter what that probability is, since for any  $x$ ,  $\frac{x}{x} = 1$ , and therefore,  $1 - \frac{x}{x} = 0$ .

if he is not dead, it cannot be the case that John has died (thus  $P(E|\neg S) = 0$ ). We therefore obtain a current relevance score  $CR_S^i(E)$  of 1, because by (13),

$$(15) \quad 1 - \frac{P(E|\neg S)}{P(E|S)} = 1 - \frac{0}{1} = 1$$

### 3.3. Going Through An Example

In order to see how this notion of current relevance is working, let us come back to Portner's example (3):

- (3) a. Mary has read *Middlemarch*.  
 b. Discourse Issue/Topic: We need to get an explanation of Eliot's style. Who can we ask?

Notice that the whole notion of relevance advocated in (13) is strongly dependent on the epistemic states of speaker and hearer. Therefore, in order to make explicit the whole process of determining the current relevance of a proposition like (3), we do not only need to have a rough idea of the context in which (3) is uttered, but we also need to state these epistemic states as clearly as we can — which may seem tedious, but this is the price to pay for a formal theory of relevance. So, let us assume the following setting for the epistemic context in which utterance (3) is set:

- Both the speaker and the hearer are great fans of Mexican masked wrestlers, and while they have heard the name Eliot, and can cite the title of several works, they have never actually read anything by or about her. Furthermore, they need an answer to the issue very quickly.
- The persons they might contact with respect to this issue and within an acceptable delay are the following:
  - Mary — of whom the speaker has private knowledge that she has read at least *Middlemarch*. However, speaker and hearer share the assumption that Mary is not particularly bright, and that she is not particularly qualified with respect to the stylistical analysis of English literature.
  - Jane — of whom speaker and hearer know that she is a big fan of Dan Brown, but that she despises non-Brownian literature in general, and Victorian novels in particular, and that she never misses an opportunity to lecture people on the superiority of Dan Brown to, say, Dante, Flaubert or Eliot.
  - Sue — of whom speaker and hearer know that she likes literature (though they are not entirely sure about Victorian novels in general and Eliot in particular), but whose

current level of alcoholization is incompatible with extended efforts of linguistic vocalization.

We can estimate the private and common epistemic states of speaker and hearer as being roughly the following:

- Speaker and hearer share the knowledge that the probability of getting an explanation without consulting anybody equals 0, since it is their common knowledge neither one of them has the means to explain Eliot's style.
- It is private knowledge of the speaker that the probability of getting a satisfying answer from Mary is weak, but above 0. I will note this probability by  $\delta$ , and assume that  $0 < \delta < 0.1$ .<sup>11</sup>
- Speaker and hearer share the common assumption that at this particular moment, the probability of getting an explanation from Sue that they might understand is negligible at best, and probably not much above 0. I will note the probability of getting an answer from Sue  $\varepsilon_1$ , and assume that it is higher than 0, but far below  $\delta$  (thus:  $0 < \varepsilon_1 \ll \delta$ ).
- Speaker and Hearer share the common assumption that the probability of getting an explanation from Jane is also negligible, and probably not much above 0. I will note the probability of getting an answer from Jane  $\varepsilon_2$ , where once again  $0 < \varepsilon_2 \ll \delta$ .
- I will assume furthermore that neither speaker nor hearer can distinguish or rank clearly  $\varepsilon_1$  and  $\varepsilon_2$ . Therefore, I assume that they think of these two values as being identical in their epistemic state and with respect to the issue at hand, that is,  $\varepsilon_1 \approx \varepsilon_2$ .

Given this context and their respective epistemic states, both Speaker and Hearer cannot expect the discourse topic to be resolved. Therefore, we are very far away from an epistemic *must*, as required by Portner (2003). Yet, intuitively, sentence (3a) should still be highly relevant in this situation, because the probability  $\delta$  of getting an answer from Mary is much higher than both  $\varepsilon_1$  and  $\varepsilon_2$ , and because therefore, asking Mary is still the best chance to get the information speaker and hearer want.

### 3.3.1. Why We Need the Odds-Format

In our analysis of the case up to this point,  $\delta$ ,  $\varepsilon_1$  and  $\varepsilon_2$  are conditional probabilities that are only based on the epistemic state and the discursive topic  $S$ , and are not in odds-form, that is, an evaluation of the conditional probabilities with respect to  $S$  and  $\neg S$ , in which the present current-relevance

<sup>11</sup>I have set this up as private information in order to give the speaker an incentive to communicate.

<sup>12</sup>I use the sign of " $x \ll y$ " as denoting " $x$  is much smaller than  $y$ ".

formalization is framed. Would it not be easier to simply take these conditional probabilities, only with respect to  $S$ , while discarding  $\neg S$ , and choose the highest?

This would not be a good idea, and the reason is that there are alternatives that would have a far higher conditional probability than (3), for instance, any version of (16):

(16) {Mary, Jane, Sue} is a girl.

It is reasonable to assume that any of the sentences in (16) has a far higher probability than (3). But, intuitively, (16) is completely irrelevant to the issue at hand. Why is this so? Notice that the conditional probability of (16) with respect to our discursive aim  $S$  may be far higher than 0.99, but its conditional probability w.r.t  $\neg S$  is just as high. Therefore, something that is as probable given an issue or the negation of that issue cannot contribute anything to shifting probabilities with respect to that issue. And if it does not shift the probabilities, it is irrelevant. Therefore, we need to state current relevance in the already given format as a ratio.

### 3.3.2. Back to the Odds-Form

Having established that the simple conditional probability given  $S$  will not work, we will walk through the example more properly. Let us spell out exactly what the elements are:

- (17) a.  $E = (3a)$   
 b.  $S =$  *We need an explanation of Eliot's style and there is someone we can ask now.*  
 c.  $\neg S =$  *We need an explanation of Eliot's style and there is nobody we can ask now.*

To start, let us consider the relation between  $P(E|S)$  and  $P(E|\neg S)$ . How probable is it that Mary has read *Middlemarch*, given that there is someone we can ask now? Let us call this probability  $\delta$ . Now, how probable might it be that Mary has read *Middlemarch*, given that there is nobody we can ask now? Let us call this probability  $\gamma$ . It seems obvious  $\gamma$  should be very close to 0, and that  $\delta$ , even if it is formulated in an awkward way, should be bigger than  $\gamma$ . This non-equality establishes that (3a) has at least some current relevance.

This may look like a rather disappointing result: there would be many other sentences that might be relevant in such a situation — although they might be only very slightly relevant. So, should we get rid of relevance, because it is not of the  $[\pm \text{feature}]$ -type, but rather, a more-or-less type of phenomenon (and thus allows also for “still relevant, but hardly any relevance, really” cases)? As far as I see it, full gradability is a welcome feature, and I have suggested elsewhere (see Schaden, 2012) that languages may establish some CR level above which they require a present perfect, and

below which one uses a simple past tense.

The non-obvious part for us now is to show that (3a) is the most relevant alternative under these circumstances. The formula (13) requires that the ratio of that particular sentence is higher than the ratio you would get with possible truthful alternatives to *E*, concerning Jane or Sue, and which would allow for a resolution of the discursive goal. A possible problem is that a proposition pointing to a highly improbable conditional probability given *S* might turn out to be extremely relevant because its conditional probability given  $\neg S$  is even more astronomically small.<sup>13</sup>

Let us look at alternatives to our given *E*. Sue is in no shape to answer, so the epistemic context alone excludes her from being the one to ask, and the conditional probabilities given *S* and  $\neg S$  should be identical. This makes it irrelevant to point out her (possible) knowledge of Victorian literature. Similarly, while Jane *might* have read *Middlemarch*, she almost certainly would not answer the question, even if she was in principle able to do so. Again, conditional probabilities for *S* and  $\neg S$  should be so close for any sentences pointing to her, that they would cause these sentences to be irrelevant. Therefore, the best remaining candidates are sentences pointing to Mary, such as (3a), which renders previously private knowledge public. Thus, it is the most relevant alternative we have considered.

Yet, there is still a problem lurking for the present conception of current relevance, and which is caused by the non-argumentative nature of the definition in (13). So far, we have only considered cases in which there was actually somebody who might help, which is arguably the preferred outcome for speaker and hearer in that situation. However, one can see the non-argumentative version as proposed here as a formalization suitable only for cases where speaker and hearer have no preferences with respect to different possible outcomes, or in cases where current relevance is evaluated with respect to an objective, non-involved bystander.<sup>14</sup> Yet, this is not really the case here. And so, it might turn out in this non-argumentative framework that a sentence like (18) proves to be more relevant than (3a):

(18) Nobody will help us! We are screwed!

There are different strategies for solving this problem: one would be to reintroduce argumentation, such that (18) would simply be no longer a competitor for sentences like (3a), because they are arguments pointing in different directions, and therefore, different discourse topics.<sup>15</sup> An alterna-

<sup>13</sup>In a sense, one might therefore say that the formalization is overly sensible to “Black Swans” (see Taleb, 2008), highly improbable events with highly important consequences.

<sup>14</sup>This is what we argued in Winterstein and Schaden (2011).

<sup>15</sup>Introducing argumentativity would imply for instance a mapping on the interval  $[-1, +1]$ , where a value  $-1$  would be a decisive counterargument for a proposition with respect to a discourse topic, a value of 0 would be as before an irrelevant proposition with respect to its current relevance, and a value of  $+1$  would be a decisive argument for the discourse topic.

tive pointed out by Malte Zimmermann (p.c.) would be to fully exploit the idea that the perfect state proposition *S* is a discourse topic, and avail ourselves of other means of inferring discourse topics, such as intonation, etc. So far, I have only considered in this discussion what Winterstein and Schaden (2011) call Relevance-Topics, but other types of discourse topics cannot be subsumed under this particular way of viewing topicality as the reflection of a speaker's discourse strategy (see, e.g., Roberts (1996) or Büring (2003)).

While it would certainly be a good idea to take into account these known factors of topicality and develop a single, unified account of perfect states as discourse topics in all their different aspects, the current paper cannot provide such a unified theory. Therefore, the evaluation of which strategy will prove more successful must be left for future research.

Summing up, the present paper has proposed a probabilistic pragmatics for perfect tenses based on current relevance, making use of a fully gradable notion of current relevance. This probabilistic notion allows us to deal successfully with cases where Portner's modal pragmatics — based on an epistemic *must* operator — is too strong.

Before I conclude, let me sketch briefly how the framework defended in this paper allows us to consider in a new light the issue of the *readings* of the present perfect.

#### 4. *Readings of Perfects as Probabilistic Clusters*

Generally, the readings of perfects are treated as the consequences of the presence of a (possibly covert) aspectual operator below the perfect operator (see, e.g., Schaden, 2009). However, there are some readings — for instance, the “*hot news reading*” (cf. (19)), or the *general past* reading, which seem to be difficult to capture under an aspectual vision. In languages in which these readings are available, they do not seem to be aspectually different in any clear way from the (perfective) existential reading of the perfect. Under the present proposal, a tempting idea is to think of (at least a subset of) perfect readings not as discrete entities, but as probabilistic clusters, as depicted in figure 1.

(19) President Obama has been reelected.<sup>16</sup>

<sup>16</sup>At the time you are reading this, this example probably hardly qualifies as “hot news” any more. However, imagine you announce this to a person having spent his time since August 2012 in a cave, cut off from any communication with the outside world, you still might use the perfect to announce this event.

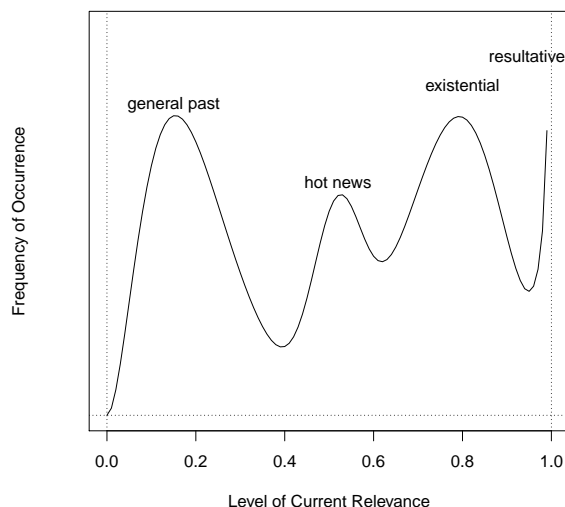


Figure 1: (Perfect) Readings as Probabilistic Clusters — Artist’s Impression

It seems clear that resultative readings should cluster close to a current relevance score of 1. Verbs with irreversible resultant states, should these be identified with the discourse topic  $S$  — see the example of *dying* above — would even obtain a current relevance score of exactly 1. General past readings (in languages like German or French) should obtain a lower current relevance score; “classical” existentials should appear somewhere in the middle. I have assumed in 1 that hot news perfects should surface somewhere between general past and existential readings. The rationale for this is the following: most *bona fide* perfect tenses have existential readings, whereas “hot news” readings are not that frequent, and “general past” readings even rarer. So, if one assumes like myself in Schaden (2012) that the grammaticalization of perfects corresponds to the lowering of the current relevance threshold for present perfects, the picture in figure 1 is what one would expect.

However, one should notice that such a probabilistic cluster hypothesis of perfect readings is an addition, not a substitute to classic, grammatical (or more precisely: aspectual) analyses of the phenomenon, since it has nothing to say about so-called universal or continuative uses of the perfect, as illustrated in (20), and where the event continues up to the moment of utterance:

(20) John has lived in Paris (ever) since 1990. [and still lives there]



## 5. Conclusion

In this paper, I have presented a formalization of the notion of current relevance, based on Merin's account of (general) relevance. I provided a pragmatic stratum to a theory of the perfect, suggesting an alternative to Portner's modal pragmatics. In principle, the present account can be added to any semantic theory of perfects, provided that it provides propositional content holding at the moment of utterance. I have argued that the perfect state family of semantic theories very easily accommodates the required propositional content, whereas other types of theories would have to be extended. In any case, any *semantic* explanation of perfect phenomena — such as the present perfect puzzle — could be retained, while adopting the current relevance framework might provide additional tools for investigating phenomena that are not semantic or syntactic in nature.

The definition of current relevance proposed in this paper should be seen as a proof that a formal definition of such an elusive concept is feasible. Whether the precise outline that has been put forward here is the best imaginable — for instance, whether it is a good idea to ignore argumentativity as I have done here, or if relevance should be investigated rather along the lines of Parikh (2009) — remains to be examined in future research.

However, my firm conviction is that in the days where on-line shops and search engines offer as a standard personalized, and thus, relevance-based results to queries,<sup>17</sup> there is really no excuse for mainstream formal linguistics to continue to ignore relevance phenomena.

## References

- Anscombe, J.-C. and O. Ducrot (1983). *L'argumentation dans la langue*. Philosophie et langage. Liège: Pierre Mardaga Éditeur.
- Büring, D. (2003). On d-trees, beans, and b-accents. *Linguistics and Philosophy* 26(5), 511–545.
- Bybee, J., R. Perkins, and W. Pagliuca (1994). *The Evolution of Grammar. Tense, Aspect and Modality in the Languages of the World*. Chicago: University of Chicago Press.
- Carnap, R. (1950). *Logical Foundations of Probability* (2 ed.). Chicago: University of Chicago Press.
- Carnap, R. and Y. Bar-Hillel (1952). An outline of a theory of semantic information. Technical Report 247, Research Lab of Electronics, MIT.
- Comrie, B. (1976). *Aspect. An Introduction to the Study of Verbal Aspect and Related Problems*. Cambridge University Press.
- Dahl, O. (Ed.) (2000). *Tense and Aspect in the Languages of Europe*. Berlin: Mouton de Gruyter.

<sup>17</sup>The techniques used in IT are not exactly the same as the ones presented here. For an introduction to the algorithms of relevance-based customer-targeting, see Segaran (2007).

- Dahl, O. and E. Hedin (2000). Current relevance and event reference. See Dahl (2000), pp. 385–401.
- Lecomte, A. and S. Tronçon (Eds.) (2011). *Ludics, Dialogue and Interaction*. Number 6505 in LNAI. Heidelberg: Springer.
- McCoard, R. W. (1978). *The English Perfect: Tense-Choice and Pragmatic Inferences*. Amsterdam: North Holland.
- Merin, A. (1999). Information, relevance, and social decisionmaking: Some principles and results of Decision-Theoretic Semantics. In L. S. Moss, J. Ginzburg, and M. de Rijke (Eds.), *Logic, Language, and Computation*, Volume 2, pp. 179–221. Stanford: CSLI Publications.
- Merin, A. (2003). Replacing ‘Horn-scales’ by act-based relevance-orderings to keep negation and numerals meaningful. *Forschungsberichte der DFG-Forschergruppe ‘Logik in der Philosophie’ 110*.
- Nishiyama, A. and J.-P. Koenig (2004). What is a Perfect state? In B. Schmeiser, V. Chand, A. Kelleher, and A. Rodriguez (Eds.), *WCCFL 23 Proceedings*, Somerville, pp. 101–113. Cascadilla Press.
- Parikh, P. (2009). *Language and Equilibrium*. Cambridge, MA: MIT Press.
- Partee, B. H. (1984). Nominal and temporal anaphora. *Linguistics and Philosophy* 7(3), 243–286.
- Pickbourn, J. (1789). *A Dissertation on the English Verb: Principally Intended to Ascertain the Meaning of Its Tenses*. London.
- Portner, P. (2003). The (temporal) semantics and (modal) pragmatics of the perfect. *Linguistics and Philosophy* 26, 459–510.
- Reichenbach, H. (1947/1966). *Elements of Symbolic Logic*. Toronto: Collier-MacMillan.
- Roberts, C. (1996). Information structure in discourse: Towards an integrated formal theory of pragmatics. In J. Yoon and A. Kathol (Eds.), *OSU Working Papers in Linguistics*, Volume 49, pp. 91–136.
- Rothstein, B. (2006). *The Perfect Time Span. On the Present Perfect in German, Swedish and English*. Ph. D. thesis, Universität Stuttgart.
- Schaden, G. (2009). *Composés et surcomposés. La sémantique du “parfait” en français, allemand, anglais et espagnol*. Paris: L’Harmattan.
- Schaden, G. (2012). Modelling the Aoristic Drift of the Present Perfect as inflation. An essay in historical pragmatics. *International Review of Pragmatics* 4, 261–292.
- Segaran, T. (2007). *Programming Collective Intelligence. Building Smart Web 2.0 Applications*. Sebastopol, CA: O’Reilly.

Sperber, D. and D. Wilson (1995). *Relevance: Communication and Cognition* (2 ed.). Oxford: Blackwell.

Taleb, N. N. (2008). *The Black Swan. The Impact of the Highly Improbable*. Penguin.

Winterstein, G. and G. Schaden (2011). Relevance and utility in an argumentative framework. See Lecomte and Tronçon (2011), pp. 134–146.