To agree without AGREE: The case for semantic agreement*

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1. Introduction

Verbal morphology in Mi'gmaq, an eastern Algonquian language, provides evidence that number and person features introduce semantic presuppositions that restrict the nature of the subject. The relevant data points involve sentences with disjoined and conjoined determiner phrases. Conjoined DPs—e.g., *John aq Mali* 'John and Mary'—require dual marking, whereas disjoined DPs—e.g., *John gisna Mali* 'John or Mary'—support either dual or singular marking, but only in a limited number of environments (i.e., when the disjoined DPs agree in person). Theories that involve feature percolation cannot adequately account for this data. In contrast, a theory where person and number features introduce presuppositional restrictions on the DP subject naturally accounts for this kind of grammatical pattern. A consequence of the presuppositional theory is that it removes the need for morphological agreement between subjects and verbs. Person and number features can impose presuppositional restrictions on the DP subject by modifying the verb, rather than the DP itself. Thus, so-called "agreement" might be better analyzed as a purely semantic phenomenon.

The outline of this paper is as follows. Section 2 discusses agreement patterns with respect to conjoined and disjoined DP subjects. Here it is shown that theories of feature percolation have difficulties explaining obligatory dual marking in some environments but not others. Section 3 outlines an alternative to the percolation theory based on a modification of Sauerland 2003. This alternative proposes that there are negative person and number features that induce presuppositional restrictions on the subject. As demonstrated in section 4, this alternative theory accounts for the Mi'qmaq data. Section 5 outlines a further modification of the semantic account where person and number features are interpreted as verbal modifiers.

*I would like to thank Janine Metallic, Jessica Coon, Brendan Gillon, Luis Alonso-Ovalle, Walter Pedersen, the members of the Mi'gmaq Research Group, and the participants at NELS 43 for their insightful comments. I would also like to thank the members of the Listuguj community for their help in researching this paper. This research would not have been possible without grants from the Social Sciences and Humanities Research Council of Canada, grant numbers 410-2011-2401, 611-2012-0001, and 890-2012-0091.

2. The puzzle: Agreement and coordinated subjects

Intransitive verb morphology in Mi'gmaq distinguishes between singular, dual and plural subjects.[1] For example, if the subject consists of two conjoined singular DPs, then the verb must have a suffix that marks dual. The verb in (1a) needs the second person dual ending *-ioq* and cannot bear a non-dual affix such as *-in* or *-it*, which marks singular subjects as shown in (2). This pattern holds for similarly structured, disjoined DPs, like the one in (1b).

(1) a. Gi'l **aq** Mali etlenm-**ioq/***-in/*-it
You **and** Mary laugh-**2.DL/***-2.SG/*-3.SG
'You and Mary are laughing'

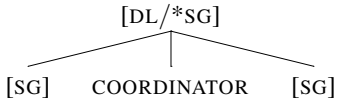
b. Gi'l **gisna** Mali etlenm-**ioq/***-in/*-it
You **or** Mary laugh- **2.DL/***-2.SG/*-3.SG
'You or Mary are laughing'

(2) a. Mali etlenm-**it/***-in/*-ioq
Mary laugh- **3.SG/***-2.SG/*-2.DL
'Mary is laughing'

b. Gi'l etlenm-**in/***-ioq/*-it
You laugh- **2.SG/***-2.DL/*-3.SG
'You are laughing'

This parallel between disjoined and conjoined subjects initially seems to suggests that dual marking might be due to some sort of percolation rule, where two singular features are inherited as a dual in coordinated subjects, as shown in (3) (cf., Marušič et al., 2007).

(3)



However, when the two coordinated DPs match in person (either both being third or second person), then the conjunctive subjects behave differently from the disjunctive ones. For example in (4a), the verb cannot have the third person singular suffix *-it*. Rather it must have the third person dual suffix *-ijig*. In contrast, the disjunctive subject in (4b) is compatible either with the dual or singular suffix.

(4) a. John **aq** Mali etlenm-**ijig/***-it
John **and** Mary laugh-**3.DL/***-3.SG
'John and Mary are laughing'

b. John **gisna** Mali etlenm-**ijig/-it**
John **or** Mary laugh-**3.DL/-3.SG**
'John or Mary is/are laughing'

[1] To simplify matters, this paper focuses on the contrast between the singular and dual, although similar patterns hold for the dual versus plural.

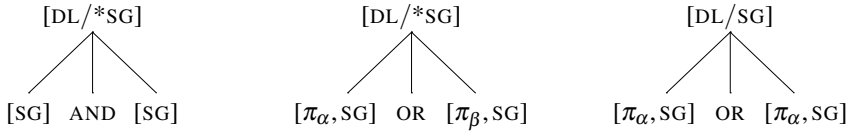
Similar facts hold for the examples in (5). The conjoined second person subjects require dual marking on the verb, whereas disjoined second person subjects are consisted either with dual or singular marking.

(5) a. Gi'l **aq** gi'l etlenm-**ioq/***-in
You **and** you laugh-**2.DL/***-2.SG
'You and you are laughing' (with pointing)

b. Gi'l **gisna** gi'l etlenm-**ioq/-in**
You **or** you laugh-**2.DL/-2.SG**
'You or you are laughing' (with pointing)

To account for the optionality in (4b) and (5b) while also capturing the obligatory morphological pattern in (1b), a percolation theory would have to hypothesize coordinator-specific percolation rules that are sensitive to person in the case of disjunction, but insensitive to person in the case of conjunction, as represented in (6) where the subscripts on π represent whether the person features are the same or different in the disjoined subjects.

(6)



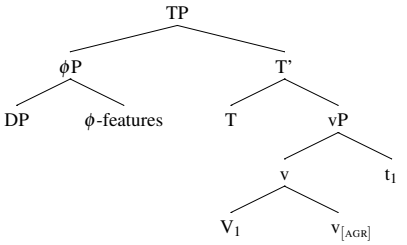
Such a percolation theory arbitrarily restates the pattern without any theoretical motivation for having such differences between the two types of coordinators.

3. Interpreting person and number features: Adapting Sauerland 2003

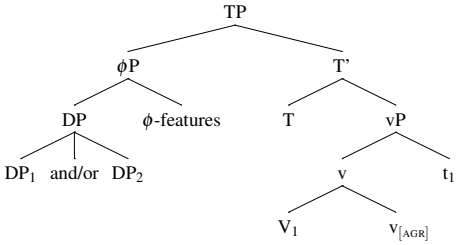
Unlike a percolation theory, a semantic presuppositional account provides a principled explanation of why verbal suffixes in Mi'gmaq pattern the way they do. The key difference between conjoined and disjoined subjects is that conjoined subjects are interpreted as groups that necessarily consist of two members. In contrast, disjoined subjects are not interpreted as groups. Rather, they are interpreted as alternative-sets. VP-predicates, due to pairwise functional application, applies to each member of these alternative-sets. When the disjoined subjects do not agree in person, a dual suffix represents the best fit for each member of the alternative-set. However, when the disjoined subjects agree in person, either the singular or dual suffixes will do. This section outlines the details of such a proposal adapting and modifying a theory presented by Sauerland (2003).

Sauerland (2003) proposes that person and number features are not part of the DP itself, but rather they are contained in a separate head that is sister to the DP. It is this head that enters into an agreement relationship with the verbal affix (situated in little v). According to Sauerland, the basic syntactic structure of a subject, ignoring tense and internal subjects for the sake of simplicity, would be as shown in (7). The basic structure of a coordinated DP would be as in (7).

(7) a.



b.



In this relatively high position, the ϕ-features act as a gateway, allowing only certain kinds of denotations to semantically "pass-through" by imposing presuppositional conditions on the denotation of the sister. For example, if the list of ϕ-features contained a first person marker, then the ϕP would be well-defined only if the denotation of the sister DP contained the speaker.

To account for the Mi'gmaq data, this theory only needs to be modified slightly, changing the relevant person and number features from positive ones to negative ones that presuppose an absence, rather than a presence, of certain elements or properties in the denotation. Hence, $[2, \text{SG}]$ and $[3, \text{SG}]$ are more accurately represented as $[-1, -3, -\text{DL}]$ and $[-1, -2, -\text{DL}]$ respectively, whereas $[2, \text{DL}]$ is more accurately represented as $[-1, -\text{PL}]$. (Note that the second person dual would not specify $[-3]$ since third parties are permitted as part of the denotation of second person dual.) The table in (8a) lists the correspondences between person/number marking in a system with positive features and person/number marking in a system with negative features.[2]

(8) a.

Old Format	$\Rightarrow$	**New Format**
$[1, \text{SG}]$	$\Rightarrow$	$[-2, -3, -\text{DL}]$
$[2, \text{SG}]$	$\Rightarrow$	$[-1, -3, -\text{DL}]$
$[3, \text{SG}]$	$\Rightarrow$	$[-1, -2, -\text{DL}]$
$[3, \text{DL}]$	$\Rightarrow$	$[-1, -2, -\text{PL}]$
$[2, 3, \text{DL}]$	$\Rightarrow$	$[-1, -\text{PL}]$
$[1, 3, \text{DL}]$	$\Rightarrow$	$[-2, -\text{PL}]$
$[1, 2, \text{DL}]$	$\Rightarrow$	$[-3, -\text{PL}]$

b.

Vocabulary Insertion Rule for v		
$[-2, -3, -\text{DL}]$	$\Leftrightarrow$	-i
$[-1, -3, -\text{DL}]$	$\Leftrightarrow$	-in
$[(-1), (-2), -\text{DL}]$	$\Leftrightarrow$	-it
$[-1, -2, -\text{PL}]$	$\Leftrightarrow$	-ijig
$[-1, -\text{PL}]$	$\Leftrightarrow$	-ioq
$[-2, -\text{PL}]$	$\Leftrightarrow$	-ieg
$[(-3), -\text{PL}]$	$\Leftrightarrow$	-igw

If it is assumed that the v-head in the vP inherits the feature bundles in the ϕ-head through some kind of agreement operation, then the Vocabulary Insertion Rule in (8b) would accurately determine the form that the v-head takes. (Note that the features in brackets need not be expressed in the rule due to the Subset Principle).[3]

These negative features can be assigned a semantic interpretation much like the positive features in Sauerland 2003, where each feature is a partial function that induces presuppositions. For example, the interpretation of $[-1]$, when applied to any x, can be defined as follows: $[\![-1]\!](x)$ is defined if and only if x does not contain the speaker. When defined,

[2]The features $[-3, -\text{PL}]$ and $[-2, -\text{PL}]$ represent the difference between first person inclusive vs. exclusive. The feature -3 is not necessary and can be dropped, but is included here for the sake of exposition.

[3]This vocabulary insertion rule is not complete. There are other forms that represent the plural. Thus, the last line of the rule is not the elsewhere condition.

$[\![-1]\!](x) = x$ (i.e., $[\![-1]\!]$ is a partial identity function). If the sister DP contains the speaker and the set of ϕ-features contains [−1], then ϕP would not be well-defined and hence the phrase and sentence would not have a semantic value. However, as with other types of partial functions, the hearer will often accommodate, when possible, by assuming that the DP does not contain the speaker.

Similar interpretations can be given for other negative features. The list in (9) gives the relevant interpretations for all such features, where the term *non-participants* is being used to refer to people/things that are neither the speaker nor hearer.

(9) **Interpretation of Negative Features**

a. $[\![-1]\!](x)$ is defined if and only if x does not contain the speaker. When defined, $[\![-1]\!](x) = x$

b. $[\![-2]\!](x)$ is defined if and only if x does not contain the hearer. When defined, $[\![-2]\!](x) = x$

c. $[\![-3]\!](x)$ is defined if and only if x does not contain any non-participants. When defined, $[\![-3]\!](x) = x$

d. $[\![-\text{DL}]\!](x)$ is defined if and only if $|x| < 2$. When defined, $[\![-\text{DL}]\!](x) = x$

e. $[\![-\text{PL}]\!](x)$ is defined if and only if $|x| < 3$. When defined, $[\![-\text{PL}]\!](x) = x$

With the single features interpreted as partial identity functions, bundles of features can be interpreted through functional composition, i.e., the composition of the set of partial functions corresponding to the individual features in the bundle. For example, $[\![-1,-2,-\text{DL}]\!](x) = [\![-1]\!] \circ [\![-2]\!] \circ [\![-\text{DL}]\!](x) = [\![-1]\!]([\![-2]\!]([\![-\text{DL}]\!](x)))$. Some of the more relevant interpretations of feature bundles are given in (10).

(10) **Interpretation of Feature Bundles**

a. $[\![-1,-3,-\text{DL}]\!](x)$ is defined if and only if x does not contain the speaker or a non-participant, and $|x| < 2$. When defined $[\![-1,-3,-\text{DL}]\!](x) = x$

b. $[\![-1,-\text{PL}]\!](x)$ is defined if and only if x does not contain the speaker and $|x| < 3$. When defined $[\![-1,-\text{PL}]\!](x) = x$

c. $[\![-1,-2,-\text{DL}]\!](x)$ is defined if and only if x does not contain the speaker or hearer, and $|x| < 2$. When defined $[\![-1,-2,-\text{DL}]\!](x) = x$

d. $[\![-1,-2,-\text{PL}]\!](x)$ is defined if and only if x does not contain the speaker or hearer, and $|x| < 3$. When defined $[\![-1,-2,-\text{PL}]\!](x) = x$

Thus, the feature bundle [−1,−3,−DL] (i.e., *-in*) requires the DP to refer to the hearer, whereas [−1,−PL] (i.e., *-ioq*) requires the DP to refer to a one or two-person group that does not contain the speaker. Similarly, [−1,−2,−DL] (i.e., *-it*) requires the DP to refer to one non-participant while [−1,−2,−PL] (i.e., *-ijig*) requires the DP to refer to a one or two-person group of non-participants.

As with the positive features in Sauerland 2003, certain aspects of the broad meaning of negative features do not emerge directly through the interpretation itself, but rather

through competition with respect to MAXIMIZE PRESUPPOSITION (Heim 1991). MAXIMIZE PRESUPPOSITION states that, relative to a set of alternatives, speakers will use the sentence that maximizes the number of presuppositions that are compatible with the given context. Inferences are derived from this maxim if speakers use a sentence that has fewer presuppositions than a salient alternative: hearers assume that the sentence with stronger presuppositions was not used because the speaker must believe that the stronger presuppositions could not be satisfied. For example, the utterance "A boss of my supervisor wants to talk to you" implies that the speaker's supervisor has more than one boss. If the speaker's supervisor only had one, then the speaker would have uttered "The boss of my supervisor wants to talk to you." The use of the definite determiner presupposes uniqueness, in contrast to the indefinite.

Similar to the definite/indefinite example, a sentence with the feature bundle [−1,−PL] contrasts with sentences with [−1,−2,−PL] and [−1,−3,−DL]. For example, consider the sentence *Etlenmioq* ('You [DL] are laughing') which, according to the present theory, has the feature bundle [−1,−PL], and thus presuppose that the subject does not contain the speaker and that the subject is a group smaller than three, as specified in (10). Note that there is no requirement that the group contain the hearer. However, the sentences *Etlenmijig* ('They [DL] are laughing') and *Etlenmin* ('You [SG] are laughing') have the feature bundles [−1,−2,−PL] and [−1,−3,−DL] respectively. These sentences have a greater number of presuppositions than *Etlenmioq* ([2.DL]), the first presupposing that the subject not contain the hearer and the second presupposing that the subject is not a group consisting of two or more members. Thus, other aspects of the meaning are derived through MAXIMIZE PRESUPPOSITION. If the speaker believed that the subject did not contain the hearer, he or she would have used *Etlenmijig* ([3.DL]) instead of *Etlenmioq* ([2.DL]). Hence, by choosing *Etlenmioq* over *Etlenmijig*, the speaker implies that the subject contains the hearer. If the speaker believed that the subject did not consist of a group with two or more members, then he or she would have used *Etlenmin* ([2.SG]) instead of *Etlenmioq* ([2.DL]). By choosing *Etlenmioq* over *Etlenmin*, the speaker implies that the subject is a two person group.

The difference between implications and presuppositions for the feature bundles in (10) are outlined in (11).

(11) **Presupposition vs. Implicatures for Non-Coordinated Subjects**

a. Etlenm-in ([−1, −3, −DL]), 'You are laughing.':

i. PRESUP: Subject is not a group. Subject is not the speaker or a non-participant.

ii. IMPLIED: ∅

b. Etlenm-ioq ([−1, −PL]), 'You (two) are laughing.':

i. PRESUP: Subject is not a group with three or more members. Subject does not contain the speaker.

ii. IMPLIED: Subject is a group with two members, at least one of whom is the hearer.

c. Etlenm-it ([−1, −2, −DL]), 'He/She is laughing.':

i. PRESUP: Subject is not a group. Subject is not the speaker or hearer.

ii. IMPLIED: $\emptyset$

d. Etlenm-ijig ([−1, −2, −PL]), 'They (two) are laughing.':

i. PRESUP: Subject is not a group with three or more members. Subject does not contain the speaker or hearer.

ii. IMPLIED: Subject is a group with two members.

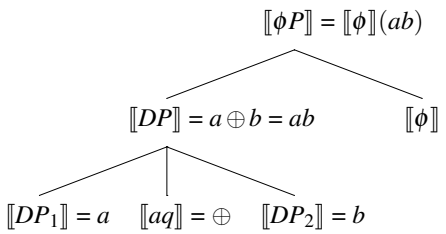
In general, the assumption that the speaker obeys MAXIMIZE PRESUPPOSITION means that the feature [−PL] in the absence of [−DL] will imply that the subject is a two-person group. Similarly, the feature [−1] in the absence of [−2] will imply that the subject contains the hearer, and the feature [−2] in the absence of [−1] will imply that the subject contains the speaker. Furthermore, the feature [−3] in the absence of [−1] and [−2] will imply that the subject contains the speaker and hearer.

4. Coordination and negative features

The interpretation of negative features has different effects on conjunctive and disjunctive phrases (i.e., DP phrases formed with *aq* 'and' vs. *gisna* 'or'). These differences stem from the semantic nature of conjunction and disjunction.

As discussed by Link (1983),[4] conjunction of DPs is best analyzed by interpreting the conjunctive morpheme as a group-formation operator (i.e., $\oplus$). Thus, a coordinated structure of the form [DP_1 aq DP_2], such as [*John aq Mali*], denotes a group consisting of at least two individuals. In Sauerland's (2003) theory, such coordinated structures would have the syntactic structure in (12).[5]

(12)



The conjoined DP is sister to the ϕ-head. In this position, such conjunctions are not consistent with the interpretation of [−DL]. Thus, the verbal affixes that involve agreement with feature bundles that contain [−DL], namely *-in* and *-it* ([−1,−3,−DL] and [−1,−2,−DL] respectively), cannot be used with these structures. This fact explains the pattern in (1), repeated below.

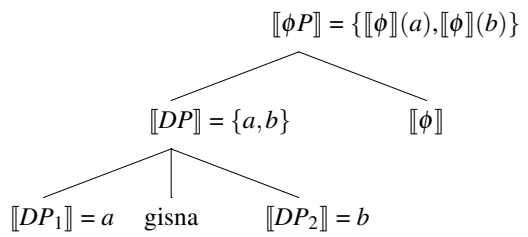
(13) a. Gi'l **aq** Mali etlenm-**ioq**/*-in/*-it
You **and** Mary laugh- **2.DL**/*-2.SG/*-3.SG
'You and Mary are laughing'

[4]Winter (2001) provides a way to keep the Boolean join interpretation of conjunction while still deriving a group formation interpretation of conjoined DPs. The choice of theory (conjunction as meet or as join) makes little difference for the analysis provided here.

[5]For the sake of simplicity, we are ignoring whether the smaller DPs are embedded under their own separate ϕP.

Unlike conjoined DPs, disjoined DPs are not interpreted as groups. As discussed by Kratzer and Shimoyama (2002), an empirically adequate interpretation of disjunction involves the formation of Hamblin-sets. Further semantic computation with these sets involves pair-wise functional application. For example, consider the disjoined DP in (14).

(14)



The interpretation of a disjoined DP of the form [DP_1 gisna DP_2] is the set $\{[\![DP_1]\!], [\![DP_2]\!]\}$. Further semantic computations involve applying functions to each member of the set, but keeping the set denotation (i.e., pairwise functional application to the members of the set as demonstrated with ϕ in (14)). Taking this into account, the following equivalency holds.

(15) $[\![I_{TP}[[DP_1\ gisna\ DP_2]\ \phi]\ T']\!] = \{[\![T']\!]([\![\phi]\!]([\![DP_1]\!])), [\![T']\!]([\![\phi]\!]([\![DP_2]\!]))\}$.

Hence, the resulting Hamblin-set at the sentential level is a set of two propositions. In terms of truth conditions, the sentence with the disjoined DP is true if and only if one member of the set of alternatives is true. More critically, the resulting meaning is defined only if $[\![\phi]\!]([\![DP_1]\!])$ and $[\![\phi]\!]([\![DP_2]\!])$ are defined. In other words, the sentence presupposes that each DP in the disjunction meets the presuppositions induced by the ϕ-features.

This type of interpretation explains why $[\![$*[[gi'l gisna Mali] [−1,−3,−DL]]*$]\!]$ is not well-formed. Although $[\![$*gi'l*$]\!]$ satisfies the presupposition induced by [−1,−3,−DL], $[\![$*Mali*$]\!]$ does not in that it contains a non-participant. In other words, it follows from this theory that (16) should be unacceptable, where *-in* marks agreement with the feature bundle [−1,−3,−DL].

(16) * Gi'l **gisna** Mali etlenm-**in**
You **or** Mary laugh-**2.SG**
INTENDED: 'You or Mary are laughing'

This semantic account also explains why $[\![$*[[John gisna Mali] [−1,−2,−DL]]*$]\!]$ is well-formed, as well as $[\![$*[[Gi'l gisna gi'l] [−1,−DL]]*$]\!]$. Both $[\![$*John*$]\!]$ and $[\![$*Mali*$]\!]$ have cardinalities less than two and both do not contain a speaker or hearer. Furthermore, both instances of $[\![$*gi'l*$]\!]$ have cardinalities less than two and both do not contain the speaker. As a consequence, this theory accounts for the acceptability of the sentences in (17), where *-it* marks agreement with the feature bundle [−1,−2,−DL], and *-in* marks agreement with the feature bundle [−1,−DL] .

(17) a. John **gisna** Mali etlenm-**it**
John **or** Mary laugh-**3.SG**
'John or Mary is laughing'

b. Gi'l **gisna** gi'l etlenm-**in**
You **or** you laugh-**2.SG**

'You or you are laughing' (pointing)

Finally, this semantic account explains why ⟦*[[gi'l gisna Mali] [−1,−*PL*]]*⟧ is well-formed, as well as ⟦*[[John gisna Mali] [−1,−2,−*PL*]]*⟧. Both ⟦*gi'l*⟧ and ⟦*Mali*⟧ do not contain the speaker and both of their cardinalities are less than three. Similarly, both ⟦*John*⟧ and ⟦*Mali*⟧ are non-participants and both of their cardinalities are less than three. As a consequence, this theory accounts for the acceptability of the sentences in (18), where *-ioq* marks agreement with [−1,−PL] and *-ijig* marks agreement with [−1,−2,−PL].

(18) a. Gi'l **gisna** Mali etlenm-**ioq**
You **or** Mary laugh-**2.DL**
'You or Mary are laughing'

b. John **gisna** Mali etlenm-**ijiq**
John **or** Mary laugh-**3.DL**
'John or Mary is laughing'

In summary, the interpretation of negative feature bundles makes the correct predictions with respect to the agreement patterns in Mi'gmaq. Since conjunctive phrases always denote a group of two, they are incompatible with feature bundles that contain [−DL]. However, with disjunctive phrases, the well-formativeness conditions in the ϕ-head are distributed across each disjunct. Thus, feature bundles that contain [−DL] are possible, as long as the person features are also compatible with each member of the disjunct.[6]

5. Agreeing without AGREE

The presuppositional account of ϕ-features can explain both the obligatory and optional nature of number marking in Mi'gmaq. In contrast to a percolation theory, which cannot account for the Mi'gmaq data, a presuppositional account need not hypothesize that person and number features impose restrictions directly on the DP itself. Rather, the semantic restrictions can arise by modifying the verb directly. There are at least two potential advantages of such a theory. First, there would be no need to hypothesize agreement operations between subjects and verbs, nor to have uninterpreted features on verbal predicates. The resulting grammatical theory would be much simpler, and perhaps, given that all person and number features are only overtly marked on the verb, much easier to learn. Second, such a theory would be able to explain why dual marking never appears on nominal arguments, but only on verbal predicates.

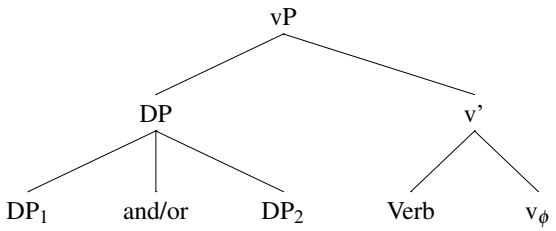
This section briefly outlines some of the details of a theory of so-called "agreement" that does away with syntactic operations (like AGREE) between subjects and verbs. To distinguish this proposal from the presuppositional account presented in section 3, which maintains syntactic agreement, I will use the phrase "purely semantic." In many ways,

[6] One of the predictions of the semantic approach is that the availability of both singular and dual marking with disjunctive subjects should result in slight differences in meaning due to competition. This prediction is, in fact, borne out. However, the details of this prediction will not be spelled out here. See future work for further details.

this new proposal explores a general project outlined in Dowty and Jacobson 1988 that hypothesizes that agreement is a semantic phenomenon.

At the heart of the purely semantic account is the idea that there is no ϕP that dominates a DP. Rather, ϕ features only appear on the v-head where they modify the verb directly, as in the vP structure in (19).

(19)



Critical to the purely semantic approach is the hypothesis that verbs are interpreted as having a positive and negative denotation, plus a presuppositional gap, as in Cooper 1983 (see also Schwarzschild 1994 for a discussion).[7] The basic intuition behind this hypothesis is that some predicates, such as *laugh*, are true of certain individuals (the positive denotation), false of others (the negative denotation), but also undefined for a third class (e.g., the individual event "John's birthday" for the predicate *laugh*, as in #*John's birthday laughs*). Thus, a verb stem like *etlenm* 'laugh' is interpreted as having an ordered pair of sets, the first being the positive value and the second being the negative value. The interpretation rules in (20) and truth conditions in (21) follow Cooper's (1983) convention of using $-$ and $+$ subscripts to select the negative and positive denotations respectively.

(20) a. $[\![\textit{etlenm}]\!] = \langle$POS, NEG$\rangle$, where POS and NEG are disjoint sets but where POS $\cup$ NEG does not necessarily equal the entire domain.

b. $[\![\textit{etlenm}]\!]_+ =$ POS, $[\![\textit{laugh}]\!]_- =$ NEG

(21) **Truth Conditions for Predicates Applying to Subjects**
For all individuals x, $[\![\textit{etlenm}]\!](x) = 1$ if and only if $x \in [\![\textit{etlenm}]\!]_+$, $[\![\textit{etlenm}]\!](x) = 0$ if and only if $x \in [\![\textit{etlenm}]\!]_-$, otherwise undefined.

Presuppositions can be induced on the subject by diminishing the size of the positive and negative denotations (and thus increasing the gap). For example, reconsider the feature $[-2]$. In the presuppositional account outlined in section 3, the feature operated on the DP subject and only returned a result if the DP subject did not contain the hearer. This same effect can be achieved by hypothesizing that $[-2]$ is a verbal modifier that reduces the size of the positive and negative denotations. Let H be the set of all groups that contain the hearer (i.e., $\{x : h \leq x\}$, where h is the hearer). Then for any verb V, let $[\![-2]\!]([\![V]\!]) = \langle([\![V]\!]_+ - H), ([\![V]\!]_- - H)\rangle$. In other words, the feature $[-2]$ subtracts any group that contains the hearer from the positive and negative denotation. If the subject contained the hearer, then the result of applying the predicate $[\![-2]\!]([\![V]\!])$ to the subject would be undefined.

This same type of interpretation can be done for each of the person and number features discussed in section 3. The details are given in (22).

[7] This type of semantics is inspired by Kamp's (1975) treatment of adjectives.

(22) **Features as Verbal Modifiers**: Where s is the speaker and h is the hearer, let S be the set of all groups that contain the speaker (i.e., $\{x : s \leq x\}$), H be the set of all groups that contain the hearer (i.e., $\{x : h \leq x\}$), O be the set of all groups that contain a non-particpant (i.e., $\{x : \exists y.\, y \neq s \,\&\, y \neq h \,\&\, y \leq x\}$), $G_{\geq 2}$ be the set of all groups that have a cardinality greater than one (i.e., $\{x : |x| \geq 2\}$), and $G_{\geq 3}$ be the set of all groups that have a cardinality greater than two (i.e., $\{x : |x| \geq 3\}$). For any verb V,

a. $[\![-1]\!]([\![V]\!]) = \langle([\![V]\!]_+ - S), ([\![V]\!]_- - S)\rangle$

b. $[\![-2]\!]([\![V]\!]) = \langle([\![V]\!]_+ - H), ([\![V]\!]_- - H)\rangle$

c. $[\![-3]\!]([\![V]\!]) = \langle([\![V]\!]_+ - O), ([\![V]\!]_- - O)\rangle$

d. $[\![-\text{DL}]\!]([\![V]\!]) = \langle([\![V]\!]_+ - G_{\geq 2}), ([\![V]\!]_- - G_{\geq 2})\rangle$

e. $[\![-\text{PL}]\!]([\![V]\!]) = \langle([\![V]\!]_+ - G_{\geq 3}), ([\![V]\!]_- - G_{\geq 3})\rangle$

For any verb V and any feature bundle $[F_1, F_2, \ldots F_n]$,

$$[\![F_1, F_2, \ldots F_n]\!]([\![V]\!]) = F_1 \circ F_2 \ldots \circ F_n([\![V]\!]) = F_1(F_2 \ldots (F_n([\![V]\!])) \ldots).$$

The semantic effect of this type of interpretation is identical to the theory with a ϕP dominating the subject DP. For example, consider the interpretation of the feature bundle $[-1, -2, -\text{PL}]$ in the theory discussed in section 3. Within this theory, $[\![-1, -2, -\text{PL}]\!]$ applies to the interpretation of its sister DP and the result of the application is defined if and only if $[\![DP]\!]$ does not contain the speaker or hearer, and $|[\![DP]\!]| < 3$. When defined $[\![-1, -2, -\text{PL}]\!]([\![DP]\!]) = [\![DP]\!]$. As a result, the sentence is undefined if $[\![DP]\!]$ contains the speaker, hearer, or its cardinality is greater than 2.

In the purely semantic account, the feature bundle applies to the verb directly. Thus, $[\![-1, -2, -\text{PL}]\!]$ applies to $[\![\textit{etlenm}]\!]$ and the result is the following ordered pair, where the first value represents the positive denotation and the second value represents the negative:

(23) $$\Big\langle \big(((([\![\textit{etlenm}]\!]_+ - S) - H) - G_{\geq 3}\big)\,,\, \big(((([\![\textit{etlenm}]\!]_- - S) - H) - G_{\geq 3}\big)\Big\rangle$$

Both the positive and negative denotations do not have any members that contain the speaker or the hearer, nor do they have any members that have a cardinality greater than 2. Thus, $[\![\textit{etlenm}\,[-1, -2, -\text{PL}]]\!]([\![DP]\!])$ is defined if and only if $[\![DP]\!]$ does not contain the speaker or hearer and does not have a cardinality greater than 2. In other words, the presuppositions induced by the purely semantic account are identical to the presupposition introduced by the theory with a ϕP and a syntactic agreement operation.

This alternative to Sauerland's theory not only simplifies syntactic theory by getting rid of long distance dependencies, but it also explains why Mi'gmaq only has a dual marker with respect to verbal suffixes. In the purely semantic account, ϕ-features only attach to verbs, and hence do not adjoin to nouns. Thus, there are no $[-\text{PL}]$ features in the DP and hence nothing that could potentially be realized as a dual marker within the nominal system. In contrast, the theory presented in section 3 has $[-\text{PL}]$ features directly modifying the DP. There is no principled reason why such features are never phonologically marked in their underlying position.

6. Conclusion

Much of this paper was focused on demonstrating that a semantic presuppositional analysis of person and number features, similar to Sauerland 2003, provided the best account of "agreement" patterns in Mi'gmaq. Although most presuppositional accounts hypothesize that ϕ-features affect the denotation of the DP subject, this need not be the case. It is possible that the same type of theory can be implemented by having ϕ-features restrict the verb directly, thus making it redundant to have syntactic operations like AGREE. Such a theory is not only more desirable due to its simplicity, it also accounts for the fact that certain features, such as dual marking in Mi'gmaq, are only overtly marked on the verb.

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