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Information structure and argument linking reconceived

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1. Introduction: A brief look at earlier discourse representation in RRG

Since its inception, RRG has concerned itself with explicating the syntax-semantics-pragmatics interface in human language, and it has restricted the tools available to the analyst in order to have a more explanatory theory. First and foremost among these restrictions is the ban on abstract syntactic representations and derivations from underlying to surface forms (and vice versa). It turns out that many of the phenomena analyzed in terms of underlying forms and derivations are in fact better explained in terms of the interaction of syntax and discourse pragmatics, e.g. extraction restrictions ('island constraints').

Of particular interest are so-called 'null elements', e.g. sentences in languages like Japanese, Mandarin and Thai which lack overt subjects and/or objects. These are typically analyzed as phonologically null pronominals which occupy the syntactic position that an overt pronominal would be in. These empty subjects and other arguments are a challenge for RRG's concrete approach to syntax, and the analysis proposed in RRG was to have discourse antecedents satisfy the valence requirements of the predicators in these languages. This crucially presupposes a motivated representation of the discourse antecedents.

The discussion will proceed as follows. The earlier RRG approach to discourse representation will be illustrated in section 2.0, followed by a critique in section 3.0. The alternative representation will be introduced in section 4.0, and it will be applied to the phenomena analyzed in section 2.0, as well as phenomena from English, in section 5. Conclusions will be presented in section 6.0.

2. Using DRSs in the linking between syntax and semantics

It seemed obvious that a formal representation of the discourse context in which sentences occur was necessary, and the only approach which could provide such a representation was Discourse Representation Theory [DRT] (Kamp and Reyle 1993). RRG adopted (and adapted) the version of DRT proposed by Klaus von Heusinger (1999), which made it possible to represent focus types a la Lambrecht (1994) and to use the discourse representations (known as DISCOURSE REPRESENTATION STRUCTURES [DRSs])to represent discourse referents. Thus, sentences with missing arguments in Japanese, etc. need not be analyzed as containing a null element but rather the linking algorithm could make reference to the discourse representation to satisfy the COMPLETENESS CONSTRAINT, which was renamed the EXTENDED COMPLETENESS CONSTRAINT (Latrouite and Van Valin 2023).

As an example of how DRSs can play a role in linking, consider the sentences in (1), from Shimojo (2008).

(1) a. *(Taro-ga) ringo-o ni-ko katta.*
Taro-NOM apple-ACC two-CL bought
'(Taro) bought two apples.'
b. *(Oyatu-wa,) ringo-o ni-ko da.*
snack TOP apple-ACC two-CL is.
' '(As for snack,) two apples[ACC] is.' [literal translation]

In the verb-less numeral quantifier construction, (1b), there is no transitive verb, only the copula *desu*, yet the sole RP in it bears accusative case, which is assigned by transitive verbs to their undergoer arguments. How can the accusative case in (1b) be accounted for? The context in which (1b) is uttered is represented by the DRS labelled 'presupposition', and the linking from semantics to syntax is summarized in the numbered steps below.

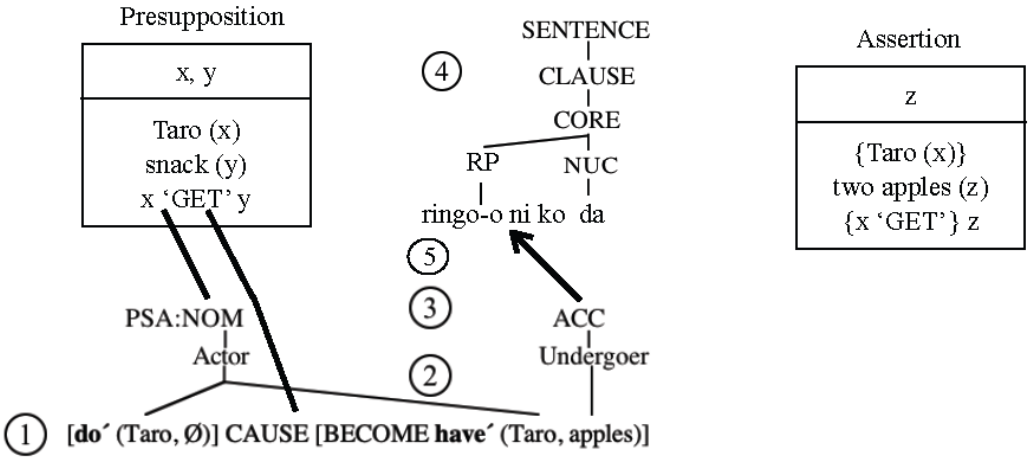


Figure 1: Linking from semantics to syntax in (1b)

Step 1 is the construction of the semantic representation of the intended utterance. Step 2 is macrorole assignment: the leftmost argument (*Taro*) is the actor and the rightmost argument (*ringo*) is the undergoer. Step 3 is the assignment of morphosyntactic status and coding: the actor is selected as PSA and assigned nominative case, while the undergoer is a direct core argument and assigned accusative case. At this point the principle that only new (non-presupposed) elements must be expressed overtly in a Japanese utterance comes into play. The presupposition DRS presents *Taro* and the verb as given, which means that they need not be mentioned explicitly in the utterance. The heavy black lines indicate that the actor/PSA and the verb can be recovered from context, i.e. from the presupposition DRS. The phrase 'two apples', on the other hand, specifies what the snack is and therefore constitutes new information and will be expressed explicitly in the utterance. Step 4 is selection of the syntactic templates motivated by the overt material, which is the phrase 'two applies' and the tense-bearing copula which marks it as a complete utterance. Step 5 links the accusative undergoer to its position in the tree, thereby explaining how the RP *ringo-o ni ko* 'two apples' gets accusative case despite the lack of a transitive verb in the sentence.

The linking from syntax and discourse to semantics is summarized in the numbered steps below.

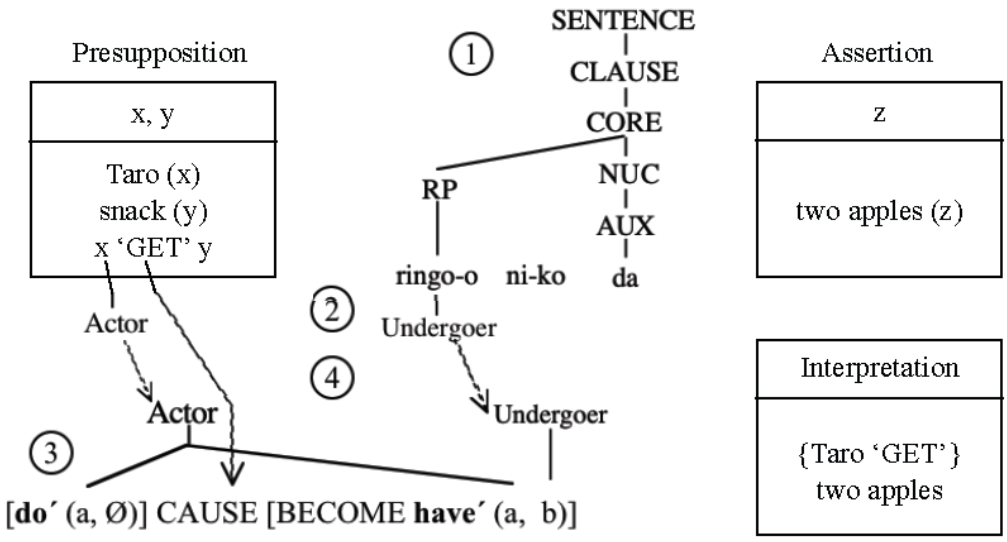


Figure 2: Linking from syntax to semantics in (1b)

Step 1 is the parser outputting a labeled syntactic tree.[1] The second step is the gleaning of the representation for indicators of the function of the constituents. In this example there is only one RP plus the copula in the tree. The RP carries accusative case and so is determined to be an undergoer. Accusative undergoers are associated with M-transitive verbs, which leads to the expectation that there should be a nominative actor and an M-transitive verb in the sentence, but there is neither in the clause. However, in the presupposition DRS there is an M-transitive verb with an actor argument which would occur as a nominative RP, and so it may be concluded that the *x* argument in the DRS, *Taro*, is the actor which pairs with the overt undergoer, *ringo-o ni-ko*. Step 3 is to go to the lexicon and retrieve the logical structure of the verb identified in the previous step. But there is no verb in the sentence, and therefore it is necessary to refer to the background DRS again for it. The logical structure for 'GET'[2] is called up and its two arguments are assigned actor and undergoer macroroles. The final step is the association of the arguments in the DRS and the syntax with the arguments in the logical structure: *Taro* is the *x* argument and the actor of 'GET', and the *a* argument is the actor, hence *Taro* links to the *a* argument; similarly, *ringo-o ni-ko* is an undergoer, and the *b* argument is the undergoer in the logical structure of 'GET', therefore *ringo-o ni-ko* links to the *b* argument. The resulting interpretation is given below the assertion DRS. Here again the Extended Completeness Constraint is satisfied by arguments from a DRS and the syntax.

[1] This is an idealization, as interpretation is incremental. See Van Valin (2023) for an incremental version of the linking system.

[2] Japanese verbs of giving and receiving involve complex social relationships among the interlocutors, which are irrelevant to the issues under discussion. Accordingly, the verb of receiving will be represented by 'GET'.

3. Critique of DRT as used in RRG

Balogh, Bentley and Shimojo (in press) present a critical assessment of discourse representation in RRG. They make a number of significant points, only two of which will be mentioned here.

1. DRT is intended not as a mere representation of context but as a model-theoretic account of the semantics of propositions. This raises questions of compatibility and redundancy with the approach to semantic representation in RRG.

2. The representation of discourse referents is inadequate in RRG, because it "currently lacks an explicit semantic representation of referents" which would allow one to differentiate between reference sharing and description sharing.

RRG used DRT as a way to represent referents and the context in which they occurred, but DRT is intended to be a full formal semantic theory. Accordingly, the semantic representations of propositions in DRT is very different from that in RRG, which involves lexical decomposition. This can be seen clearly in Figures 1 and 2, where the propositional representation in the DRSs is quite different from that in the linking system. If RRG intended to continue using DRSs for representing context, it would be necessary to replace the system of semantic representation in the DRSs with the *Aktionsart*-based decompositional system used in RRG. The second point highlights a serious deficiency in the representation of discourse referents, namely RRG has treated discourse referents as simple, atomic entities, but this is inadequate for several reasons. Balogh et al. give several reasons, and we will concern ourselves with only one, namely reference sharing vs. description sharing. They illustrate this with the following contrast.

(2) a. Sam saw a yellow bus. Alex saw *it*, too. Reference sharing
b. Sam saw a yellow bus. Alex saw *one*, too. Description sharing

In addition, the way propositions are referred to is also inadequate. Formal semantic theories standardly invoke an event variable accompanying the semantic representation of the event.

4. Contextualized meaning and RRG

Balogh, Bentley and Shimojo (in press) propose the concept of CONTEXTUALIZED MEANING to replace DRSs for representing aspects of the discourse context. It requires a formal model of the IMMEDIATE COMMON GROUND [ICG], which is the discourse context plus the immediate physical environment that the speech event occurs in. A crucial part of their proposal is the representation of discourse referents in two ways: with a referential index and an argument description. This is illustrated in (3).

(3) a. Bill bought a candy bar.
b. LS: [**do´** (Bill, Ø)] CAUSE [INGR **have´** (Bill, candy bar)])]
c. indexed LS: [**do´** (1:Bill, Ø)] CAUSE [INGR **have´** (1: Bill, 2:candy bar)])]

RRG's representations of referents have not contained a referential index despite the fact that referring and describing are distinct functions. They also introduce a variable *e* which

refers to the eventuality denoted by the proposition. The contrast between the current architecture of RRG and that proposed by Balogh et al. can be seen in Figure 3.

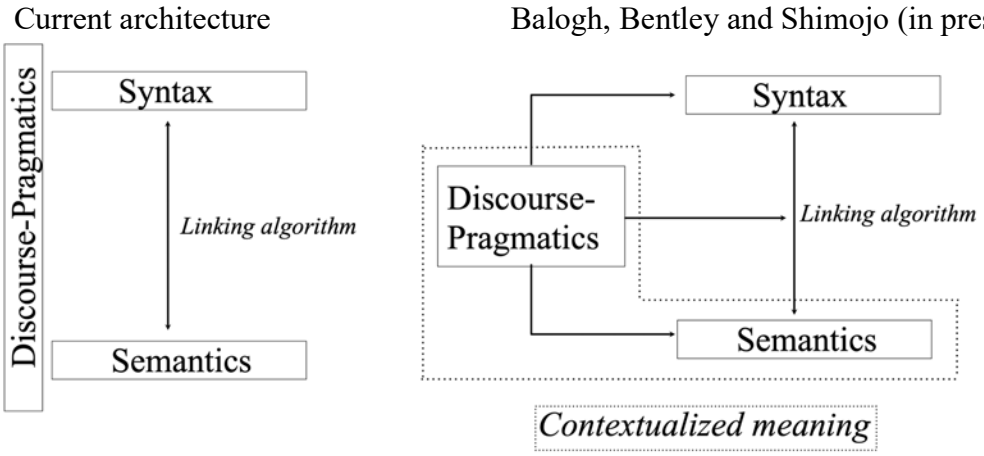


Figure 3: Current RRG vs. proposed CONTEXTUALIZED MEANING architecture

The most significant change is treating discourse-pragmatics on a par with syntax and semantics, as opposed to treating it as something peripheral to the linking system. Contextualized meaning consists of the semantic representation of the sentence (its descriptive and indexed LSs) together with a set of indexed LSs representing the previous discourse context, i.e. the ICG. It also includes local salience relations, e.g. actor > undergoer in active voice. Contextualized meaning is illustrated in Figure 4.

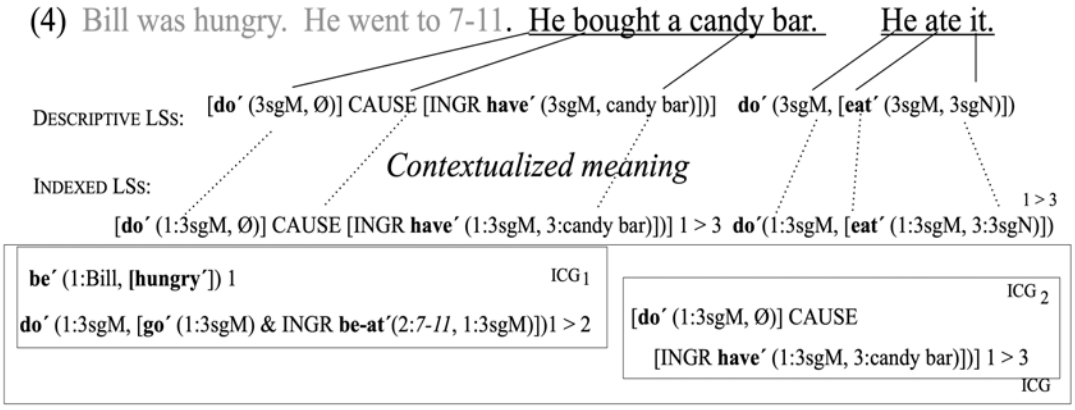


Figure 4: Contextualized meaning analysis of (4)

The first two sentences establish the context for the last two, for which the contextualized meanings are given. The descriptive LSs are the same as the LSs in a traditional RRG analysis, while the indexed LSs contain referential indices on the referential RPs. Non-referential RPs have no index. The indexed LSs also contain an indication of the salience relations holding among the RPs in the LS. Most important for this discussion is the role of the indexed LSs in the constitution of the ICG, which is the representation of the

discourse context. ICG_1 is the context in which *He bought a candy bar* occurs. It consists of the indexed LSs of *Bill was hungry*, introducing the referent 'Bill', and *He went to 7-11*, which continues 'Bill' as a pronoun and introduces the referent '7-11'. The final sentence, *He ate it* occurs in the context constituted by ICG_1 and the indexed LS of *He bought a candy bar.*, i.e. ICG_2.

The indexed LSs in the ICG do the work done by DRSs in the RRG representations of discourse. This means that the propositions in the semantic representation are formally the same as those in the discourse representation, thereby avoiding the problem of having incompatible semantic representations. We can illustrate this with the verbless numeral quantifier construction (Shimojo 2008) discussed earlier. In the linking diagram the indexed LS in the ICG captures the relevant context, namely that the actor *Taro* and the verb do not have to be expressed overtly in the sentence because they are recoverable from the ICG, just as in the original analysis they were recoverable from a DRS.

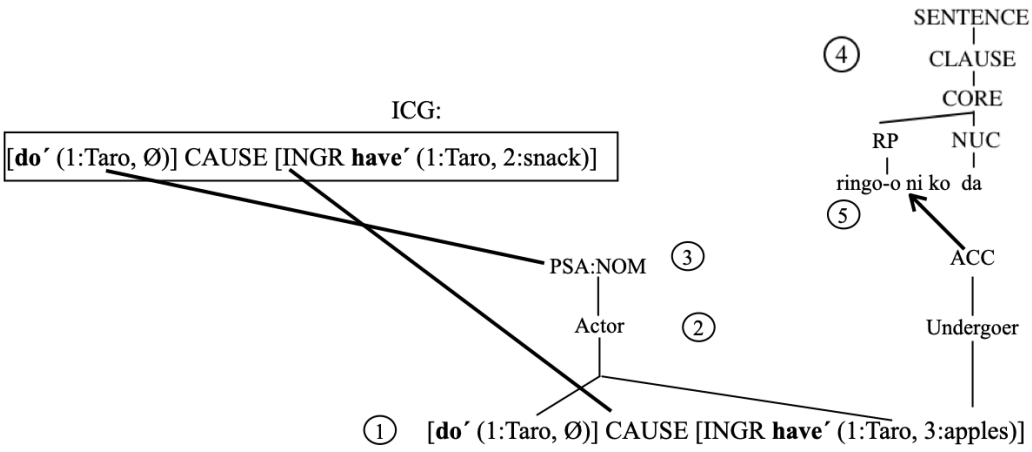


Figure 5: Contextualized meaning analysis of (1b)

5. Focus Structure and Contextualized Meaning

Balogh, Bentley and Shimojo (in press) address the other important function of DRSs, namely, the analysis of focus structure. The central concepts of the RRG approach to focus structure (focus types, information units [IU], actual vs. potential focus domains, etc.) can be accommodated comfortably in the theory of contextualized meaning. The ICG plays the role of the component which keeps track of the referents, eventualities, and properties in the discourse. The constituents being discussed can be represented as IUs, which can be tagged to indicate their status (topic, given, new, focus, etc.). We can illustrate these notions with the example in (3), repeated below.

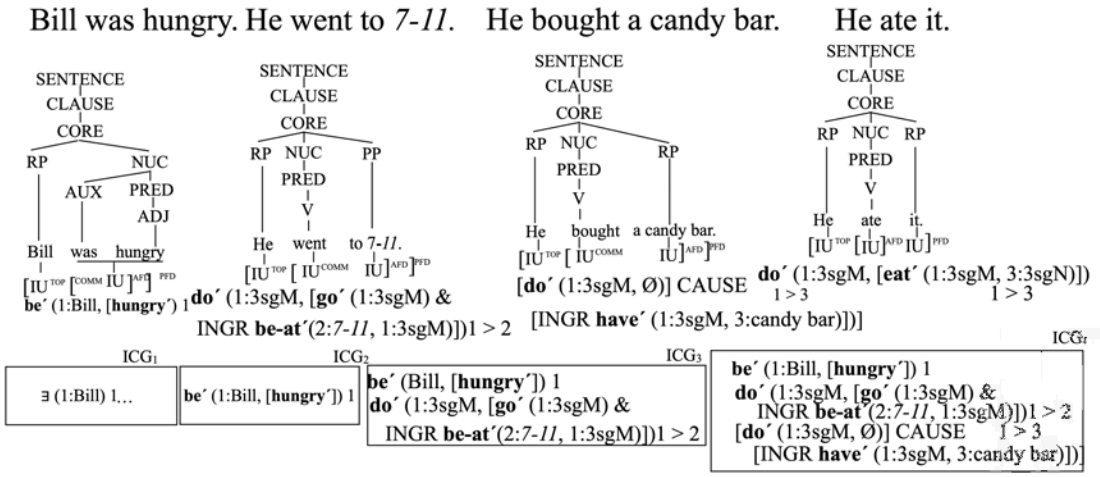


Figure 6: Focus structure derived from ICGs

ICG_1 contains only the referent of *Bill*, and it is either brand new unanchored, brand new anchored, or activated from a previous use in the past. In ICG_2 it is activated due to its having been mentioned in the previous sentence and is pronominalized. The referent of the RP *7-11* is new, or it could be accessible if *7-11* was a common place to go for a quick snack. In ICG_3 the referent of 'Bill', expressed by a pronoun, continues to be activated, and the referent of *a candy bar* is the new information; it is brand new anchored due to the connection to 7-11. Finally, ICG_4 contains two activated referents, *Bill/he* and *a candy bar/it*, and the only new element is the verb *ate*. The contextualized meaning contains the information needed to motivate the activation status of the referents of the referring expressions in these utterances. RRG linking diagrams are annotated with the activation status of the referent of the RP; see Van Valin and LaPolla (1997: 200–201), Van Valin (2005: 137), Bentley (2023: 458–461). This can be derived from the ICGs.

6. Applying contextualized meaning

Balogh, Bentley and Shimojo (in press) illustrate recovering referents and predicators from discourse with the construction known as 'VP'-ellipsis. Something similar was exemplified in the discussion of the Japanese verbless-numeral quantifier construction earlier.

(5) a. Kim is eating an ice cream cone, and Pat is, too.
b. (i) Speaker 1: Kim is eating an ice cream cone.
(ii) Speaker 2: Pat is, too.

(5a) illustrates the construction within a single sentence. Of interest here is (5b), in which the ellipsis occurs in separate utterances by distinct speakers. The reduced form in (5bii), *Pat is, too*, has only a PSA and a tense-bearing auxiliary. The verb *eat* and the undergoer *ice cream cone* are recovered from the previous speaker's utterance. This involves the ICG representations, which, here again, are doing the work done by the DRSs in earlier RRG analyses.

'VP'-ellipsis exhibits a phenomenon which is relatively rare in English, namely discourse-driven subject-AUX inversion. This is illustrated in (6).

(6) a. Speaker 1: Kim is eating an ice cream cone.
b. Speaker 2: Pat is, too.
b′. Speaker 2′: So is Pat.

The first utterance of Speaker 2 reflects the default response to Speaker 1's assertion, and it reflects the default pattern of PSA followed by the tensed auxiliary. The second response, on the other hand, illustrates a much less common pattern in declarative utterances in English, tensed AUX + PSA. A clue to the motivation for this alternation can be found in 'VP'-fronting, as shown in the following examples.

(7) a. I expected to find Bill mowing the yard, and mowing the yard he was.
b. #I expected to find Bill mowing the yard, and mowing the yard was he.

(8) a. #I expected to find someone mowing the yard, and mowing the yard Bill was.
b. I expected to find someone mowing the yard, and mowing the yard was Bill.

In (7) the referent of the referring expression *Bill* is introduced in the first clause, and in the second it is activated and realized as a pronoun. Since English PSAs are prototypically topics and therefore activated and given, it is more felicitous for it to occur in the pre-auxiliary position, as in (7a), rather than in the post-auxiliary position, as in (7b). Conversely, when the first clause does not introduce a specific referent but the second one does, as in (8), the PSA in the second clause is preferentially post-auxiliary. So the position of the PSA in the second clause is a function of how topical or focal it is.

The same considerations hold with respect to 'VP'-ellipsis. When the PSA in the second clause is part of the ICG and therefore activated, the PSA occurs before the auxiliary, as in (6b). If, on the other hand, the referent of the PSA is being introduced into the context, then the PSA may occur after the auxiliary, as in (6b′). This is illustrated below, repeated from (5) and (6).

(9) a. Speaker 1: I wonder if anyone's getting hungry.
b. Speaker 2: Well, Kim is eating an ice cream cone. What about Pat?
c. Speaker 1: Pat is, too/#So is Pat.

(10) a. Speaker 1: I wonder if anyone's getting hungry.
b. Speaker 2: Well, Kim is eating an ice cream cone.
c. Speaker 1: So is Pat/Pat is, too.

The reason *Pat is, too* is fully felicitous in both of the contexts created by (9b) and (10b), whereas *So is Pat* is not, is that *Pat is, too* is the default form, since the PSA occurs in the normal pre-nuclear, core-internal position. *So is Pat,* with its post-nuclear PSA, on the other hand, is a marked form, and accordingly it requires specific contextual conditions for its felicitous occurrence.

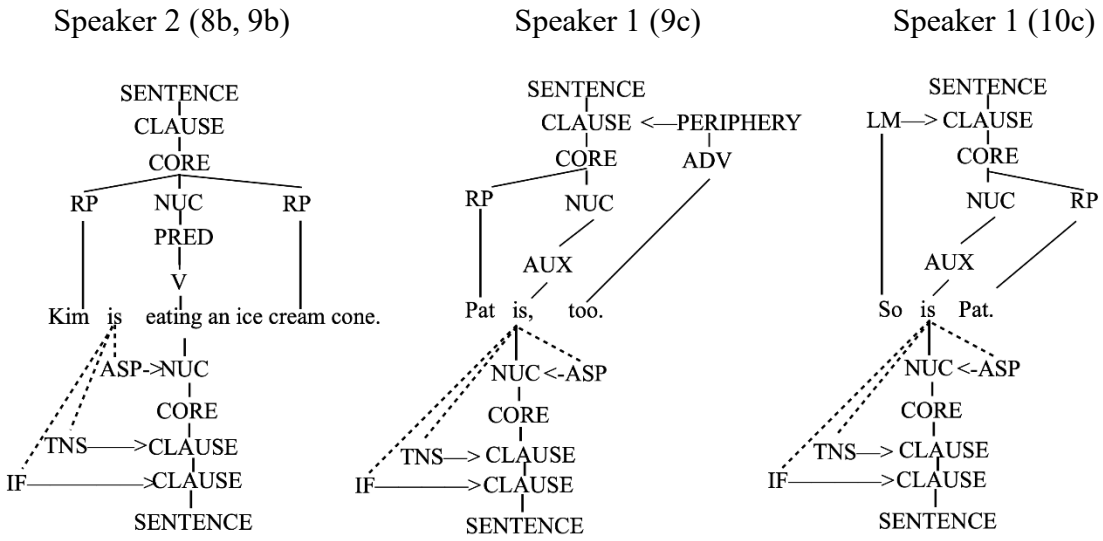


Figure 7: Discourse-driven subject-AUX variation in English

In their discussion of this construction, Balogh, Bentley and Shimojo argue:

> The case in [(9c), (10c)] requires description sharing instead of referential sharing. The sentence expresses that there is another event (hence other referential index), which shares the description 'x is eating an ice cream cone' (**do´** (x, [**eat´**(x, y: ice cream cone)]) with the event that was given in previous discourse context… Within the two descriptions the referential indices of the arguments do not need to be the same. In [these examples], they are different; the actor is '1:Kim' in the discourse and '3:Pat' in the sentence.

In order to account for the difference in order of PSA and auxiliary, it is necessary to make reference to the ICG associated with the sentence. If it contains the indexed LS with the indexed referent of the PSA, then (9c) would be the preferred form. If it does not, then (10c) would be the preferred form.

Thus, the RRG analysis of 'VP'-ellipsis in (9) and (10) requires all of the machinery discussed so far: descriptive LSs, indexed LSs, ICG, focus structure. The utterance in (9a) and (10a) is not included in the analysis below.

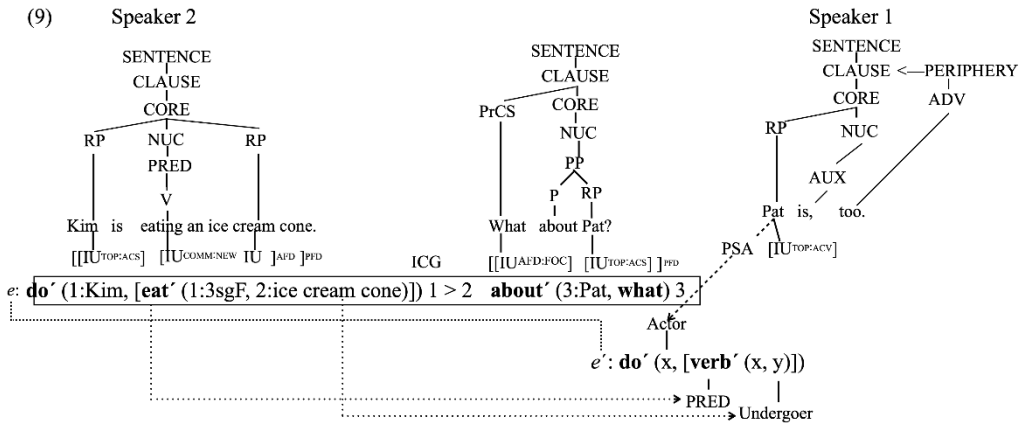


Figure 8: Contextualized meaning of (9)

The crucial difference between (9c) and (10c) lies in the ICG they occur in: the one for (9c) contains two indexed LSs, '**do´** (1:Kim, [**eat´** (1:3sgF, 2:ice cream cone)]) 1 > 2' and 'about´ (3:Pat, **what**) 3', while (10c) contains only the former. Hence *Pat* is not part of the ICG for (10c) and cannot be interpreted as a topical PSA. It can therefore occur after the auxiliary.

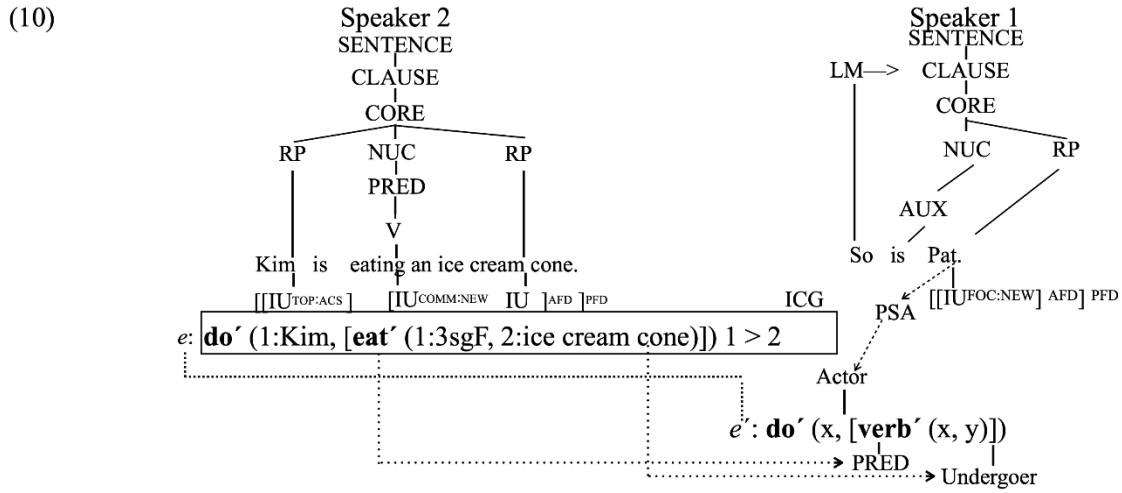


Figure 9: Contextualized meaning of (10)

The examples discussed thus far have involved linking from the discourse to syntax and then to the semantic representation. That is the interpretative perspective on the interaction: the interlocutor interprets the reduced response of the other interlocutor with help from the ICG. The interlocutor producing the reduced response also must rely on the ICG, as will be seen. Let's suppose Speaker 1 has just responded to Speaker 2's utterance 'Kim is eating an ice cream cone', in reply to Speaker 1's query 'I wonder if anyone's getting hungry.' Speaker 1 seeks the most efficient, compact answer possible, and accordingly replies with 'So did Pat'. In order to achieve this, Speaker 1 assumes that Speaker 2 shares the same ICG relevant to the interaction. The key to the linking is the recognition that elements established in the ICG need not be expressed overtly in this construction. In this case only the PSA is new and must be expressed overtly in the

sentence; the predicator and the undergoer are given in the ICG. Because the PSA is new, it can occur after the nucleus.

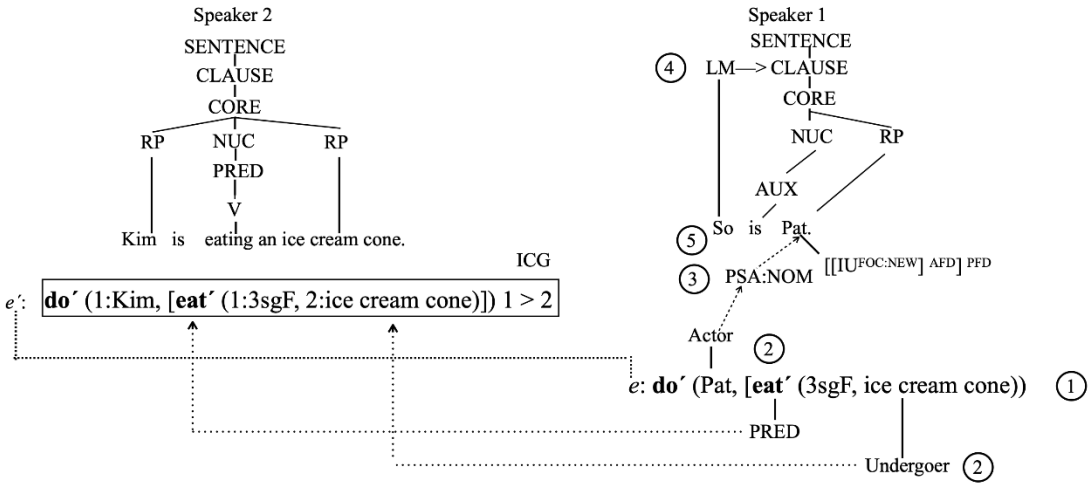


Figure 10: Semantics-to-syntax linking for (10c)

Space limitations have precluded representing the operators in the diagrams, and they are very important in this construction. (See Van Valin 2005:231–234.) There is a strong constraint governing the identity of the auxiliary: it must be the same as that in the clause uttered by the other speaker. When there is a simple tense in the first utterance, as in (11a) and (12a), the constraint seems to be weaker and revolve around semantic compatibility.

(11) a. Spkr. 1: The boy ate an ice cream cone. Spkr. 2: Sam did, too./So did Sam.
b. Spkr. 1: The boy will eat an ice cream cone. Spkr. 2: Sam will, too./so will Sam.
c. Spkr. 1: The boy has eaten an ice cream cone. Spkr. 2: Sam has, too./So has Sam.

(12) a. Spkr. 1: The boy ate an ice cream cone. Spkr. 2:?Sam will, too./So will Sam.
b. Spkr. 1: The boy has eaten an ice cream cone. Spkr. 2:*Sam is, too./So is Sam.

7. Summary

Balogh, Bentley and Shimojo (in press) have proposed contextualized meaning as a replacement for DRSs borrowed from DRT for representing the discourse context in which utterances occur in RRG. They make a strong case for the superiority of the new approach and illustrate it using data from Japanese, English and Hungarian. This paper has used these ideas and applied them successfully to the reanalysis of the Japanese verbless numeral quantifier construction and 'VP'-ellipsis in English. In the latter, the discussion covered not only the linking between the ICG and the syntax, but also the variation in the position of the PSA relative to the tensed auxiliary.

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