Semantics & Pragmatics Volume 3, Article 8: 1–57, 2010
doi: 10.3765/sp.3.8

Varieties of conventional implicature*

Eric McCready
Aoyama Gakuin University

Received 2009-11-30 / First Decision 2010-03-08 / Revised 2010-04-12 / Accepted 2010-05-08 / Final Version Received 2010-05-24 / Published 2010-07-29

Abstract

This paper provides a system capable of analyzing the combinatorics of a wide range of conventionally implicated and expressive constructions in natural language via an extension of Potts's (2005) $\mathcal{L}_{CI}$ logic for supplementary conventional implicatures. In particular, the system is capable of analyzing objects of mixed conventionally implicated/expressive and at-issue type, and objects with conventionally implicated or expressive meanings which provide the main content of their utterances. The logic is applied to a range of constructions and lexical items in several languages.

Keywords: conventional implicature, mixed content, type logic, resource sensitivity, expressive content

1 Introduction

The nature of conventional implicatures has been under debate since their existence was proposed by Grice (1975). Some philosophers deny that there are such things at all (Bach 1999). In linguistic semantics, however, there has been a recent surge of interest in their analysis, starting with the work of Potts (2005). The work of Potts in this area has centered on conventional implicatures that provide content which supplements the main, at-issue content of the sentence in which they are used.

* Thanks to Daniel Gutzmann, Yurie Hara, Makoto Kanazawa, Stefan Kaufmann, Chris Potts, Magdalena Schwager, Yasutada Sudo, Wataru Uegaki, Ede Zimmermann, and audiences at NII, Kyoto University and the University of Göttingen for helpful discussion, and in particular to three anonymous reviewers for *Semantics and Pragmatics*, as well as David Beaver and Kai von Fintel, for extremely useful and insightful comments.

(1) a. John, a banker I know, played golf with Bernie yesterday.

b. Frankly speaking, I don't know what you're talking about.

Here, the content of the nominal appositive in (1a) and that of the speaker-oriented adverbial in (1b) add content to the utterance, but in a way intuitively independent of the claim the speaker intends to make by her utterance. Notice also that the appositive and adverbial only introduce conventionally implicated content; they add nothing to the 'at-issue' content. This is characteristic of all the elements studied by Potts.[1]

A number of authors (e.g. Bach 2006; Williamson 2009) have noted that not all lexical items (or constructions) are associated exclusively with at-issue content, or with conventionally implicated or expressive (CIE) content;[2] instead, some expressions seem to introduce both. Pejoratives are the most widely cited example. Williamson discusses an example from Dummett (1973), the (extinct) pejorative *Boche*, which according to Williamson was in use in Britain and France in the initial stages of WW1 in anti-German propaganda. This choice is presumably made to avoid other expressions that are more obviously offensive to the modern reader. However, the obsolete nature of *Boche* makes it difficult to have clear intuitions about sentences in which it is used. I will therefore make use of the pejorative *Kraut* instead, as an example of a pejorative that, while still attested, is probably milder and less offensive than some other possible choices.[3] In any case, all instances of pejoratives in this paper are data; they are mentioned, not used.

(2) He is a Kraut.

Pejoratives plainly introduce what I will call *mixed content*: they are predicative of at-issue content, yet introduce a conventional implicature. I will

1 It is still possible that these expressions could be presuppositional in nature, rather than part of a separate class of conventionally implicated meanings, as suggested by a reviewer. I find the arguments of Potts on this issue (2005, 2007a, and 2007b) convincing, but I will return to the point below.

2 'CIE content' is intended as a neutral term for conventionally implicated and expressive content. In this paper, the assumption is made that, to a first approximation, both conventional implicatures and expressives make use of roughly the same combinatoric system. Where the distinction matters, I will not use the cover term.

3 I thank David Beaver and Kai von Fintel for helping me with the difficult choice of which pejorative would have the desired qualities of being both relatively common and relatively inoffensive. Hom (2008), faced with a similar decision, makes use of *Chink*, which is perhaps fairly similar in quality.

provide a more detailed characterization of mixed content expressions in the next section. Potts's core logic is not able to handle examples of this sort of mixed content (due to limitations imposed by the type system) without additional, costly assumptions about semantic decomposition.[4] The first goal of this paper is to provide a system capable of analyzing mixed content without such assumptions; formally this corresponds to an extension $\mathcal{L}^{+}_{CI}$ of Pott's original (2005) system $\mathcal{L}_{CI}$, which is the most explicit theory of CIE content presently available, and the one that is best understood. This is done in section 2, where I also discuss and analyze other cases of mixed content.

The research of Potts and others suggests that conventionally implicated content is supplementary by nature, a conclusion embodied in the original system $\mathcal{L}_{CI}$, as will be shown in section 2.2. The cases of mixed content to be discussed do not significantly alter this picture: although mixed content elements introduce content in both at-issue and CIE dimensions, there is clearly a sense in which the CIE content remains supplementary to the at-issue content. $\mathcal{L}_{CI}$ does allow for non-supplementary content of propositional type, which is one way to view purely expressive single-expression utterances, as I will show in section 3. In cases where combinatorics come into play, however, only supplementary interpretations are available. The extended system $\mathcal{L}^{+}_{CI}$ enables nonsupplementary interpretations for reasons explained in detail in sections 2.3 and 3.1: briefly, a new set of types turns out to be necessary for the mixed content cases, given the combinatoric rules of $\mathcal{L}_{CI}$ (which I will argue should be kept intact). These cases cannot be analyzed in $\mathcal{L}_{CI}$ at all. Section 3, after discussing some instances of single-expression utterances, argues that there are reasons that one might want the additional possibilities given by these new types. Two main reasons are discussed: first, cases of elements that are able to modify certain kinds of CIE elements but not others (a possibility already disallowed by $\mathcal{L}_{CI}$) and, second, cases of multiexpression utterances that seem to lack at-issue content. The main cases focused on are stand-alone particles and the Japanese adverbial *yokumo* (cf. McCready 2004). Section 4 presents an analysis of Quechua evidentials (following the basic picture presented by Faller 2002) that treats parts of their content as CIE; this analysis makes use of the full system introduced here.

The analyses proposed here, if correct, have substantial implications for our understanding of CIE elements, and possibly for other semantic elements as well. Section 5, the conclusion to the paper, discusses some of

4 Williamson comes to the same conclusion about pejorative items, indeed noting that Potts must allow for mixed content to analyze them (his note 16).

these implications, as well as summing up the paper and mentioning some directions for future research.

2 Mixed Content

This section focuses on mixed content. I begin by providing criteria for an expression introducing mixed content, in section 2.1, continuing with a detailed look at the case of pejoratives in section 2.2. There it becomes clear that there are two parts to the meaning of a pejorative expression: an 'ordinary' predication of an individual as part of some group, and a negative attitude expressed by the speaker with regard to that individual by virtue of being part of that group. As has been argued in the literature, this first content must be at-issue, while the second must be CIE. I review these arguments and add some additional ones. Section 2.3 introduces Potts's (2005) logic $\mathcal{L}_{CI}$ and shows that it has no way of producing single lexical entries for linguistic objects that introduce mixed content. As I will show, however, this does not mean that $\mathcal{L}_{CI}$ has no way of analyzing such expressions: it can decompose them into multiple morphemes at some level of representation, some introducing at-issue content, and some CIE content. I will evaluate this way of doing things in section 2.3 as well, concluding that it is undesirable as a general method. 2.4 extends the logic to a system that can analyze mixed content without decomposition: this is done by allowing the construction of additional types via the recursive type definition, and (crucially) introducing new combinatoric operations over these types. The resulting system, $\mathcal{L}^{+}_{CI}$, is used to analyze pejoratives in 2.5. Section 2.6 examines other kinds of mixed content elements: formal and informal pronouns, benefactive expressions, and certain honorifics, among others.

2.1 Mixed Content: Criteria

Before considering particular examples of expressions introducing what I will be calling mixed content, it will be useful to first make it clear exactly what is meant by this term.[5] I will take an expression to introduce mixed content if it fulfills the following two criteria.

First, it should introduce content in both at-issue and CIE dimensions. The pejorative case above fills the bill: it is predicative, and so introduces content in the at-issue dimension, but at the same time introduces an attitude

5 Thanks to several reviewers for suggesting that this exposition be made.

of the speaker toward some individual or group of individuals, which is CIE content, as I will show in detail in the next section. Introducing content in both dimensions is the essential criterion.

The second criterion is that it should be monomorphemic. Exactly what counts as monomorphemic is, in part, a theory-dependent notion; the amount of decomposition licensed by a particular theory will influence what can count as introducing mixed content. For example, if one were to take pejoratives like *Kraut* to introduce multiple morphemes at some level of semantic composition, then such pejoratives would no longer introduce mixed content, at that level; rather, each bit of the word meaning would introduce unmixed content of either purely at-issue or purely CIE type. This criterion means that the first criterion is in fact strengthened: not only must at-issue and CIE content both be introduced, but they must be introduced simultaneously, at the same point in semantic composition.

A word about my own methodology. Here I will be working mostly with a naive view of word structures which admits little to no semantic decomposition. This will lead to taking certain expressions to introduce mixed content which on other approaches might not do so; it will also lead to a particular analysis which allows such introductions. I will discuss some issues raised by this view, as well as alternate possible accounts, after introducing the analysis itself. In any case, I believe that I will be able to present some examples of mixed content that are monomorphemic on most anyone's view of the lexicon.

2.2 Pejoratives

Let us take as our main example of pejoratives *Kraut*, mentioned already in the previous section. This choice is made for reasons of delicacy: many current pejoratives sting quite a bit more than this one does, thanks to the fact that it is (I believe) not used very much these days: in this sense it resembles *Boche*, though it is much more current. This allows for a more objective consideration. If the reader wishes to sharpen intuitions, she is welcome to substitute her favorite pejorative; also, if she finds the particular pejorative I have chosen excessively offensive, she is welcome to substitute another one.[6]

Kraut is a pejorative term for German people on its nominal use. By

6 Again, just to make things absolutely clear, I have no attachment to the word *Kraut*, and I would not want to be associated with the attitude it expresses.

saying (2), repeated as (3), I assert that the referent of *he* is German, and express that I have negative feelings about him.

(3) He is a Kraut.

Here, 'Kraut' obviously must contribute to at-issue content: if it does not, the sentence cannot form a proposition, for the pejorative is the main predicate of the sentence. The same can be seen when pejoratives serve as subjects.

(4) Every Kraut is not evil.

Here, the pejorative term is serving as the first argument to the determiner (on a standard semantics). Pejoratives thus clearly form part of at-issue content.

The expression of negative feeling that the word introduces, though, is not part of at-issue content. This can be seen by considering the characteristics of conventionally implicated and expressive content as discussed in Potts 2005 and Potts 2007a. Potts lists a number of properties that these kinds of content are meant to have, some of which have been called into question by various authors (e.g. Wang, Reese & McCready 2005; Wang, McCready & Reese 2006; Geurts 2007; Amaral, Roberts & Smith 2008). In this paper I will primarily consider two tests for conventional implicature/expressiveness (CIEness). The first is scopelessness. The second is the behavior of CIE items under denial.

CIE items, by definition, do not participate in at-issue semantic processes.[7] In particular, they are not affected by semantic operators. Consider the following examples.

(5) a. It is false that John, the swimmer, is a good dancer.

b. If John, the swimmer, comes to the party, everyone will have a good time.

(6) a. That damn John didn't come to the party.

b. If that damn John comes to the party, no one will have a good time.

7 I do not consider here counterexamples to this claim which have been raised by Wang et al. 2005, 2006 and Amaral et al. 2008. These authors' focus is on indefinite appositives in the first case and on the interaction of attitude verbs and CIE content in the second. In my discussion, I will use only examples that have not been controversial. I think it is clear that the Potts generalizations about scope independence and denial hold for at least the areas of CIE content and operators that I will be concerned with.

In these examples, it is clear that the content of the nominal appositives is not affected by the negation or by the conditional, and similarly for the expressive adjective *damn*. In this respect, CIE content is similar to presupposition. It differs in that it cannot be bound (cf. van der Sandt 1992). 'Binding' refers to the situation in which a conditional antecedent (or other universal construction) entails the content of a presupposition which appears in the consequent. In this situation, no presupposition is projected.

(7) If John has a daughter, John's daughter must be pretty.

Such binding does not happen for CIE content.

(8) a. # If John is a swimmer, then John, a swimmer, came to the party.

b. # If I hate John, then that damn John came to the party.

In these sentences, the content of the appositive, that John is a swimmer, and of the expressive adjective, that John is in some way bad, is indeed projected. The infelicity of the examples can be taken to follow from this projection behavior: in (8a), for instance, since the speaker indicates that John is a swimmer, it is odd conversational behavior to conditionalize over this content, producing a sense of redundancy.

The second test relates to the first. CIE content does not participate in denials. In ordinary denial, the truth of any at-issue part of a sentence can be called into question. B's denial in (9a) has the interpretations in (9b).[8]

(9) a. A: John came to the party last night.
B: That's not true/That's false.

b. 'John didn't *come to the party*.'
'John didn't come to the party *last night*.'
etc.

Consider what happens when one denies a sentence containing CIE content. As the following examples show, the CIE content cannot be the target of denial.

(10) a. A: John, a swimmer, came to the party last night.
B: That's not true/That's false.

b. ≠ 'John is not a swimmer.'

8 Exactly which interpretation is selected will depend on focus, discourse topic, and other aspects of information structure.

(11) a. A: That damn John came to the party last night.
B: That's not true/That's false.

b. ≠ 'There's nothing wrong with John.'

Insofar as we take denial to be at least partly a semantic operation (cf. van Leusen 2004), the result of this second test is a direct corollary of the first.

Now we can apply our first test to the cases of present concern: what happens when one attempts to embed pejoratives? Clearly, the negative attitudes they express are projected in that situation, so the content must at the very least be presuppositional.

(12) a. He is not a Kraut.

b. He might be a Kraut.

c. Is he a Kraut?

However, if it is presuppositional we would expect that it can be 'bound' in the usual way, so that if a conditional antecedent entails the non-assertive content of *Kraut* this content will not be projected. In order to check whether this is possible, we must determine what exactly the content of *Kraut* is. Discussing *Boche*, Williamson takes the expressed content to be that the individual picked out by the subject *he* is cruel, noting that it is not clear that this really captures the non-asserted part of the meaning. Here he is abstracting from Dummett, who writes 'barbarous and more prone to cruelty than other Europeans' (Dummett 1973:454). I do not think Williamson's paraphrase is correct (indeed, he himself is not satisfied with it). It is certainly not correct for the modern pejoratives that I know; while it may be correct for *Boche*, it seems that pejoratives behave more or less alike in terms of their basic meanings, differing only in the degree of approbation assigned to the individual or group under discussion.[9]

Richard (2008) describes the expressive part of the content of pejoratives as that an individual is bad by virtue of membership in a particular group; in this case, the individual picked out by the pronoun is bad by virtue of being a German. This is closer, but still cannot be correct; note that in the examples in (12) there is no implication that the subject individual is bad in

9 I say 'individual or group' so as not to prejudge the issue. Also, it is possible that there may be real differences between pejoratives in semantic terms, and that there may be different semantic classes of pejoratives. These issues are larger than I can take on in the present paper.

any way at all.[10] Instead, what is expressed by the sentences in (12) is that the speaker takes German people to be bad.[11] Presumably the sense that the subject individual is negatively characterized that Williamson picks up on is derived via an inference: since it is asserted that he is German, and expressed that German people are bad, it is also expressed, though indirectly, that he is bad. But this does not seem to be a part of literal content, either at-issue or CIE.

Supposing then that the expressed content of *Kraut* is roughly that German people are bad, we can test its bindability via a conditional in the usual way.

(13) If (I think) Germans are bad, then he is a Kraut.

This sentence is rather odd, in part because the expressed content of *Kraut* does indeed appear to project from the conditional.[12] On the assumption that the proposed paraphrase is the right one, and generalizing from this case, we can conclude that the expressed content of pejoratives is CIE rather than presupposed. I will assume so in the following. It should be noted, however, that the significance of the result of the binding test depends on the accuracy of the paraphrase. If the paraphrase given is incorrect, or, even worse, if the expressive portion of pejoratives is such that it does not admit a linguistic paraphrase at all, then the test is invalidated. This is worrisome given the analysis of Potts (2007a), according to which expressives have the property of 'ineffability,' meaning that they literally cannot be paraphrased in ways not involving other expressives.[13] Even in this case, though, an expressive paraphrase is possible:[14]

10 Unless one takes it to be a bad thing that one is not, or might be (etc.), a German; I will ignore this notion in the following.

11 This may well be what Dummett had in mind.

12 A reviewer suggests that the oddity is due to the speaker apparently expressing uncertainty about his own attitudes, which should be pragmatically inappropriate. However, even if the speaker is an amnesiac who in fact does not know what his attitudes are (in some sense), the oddity remains, suggesting that this is not the right explanation.

13 Geurts (2007) notes that something similar holds for other, non-expressive words like *green*, though: they are not easily given satisfying paraphrases either. See also Fodor 2002. However, the degree of difficulty seems to be different for the cases of *green* and (e.g.) *damn*. A paraphrase of the latter cannot even be attempted without using expressives, whereas one can (for instance) try to give exemplars of greenness for the former. I think Potts is right in distinguishing the two types. I will have more to say about this issue in the conclusion.

14 A reviewer notes that the projection behavior may not be very surprising, given that we also have expressive content in the antecedent, which has nothing to bind it. The fact that it

(14) If I hate the {damn|fucking} Germans, then he is a Kraut.

Here, if one accepts the Richard analysis, the expressive content of 'Kraut' is pretty clearly entailed[15] by the content of '(I) hate the damn/fucking Germans.' The conclusion is that this part of the content of *Kraut* is not presupposed, which indicates that it is highly likely to be CIE content, given its other behavior.[16]

Let us now consider the second test. What happens when one tries to deny the content of a pejorative?

(15) a. A: Juan is a Kraut.
B: That's not true/That's false.

b. ≠ 'German people are not bad.'

The result of this test also supports the conclusion that the negative part of the meaning of *Kraut*, and, by extension, pejoratives in general is CIE content, and not part of the at-issue meaning.

To sum up, we have reached the conclusion that pejoratives play a dual semantic role: they act as ordinary nominals for predication or as arguments of determiners, etc., but carry CIE content as well. They also appear to be monomorphemic, at least in many cases. One might argue (as has Chris Potts, p.c.) that in fact pejoratives are polymorphemic. An argument for such a view comes from pejoratives like *Jap*, which could be viewed as composed of

---

is necessary to use expressives to paraphrase other expressives (given Potts's ineffability condition) may be one reason that binding of CIE content is impossible.

15 Or some expressive equivalent for the Potts 2007 system. Since according to that analysis the function of (emotive) expressives is to narrow down a subinterval of $\mathbb{R}$ used as a model of a range of emotion displayed with respect to some object, one can define a notion of emotive entailment according to which Px emotively entails Qx iff the interval assigned to x by P is a subset of that assigned to x by Q. Since I will not make use of this system in this paper, I will not work out the details.

16 A reviewer suggests an analysis in terms of indexical presuppositions (Schlenker 2007), with the following lexical entry:

(i) $[\![\text{Kraut}]\!]^{c,w} = \lambda x\colon \text{speaker}(c) \text{ has a negative attitude toward German people in } w(c).\ \text{German}(x)$

But this suggests (as far as I can see) that such a presupposition should be bindable in examples like (ii).

(ii) If I have a negative attitude toward German people, then he is a Kraut.

Again, in amnesia contexts, this should be felicitous; and here the content certainly projects.

a root word (*Japanese*) and a truncating suffix with an expressive meaning. I think this is at least reasonably plausible for cases like *Jap*, but certainly not for all pejoratives. Expressions like *Frog*, *Yankee*[17] or the Japanese *sangokujin* 'third country person' — or indeed *Kraut* — pretty clearly lack a truncation of the relevant type. At the very least, it is not clear that all pejoratives contain multiple morphemes. Since the proposed conditions are met, then, they introduce mixed content.[18] In the next section, I will introduce the compositional system of Potts 2005, which was designed for the analysis of conventional implicature; as we will see, it is not, as it stands, able to analyze mixed content *qua* mixed content. But this is not the end of the story yet.

2.3 $\mathcal{L}_{CI}$

Potts (2005) proposes a pair of logics called $\mathcal{L}_{CI}$ and $\mathcal{L}_{U}$ for the analysis of conventional implicature.[19] These two logics interact in sometimes complex ways. The parts of the system that concern us here involve a) what kinds of expressions are semantically well-formed, b) how these expressions are combined in the logical syntax, and c) how the resulting expressions are interpreted. These issues all relate to $\mathcal{L}_{CI}$, which is a higher-order lambda calculus. The first corresponds to a definition of admissible types in $\mathcal{L}_{CI}$ and the second to rules for how the admissible types are combined. The third issue corresponds to a rule for the interpretation of conventionally implicated expressions: effectively a mapping between expressions of $\mathcal{L}_{CI}$, the type theory used for the combinatorics, to logical forms intended for model-theoretic evaluation. I examine each in turn. As we will see, the system as set up in Potts's work cannot be used to model the behavior of mixed content expressions, which will prompt modifications to it in section 2.3.

First, the types themselves. Potts defines a system of types. Here, as in

17 As in 'Yankee Go Home' — I make no claims about the historical development of the term.

18 It is still debatable whether the precise content I have proposed (following Richard) is right. Hom (2008) gives an interesting analysis in which pejorative content is not expressive at all, but instead is a social construct varying across speaker groups. I will not argue in detail against this proposal here — I am sympathetic to the notion of social construction of meaning, at least in these sorts of cases — but I doubt that all the content of pejoratives is truth-conditional. Hom considers and rejects the sort of evidence (denials and operator scope arguments) I have made use of here. In my opinion he is too hasty in doing so, but fully responding to his arguments would take us too far afield.

19 I will not review the full motivations for these logics here, or all the details of how they work. I will focus only on the parts that will be necessary for the proposal in this paper.

the type theories standardly used in linguistic semantics (cf. Heim & Kratzer 1998), basic types are e, t, s, which are used to produce an infinite set of types via the usual kind of recursive definition. (The details of the definition are provided in Appendix A.) However, Potts's logic differs in that it makes crucial use of a distinction between *at-issue types* and *CI types* ('CI' indicating conventional implicature). The distinction is indicated via a superscript 'a' or 'c' on the type name. At-issue types are freely produced in the usual way. CI types are distinct: they are always of the form $\langle \sigma^a, \tau^c \rangle$, functions taking at-issue typed objects as input and outputting CI-typed objects. There is no mechanism for producing types that take CI-typed objects as input. This, according to Potts, is the reason that conventionally implicated content is independent of at-issue operators: there simply are no operators over CI content.

How are these objects combined? $\mathcal{L}_{CI}$ has the derivation rules for type combination shown in Figure 1. Potts couches them as 'tree admissibility conditions' but this comes out to more or less the same thing as a derivation rule if one understands his trees as proof trees: the Table 1 notation is more compact, so I will use it in what follows. As far as I am concerned this is a notational variant. It should, however, be noted that the logic behaves in ways that are odd from the standpoint of many logics familiar to linguistics such as categorial grammar; notably, unlike the categorial grammars implemented for standard at-issue semantic combination, it is not resource sensitive for CI types, as detailed below. The essential point is that a resource sensitive logic is one that consumes resources as they are used in proofs. This is a property of the combinatorics of at-issue content: combining ⟦sleeps⟧ with ⟦John⟧ yields *sleeps(john)*, but the meanings of noun and verb are consumed and no longer available for further composition. As we will see, this is a property that $\mathcal{L}_{CI}$ rightly lacks.

The rules in Figure 1 are meant to model the combinatorics in conjunction with a syntactic structure, just as in the work of Potts, meaning that they should retain the constituency-driven character of the original $\mathcal{L}_{CI}$ rules.[20] (R1) is just a reflexivity axiom. (R2) is ordinary application for at-issue

20 I also diverge from Potts on my treatment of CI propositions introduced low in a tree. In Potts's formulation, the possible presence of such additional CI conditions warrant sometimes thinking of these rules as shorthand for a larger rule set. See Potts 2005: 222 for details. Instead of this route I will consistently make use of R5 to eliminate all elements of type t^c from derivations immediately after they are derived, which means that there will not be extra free-floating CI content. Thanks to a reviewer for inspiring this strategy.

$$(R1) \quad \frac{\alpha : \sigma}{\alpha : \sigma}$$

$$(R2) \quad \frac{\alpha : \langle \sigma^a, \tau^a \rangle, \beta : \sigma^a}{\alpha(\beta) : \tau^a}$$

$$(R3) \quad \frac{\alpha : \langle \sigma^a, \tau^a \rangle, \beta : \langle \sigma^a, \tau^a \rangle}{\lambda X.\alpha(X) \wedge \beta(X) : \langle \sigma^a, \tau^a \rangle}$$

$$(R4) \quad \frac{\alpha : \langle \sigma^a, \tau^c \rangle, \beta : \sigma^a}{\beta : \sigma^a \bullet \alpha(\beta) : \tau^c}$$

$$(R5) \quad \frac{\beta : \tau^a \bullet \alpha : t^c}{\beta : \tau^a}$$

$$(R6) \quad \frac{\alpha : \sigma}{\beta(\alpha) : \tau} \text{ (where } \beta \text{ is a designated feature term)}$$

Figure 1 Rules of proof in $\mathcal{L}_{CI}$.

elements; this is completely standard in formal semantics. (R3) is a rule for intersection, where we abstract over the input type of two elements. (R4) and (R5) are the rules mainly of interest to us. Given an expression of a given at-issue type and another expression mapping that type to some conventionally implicated type, use of (R4) yields the resulting conventional implicature paired with the original at-issue type, where the '•' operator (henceforth referred to as 'bullet') simply indicates this pairing. The bullet is used only to conjoin at-issue and CI type objects. This means that any given node in the proof tree can be decorated with both at-issue and conventionally implicated content.[21] (R5) strips CI objects of propositional type away from a premise set (by shunting them away to another meaning dimension, as we will see shortly). What is absolutely crucial in rule (R4) is that the at-issue content is duplicated in the output of the derivation. This means that the logic allows, indeed requires, duplication of resources, when conventional implicatures are involved. Given that $\mathcal{L}_{CI}$ is designed for the interpretation of supplementary elements like appositives and (some) speaker-oriented adverbials, this makes perfect sense. This observation, though, highlights a difference with standard categorial logics: since such logics are meant exclusively to model at-issue semantic composition (via the Curry-Howard isomorphism, cf. Carpenter 1998; Sørensen & Urzyczyn 2006), they are always resource-sensitive. This difference can be taken as a significant generalization about supplementary CI(E)s. The final rule, (R6), allows introduction of content via 'designated features'; such features can be associated with constructions, as in the case of appositives, or (in principle at least) with lexical items.

After the semantic computation is complete, the proof tree itself is then interpreted as a semantic object via the following rule.[22]

21 •-terms have some affinities to the *dot objects* of Pustejovsky (1995), and not only in form. I will say a bit more about this in footnote 29.

22 As noted by Chris Potts (p.c.), this rule is potentially odd from the perspective of proof interpretation. In proofs, objects of type t are often introduced in the course of logical derivations but left out of truth evaluation (e.g. in the context of a conditional proof); (16) has such objects contributing to evaluation just in case they are of type t^c. This is just to say that it is necessary to collect type t^c objects from the entire proof, so in a sense the proof becomes a first class citizen of the interpretation mechanism and not merely a means for deriving a sentential interpretation. This may well be out of line with what is commonly assumed in e.g. the literature on direct interpretation (see Barker & Jacobson 2007). For this reason Potts uses derivation trees, which he takes to be a necessary intermediate step in interpretation of CI elements, a point stressed in both Potts 2005 and Amaral et al. 2008. He suggests that my use of proof trees here is misleading.

He may be right, but I do not think the problem is so serious. In essence, defining a rule

(16) **Proof tree interpretation (after Potts).** Let $\mathcal{T}$ be a proof tree with at-issue term $\alpha : \sigma^a$ on its root node, and distinct terms $\beta_1 : t^c, \ldots, \beta_n : t^c$ on nodes in it. Then the interpretation of $\mathcal{T}$ is $\langle [\![\alpha : \sigma^a]\!], \{[\![\beta_1 : t^c]\!], \ldots, [\![\beta_n : t^c]\!]\}\rangle$.

Here α and β are variables over lambda terms, and σ^a is a variable over semantic types. The superscripts distinguish the types as either at-issue (superscript a) or CI (superscript c). Effectively, conventionally implicated content is shunted into a separate dimension of meaning. The bullet therefore functions as a bookkeeping device in the proof.

The action of these three elements of the Potts logic, then, is as follows. First, types for conventional implicature are defined; crucially, there are no types that take conventionally implicated content as input. Second, these types are combined via the rules in (R1-6). With respect to conventional implicatures, this means the effect is to isolate conventionally implicated content from at-issue content with a bullet, by rules (R4) and (R5). $\bullet$-terms are then separated into separate dimensions of meaning, by the schema in (16).

Let us consider how this logic can be used for the analysis of mixed content objects. It is easy to see that it cannot be so used in its current form, given the assumption that the at-issue and CIE content are introduced by the lexical item simultaneously. The type construction rules (again, see Appendix A for details) provide for types of the form $\langle \sigma, \tau \rangle^a$, purely at-issue types, and $\langle \sigma, \tau \rangle^c$, purely CI types. Intuitively, in the case of pejoratives we require an object with the type of an ordinary predicate in the at-issue dimension, and one of propositional type which is CIE.[23] What we need is a typing for objects that are of mixed type, but this cannot be produced in $\mathcal{L}_{CI}$. As far as I can see, the only way to model mixed content in $\mathcal{L}_{CI}$ would be to assume that content can be introduced in two distinct stages. This

on semantic derivation trees and semantic derivation proofs should yield the same results, given that the mechanisms of derivation are equivalent. I do not see a substantial difference in giving derivation trees citizen status and giving the same kind of status to proof trees. In any case, the proof-based rule is less odd in the context of derivations proceeding in concert with a syntax, and problems that could arise with e.g. λ-abstraction will not arise in the context of CIE content, where (as far as is known presently) abstraction does not occur. Still, if the reader feels happier with using trees, she is welcome to perform the translation, which is technically trivial.

23 If one follows e.g. Williamson and takes pejoratives to introduce predicates in the CI dimension as well, the situation changes somewhat, but the basic problem is the same. We will see cases of this type in section 2.6.

idea can be implemented by assuming that pejoratives introduce an at-issue object, which is then predicated in some way by a CI object via R4. The result will be a CI proposition and an at-issue predicate. In the case of *Kraut*, we would have the following. (Here '$\cap$' is the kind formation operator used by e.g. Chierchia 1998.)

$$\text{R4}\frac{\lambda x.\,\text{German}(x) : \langle e,t\rangle^a \qquad \lambda P.\,\text{bad}(\cap P) : \langle\langle e,t\rangle^a, t^c\rangle}{\lambda x.\,\text{German}(x) : \langle e,t\rangle^a \bullet \text{bad}(\cap\text{German}) : t^c}$$

This is the desired logical form. But this kind of approach requires allowing mixed content objects to separately introduce multiple pieces of content. This analysis seems to destroy the intuition that pejoratives and other instances of mixed content are singular semantic objects with a dual character. It indeed strikes me as highly unnatural to have a lexical entry realized in terms of multiple, fully separate entities.[24,25] I therefore take it to be truer to intuitions to modify the logic in such a way that mixed content can be modelled directly. This is done in the following section.

2.4 $\mathcal{L}^+_{CI}$

This section of the paper proposes $\mathcal{L}^+_{CI}$, an extension of $\mathcal{L}_{CI}$ that can handle mixed content. In the process, we will also define a sublogic of $\mathcal{L}^+_{CI}$, $\mathcal{L}^{+S}_{CI}$, which introduces a set of types for CIE objects that have resource-sensitive properties.

The first necessary step involves adding resource-sensitive CIE types to $\mathcal{L}_{CI}$. The reason is that there are mixed content items which are predicative in both dimensions. Pejoratives introduce mixed content: but only part of this content, the at-issue portion, is predicative (or so I have argued). The CIE content is propositional. Because it is propositional, there is no special

24 The case of presupposition may seem formally similar on a superficial level, but it is rather different in that presuppositions (on some perspectives at least) simply indicate definedness conditions for the at-issue content, whereas here the two bits of content are entirely separate and represent fully distinct discourse contributions.

25 Note also that the proposed analysis is different from analyzing single lexical items as consisting of a single complex condition; the two types of decomposition are entirely different in quality. Assigning a word a meaning of the form $\lambda x[P(x) \wedge Q(x)]$ seems rather different from giving it a pair of meanings $\lambda x[P(x)]$ and $\lambda x[Q(x)]$ which are meant to apply to the input at different points in the derivation. The latter seems appropriate in only special situations, e.g. when a word makes two distinct contributions that can be traced back to specific distinct parts of the word. We will return to such examples in section 2.6, where I will discuss the general merits of the decompositional strategy.

need for resource-sensitive types here; but in cases where there is a dual predication, a lack of resource sensitivity will cause serious problems in the meaning composition, as I will detail shortly. It is not hard to find cases of mixed content where both the at-issue content and the CIE content are predicative. An instance can be found in the Japanese honorific system. Certain honorifics in Japanese come with special morphology which clearly carries the honorific load; these sorts of expressions are analyzed by Potts & Kawahara (2004) as introducing a kind of expressive content. In such cases, it is easily possible to analyze the morphemes as introducing supplementary expressive content exclusively. However, there are other lexical items which simultaneously honor some individual and predicate something of her. An example is *irassharu* 'come[Hon]'.

(17) sensei-ga irasshaimasi-ta
teacher-Nom came.Hon-Pst

'The teacher came' (the teacher is being honored)

Here, the verb simultaneously says of the teacher that she came, and indicates that she is deserving of honor.[26] This verb satisfies both the criteria for mixed content: it introduces both an at-issue predication and expresses honorification at the CIE level.[27] Further, the verb is (at the surface at least) monomorphemic. It cannot be separated into morphemes introducing at-issue and expressive content separately, unlike (for instance) the honorifics studied by Potts & Kawahara (2004), which clearly contain morphemes which separately provide honorific meanings. This does not of course preclude a decompositional analysis, on which more below. But, barring independent (synchronic) reasons for such an analysis, it seems desirable to analyze this expression as simultaneously introducing two types of meaning, and so as a bearer of mixed content.

The upshot is that honorifics like *irassharu* are instances of mixed content which are predicative in both dimensions of meaning. How could such examples be analyzed in $\mathcal{L}_{CI}$? Note what will happen if we make the obvious move, and analyze this expression as involving an object of at-issue predicative type, and a CIE object of similar type, conjoined by a bullet as usual:

26 Or however one wishes to paraphrase the honorific relation; I will not address this question here in detail. See section 2.4 for some brief discussion.

27 For arguments that honorific content is expressive, see Potts 2005, Potts & Kawahara 2004, and Kim & Sells 2007.

(18) $[\![\text{irassharu}]\!] = \lambda x.\ \text{come}(x) : \langle e, t\rangle^a \bullet \lambda x.\ \text{honor}(s, x) : \langle e, t\rangle^c$

Applying this object to the referent of *sensei* 'the teacher' (which I will treat as a referring expression for simplicity) yields the following by R4, or would if R4 was defined for expressions conjoined by the bullet operator, which it actually is not. If we wanted to extend R4 to cases of •-conjoined objects, we would actually need to define a new rule. Let us see what such a rule would be for purposes of discussion. This rule simply assumes that we perform pointwise application of every element conjoined by a bullet according to the proper rules, which will be R2 for the at-issue side of the bullet and R4 for the CIE side. The use of R4 of course means that the content of the input to the CI type will be duplicated in the output, yielding the results of the two applications, and an unmodified input as well.

(19) $$\frac{\alpha : \langle \sigma^a, \rho^a\rangle \bullet \beta : \langle \sigma^a, \tau^c\rangle \qquad \gamma : \sigma^a}{\alpha(\gamma) : \rho^a \bullet \beta(\gamma) : \tau^c \bullet \gamma : \sigma^a}$$

With this rule we can attempt a derivation of (17), which will go as follows.

$$\frac{\lambda x.\ \text{come}(x) : \langle e, t\rangle^a \bullet \lambda x.\ \text{honor}(s, x) : \langle e, t\rangle^c \qquad t : e^a}{\text{come}(t) : t^a \bullet \text{honor}(s, t) : t^c \bullet t : e^a}$$

Since the CIE content is not, by R4, resource-sensitive, the predication by the right conjunct of the • in the premises will yield the result of the application, as desired, but also will return the original at-issue input to the functional application. But this is undesirable: the result is not semantically interpretable. In Potts's work, where CIE expressions are restricted to those introducing supplementary content, the CI types were required to have a resource-insensitive nature. But, as we can see, in cases of mixed content it yields the wrong results. We therefore need to add a new sort of content which is both CIE and resource-sensitive.

The result of adding types for resource-sensitive CIE content to $\mathcal{L}_{CI}$ is called $\mathcal{L}_{CI}^{+S}$. I will use a superscript s to distinguish what I will call *shunting types*, types for those semantic objects that 'shunt' information from one dimension to another, without leaving anything behind for further modification. The type system obtained by adding these types to $\mathcal{L}_{CI}$ is defined in Appendix B.1. With this type classification, it becomes possible to define a rule specific to nonsupplementary conventional implicatures.

(R7) $$\frac{\alpha : \langle \sigma^a, \tau^s\rangle, \beta : \sigma^a}{\alpha(\beta) : \tau^s}$$

We can then modify the rule in (16) to handle information from shunting types as well. $\sigma^{\{x,y\}}$ indicates that σ is a type of sort x or sort y.[28] We will see a number of examples of the application of this rule in what follows.

(20) **Generalized Interpretation (first attempt).** Let $\mathcal{T}$ be a proof tree with at-issue term $\alpha : \sigma^a$ on its root node, and distinct terms $\beta_1 : t^{\{c,s\}}, \ldots, \beta_n : t^{\{c,s\}}$ on nodes in it. Then the interpretation of $\mathcal{T}$ is $\langle [\![\alpha : \sigma^a]\!], \{[\![\beta_1 : t^{\{c,s\}}]\!], \ldots, [\![\beta_n : t^{\{c,s\}}]\!]\}\rangle$.

The combination of (R7) and the new interpretation rule in (20) serves to maintain the original generalizations about supplementary meanings provided by $\mathcal{L}_{CI}$ while expanding the system's coverage to conventional implicatures that introduce the primary meaning of the sentence they appear in. In section 3, I will show that the possibilities made available by the existence of these types are exploited by natural language, even outside the domain of mixed content.

The resources to create the needed kind of objects to model mixed content are obviously already present in $\mathcal{L}^{+S}_{CI}$. We already have what we need: at-issue types and CI types. We need only a way to produce product types across the two dimensions, and then an application rule telling us what to do with such types when we have them. I will now provide these tools; the resulting type system is called $\mathcal{L}^{+}_{CI}$.

It is rather simple to add the relevant types. We need only a single typing rule producing mixed types. This rule is provided in Appendix B.2. It produces types of the following form:

$$\langle \sigma, \tau \rangle^a \times \langle \zeta, \upsilon \rangle^s$$

This object is a product type where the conjoined types are an at-issue type and a shunting type.[29] Note that the input to the at-issue type and the shunting type need not be of the same semantic type; this means that it is in principle possible that the situation arises where the two will have incompatible inputs. Such typings will not work in composition though, as

28 I thank Yasutada Sudo for helping me to correct an infelicity in an earlier version of this definition.

29 These objects are rather similar to the *dot objects* of Pustejovsky (1995), as already mentioned in footnote 21. The difference is that, in Generative Lexicon theory, trying to make use of both 'sides' of the dot object generally results in zeugmatic infelicity as in (i), so there is no rule like (R8) even in the extended system (Asher & Pustejovsky 2005).

(i) ?? John hung a poster on and walked through the door.

they will not be interpreted by any rule, which will rule them out in practice. Mixed types like these are paired with λ-terms of the form $\alpha \blacklozenge \beta$: '$\blacklozenge$' (hereafter 'diamond') signifies a semantic object of mixed type. We now need rules for interpreting these types. I propose the following two.

$$\text{(R8)} \quad \frac{\alpha \blacklozenge \beta : \langle \sigma^a, \tau^a \rangle \times \langle \sigma^a, \upsilon^s \rangle, \gamma : \sigma^a}{\alpha(\gamma) \blacklozenge \beta(\gamma) : \tau^a \times \upsilon^s}$$

Given as input a mixed type and an object of the at-issue type that is input to both conjoined elements in the mixed type, (R8) outputs the result of applying each element of the mixed type to the input, where both objects are conjoined with '$\blacklozenge$' as before. An example of this is precisely the derivation of mixed content terms, where both CIE content and at-issue content look for objects of the same type as input; we will see many examples in the coming sections. We will need one further rule telling us what to do with mixed terms when the CIE part of the derivation is complete: this is provided as R9.

$$\text{(R9)} \quad \frac{\alpha \blacklozenge \beta : \sigma^a \times t^s}{\alpha : \sigma^a \bullet \beta : t^s}$$

This rule instructs us to replace mixed type terms involving the conjunction '$\blacklozenge$' with terms conjoined by a '$\bullet$' when the CIE object is propositional (of type t). Roughly, we have a change in bookkeeping device corresponding to a change in typing: the diamond indicates that the two terms it conjoins are still 'active' in the derivation, but the bullet indicates that the CIE side has already gotten all its arguments and is ready for interpretation. R9 thus, in a sense, moves shunting-typed terms out of active use. Doing so allows for interpretation via the rule in (20). Again, we will see examples in the following sections.

At this point, it is possible to abstract away from the honorific example provided earlier to make clear the general need to use shunting types on the CI side of the mixed type. Recall that the CI types in $\mathcal{L}_{CI}$ are not resource sensitive; they always return their at-issue input as well as the result of applying the CI type to this input. (R4) yields an object of the type $\sigma^a \bullet \tau^c$ when an functional CI type $\langle \sigma^a, \tau^c \rangle$ is applied to something of type σ^a. But this means that, if we use CI types, then in the terms typed as $\alpha(\gamma) \blacklozenge \beta(\gamma) : \tau^a \times \upsilon^c$ yielded by a variant of (R8) which uses CI types, the object to the right of the diamond will be of the form $\gamma : \sigma^a \bullet \beta(\gamma) : \upsilon^c$ itself due to (R4), as we have seen. This means that the result of the application is of the form $\alpha(\gamma) \blacklozenge \gamma : \sigma^a \bullet \beta(\gamma) : \upsilon^c$.' We have seen an instance of this with the

attempted (and failed) derivation of (17) above. This means that there is an 'unused' term of type σ^a floating around in the derivation, which will result in ill-formedness. We do not want this, and we can avoid it by using shunting types on the right-hand side instead. Such types remove the terms they apply to from the at-issue dimension completely, which clearly is what is needed in this case.[30]

With this rule and the type system in Appendix B.2, we are able to provide an adequate semantics for lexical items that introduce simultaneously at-issue and conventionally implicated content, by defining objects of mixed at-issue and CI types.[31] The next section shows in detail how this can be done for pejoratives, and the following section, 2.6, how it applies to other parts of natural language in which we find mixed content.

2.5 Analyzing Pejoratives

It is straightforward to give an analysis of pejoratives in $\mathcal{L}^+_{CI}$. Recall that we needed a way to provide at-issue content and CIE content in a single lexical entry. We now have the means to do so. We need only make use of the mixed types defined in the previous section. As discussed in section 2.2, I will take the at-issue content of pejoratives to be predicative, and the CIE content to be propositional. We end up with the following kind of lexical entry: again, I use *Kraut* as a representative example.

(21) $[\![\text{Kraut}]\!] = \lambda x.\ \text{German}(x) \blacklozenge \text{bad}(^\cap\text{German}) : \langle e,t\rangle^a \times t^s$

The composition will work as follows.

30 If one takes the intuitive interpretation of shunting types to be 'main conventionally implicated content,' then the definition of mixed types indicates that there are two kinds of 'main content' in mixed-type sentences. I myself do not find this very counterintuitive.

31 A reviewer asks whether we need CI types at all anymore, given the new system. The suggestion is that one could make all types for CIE objects use the format of mixed types, but just provide a tautological component on the at-issue side, for instance the identity $\lambda X.X$ for polymorphic types. I do not see any technical reason this could not be done, though there might be reasons one would want to make a clear distinction between mixed and unmixed types in the type system. In any case, the comment shows that $\mathcal{L}^+_{CI}$ is in fact a genuine extension of $\mathcal{L}_{CI}$. Thanks to the reviewer for picking up on this point.

(22) a. Juan is a Kraut.

b.

$$\text{R2}\,\frac{j : e^a \qquad \text{R9}\,\dfrac{\text{R5}\,\dfrac{\lambda x.\,\text{German}(x) : \langle e,t\rangle^a \bullet \text{bad}(^\cap\text{German}) : t^s}{\lambda x.\,\text{German}(x) : \langle e,t\rangle^a}}{\lambda x.\,\text{German}(x) \blacklozenge \text{bad}(^\cap\text{German}) : \langle e,t\rangle^a \times t^s}}{\text{German}(j) : t^a}$$

Given the rule (20), this will yield

$$\langle \text{German}(j), \{\text{bad}(^\cap\text{German})\}\rangle$$

as its interpretation, which will be evaluated as usual in the Potts system. Roughly, the sentence will be true iff Juan is a German, and expressively appropriate if the speaker feels that Germans are bad. Use of (22a) intuitively indicates that the speaker thinks that Juan is bad himself; I showed in 2.2 that this is not a part of the CIE content of the sentence (via embedding tests), but one can see why it follows in this system. Since the speaker asserts that Juan is German, and expresses a negative attitude toward German people in general, it is natural to conclude that the speaker holds a negative attitude toward Juan as well. It is also natural to conclude that the speaker intends, as part of the reason for his utterance, to indicate this attitude. The content that Juan is bad, then, is communicated, probably intentionally, but is not, strictly speaking, a part of the semantic content of the sentence.[32]

2.6 Other Mixed Elements

It is easy to find examples of mixed content in the languages of the world. It suffices to consider the characteristics of mixed expressions. They are

32 A reviewer questions the analysis on the basis of examples like (i) and (ii).

(i) He's German but at least he's not a Kraut.

(ii) He's a Boche but at least he isn't a Kraut as well.

The reviewer finds these grammatical and suggests that they are problematic, because only the CIE content distinguishes the two categories in each case. This is an interesting observation, but speakers I have consulted (including myself) find the examples infelicitous. I myself feel they are contradictory, especially (ii). I therefore will not modify the theory to address them. But one suggestion might be that, for those that find such examples OK, there is some content present in the pejoratives in addition to the CIE content which distinguishes the two properties; perhaps it is even the case that some of the CIE content has been reanalyzed as at-issue. I will not speculate further.

associated with conventional implicatures, but, since they also denote at-issue content, they can serve as main predicates and are affected (in part) by various semantic operators. It does not seem at all difficult to find such expressions; in fact, many examples are noted in the literature. Let us begin by returning to the Japanese mixed content honorifics discussed in section 2.3. There I discussed the honorific *irassharu*, which has the at-issue content of an ordinary motion verb and the CIE content that the speaker honors the individual denoted by the sentential subject. In $\mathcal{L}^{+}_{CI}$, this can easily be given an analysis.[33]

(23) $[\![\text{irassharu}]\!] = \lambda x.\ \text{come}(x) \blacklozenge \lambda x.\ \text{honor}(s, x) : \langle e, t\rangle^{a} \times \langle e, t\rangle^{s}$

Given this lexical entry, we can see that the honorific will participate in composition in much the same way that (predicative instances of) pejoratives do. The difference will, of course, be that predication takes place in both at-issue and CIE dimensions. An example is the following.

(24) a. Yamada-sensei-ga irasshaimasi-ta
Y-teacher-Nom came.Hon-Pst
'Teacher Yamada came. (and I honor him)'

b.

$$\text{R9}\ \dfrac{\text{R8}\ \dfrac{\text{ty} : e^{a} \qquad \lambda x.\ \text{come}(x) \blacklozenge \lambda x.\ \text{honor}(s, x) : \langle e, t\rangle^{a} \times \langle e, t\rangle^{s}}{\text{came}(\text{ty}) \blacklozenge \text{honor}(s, \text{ty}) : t^{a} \times t^{s}}}{\text{came}(\text{ty}) : t^{a} \bullet \text{honor}(s, \text{ty}) : t^{s}}$$

Other examples of this type include *meshiagaru* 'eat.Hon' and *goranninaru* 'see.Hon', which will receive an analysis similar (in terms of typing) to the above *irassharu*, except that they will take two arguments, as the verbs are transitive.

33 It is worth asking what the behavior of expressions like these is with respect to the tests proposed by Potts, Alonso-Ovalle, Asudeh, Bhatt, Cable, Davis, Hara, Kratzer, McCready, Roeper & Walkow (2009). These authors argue that expressive content does not participate in a number of grammatical operations that intuitively involve identity, such as anaphora. Indeed, the behavior of *irassharu* is as expected given this test.

(i) Sensei-ga irasshaimasita. Ano kojiki mo soo-shita
teacher-Nom came.Hon. that bum also so-did
'The teacher came. (The teacher is honored.) That bum did too.'

No inconsistency is felt here, despite the epithet in the second sentence; and the second person who came is not honored, consistent with the conclusions of the squib.

We can now consider the details of what one would have to do to analyze these examples with only the type resources of at-issue and CI types. This makes the need for shunting types even more obvious than before. I can see two ways to allow for this in principle in $\mathcal{L}_{CI}$, only one of which involves modifying the logic at all. The first, as with the propositional part of pejorative meanings, involves letting mixed content elements introduce separate pieces of content. Then we could simply stipulate that CI application takes place before at-issue application, yielding a two-step composition process for mixed type objects. This ordering must be introduced to exploit the non-resource-sensitivity of CI types. We would get roughly the following, supposing that both at-issue and CI content is of type $\langle e, t\rangle$.

$$\text{R2}\,\dfrac{\text{R4}\,\dfrac{a : e^a \qquad \lambda x.Px : \langle e,t\rangle^c}{\text{R5}\,\dfrac{a : e^a \bullet Pa : t^c}{a : e^a}} \qquad \lambda x.Qx : \langle e,t\rangle^a}{Qa : t^a}$$

which in turn yields the meaning $\langle Qa, \{Pa\}\rangle$ by the interpretation rule in (16). Effectively, this idea amounts to analyzing mixed content terms as two completely separate lexical objects, one at-issue and one CI, as can be seen from the fact that in the semantic derivation this application would have to take place on two distinct nodes. Notice also that the two parts of the content must be separated in the combinatorics for things to work out. I take it that this option is entirely undesirable, just as in the case of pejoratives. However, there may be arguments for this style of analysis in certain cases; I will discuss some below, and also evaluate the whole style of this approach as a possibility for the general analysis of mixed content bearers.

A second option would be to add a new composition rule to $\mathcal{L}_{CI}$ and add a means of producing mixed types, but not to introduce shunting types, instead making use of only the standard Pottsian CI types, σ^c.[34] Together with this, we would require a composition rule for 'mixed bullet types,' necessary in order to avoid the unwanted duplication of content that would result from allowing the application of R4, as discussed in section 2.2. This rule would have to look roughly like the following. This can be viewed as an attempt to solve the problems introduced by the rule (19), which of course caused difficulties stemming from lack of resource sensitivity.

34 The rule for producing such types is the obvious analogue of B.2.1.i in which '•' is substituted for '◆' and all instances of shunting types are replaced with CI types.

(25)
$$\frac{\alpha \bullet \beta : \langle \sigma^a, \tau^a \rangle \times \langle \sigma^a, \upsilon^c \rangle \qquad \gamma : \sigma^a}{\alpha(\gamma) : \tau^a \bullet \beta(\gamma) : \upsilon^c}$$

The result of (25) is to allow application to occur in • types, but without duplication of content. This is just what is required for cases of mixed content. However, it comes with obvious problems. Its function is precisely to make R4 not apply in the relevant cases. But this has bad consequences for the typing system: it becomes inconsistent in the sense that the behavior of types is now situation-specific. One might even wonder if objects behaving in this way are types in the usual sense at all. Further, consider one major purpose of allowing CI types in the first place in $\mathcal{L}_{CI}$. This was to model the work done by supplementary CI content, which always seems to show non-resource-sensitive behavior. If we allow for rules like (25), this behavior is no longer a direct consequence of the system. Concretely, suppose that, unlike the instances of supplementary content discovered so far, instances of supplementary content that take more than one argument are discovered, but which are still resource-insensitive. In such circumstances, conflicts may develop between R4 and (25), which the type system would have no way to resolve without use of ad hoc constraints external to the formal system. All these problems are avoided by the use of shunting types.

It is not hard to find other examples of mixed content in recent work in the semantics-pragmatics literature. Kubota & Uegaki (2009) analyze the Japanese benefactive, which simultaneously indicates that the subject has caused the dative argument to do some action and conventionally implicates that the action was beneficial for the nominative argument.[35]

(26) Taroo-ga Hanako-ni piano-o hii-te morat-ta.
Taro-Nom Hanako-Dat piano-Acc play Benef-Pst

at-issue: 'Taro made Hanako play the piano.'
CI: 'Hanako's playing the piano was beneficial to Taro.' (K&U; their glosses)

The crucial point here is that the benefactive introduces both a causative at-issue meaning and a conventional implicature to the effect that the caused event benefited the causer. Again, this expression satisfies both criteria for mixed content bearing: it is both monomorphemic and introduces content along two dimensions. This is plainly an instance of mixed content.

35 I follow Kubota and Uegaki's glosses and morphological analysis.

In our system $\mathcal{L}^{+}_{CI}$, we can represent the benefactive *morau*[36] with the semantics in (27a), which is of the type in (27b):

(27) a. $\lambda P \lambda x \lambda y.\ \text{cause}(y, P(x)) \blacklozenge \lambda P \lambda x \lambda y.\ \text{good}(y, P(x))$

b. $\langle \langle e,t \rangle, \langle e, \langle e,t \rangle \rangle \rangle^{a} \times \langle \langle e,t \rangle, \langle e, \langle e,t \rangle \rangle \rangle^{s}$

This lexical entry is of mixed type; derivations with it will proceed via the rules (R8), for the combinatoric steps, and (R9), for the final step which shifts the mixed content to something interpretable via (20). Here is the derivation, with types and rules of proof only.[37]

$$\text{R9}\,\dfrac{\text{R8}\,\dfrac{t : e^{a} \qquad \text{R8}\,\dfrac{h : e^{a} \qquad \text{R8}\,\dfrac{\text{R2}\,\dfrac{\text{piano} : e^{a} \qquad \text{hiite} : \langle e, \langle e,t \rangle \rangle^{a}}{\text{hiite(piano)} : \langle e,t \rangle^{a}} \qquad \text{moratta} : \langle \langle e,t \rangle, \langle e, \langle e,t \rangle \rangle \rangle^{a} \times \langle \langle e,t \rangle, \langle e, \langle e,t \rangle \rangle \rangle^{s}}{\text{moratta(hiite(piano))} : \langle e, \langle e,t \rangle \rangle^{a} \times \langle e, \langle e,t \rangle \rangle^{s}}}{\text{moratta(hiite(piano))}(h) : \langle e,t \rangle^{a} \times \langle e,t \rangle^{s}}}{\text{moratta(hiite(piano))}(h)(t) : t^{a} \times t^{s}}}{\pi_1(\text{moratta(hiite(piano))}(h)(t)) : t^{a} \bullet \pi_2(\text{moratta(hiite(piano))}(h)(t)) : t^{s}}$$

Formal and informal pronouns in various European languages such as *tu/vous* in French or *tu/usted* in Spanish also carry mixed content, as discussed by Horn (2007). These objects carry the conventional implicature that the speaker feels (as if he should be) formal (informal) toward the addressee, while having the at-issue indexical denotation of a normal second person pronoun, on which they pick out the addressee of the context (Kaplan 1989). Again, they are (at the surface) monomorphemic, and they plainly introduce both at-issue and CIE content, making them mixed content bearers by the proposed criteria. This means the formal versions can be assigned the following denotation, where s^{c} denotes the speaker of the context and h^{c} its hearer:

(28) $h^{c} \blacklozenge \text{honor}(s^{c}, h^{c}) : e^{a} \times t^{s}$

I make use of just an honorific relation here, following Potts & Kawahara (2004). I do not want to take a position on its content here because mere use of a pronoun need not indicate that the addressee is actually honored. It is difficult to decide exactly what should be made of insincere uses of such pronouns. Potts & Kawahara (2004) analyze Japanese subject honorifics as

36 The term *morat-ta* 'Ben-Pst' is derived from *mora-u* 'Ben-Npst' via morphological operations that are of no concern to us here.

37 π_1 and π_2 here are the usual projection functions/pullbacks on product types, which work to pick out the first or the second element of the product type, respectively.

performative, so their use already causes the 'honoring' relation to hold; it is not so clear to me that this is the right analysis, for there is a merely normative or polite use. Perhaps we should understand $honor(x, y)$ in this way. The same of course holds for the honorifics discussed earlier. I put these delicate issues aside here.

This is the place to discuss the alternative decompositional analysis in detail. Potts (2007a) provides an analysis of formal pronouns in terms of an honorific feature applying to the pronoun meaning. The idea is that a pronoun consists of a feature bundle which introduces certain kinds of content via the features themselves. Kratzer (2009) elaborates this sort of view. This is certainly another possible route for the pronoun case; the correct answer depends on what the real nature of pronouns is, and on how much of this should be implemented at the level of interpretation rather than, say, morphology. I cannot address these large questions in this paper. My work here merely implements the picture suggested by Horn's (2007) work. I am not ultimately certain what the right analysis of pronouns should be.

However, I am skeptical about the prospects of extending this sort of view to the general case of mixed content.[38] The question ultimately is whether we need a separate system of types for mixed content at all. Generalizing from the above, one might wish to maintain the simpler system of $\mathcal{L}_{CI}$ and analyze all mixed content expressions as morphologically complex at the level of type combination: in other words, to decompose all mixed content bearers into at-issue parts and CIE parts, and let these parts operate on one another to yield the right meanings. Could this strategy work? Not without further elaboration, because cases like the Japanese benefactive above require multiple operations at the CIE level, which we have seen cannot be handled by using CI types. I do not see any easy way to get around this problem, even if one admits shunting types into the system (so adopting $\mathcal{L}_{CI}^{+S}$; see Appendix B.1), while rejecting mixed types. But this is largely a technical problem. It is possible that it might have a solution within the system, though I cannot see how it would be done.[39]

38 Thanks to several anonymous reviewers and to Chris Potts (p.c.) for discussion of this point.

39 One possibility would be to perform an extreme decomposition and separate out a 'morpheme' from the benefactive of type $\langle t^a, t^c \rangle$ which would provide a conventionally implicated modification of the whole sentence. For this to work out, one would need a way to predicate properties (e.g. deriving benefit) of individuals occupying roles in the sentence without doing so directly, which might be done by using neo-Davidsonian event semantics, or a system providing 'tags' for grammatical roles in the way that e.g. LFG does. But allowing the

More worrisome, in my view, is the idea of necessarily decomposing *all* mixed content terms. One can justify this move in the case of pronouns, which have independently motivated analyses as feature bundles already. It may also be justifiable for some pejoratives, like *Jap*, which is truncated; I noted previously that one might take the truncation to introduce expressive content as a separate morpheme. Perhaps it is even possible to decompose honorifics like *irassharu* as something like [$_V$ COME Hon], a motion verb with a separate honorific morpheme. But giving a multimorphemic analysis to epithets like *bum* or *asshole*, pejoratives like *Frog* or *Boche*,[40] or (especially) the so-called colored terms that will close the discussion in this section seems to be a stretch. In at least some of these cases, a decompositional analysis seems very unnatural. I do not think that a knockdown argument is available against such analyses — one could always decompose, after all. But in at least these cases, there is no obvious motivation for decomposition, other than the limitations imposed by the analytical resources made available in $\mathcal{L}_{CI}$. Without independent motivation, it seems much more natural just to analyze them as mixed content bearers. At the very least, one would not want to be forced to a decompositional analysis by the type system underlying the work.

As a final example of mixed content terms discussed in the literature, and perhaps the example least amenable to decomposition, let us consider pairs like Frege's *steed* and *nag*, where the extensions are identical but the attitudes conveyed distinct (Horn 2007). Terms of this kind initially appear similar to pejoratives, but they are semantically distinct. While pejoratives express negative attitudes toward all members of some particular group, *steed*, *nag* and other terms that merely add 'color' to an at-issue description (Neale 1999) express positivity and negativity which is directed only at the individual being described, in the case of predicative uses. Again, these expressions are monomorphemic and introduce both at-issue and CIE content; they are therefore mixed content bearers, which do not seem to be decomposable in any natural way.

multiple morphemes introduced by lexical items in decompositional analyses to take distinct scope positions and to be of different types opens the door to many impossible readings and unattested possibilities; the costs of the story seem to far outweigh the benefits here.

40 Again, these pejoratives are selected for their lack of real sting. It is not hard to find other pejoratives that are clearly monomorphemic in my sense, but most of them are sensitive enough that I will avoid even their mention, much less their use.

(29) a. Get my steed from the stable.
at-issue: 'Get my horse from the stable.'
CIE: 'My horse is a noble animal.'

b. Get my nag from the stable.
at-issue: 'Get my horse from the stable.'
CIE: 'My horse is a useless animal.'

This generalization can be taken to mean that colored terms have denotations of a similar type to the subject honorifics discussed earlier. We can give them lexical entries as follows.

(30) a. $[\![\text{steed}]\!] = \lambda x.\ \text{horse}(x) \blacklozenge \lambda x.\ \text{noble}(x) : \langle e,t\rangle^a \times \langle e,t\rangle^s$

b. $[\![\text{nag}]\!] = \lambda x.\ \text{horse}(x) \blacklozenge \lambda x.\ \text{useless}(x) : \langle e,t\rangle^a \times \langle e,t\rangle^s$

The behavior of these items in semantic derivations should be obvious by now; I omit showing details of any derivations.

Let me briefly mention another case provided by McCready & Schwager (2009), who discuss the Viennese German intensifier *ur* in this system. One use of *ur* is to intensify the meaning of a noun or adjective:

(31) a. Das ist ur interessant.
that is ur interesting
'That is totally interesting.'

b. Er ist ein ur Idiot.
he is a ur idiot
'He is a total idiot.'

The meaning of this modifier has two parts. First, it performs intensification in the at-issue dimension, so (31a) means that the referent of *that* is extremely (or 'totally') interesting; but the speaker also indicates that she holds some emotive attitude toward the sentential content. This latter part is expressive or conventionally implicated, and indeed bears the usual hallmarks of emotive expressive meanings: for example, it is highly context dependent with respect to positivity and negativity.[41] McCready and Schwager further provide a formal semantics for the intensifier in $\mathcal{L}^{+}_{CI}$. The analysis is complex, and I will not review it here; but it is at least clear that *ur* passes the tests I have proposed for mixed content bearers.

41 Footnote 50 discusses the issue of context dependence of emotive meanings further.

I suppose that there are many other kinds of mixed content, but most have not come to the attention of researchers yet. The previous discussion should at least show the usefulness of the notion. There is plainly much more work to be done on the range of conventionally implicating and expressive items in the world's languages, but I hope that the small sample given here and in the previous section show that the type-theoretic tools proposed here have useful application in their analysis.

3 Main CIEs

The logic proposed in the previous section, $\mathcal{L}^{+}_{CI}$, does more than allow for the analysis of mixed content. The introduction of shunting types that was shown to be necessary for that purpose also makes available another possibility for semantic denotation. As we have seen, the result of composition with mixed terms is similar in the end to the addition of supplementary information via conventional implicatures: this similarity is modeled by letting both sorts of CIE content be conjoined to at-issue content via the bullet. Shunting types, though, because of their resource sensitivity, allow for a situation where there is no at-issue content at all. The aim of this section is to show that this feature of the logic should not be taken as a negative one.

The existence of shunting types implies that it is possible that a particular sentence (or utterance) can convey only CIE content. We will examine several cases where this situation appears to be realized. In general, this situation is somewhat special; the uses of language most often analyzed in linguistic and philosophical work serve to convey information about the world, rather than to express aspects of the speaker's mental state or meta-information about the conversation, which (arguably) is the function of conventional implicature. Information about the world is thus conveyed mostly by default here, or in ways other than via the conventional implicature itself, e.g. when the 'primary' content is present in the context, or entered into it by other means. This observation suggests a division in content type which we will find to be borne out, at least at the level of inspection that I can provide in the present context.

The discussion is structured as follows. In section 3.1, I briefly show why shunting types imply that CIE content can be primary. Section 3.2 examines a first case, the basic cases of single-word utterances of particles of the kind introduced in Kaplan 1999. There it is also shown that these cases exhibit unexpected behavior from the perspective of $\mathcal{L}_{CI}$ in that they

can fall in the scope of certain semantic operators. As it turns out, the existence of shunting types makes it possible to allow for these cases while simultaneously retaining Potts's generalizations about the interaction of semantic operators and CIE content. Section 3.3 discusses the Japanese adverbial *yokumo*, which exhibits a different kind of behavior: while the denial test supports an analysis of the content of sentences containing this adverbial as CIE, there is composition within the adverbial scope, unlike what is found with Kaplan's particles (as noted by Kratzer 1999). It is shown that analyzing *yokumo* as being of shunting type both provides an explanation of its behavior with respect to denials. 3.4 concludes with some suggestions about possible related phenomena.

3.1 Why Main Content?

The reason that shunting types allow for utterances with only CIE content is the resource-sensitivity of these types. The function of shunting types is to 'shunt' at-issue content into the CIE dimension of meaning; because of the resource-sensitivity of these types, no at-issue content remains. Any successful derivation will result in an object of type t^s. Here is a sample, with two applications:

$$\text{R7}\dfrac{\beta : \tau^a \qquad \text{R7}\dfrac{\alpha : \sigma^a \qquad \gamma : \langle \sigma, \langle \tau, \upsilon \rangle \rangle^s}{\gamma(\alpha) : \langle \tau, \upsilon \rangle^s}}{\gamma(\alpha)(\beta) : \upsilon^s}$$

Plainly, no at-issue content remains.

We have seen that shunting types are needed in the analysis of mixed content. But their existence implies that there could be expressions that are exclusively of shunting type. The rest of this section indicates some instances of such expressions in various natural languages. Before the empirical facts, though, two theoretical issues must be addressed; one relatively simple, and one difficult.

The first issue is that the definition of proof tree interpretation in (20) cannot be used when an utterance lacks asserted content. The reason is that the definition assumes the existence of an object of type t^a on the root node, but when there is no asserted content, there is no such object.[42] It is therefore necessary to modify the definition to allow for this case. Note that it also seems necessary to modify the original definition provided by

42 Thanks to Kai von Fintel (p.c.) for bringing this issue to my attention.

Potts (2005) as well, for precisely the same reasons; I therefore modify (20) to cover the case where the utterance contains only content of type t^c as well. I will simply stipulate that in cases where a sentence lacks asserted content it is still interpreted as a 2-tuple, but one with a first (left) element which is always satisfiable. I will denote this trivial assertion by T. The result of all this is a definition with two distinct cases, one which applies when there is an asserted proposition, and one which applies when there is not.

(32) **Generalized Interpretation (final).**

i. Let $\mathcal{T}$ be a proof tree with at-issue term $\alpha : \sigma^a$ on its root node, and distinct terms $\beta_1 : t^{\{c,s\}}, \ldots, \beta_n : t^{\{c,s\}}$ on nodes in it. Then the interpretation of $\mathcal{T}$ is $\langle [\![\alpha : \sigma^a]\!], \{[\![\beta_1 : t^{\{c,s\}}]\!], \ldots, [\![\beta_n : t^{\{c,s\}}]\!]\}\rangle$.

ii. Let $\mathcal{T}$ be a proof tree with at-issue term $\alpha : \sigma^{\{c,s\}}$ on its root node, and distinct terms $\beta_1 : t^{\{c,s\}}, \ldots, \beta_n : t^{\{c,s\}}$ on nodes in it. Then the interpretation of $\mathcal{T}$ is $\langle T, \{[\![\alpha : t^{\{c,s\}}]\!], [\![\beta_1 : t^{\{c,s\}}]\!], \ldots, [\![\beta_n : t^{\{c,s\}}]\!]\}\rangle$.

The second issue is less easily resolved. We have a fairly good idea of what conditions there are on assertion and what norms govern this speech act. But these norms do not necessarily apply when there is no asserted content present in an utterance. What then are the norms of the use of sentences which have CIE content as their primary content?[43] This is a difficult question and one which might be asked about all uses of CIE content. It is not really clear at this point exactly what the normative conditions are on the use of supplementary CIEs, for example. A full answer is therefore far beyond the scope of this paper. I can only suggest a path toward an answer here. It seems that what the 'norms of expression' are depends on what kind of act is at issue. In assertion we are, roughly, concerned with the transmission of true information. If a sentence is false, then a norm has been violated. With respect to CIE content, one can think of a notion of 'expressive correctness,' following Kaplan; the question then becomes what exactly it takes for something to be expressively correct. The answer to this turns on what one takes the function of CIEs to be. It is not clear to me that we have the necessary understanding of their function yet. Once we do, we will be in a better position to articulate the norms of expressive use.

Let us now turn to some empirical facts, focusing on particles and adverbials.

43 Thanks to Kai von Fintel (p.c.) for raising this question.

3.2 Particles

Sentence-modifying particles introduce several interesting issues. First, we can consider the case of particles that do not modify any sentences, such as *man*.

(33) Man!

This kind of case is discussed briefly by McCready (2008b). There *man* was taken to be a conventional implicature-introducing propositional modifier that applies to a proposition made available by context. If one agrees with this analysis (and if one follows the analysis of proposition-modifying sentence-initial *man* offered in that paper) one ends up with an undesirable situation where both $man(\phi)$ and ϕ are directly communicated. The reason is that *man* would end up being analyzed as of type $\langle t, t\rangle^c$, which means that one ends up with the denotation $\varphi : t^a \bullet man(\varphi) : t^c$ for the sentence. Intuitively, though, this is not correct: φ is not asserted by sentences like the above. To see this, consider cases where a question is answered with the particle:

(34) a. A: What's the weather like outside?

b. B: Man!

B's response is understood roughly as follows: B has some sort of strong feeling about the weather outside. It is not clear what the weather outside is actually like. In this kind of case, A is likely to infer that the weather is extreme in some way, but exactly what way this is depends entirely on A's prior knowledge about the weather. We can therefore see clearly that the proposition *man* modifies is not asserted by B's utterance — if it were, it should be recoverable, but it is not. Still, we should not take this to mean that nothing about this proposition is communicated, only that this communication cannot be 'literal.'

Of course, there is another possibility for analysis. The above discussion is relevant only if stand-alone *man* is in fact modifying a proposition. It is also possible that it is a simple exclamation of the type discussed immediately below: if this is right, then (33) indicates only that the speaker is in an excited state. If so, then the conclusion that B's response in (34) indicates something about the weather follows completely from inference: given that A has asked a question about the weather and B is indicating that he is in a heightened emotional state, it is natural (though defeasible) to conclude that he is excited

about the weather. It is not easy to see which of these options is correct, for it's not clear that there are empirical tests to distinguish between the two positions.[44] However, as we'll see, either approach proves to give support to an analysis of particles that takes them to denote objects of shunting type.

Clearly, on either analysis, stand-alone particles provide another case where the conventionally implicated content is the primary content of the utterance. If we assume that a proposition is being directly modified, ⟦man⟧ can be typed as

$$\lambda p.\ \mathrm{man}(p) : \langle t^a, t^s \rangle$$

ignoring the actual content of the particle, which is roughly that the speaker has some kind of emotional reaction toward p (that it is good or bad).[45] This analysis disallows the assertion of p itself, as desired. The question of how extensively we should take particle meanings to be analyzable in terms of shunting types is left for another occasion; it turns on the empirical question of whether or not the propositional content of sentences modified by particles can serve as answers to questions. In many cases it is clear that they can, in others, perhaps not.

Another kind of even more obvious case is that of expressives that do not perform any modification, such as salutations or fully expressive exclamations (cf. Kaplan 1999; Kratzer 1999). On the second analysis of stand-alone particles like *man*, they too will fall into this category.

(35) a. Thanks!

b. Good morning.

c. Ouch!

Expressions like these lack truth conditions, though they can be expressively correct (appropriate) or not. They plainly do not assert anything.[46] They can be analyzed as objects of type t^c (or t^s), which simply express something about the speaker's mental states or what she takes the situation to be like.

44 We cannot, for instance, make use of the kind of binding tests that proponents of 'unarticulated constituents' have taken as evidence for their approach (cf. Stanley 2000 for a use of these tests, and Cappelen & Lepore 2005 for critical discussion).

45 The semantics of *man* is discussed in detail in McCready 2008b.

46 As the editors point out, this is so only if one does not accept relevant aspects of the performative hypothesis, according to which (35c), for example, would assert something like 'I hereby express 'ouch!" Discussion of the hypothesis with arguments for and against it can be found in Levinson 1983.

Here the extension to $\mathcal{L}_{CI}^{+S}$ does not at first appear necessary, as type t^c is sufficient, given that no combinatorics are taking place; but it is clear that, in cases like these, the expressive (or conventionally implicated) content is the main content of the utterance. We thus have a division between cases of 'primary' CIs: one, modeled via shunting types, where the CI content is functional, and another, apparently modellable either via shunting types or CI types, where the content is not functional and expresses a constant.

However, it turns out that there are reasons to take type t^c to be inappropriate for these contexts. The reason is that — by definition — there are no functional types taking CI types as input. As discussed in detail above, this is by design: the content of e.g. appositives never seems to fall in the scope of semantic operators. But certain operators are able to act on expressive particles such as those discussed by Kaplan: namely, other particles.

(36) a. Ouch, man!

b. Man, ouch!

If *man* is to modify *ouch* in these cases, it must be either of type $\langle t^c, t\rangle$ or $\langle t^s, t\rangle$ (where the output type is also either t^c or t^s). But if it takes an object of type t^c as input, the generalization about the semantic independence of e.g. appositives is lost: we must admit functional types taking CI types as input. If we assume that *ouch* denotes something of type t^s, though, we can avoid this situation.

One might think that the two particles are merely adjacent, so neither need to be analyzed as functional. To see that there is genuine interaction between the two particles, consider the following two situations.

(37) a. Situation 1: You stub your toe on the curb while walking down the street with your friend Curly.

b. Situation 2: Your friend Curly suddenly pokes you in the eye with a fork.

(38) a. Ouch!

b. Ouch, man!

(38a) is an appropriate utterance in either Situation 1 or Situation 2. (38b) gives an impression of blame: 'it's your fault that I am in a position to say

this appropriately!'[47] This kind of accusation is obviously appropriate in Situation 2. If uttered in Situation 1, it is somewhat odd: why is it Curly's fault that you've stubbed your toe? These considerations are enough to make it clear that *man* is in fact doing something to the meaning of *ouch* in (38b), and so some kind of composition is at work.

Another kind of example comes from the intensifiers discussed by McCready & Schwager (2009). One use of these expressions is as propositional modifiers, which intensify along the expressive dimension, as in (39).

(39) a. John totally came to the party.

b. He fully wiped out, dude.

McCready & Schwager (2009) analyze uses like these as expressing that the speaker has maximal epistemic commitment to her justification for her use of the modified proposition, so (39a) would express that the speaker is maximally committed to her justification (evidence) that John came to the party. It turns out that these modifiers can also modify purely expressive items in some dialects of English.

(40) Totally ouch(, dude).

On the McCready and Schwager analysis, this would express that the speaker has maximal commitment to her justification for uttering *ouch*, itself an expressive item. Presumably such justification would be a pain felt by the speaker or something similar. But the main point for our purposes here is that *ouch* is a bearer of purely expressive content. A proper analysis of cases like these therefore will, again, require modification of expressive content.

We have now seen that there are instances in which purely expressive content is modified. This means that we must add to the system a provision for operators that take CIE content as input. But what type of content should this be? The worry is that, if we allow operators over CI types (σ^c), the generalizations made by Potts (i.a.) about modification of conventional implicatures such as the content of appositives are lost. The natural way to avoid this problem is to analyze *man* and *totally* in (39) as operators over shunting typed objects, so to make them of type $\langle t^s, t^s \rangle$.[48] Such types are

47 I believe this follows from the analysis of sentence-final *man* given in McCready 2008b, on which it performs a dynamic strengthening of speech acts, though I will not provide details here.

48 Of course, there is also a need for a typing for these operators that allows them to modify at-issue content as well: $\langle t^a, t^s \rangle$. Depending on the facts about modification of CIE content,

easily added to the system (via clause (i) of B.1.1). With this move the Potts generalizations are maintained in the type system.

I believe that the particles, and particularly the expressives like (35), are the clearest instances of sentences which lack at-issue content, and, perhaps as a consequence, are the instances which have received the most attention in the literature. Let us now turn to another kind of sentence that does not appear to have at-issue content.

3.3 *Yokumo*

The second example we will consider are sentences modified by the Japanese adverbial *yokumo*. In line with McCready 2004, I will argue that *yokumo* introduces three pieces of content: a) a statement of the speaker's emotional attitude toward the modified proposition φ, b) a statement regarding the prior probability the speaker assigned to φ, and c) a condition on mutual knowledge of φ. Unlike McCready 2004, however, I will analyze conditions (a) and (b) as conventionally implicated rather than asserted, for reasons which will become clear. The question of the status of (c) is more difficult to resolve, but in the end I will conclude that it is presuppositional.

The meaning of *yokumo* is complex, as may already be clear from the brief discussion above. Here are some representative examples, with somewhat rough translations.[49]

(41) a. Yokumo koko ni kita (na)!
YOKUMO here to came (PT)
'You have a lot of guts to come here!'

b. Yokumo ore o damashita (na!)
YOKUMO me Acc tricked (PT)
'I can't believe you had the gall to trick me.'

The most obvious approximation of the meaning of the adverbial is a simple negative statement about the propositional content.[50]

---

it may be that these two typings are consistently available for particles and other such modifiers. Much more empirical investigation is needed before this question can be answered definitively.

49 Most examples in this section come from McCready 2004.

50 This is the simplest version of the adverbial meaning. For many speakers, *yokumo* can also be used with a positive meaning.

(42) $[\![\text{yokumo}]\!] = \lambda p.\ \text{bad}(p)$

The second component of *yokumo*'s meaning involves likelihood. *Yokumo* indicates that the speaker did not expect the event described by the modified sentence to occur, and that she is surprised that it actually did. There are a variety of ways to model this situation. I will simply make use of a predicate *surprise*, which can be given a semantics in terms of probabilities in ways that are more or less obvious.[51] Adding this to the denotation of *yokumo* yields

(43) $[\![\text{yokumo}]\!] = \lambda p.\ \text{bad}(p) \wedge \text{surprise}(p)$

One element of this adverbial's meaning remains to be analyzed. It was also discussed by McCready (2004): the proposition modified by *yokumo* must be (believed by the speaker to be) common ground. To see that this proposition must indeed be common ground, note that sentences modified by *yokumo* are not felicitous as answers to questions.

(i) omae yokumo konna ii sakuhin kaketa na
you YOKUMO this-kind-of good artwork write.able-Pst PT
'I can't believe you were able to make a piece this good!'

Whether the attitude expressed by *yokumo* is positive or negative appears to depend on several factors. First, the content of the sentence: in (41b), the modified proposition describes an event that (we can assume) was negative for the speaker, while (i) is clearly positive. Other facts about the world also must play a role, though. Suppose that it is the speaker's birthday, and he comes home to find a surprise party. The hearer had told him earlier that everyone had forgotten his birthday. Here, the tricking lacks a negative character. The identity of the speaker also obviously plays a role. These facts are reminiscent of what we find with modification by the particle *man* (McCready 2008b), which has the introduction of emotional attitudes as one of its functions. There I introduced a function E which maps Kaplanian contexts and propositions to emotive predicates; the relevant features of the context, and the content of the proposition, determine an emotive predicate, which is then applied to the proposition itself. In these more permissive dialects, the statement $bad(p)$ in the semantics below should be replaced with $E(c)(p)(p)$, which is interpreted, after application of E to the context and the proposition, either as $bad(p)$ or $good(p)$. The issue of how the emotive import of expressives arises is an important one in the context of the study of expressive meaning and one I hope to return to in later work, but is orthogonal to the purposes of the present paper, which is mostly concerned with combinatorics.

51 The operator should be defined in terms of probabilities prior to learning that the 'surprising' proposition is true, which requires a notion of dynamic changes in probabilities. For discussion, see Jeffrey 1983, Kooi 2003, or McCready & Ogata 2007.

(44) a. Context: A asks B 'Who did Austin marry?'(McCready 2004)

b. #Yokumo Dallas to kekkon sita na!
YOKUMO Dallas with marry did PT
'He did an amazingly stupid and shocking thing by marrying Dallas!'

This example can be taken to indicate that *yokumo* cannot provide new information. In my earlier work I modeled this knowledge requirement via a condition on update: update is only defined if both hearer and speaker already know the content of the proposition, in conjunction with an assumption of common knowledge. There are several options regarding how this condition should be stated. On the one hand, it is possible to simply presuppose that $CG_{\{s,h\}}(\varphi)$, that φ is common ground for speaker and hearer;[52] on the other hand, taking a less interactive approach to the dynamics of information, we can simply stipulate that an update with $yokumo(p)$ is only defined if update with p does not alter the information state of speaker or hearer. These two conditions amount to the same thing for present purposes.[53] I will make use of the former method in this paper.[54] We arrive at the following lexical entry.[55]

(45) $[\![\text{yokumo}]\!]^c = \lambda p\colon CG_{\{s,h\}}(p).\ \text{bad}(p) \wedge \text{surprise}(p)$

52 See van Ditmarsch, van der Hoek & Kooi (2007) for the semantics of this operator.

53 We do not need to concern ourselves with deep questions about the difference between knowledge and belief here, for instance.

54 In McCready 2004, I took the second route. This decision was partly motivated by the fact that the particle *na* can induce felicity, which I took to mean that it can help introduce content into the common ground. Since I will not consider the action of this particle in this paper, we can avoid detailed discussion of common ground and update. In any case, it may well turn out that *na* has a different function that makes sentences modified by it compatible with *yokumo* (McCready, in preparation).

55 One might think that all this is unnecessary, given that $surprise(\phi)$ is factive, if we assume that the logical predicate has the same interpretation as the natural language *surprise*, which I see no reason to do. But even if it is presupposed that ϕ, must we take ϕ to be common knowledge? The answer is yes. First, note that what is presupposed by $surprise(\phi)$ is not ϕ but that the speaker (believes herself to have) learned ϕ at some past time, which is already the wrong interpretation. Further, this presupposition should be accommodatable; but it is not. This is surprising given the results of Kaufmann (2009), who shows that such presuppositions should be readily accommodatable, unlike presuppositions about the common ground. I take this to indicate that the presupposition of common ground is needed.

This essentially restates the lexical content originally provided in McCready 2004. However, there is more to the story, as discussed in that paper. In (45) I have, without argument, taken the common ground condition to be presupposed, and the other two parts of the meaning to be asserted. But if they are indeed asserted, it should be possible for a hearer to deny them directly. However, the content of *yokumo*(p) cannot be directly denied. Consider the following example.[56]

(46) Yokumo Dallas to kekkon shita na!
YOKUMO Dallas with marry did PT
'He did an amazingly stupid and shocking thing by marrying Dallas!'

a. # sore-wa hontoo janai
that-Top truth Cop.Neg
'That's not true.'

b. # uso da
lie Cop
'That's a lie!'

Each of the possible denials in (46) is infelicitous. One might try to explain this in terms of 'privileged content' or speaker relativity; it is known that it is difficult to make claims about the truth or falsity of claims that depend (in part) on the speaker's preferences (cf. Lasersohn 2005; Stephenson 2007). It makes some sense, given this, that the emotive content of the adverbial content is hard to deny. But this argument does not go through for the probability statement.[57]

The analysis starts with the observation that it is not actually impossible to deny the content of the adverbial — it just cannot be done with the responses in (46). Less direct expressions are needed.

(47) Yokumo Dallas to kekkon sita na!
YOKUMO Dallas with marry did PT
'He did an amazingly stupid and shocking thing by marrying Dallas!'

a. Chigau yo!
wrong PT

56 Here we suppose that it is known that the referent of 'he' is marrying Dallas.

57 If probabilities are understood as subjective, the basis for assertion may indeed be hard to deny. But it seems clear that statements about likelihood become part of the public domain once made, so denial of the surprise clause in the denotation of *yokumo* is surely possible.

'That's wrong!'

b. Sonna koto nai yo!
that-kind-of thing Cop.Neg PT
'That's not right.'

These facts are reminiscent of facts noted by Potts (2005) about conventional implicatures. How can one call the content of a nominal appositive into question, given that it cannot be denied directly?

(48) Bill, the philanthropist, is very rich.

a. That's not true. (= Bill is not very rich.)

b. Well, yeah, he is, but that's not really right . . . (= casts doubt on the appositive content)

What I will call *truth-directed denials* like those in (46) cannot target conventionally implicated content, but only asserted content. Denials like (47) can target either type of content. If we assume that the content of *yokumo* is conventionally implicated, the facts in (46) are therefore immediately explained. Note that the fact that truth-directed denial can target the asserted content in (48) and not in (46) has an immediate explanation: (48) asserts that Bill is rich, but (46) asserts nothing at all, for it is already common ground that Dallas and Austin got married.[58]

58 Another commonality can be found with denials. Note that there are two parts to the 'deniable' content of *yokumo* sentences, given that the proposition modified is already part of the common ground: the emotive content and the statement of surprise. For many (but not all) speakers, the denials of *yokumo*-modified sentences in (47) can only target one of these, meaning that they can deny the good/badness of the marriage, or its surprisingness, but not both. The same seems to hold for sentences in English where multiple conventional implicatures are tied to the same host NP, as in (ia). Here, the denial in (ib) seems to indicate that either a) John is not a banker, or b) that he does not own a large house. It is difficult to understand (ib) as denying both together. If this data is correct, the identification of the content introduced by *yokumo* as conventional implicature receives additional support.

(i) a. A: John, a banker, who owns a large house, is going bankrupt.

b. B: Well, yeah, true, but . . .

However, none of this follows from the analysis I am going to provide in terms of $\mathcal{L}^{+}_{CI}$, where the adverbial simply introduces a conjunction; unless it is assumed that only a single conjunct can be targeted by a denial in the case of conventionally implicated content. Formally, we might take the adverbial to introduce several distinct conditions, for example

In previous work, I analyzed these facts in Segmented Discourse Representation Theory (SDRT; Asher & Lascarides 2003), in a way related to the analysis of parentheticals of Asher (2000). Here I will explore a different approach.[59]

One may wonder if the above facts about denial are really sufficient evidence to justify treating the content of *yokumo* as conventionally implicated. This is legitimate; but, for independent reasons, it is difficult to apply the other standard test for conventional implicature. It is known that conventional implicatures are scopeless with respect to semantic operators over asserted content, such as negation, conditionals and the various modalities. Ordinarily, one would test the behavior of the putative conventional implicature item in operator contexts, and then draw conclusions about whether or not it is actually asserted. Unfortunately, this proves to be impossible with *yokumo*. *Yokumo* is resistant to appearing in nonveridical contexts, as shown by McCready (2004).[60] Because *yokumo* is ungrammatical in these contexts, it is impossible to test its scope behavior, and, as a result, the operator test for conventional implicature cannot be applied. The same goes for the binding test. Since *yokumo* can't appear in conditional consequents, it is hard to tell whether or not its content would be bindable. But a conceptual argument is available. Intuitively, sentences modified by *yokumo* serve to introduce new information about the speaker's mental states and attitudes. If this content was presupposed, then (on a standard picture of presupposition) the speaker would be assuming it to be in the common ground. But, intuitively,

in the form of a set of propositions. Before taking this kind of step, though, it is worth checking to see how stable the denial facts are with respect to 'multiple denials.'

59 The SDRT analysis involved assuming that each part of the lexical content of the adverbial introduced distinct speech act discourse referents which were then connected by discourse relations. This analysis has three problems, as I now see it. First, there is no clear reason why the denials in (46) are different from those in (47). There is no independently motivated reason to distinguish between these kinds of denial at the level of discourse structure (to my knowledge). Second, I had to make an assumption about possible attachment points for the denials to work out right, which also lacks independent motivation. Third, on my analysis there, *yokumo*(p) also was taken to assert p, despite the presence of p in the common ground already (as shown by the facts in (44)). This strikes me as highly problematic in view of the norms of assertion: one should not assert things that are already common ground (or even cannot, if this is taken to be a precondition on assertions). I therefore take the new analysis presented in the main text to be preferable.

60 The reason for this may relate to evidential behavior: it seems possible that *yokumo* requires that the speaker have a certain kind of relation with the proposition it modifies, in a way related to what is found with sentence-initial *man* (McCready 2008b). I will not consider this behavior in detail here.

the speaker is communicating her attitudes, so the presupposition picture simply does not seem to be correct.[61]

Here I will take the results of the denial test to be conclusive, and therefore treat the content of *yokumo* as conventionally implicated in what follows (excluding the presupposition of common ground).[62] The question now is what type to assign it. As with stand-alone *man*, there are two options: $\langle t^a, t^c \rangle$ and $\langle t^a, t^s \rangle$. Just as with *man*, there are obvious problems with the first option. Given the resource-insensitivity of CI types, applying a denotation of the first option to a proposition φ will yield $\varphi : t^a \bullet \mathit{yokumo}(\varphi) : t^c$. But this means that φ is asserted, and so it should be deniable. But it is not. The first option, therefore, cannot be right. Assuming *yokumo* to be of type $\langle t^a, t^s \rangle$, however, means that the result of combining the adverbial with a proposition will be only $\mathit{yokumo}(\varphi) : t^s$; nothing is asserted, so the denial facts are predicted. The result is that sentences modified by *yokumo* carry only CIE content.

3.4 Conclusion

In this section we have seen several areas in which natural language appears to make use of the possibilities afforded by shunting types, and have also had occasion to slightly extend $\mathcal{L}^+_{CI}$ to allow for modification of shunting typed objects. I hope the reader has been convinced of their usefulness. I do not think that this discussion exhausts the utility of shunting types: for example, one other area where I think they could be useful is in the analysis of exclamatives, which have the combinatory properties one would expect from shunting-typed objects in terms of further combinatorics, given certain

61 This argument seems reasonable, but the presupposition that the modified proposition is in the common ground is less simple to get clear about. How can we be sure that presuppositions of this sort, that have no real equivalent in non-technical natural language, are not actually conventionally implicated? I do not know of a really good way. The issue is general, and has received a bit of recent discussion by Schlenker (2008), who raises worries for his theory of presupposition involving complex presuppositions that cannot be articulated easily or at all in natural language. This is an interesting issue but a difficult one, and I will not be able to do it full justice in this paper.

62 Another way to interpret these results is to conclude that *yokumo* introduces a different kind of content, that behaves in some ways similarly to CIE content (cf. the comments of a reviewer). This seems possible; but it also seems that, even in this case, it behaves like CIE content where it can appear. I think this justifies using the present system to analyze it.

assumptions.[63] They also exhibit semantic similarities with *yokumo* and even the modifications done by particles, which suggest a larger correspondence. The topic is large enough that I cannot do justice to it here. Another area is expressive small clauses, sentential phrases like (49), discussed by Potts & Roeper (2006).

(49) You damn fool!

Utterances like this one do not exhibit any at-issue content; there is nothing for truth-directed denials to target, for example. This fact makes it look like shunting types should be involved. As Potts and Roeper state, though, it is not completely clear how the details of the composition should work, and I cannot improve on their observations here.

In a sense, the conventional implicatures introduced by shunting-typed content remain supplementary, at least in the cases examined here; the difference with 'ordinary' conventional implicatures of CI type is that shunting-typed objects supplement content that is already present, and not asserted by the sentence providing the supplementary information. In the case of *yokumo*, this content must be introduced via accommodation, if it is not already present; but this presents no special difficulties, unlike presuppositions of some kinds of expressive content (e.g. Kaufmann 2009). For some other instances of CIE content in contexts where no assertion is made, the situation can be different, for instance in the analysis of the Japanese modal particle *daroo* provided by Hara (2008). According to this analysis, *daroo*(φ) conventionally implicates that $\mu(\varphi) > 50\%$, but does not assert anything. Hara notes that $\mathcal{L}_{CI}$ is not appropriate for analyzing this case, in that, given that this type system returns φ itself in the at-issue dimension, Gricean maxims would be violated by any use of *daroo* to modify a proposition. $\mathcal{L}^{+S}_{CI}$, however, makes the right predictions (assuming that the Hara analysis is correct.) What these cases have in common is that the conventionally implicated content is, in some sense, primary to the intent behind the utterance.

63 For instance, one must say something about 'embedded exclamatives.' One possible route is to note that embedded instances of exclamatives show very different behavior from non-embedded instances, a fact already noted by Rett (2008), who draws a sharp distinction between the two types.

4 Quechua Evidentials: a Case Study

Let us now examine a single phenomenon (or group of phenomena) that seems to make use of all the types of content discussed here. This is the system of Quechua evidentials, for which $\mathcal{L}^{+}_{CI}$ can provide an alternate analysis to the proposal of Faller (2002), on which these evidentials modify speech acts. I will begin by giving the basic background and facts that a theory of the evidentials should explain. I then briefly present Faller's speech act-based analysis and show (following McCready 2008a) that, despite the conventional implicature-like behavior of the evidentials, an adequate analysis cannot be given in $\mathcal{L}_{CI}$. I then show that such an analysis is available in $\mathcal{L}^{+}_{CI}$. The intent is to duplicate the basics of Faller's analysis as closely as possible in a conventional implicature-based system which does not make use of speech acts. I should make two caveats before embarking on this project. First, the proposal I make here does not account for many of the subtle issues that arise in the Quechua evidential system, only the most basic, brutal facts about the way in which composition seems to work for the different evidentials in the language.[64] Second, the analysis of Faller (2002) is by no means the last word on this subject. More recent work by Faller (2003, 2007, 2006) introduces additional complexities, which I will also leave aside. This section should therefore be taken as only a sketch of an alternate analysis, in which we see how one can ensure some kinds of scope behavior without making anything other than lexical stipulations about types of content.

Cuzco Quechua has several enclitic suffixes that mark evidentiality: roughly, the nature of the speaker's justification for the claim made by the utterance. Faller analyzes three suffixes in detail. The first is the direct evidential *-mi*, which indicates that the speaker has the best available grounds for the claim made, which generally amounts to perceptual evidence. The second, *-si*, is a hearsay evidential which indicates that the speaker heard the information expressed in the claim from someone else. Finally, *-chá*, an inferential evidential, indicates that the speaker's background knowledge, plus inferencing, provides evidence for the proposition the modified sentence denotes, and asserts that the sentence might be true.

(50) a. Para-sha-n-mi
rain-Prog-3-MI

64 I also restrict attention to assertions; complex issues arise with questioning evidentials in this language, which I am not sure how should best be addressed.

'It is raining. + speaker sees that it is raining'

b. para-sha-n-si
rain-Prog-3-SI

'It is raining. + speaker was told that it is raining'

c. para-sha-n-chá
rain-Prog-3-CHÀ

'It may be raining. + speaker conjectures that it is raining based on some sort of inferential evidence'

Cuzco Quechua evidentials do not embed semantically; even when they appear in the surface scope of semantic operators, they always take widest scope (or are scopeless with respect to such operators). The negation in the following example cannot take scope over the evidential, for instance.

(51) Ines-qa **mana-n/-chá/-s** qaynunchaw ñaña-n-ta-chu
Ines-Top not-MI/CHÀ/SI yesterday sister-3-Acc-CHU
watuku-rqa-n
visit-Pst1-3

'Ines didn't visit her sister yesterday.' (and speaker has evidence for this) NOT 'Ines visited her sister yesterday' (and speaker doesn't have evidence for this)

A final basic fact that a theory of evidentials in this language must explain is that use of the hearsay evidential with a sentence does not commit the speaker to the content of the sentence. For instance, the first clause of the following sentence does not commit the speaker to the proposition that a lot of money was left for the speaker, as the continuation shows.

(52) Pay-kuna-s ñoqa-man-qa qulqi-ta muntu-ntin-pi saqiy-wa-n,
(s)he-PL-**SI** I-Illa-Top money-Acc lot-Incl-Loc leave-10-3
mana-má riki riku-sqa-yki i un sol-ta centavo-ta-pis
not-Surp right see-PP-2 not one Sol-Acc cent-Acc-Add
saqi-sha-wa-n-chu
leave-Prog-10-3-Neg

'They left me a lot of money (they said/it was said), but as you have seen, they didn't leave me one *sol*, not one cent.' (Faller 2002:191)

Thus, roughly, what is needed is the following result, where the evidential content is not asserted:

(53) a. $\text{mi}(\phi) \vDash \phi \wedge$ speaker has direct evidence for ϕ

b. $\text{si}(\phi) \vDash$ speaker has hearsay evidence for ϕ

c. $\text{cha}(\phi) \vDash \Diamond\phi \wedge$ speaker has inferential evidence for ϕ

Faller uses Vanderveken's (1990) speech act theory for her analysis. This theory, like other theories of speech acts, assigns them preconditions for successful performance. Faller takes evidentials to introduce additional content into the set of preconditions. For the cases under consideration, we need only be concerned with one kind of precondition: sincerity conditions on successful performance of the speech act. For assertions, Vanderveken takes it to be necessary that $Bel(s, p)$ holds — that the speaker believes the content of the assertion.[65]

Most of the action in Faller's analysis of *-mi* and *chá* is in the sincerity conditions for the assertion. On her analysis, *-mi* adds an additional sincerity condition to the assertion, that $Bpg(s, \phi)$. The formula $Bpg(s, \phi)$ means that the speaker has the best possible grounds for believing ϕ. It is very difficult to make this condition precise. Faller notes that what counts as best possible grounds is dependent on the content in the scope of *-mi*: for externally visible events *Bpg* will ordinarily be sensory evidence, while for reports of people's intentions or attitudes even hearsay evidence will often be enough.

Faller analyzes *-chá* as being simultaneously modal and evidential. The asserted content is therefore $\Diamond\phi$ when ϕ is modified by *-chá*; the corresponding sincerity condition also involves $\Diamond\phi$ instead of ϕ. A sincerity condition indicating that the speaker's reasoning has led him to believe that ϕ might be possible is also introduced. The hearsay evidential *-si* is also complex; the propositional content p is not asserted when this hearsay evidential is used, as we saw, which means that the propositional content of the utterance cannot be asserted. Faller posits a special speech act PRESENT for this situation, on which the speaker simply presents a proposition without making claims about its truth. In addition, the sincerity condition requiring that the speaker believe ϕ is eliminated, and a condition stating that the speaker learned ϕ by hearsay is added.

While considering the degree to which the semantics of evidentials can be viewed as homogeneous, McCready (2008a) attempted to provide a conventional implicature-based analysis of the Quechua system. It seems plain that the evidentials of this language behave in a way similar to conventional

65 This is only a very rough approximation of the normative conditions on assertion. See e.g. Searle 1969 and Siebel 2003 for discussion.

implicatures: they are scopeless, do not participate in denial,[66] and so on. However, an adequate semantics cannot be provided in $\mathcal{L}_{CI}$. To see this, it suffices to consider *-si*: although $si(\phi)$ does not entail ϕ, taking *si* to introduce a conventional implicature causes ϕ to be asserted, given a $\mathcal{L}_{CI}$ analysis where *si* is an object of type $\langle t^a, t^c \rangle$. As we have already seen, the combinatorics, together with (16), yield $\langle \phi, \{si(\phi)\} \rangle$ in this situation; this means that ϕ is asserted, so the analysis fails.

However, with the extension of $\mathcal{L}_{CI}$ to $\mathcal{L}^+_{CI}$, we have more options available. In fact, when one examines the conditions in (53), it can be seen that they correspond to the three kinds of content we have discussed. The direct evidential appears to provide the 'ordinary' supplementary content of Pottsian conventional implicatures; the hearsay evidential, given that it makes no claims about the truth of the content it applies to, acts to provide the conventionally implicated main content of its utterance, and the inferential evidential, given that it has effects in both the at-issue and CI dimensions, is of mixed type. With this observation, an analysis becomes available. Here I do not delve deeply into the content of the evidentials, instead making use of predicates *Bpg* 'there are best possible grounds for', *Hearsay* 'there is an event of hearsay of', and *Inf*, a relation between individuals and propositions indicating that the first element has inferential evidence for the second.[67]

(54) a. $[\![\text{mi}]\!] = \lambda p.\ \text{Bpg}(p) : \langle t^a, t^c \rangle$

b. $[\![\text{si}]\!] = \lambda p.\ \text{Hearsay}(p) : \langle t^a, t^s \rangle$

c. $[\![\text{cha}]\!] = \lambda p.\ \Diamond p \blacklozenge \lambda p.\ \text{Inf}(s, p) : \langle t^a, t^a \rangle \times \langle t^a, t^s \rangle$

Applied to a proposition ϕ, these lexical entries will, respectively, yield the following:

66 See Faller 2002 for details.

67 It is possible to spell at least some of this out in McCready & Ogata's (2007) evidential logic. This logic is dynamic and makes use of discourse referents for evidence sources, sorted according to the type of evidence they provide (hearsay, visual, etc.). Quinean occasion sentences are associated with a predicate E and are associated with an agent a, the evidence holder, and a source i, the source of the content. McCready (2008a) gives a first attempt at using this logic for the Quechua system. The idea is that $Hearsay(p)$ can be defined by making use of a test over $\mathsf{E}^i_a p$-events where *Sort(i)=hearsay* and *Inf(s,p)* can be defined via a test over $\mathsf{E}^i_a p$-events where *Sort(i)=judgemental*. It is a bit harder to define $Bpg(s, p)$, because its satisfaction conditions are dependent on the content of p itself; but it should be possible. I will not go further into this issue here.

(55) a. $\langle \phi, \{\text{Bpg}(\phi)\}\rangle$

b. $\langle T, \{\text{Hearsay}(\phi)\}\rangle$

c. $\langle \Diamond\phi, \{\text{Inf}(s, \phi)\}\rangle$

These are precisely the desired results. This sketch of an analysis for the Quechua evidential case thus provides an example of a situation in which the full power of $\mathcal{L}^{+}_{CI}$ is needed to analyze a single linguistic phenomenon. Of course, the question of whether this analysis or Faller's speech act-based one is to be preferred for this case is separate, and depends on working out the details of the conventional implicature story in connection with looking at a wider array of more complex data. Still, at minimum, the discussion here shows that a speech act analysis is not the only possibility for the phenomena in question.

5 Conclusion

This paper has made two major contributions. It has distinguished and provided a logical system for the analysis of three distinct types of conventional implicature: supplementary CIEs as modeled in Potts 2005, CIEs that provide main content, analyzed in $\mathcal{L}^{+S}_{CI}$ as being of shunting type, and mixed CIEs, analyzed in $\mathcal{L}^{+}_{CI}$. This typology is novel and is one that I think helps significantly in understanding CIE phenomena. I doubt it is exhaustive, however. It seems possible that the three categories analyzed need further subdivision, even in terms of their typing (there is obvious need for subdivision in terms of content). I believe that these systems will be useful for researchers working to understand the range of conventional implicature in the world's languages; I hope the above discussion has provided some support for this belief. In the process, the paper has analyzed a number of phenomena involving CIE content, mostly of mixed or shunting type: these analyses are the second contribution of the paper.

One question that has not been addressed in any detail is the nature of the distinction between conventional implicature and expressive content, or even if there is any empirical distinction. I think that, in terms of their combinatorics, there might well not be any difference. The two show a similar lack of interaction with most kinds of semantic operators (embedding under attitudes being a significant exception), which suggests that they act similarly in terms of compositional semantics. At the present moment, there has not been sufficient empirical investigation for this point to be really clear.

My suspicion is that the difference between expressive and CI lies in the type of meanings that are carried rather than how those meanings behave in composition, and so that the distinction is one that cross-cuts the distinctions embodied in $\mathcal{L}^{+}_{CI}$.

Another issue that arose several times in this paper is the nature of the divide between presupposition and conventional implicature. I suggested that (in part at least) it comes down to a difference in function. Presuppositions aim to 'match' old information with new; conventional implicatures instead work to introduce new information, but information that is not 'open to question' in the way that asserted content is, instead serving to indicate the speaker's attitudes and commitments. This distinction is useful in cases where the standard tests break down due to the complexity of a given piece of content or the lack of a way to express it in a given (formal or natural) language, as we saw. The particular examples provided here also raise questions about the degree of translatability one can find for non-at-issue domains in natural languages. It seems likely to me that Katz (1978) was right in his thesis that any piece of content in a natural language $\mathcal{L}$ can be translated into any other language $\mathcal{L}'$ — if one restricts attention to at-issue content. Whether this thesis holds for presupposition or for conventional implicature strikes me as more problematic (and not me alone: see Keenan 1974 and von Fintel & Matthewson 2008). The data in this paper suggests that in certain complex cases, translation of these kinds of non-truth-conditional content might be difficult or impossible, if there is no term in the target language with the same semantics. For example, it is not at all obvious how one might translate a sentence containing honorifics, or (certain) evidentials, or particles of the kind discussed in this paper, into a language without similar constructions, in a way that preserves meaning.[68] It is my hope that the work described in the present paper will contribute to solving questions like these, and, in general, to the theory of natural language meaning.

A Formal System of Potts (2005)

Here is the type system of $\mathcal{L}_{CI}$.

i. The type system itself is as follows.

   a. e^a, t^a, s^a are basic at-issue types for $\mathcal{L}_{CI}$.

68 This task is difficult even in the most basic sense of content-level equivalence. If one specifies a translation that also preserves pragmatic and discourse-level behavior, it is even harder.

b. e^c, t^c, s^c are basic CI types for $\mathcal{L}_{CI}$.

c. If σ and τ are at-issue types for $\mathcal{L}_{CI}$, then $\langle \sigma, \tau \rangle$ is an at-issue type for $\mathcal{L}_{CI}$.

d. If σ is an at-issue type for $\mathcal{L}_{CI}$ and τ is a CI type for $\mathcal{L}_{CI}$, then $\langle \sigma, \tau \rangle$ is a CI type for $\mathcal{L}_{CI}$.

e. If σ and τ are at-issue types for $\mathcal{L}_{CI}$, then $\langle \sigma \times \tau \rangle$ is a product type for $\mathcal{L}_{CI}$.

f. The full set of types for $\mathcal{L}_{CI}$ is the union of the at-issue types and CI types for $\mathcal{L}_{CI}$.

ii. Further, let x serve as a variable over $\{e, t, s\}$ and let σ and τ serve as variables over well-formed types with their superscripts stripped off. The type-superscript abbreviator $\rightsquigarrow$ is defined as follows:

$$\begin{aligned} x^a &\rightsquigarrow x^a \\ x^c &\rightsquigarrow x^c \\ \langle \sigma^a, \tau^a \rangle &\rightsquigarrow \langle \sigma, \tau \rangle^a \\ \langle \sigma^a, \tau^c \rangle &\rightsquigarrow \langle \sigma, \tau \rangle^c \end{aligned}$$

B Modified Type System: $\mathcal{L}_{CI}^{+}$

I define two type systems here. The first, $\mathcal{L}_{CI}^{+S}$, introduces shunting types. The second, $\mathcal{L}_{CI}^{+}$, builds on $\mathcal{L}_{CI}^{+S}$ to allow for the use of mixed content terms as well. The reason for defining the two systems independently is that the full power of the extended system will not be needed for all applications, and it may be convenient for users of the types proposed here to have a subsystem at hand that fits their needs.

B.1 Shunting types: $\mathcal{L}_{CI}^{+S}$

Here is the type system of $\mathcal{L}_{CI}^{+S}$, which is just that of $\mathcal{L}_{CI}$ supplemented with additional shunting types. I follow Potts in my definition, which means that many shunting types are produced that do not get used (just as with the CI types of $\mathcal{L}_{CI}$).

- The type system itself is identical to that of $\mathcal{L}_{CI}$ except that:

  i. The following clauses are added to the $\mathcal{L}_{CI}$ type specification:

(g) e^s, t^s, s^s are basic shunting types for $\mathcal{L}_{CI}^{+S}$.

(h) If σ is an at-issue type for $\mathcal{L}_{CI}^{+S}$ and τ is a shunting type for $\mathcal{L}_{CI}^{+S}$, then $\langle \sigma, \tau \rangle$ is a shunting type for $\mathcal{L}_{CI}^{+S}$.

(i) If σ is a shunting type for $\mathcal{L}_{CI}^{+S}$ and τ is a shunting type for $\mathcal{L}_{CI}^{+S}$, then $\langle \sigma, \tau \rangle$ is a shunting type for $\mathcal{L}_{CI}^{+S}$.

ii. Clause (f) of the $\mathcal{L}_{CI}$ type specification is replaced with

f'. The full set of types for $\mathcal{L}_{CI}^{+S}$ is the union of the at-issue types, the CI types and the shunting types for $\mathcal{L}_{CI}^{+S}$.

iii. All instances of '$\mathcal{L}_{CI}$' in the $\mathcal{L}_{CI}$ type specification are replaced with '$\mathcal{L}_{CI}^{+S}$'.

iv. The following two clauses are added to the definition of the type-superscript abbreviator $\rightsquigarrow$:

$$x^s \rightsquigarrow x^s$$
$$\langle \sigma^a, \tau^s \rangle \rightsquigarrow \langle \sigma, \tau \rangle^s$$

- This type definition, bundled with the $\mathcal{L}_{CI}$ rules (R1-6), the newly defined rule (R7), and the revised interpretation mechanism in (32), comprises $\mathcal{L}_{CI}^{+S}$.

B.2 The full system: $\mathcal{L}_{CI}^{+}$

The full system adds some rules to $\mathcal{L}_{CI}^{+S}$.

- The type system is identical to that of $\mathcal{L}_{CI}^{+S}$ except that:

i. The following clauses are added to the $\mathcal{L}_{CI}^{+S}$ type specification.[69]

(i) If σ andτ are at-issue types for $\mathcal{L}_{CI}^{+}$, and ζ and υ are shunting types for $\mathcal{L}_{CI}^{+}$, then $\sigma \times \zeta$, $\langle \sigma, \tau \rangle \times \zeta$, $\sigma \times \langle \tau, \zeta \rangle$ and $\sigma \times \langle \zeta, \upsilon \rangle$ are mixed types for $\mathcal{L}_{CI}^{+}$.

(ii) If σ, τ and ζ are at-issue types for $\mathcal{L}_{CI}^{+}$ and υ is a shunting type for $\mathcal{L}_{CI}^{+}$, then $\langle \sigma, \tau \rangle \times \langle \zeta, \upsilon \rangle$ is a mixed type for $\mathcal{L}_{CI}^{+}$.

69 Comment: It is not necessary to use most of the types produced by clause (i) for the analyses made in the present paper. However, I will make such types available in the logic: I do not think it wise to restrict the type system too much in view of our limited current knowledge of the range of mixed type expressions in natural language. Here I in effect follow the practice of $\mathcal{L}_{CI}$, where a wide range of CI types is made available, although in practice only a narrow range of them ends up being used.

ii. All instances of '$\mathcal{L}_{CI}^{+S}$' in the $\mathcal{L}_{CI}^{+S}$ type specification are replaced with '$\mathcal{L}_{CI}^{+}$'.

- This type definition, together with the $\mathcal{L}_{CI}$ rules (R1-7) and the new rules (R8,9) and the interpretation rule (32), comprise $\mathcal{L}_{CI}^{+}$.

References

Amaral, Patricia, Craige Roberts & E. Allyn Smith. 2008. Review of 'The logic of conventional implicatures' by Christopher Potts. *Linguistics and Philosophy* 30(6). 707–749. doi:10.1007/s10988-008-9025-2.

Asher, Nicholas. 2000. Truth conditional discourse semantics for parentheticals. *Journal of Semantics* 17(1). 31–50. doi:10.1093/jos/17.1.31.

Asher, Nicholas & Alex Lascarides. 2003. *Logics of conversation*. Cambridge: Cambridge University Press.

Asher, Nicholas & James Pustejovsky. 2005. Word meaning and commonsense metaphysics. Ms., University of Texas Austin and Brandeis University. http://semanticsarchive.net/Archive/TgxMDNkM/asher-pustejovsky-wordmeaning.pdf.

Bach, Kent. 1999. The myth of conventional implicature. *Linguistics and Philosophy* 22(4). 327–366. doi:10.1023/A:1005466020243.

Bach, Kent. 2006. Review of Christopher Potts, 'The logic of conventional implicatures'. *Journal of Linguistics* 42(2). 490–495. doi:10.1017/S0022226706304094.

Barker, Chris & Pauline Jacobson. 2007. *Direct compositionality*. Oxford: Oxford University Press.

Cappelen, Herman & Ernest Lepore. 2005. *Insensitive semantics*. Oxford: Blackwell.

Carpenter, Bob. 1998. *Type-logical semantics*. Cambridge, MA: MIT Press.

Chierchia, Gennaro. 1998. Reference to kinds across language. *Natural Language Semantics* 6(4). 339–405. doi:10.1023/A:1008324218506.

van Ditmarsch, Hans, Wiebe van der Hoek & Barteld Kooi. 2007. *Dynamic epistemic logic*. Berlin: Springer.

Dummett, Michael. 1973. *Frege: Philosophy of language*. London: Duckworth.

Faller, Martina. 2002. *Semantics and pragmatics of evidentials in Cuzco Quechua*. Stanford, CA: Stanford University dissertation.

Faller, Martina. 2003. Propositional- and illocutionary-level evidentiality in Cuzco Quechua. In Jan Anderssen, Paula Menendez-Benito & Adam Werle

(eds.), *The proceedings of the second conference on the semantics of underrepresented languages in the Americas [SULA 2]*, 19–34. Amherst: GLSA.

Faller, Martina. 2006. Evidentiality above and below speech acts. Unpublished ms. http://personalpages.manchester.ac.uk/staff/Martina.T.Faller/documents/Evidentiality.Above.Below.pdf.

Faller, Martina. 2007. The Cuzco Quechua reportative evidential and rhetorical relations. In Andrew Simpson & Peter Austin (eds.), *Endangered languages* (Linguistische Berichte Sonderheft 14), 223–252. Hamburg: Helmut Buske Verlag.

von Fintel, Kai & Lisa Matthewson. 2008. Universals in semantics. *The Linguistic Review* 25(1-2). 139–201. doi:10.1515/TLIR.2008.004.

Fodor, Jerry. 2002. *Concepts*. Oxford: Oxford University Press.

Geurts, Bart. 2007. Really fucking brilliant. *Theoretical Linguistics* 33(2). 209–214. doi:10.1515/TL.2007.013.

Grice, H. Paul. 1975. Logic and conversation. In Peter Cole & Jerry Morgan (eds.), *Syntax and semantics III: Speech acts*, 41–58. New York: Academic Press.

Hara, Yurie. 2008. Non-propositional modal meaning. Manuscript, Kyoto University. http://www.semanticsarchive.net/Archive/WUxZjFiM/darou_hara.pdf.

Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar* (Blackwell Textbooks in Linguistics 13). Oxford, England: Blackwell.

Hom, Christopher. 2008. The semantics of racial epithets. *The Journal of Philosophy* 105(8). 416–440.

Horn, Laurence. 2007. Toward a Fregean pragmatics: Voraussetzung, Nebengedanke, Andeutung. In Istvan Kecskes & Laurence Horn (eds.), *Explorations in pragmatics*, 39–69. Berlin: Mouton de Gruyter.

Jeffrey, Richard. 1983. *The logic of decision*. Chicago: University of Chicago Press.

Kaplan, David. 1989. Demonstratives. In Joseph Almog, John Perry & Howard Wettstein (eds.), *Themes from Kaplan*, 481–566. Oxford University Press. Manuscript version from 1977.

Kaplan, David. 1999. The meaning of *ouch* and *oops*: Explorations in the theory of *meaning as use*. Manuscript, UCLA.

Katz, Jerrold. 1978. Effability and translation. In Franz Guenthner & Monica Guenthner-Reutter (eds.), *Meaning and translation: Philosophical and linguistic approaches*, 191–234. London: Duckworth.

Kaufmann, Stefan. 2009. On the projection of expressive presuppositions.

Paper presented at Workshop on Non-truth-conditional Meaning, DGfS, Osnabrück.

Keenan, Edward L. 1974. Logic and language. In Morton Bloomfield & Einar Haugen (eds.), *Language as a human problem*, 187–196. New York: W.W. Norton and Company.

Kim, Jong-Bok & Peter Sells. 2007. Korean honorification: A kind of expressive meaning. *Journal of East Asian Linguistics* 16(4). 303–336. doi:10.1007/s10831-007-9014-4.

Kooi, Bartled Pieter. 2003. Probabilistic dynamic epistemic logic. *Journal of Logic, Language and Information* 12(4). 381–408. doi:10.1023/A:1025050800836.

Kratzer, Angelika. 1999. Beyond *ouch* and *oops*: How descriptive and expressive meaning interact. Handout of a talk given at Cornell Conference on Theories of Context Dependency. http://semanticsarchive.net/Archive/WEwNGUyO/.

Kratzer, Angelika. 2009. Making a pronoun. *Linguistic Inquiry* 40(2). 187–237. doi:10.1162/ling.2009.40.2.187.

Kubota, Yusuke & Wataru Uegaki. 2009. Continuation-based semantics for conventional implicatures and the Japanese benefactive. Poster presented at SALT 19. http://www.ling.ohio-state.edu/~kubota/papers/ci-salt.pdf.

Lasersohn, Peter. 2005. Context dependence, disagreement, and predicates of personal taste. *Linguistics and Philosophy* 28(6). 643–686. doi:10.1007/s10988-005-0596-x.

van Leusen, Noor. 2004. Incompatibility in context: a diagnosis of correction. *Journal of Semantics* 21(4). 415–441. doi:10.1093/jos/21.4.415.

Levinson, Stephen. 1983. *Pragmatics*. Cambridge: Cambridge University Press.

McCready, Eric. 2004. Two Japanese adverbials and expressive content. In Kazuha Watanabe & Robert B. Young (eds.), *Proceedings of SALT 14*, 163–178. http://semanticsarchive.net/Archive/2Y3YjAxM/.

McCready, Eric. 2008a. Semantic heterogeneity in evidentials. In Ken Satoh, Akihiro Inokuchi, Katashi Nagao & Takahiro Kawamura (eds.), *New frontiers in artificial intelligence: JSAI 2007 conference and workshops revised selected papers* (Lecture Notes in Computer Science 4914), 81–94. Berlin: Springer. doi:10.1007/978-3-540-78197-4_10.

McCready, Eric. 2008b. What man does. *Linguistics and Philosophy* 31(6). 671–724. doi:10.1007/s10988-009-9052-7.

McCready, Eric & Norry Ogata. 2007. Evidentiality, modality, and probability. *Linguistics and Philosophy* 30(2). 147–206. doi:10.1007/s10988-007-9017-7.

McCready, Eric & Magdalena Schwager. 2009. Intensifiers. Paper presented at Workshop on Non-truth-conditional Meaning, DGfS, Osnabrück.

Neale, Stephen. 1999. Coloring and composition. In Robert Stainton (ed.), *Philosophy and linguistics*, 35–82. Boulder, CO: Westview Press.

Potts, Christopher. 2005. *The logic of conventional implicatures*. Oxford University Press. Revised version of 2003 UCSC dissertation.

Potts, Christopher. 2007a. The expressive dimension. *Theoretical Linguistics* 33(2). 165–198. doi:10.1515/TL.2007.011.

Potts, Christopher. 2007b. The centrality of expressive indices: Reply to the commentaries. *Theoretical Linguistics* 33(2). 255–268. doi:10.1515/TL.2007.019.

Potts, Christopher, Luis Alonso-Ovalle, Ash Asudeh, Rajesh Bhatt, Seth Cable, Christopher Davis, Yurie Hara, Angelika Kratzer, Eric McCready, Tom Roeper & Martin Walkow. 2009. Expressives and identity conditions. *Linguistic Inquiry* 40(2). 356–366. doi:10.1162/ling.2009.40.2.356.

Potts, Christopher & Shigeto Kawahara. 2004. Japanese honorifics as emotive definite descriptions. In Kazuha Watanabe & Robert B. Young (eds.), *Proceedings of SALT 14*, 235–254. http://semanticsarchive.net/Archive/WZhMmY3N/.

Potts, Christopher & Tom Roeper. 2006. The narrowing acquisition path: From expressive small clauses to declaratives. In Ljiljana Progovac, Kate Paesani, Eugenia Casielles & Ellen Barton (eds.), *The syntax of nonsententials*, 183–201. John Benjamins.

Pustejovsky, James. 1995. *The generative lexicon*. Cambridge, MA: MIT Press.

Rett, Jessica. 2008. *Degree modification in natural language*. New Brunswick, NJ: Rutgers dissertation.

Richard, Mark. 2008. *When truth gives out*. Oxford: Oxford University Press.

van der Sandt, Rob. 1992. Presupposition projection as anaphora resolution. *Journal of Semantics* 9(4). 333–377. doi:10.1093/jos/9.4.333.

Schlenker, Philippe. 2007. Expressive presuppositions. *Theoretical Linguistics* 33(2). 237–245. doi:10.1515/TL.2007.017.

Schlenker, Philippe. 2008. Presupposition projection: Explanatory strategies. *Theoretical Linguistics* 34(3). 287–316. doi:10.1515/THLI.2008.021.

Searle, John. 1969. *Speech acts*. Cambridge: Cambridge University Press.

Siebel, Mark. 2003. Illocutionary acts and attitude expression. *Linguistics and Philosophy* 26(3). 351–366. doi:10.1023/A:1024110814662.

Sørensen, Morton Heine & Pawel Urzyczyn. 2006. *Lectures on the Curry-Howard isomorphism* (Studies in Logic and the Foundations of Mathemat-

ics 149). Amsterdam: Elsevier Science.
Stanley, Jason. 2000. Context and logical form. *Linguistics and Philosophy* 23(4). 391–434. doi:10.1023/A:1005599312747.
Stephenson, Tamina. 2007. Judge dependence, epistemic modals, and predicates of personal taste. *Linguistics and Philosophy* 30(4). 487–525. doi:10.1007/s10988-008-9023-4.
Vanderveken, Daniel. 1990. *Meaning and speech acts*. Cambridge: Cambridge University Press.
Wang, Linton, Eric McCready & Brian Reese. 2006. Nominal appositives in context. In Michael Temkin Martínez, Asier Alcázar & Roberto Mayoral Hernández (eds.), *Proceedings of the thirty-third Western Conference on Linguistics [WECOL 33]*, 411–423.
Wang, Linton, Brian Reese & Eric McCready. 2005. The projection problem of nominal appositives. *Snippets* 11. 13–14. http://www.ledonline.it/snippets/allegati/snippets10005.pdf.
Williamson, Timothy. 2009. Reference, inference and the semantics of pejoratives. In Joseph Almog & Paolo Leonardi (eds.), *The philosophy of David Kaplan*, 137–159. Oxford: Oxford University Press.

Eric McCready
Department of English
Aoyama Gakuin University
4-4-25 Shibuya
Shibuya-ku, Tokyo 150-8366
mccready@cl.aoyama.ac.jp