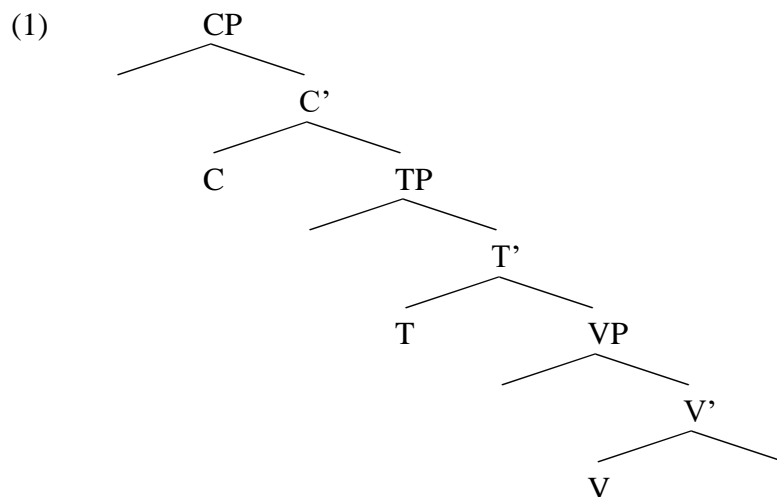# The 3SGS morpheme in child and adult English: A formal analysis

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1. Introduction[1]

For decades, formal linguists have struggled with how to analyze the position of the verb in a sentence. Various mechanisms and analyses have been implemented ranging from specific morphological operations to mechanisms that are part of the syntactic derivation and representation. Since Chomsky (1957), the position of the verb has been related to the interaction between a verbal root and its inflectional morpheme (the position is labeled T in this paper).[2] That is, researchers have asked whether the verb should be decomposed into smaller units, and if so, how these units combine across languages? For the past 30 years, the verb has been considered to occupy one of three main positions: the C head, the T head, and the V head (Stowell 1981; Chomsky 1986); cf. (1).[3]

(1)

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              CP
             /  \
              C'
             /  \
            C     TP
                 /  \
                   T'
                  /  \
                 T     VP
                      /  \
                        V'
                       /  \
                      V
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V has been assumed to be the base position, where a verb that does not move remains. A verb that moves would either move to T or further onwards to C. Since the early 1990s, the structure has expanded and now contains a rich inventory of possible head positions (Chomsky 1995; Rizzi 1997; Cinque 1999, etc.). In this paper, we will assume a fairly traditional structure, mainly for expository convenience.

Despite the considerable number of research papers that have investigated the dependency between the root and the inflectional morpheme, there is still no agreed-upon analysis. There are various reasons why this is the case.

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[2] See Lasnik (2000) and Freidin (2004) for comprehensive reviews and discussion.

[3] Here we have decided to use TP and not IP for the inflectional position, following what has become the main convention in the field.

One reason is that there is a lot of variation between languages and an agreed-upon analysis should be able to account for this variation. In some languages, all verbs in main clauses are moved (e.g., Scandinavian languages; Holmberg and Platzack 1995), whereas others are like English in not moving main verbs but auxiliaries. Languages like French move their main verbs to I but not to C, and so on and so forth. The variation clearly demonstrates that children acquiring the syntactic patterns of their local language need to pay close attention to the position of the verb in the structure.

Another issue concerns the locus of verb movement. A range of different proposals have been advanced, ranging from purely syntactic mechanisms (Emonds 1978; den Besten 1983; Koopman 1984; Travis 1984; Baker 1985; 1988, Larson 1988; Vikner 1995; Julien 2002, 2007; Freidin 2004; Lechner 2005; Roberts 2010, 2013) to the claim that verb movement and head movement more generally is purely a PF phenomenon (see Chomsky 2001; Boeckx and Stjepanović 2001; Flagg 2002; Sauerland and Elbourne 2002). Some scholars have also advocated a mixed approach that combines aspects of syntax, morphology and phonology (e.g., Bobaljik 1995, 2003; Embick and Noyer 2001; Zwart 2001; Adger 2003; Harley 2004, 2011, 2013; Matushansky 2006), and yet others have eliminated head movement altogether by incorporating its effects under remnant movement (Koopman and Szabolcsi 2000; Mahajan 2000, 2003; Nilsen 2003; Müller 2004; Svenonius 2007). For useful overview articles, see Roberts (2001, 2011) and Barrie and Mathieu (2014). As is obvious, our understanding of verb movement still appears fairly inadequate, but the present situation underscores the need for continued work on head movement and verbal morphology in order to hopefully one day better understand the phenomena.

In this paper, we look at the issue through the lens of child language acquisition. We discuss data from a production experiment designed to uncover children's knowledge of verbal inflection. These data will lend support to one specific view of head movement, namely what we labeled the mixed approach above. Specifically, we will argue that head movement is syntactic, and that there is variation across varieties when it comes to which member of a chain of related heads is spelled out (Zwart 2001; Adger 2003).

The outline is as follows. Section 2 provides an empirical overview by focusing on production data from child English compared with the standard adult language. In section 3, we present the approach to head movement that we will rely on in this paper. Section 4 analyzes the data from section 2. In section 5, we make a few concluding remarks.

2. Empirical overview: Child English

It has been useful to formalize cross-linguistic differences in verb movement as parameters (see e.g., Pollock 1989; White 1990/1991). Thus, children acquiring any language must appeal to their linguistic experience to decide whether their language raises the verb to C, to I, or whether it remains in situ.[4] These word order parameters have been proposed to be set very early in the course of acquisition. According to Wexler (1998), the main word order parameters are set by the time the child enters the two-word stage, roughly around 18 months of age or possibly even earlier. These parameters include VO versus OV (Swedish versus German); V to I,

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[4] Arguably a more fine-grained typology is needed, viz. the variation among Norwegian dialects where children are clearly distinguishing between fine-grained syntactic properties that sometimes are contingent on information structure as well (see Westergaard 2009, 2013 inter alia).

V2 and the null subject parameter. Although word order parameters are mastered early, until about 3 years of age, children often use the infinitive form of the verb in main clauses. For this reason, children are said to be in the 'Optional Infinitive Stage'. However, it is also the case that when children do raise the verb, they raise it appropriately for their language, and in verb raising languages, provide appropriate inflection. This has been found for child Dutch (de Haan 1986; Jordens 1990; Haegeman 1995b), child German (Meisel and Müller 1992; Jordens 1990; Poeppel and Wexler 1993; Weissenborn 1990), child French (Pierce 1992; Verrips and Weissenborn 1992) among others. See also Wexler (1994) and Phillips (2010) for a review.

In contrast to many Romance and Germanic languages, main verbs in English do not raise, and indeed, English-speaking children are not observed to produce verb raising. English-speaking children have not been observed to raise the verb higher than negation to produce utterances like *Tigger fits not*, for example. Since English does not have a special morphological form for the stem, there is no clear morphological test for whether or not they use infinitive forms in main clauses. However, Wexler (1994) argues that English-speaking children do produce infinitive verb forms in main clauses. His claim is that children's omissions of inflection, such as the 3rd person *s* (hence '3SGS') from the verb indicate that children are producing the infinitival form of the verb, not just the verb stem. Thus children's optional production of the 3SGS morpheme and other tense-related morphemes such as auxiliary verbs is taken to characterize the Optional Infinitive stage in English. Wexler (1994) goes on to argue that the overall distribution of child data in negative sentences should provide strong support for an Optional Infinitive stage in English. Our data support such a stage, but show that the data from spontaneous production on which conclusions have been drawn do not reveal the full picture. We will provide data from elicited production experiments that show not only omissions of the 3SGS in negative sentences, but its presence in non-target positions. These data lead us to a different perspective on the nature of the Optional Infinitive grammar and what children need to acquire to produce adult-like sentential negation. We turn next to a review of the English child data.

2.1. Inflection in child English
In adult English the 3SGS inflectional morpheme is realized in different positions in affirmative and negative sentences. In affirmative sentences, it is affixed to the main verb , as in (2a), while in negative sentences it is realized on the auxiliary verb *do*, as shown in (2b, 2c). Note that the 3SGS morpheme is realized on *do* whether the negation is the free standing form of negation *not* or the form *n't* which is incorporated into the more colloquial *doesn't*.

(2)   a.   *Tigger fits*
         b.   *Tigger doesn't fit*
         c.   *Tigger does not fit*

Children acquiring English do not converge immediately on consistent use of the range of adult sentences in (2). We will fill out the developmental picture, taking Bellugi's (1967) seminal dissertation on sentential negation in the 'Harvard' children Adam, Eve and Sarah (Brown 1973) as a starting point. We review subsequent research from Harris and Wexler (1996) and Schütze (2010) and also incorporate empirical findings from elicited production studies. We review data from a

longitudinal study of four 2-year-old children reported in Thornton and Tesan (2013) and an elicited production study with 25 children aged from 2;05 to 3;04 (mean age of 2;11) by Thornton and Rombough (2015) to complete the developmental picture.

It is now well documented that English-speaking children in the Optional Infinitive stage, that is, children roughly up to about age 3 years, do not use tense-related morphemes, including the 3SGS morpheme consistently (Rizzi 1994; Schütze and Wexler 1996; Wexler 1994, 1998; Phillips 2010). Spontaneous speech transcripts reveal that children's non-target productions largely feature omissions of the tense-related morphemes. Sporadic uses of the 3SGS used 'high' rather than affixed to the verb, have been observed. For example, Aran and Warren from the Manchester corpus produce the affirmative sentences shown in (3) (Theakston, Lieven, and Tomasello 2003). Such errant uses of the 3SGS morpheme have largely been relegated to performance errors or analyzed as lexically-specific rote-learned items (e.g. Wilson 2003).

(3)   a.   *That one's go up there* (Warren, file 10a, ll 529)
        b.   *That one's go in* (Warren file 11b, ll 48
        c.   *Teddy's do wiggle wiggle wiggle* (Warren file 15a, ll 40)
        d.   *That's go in the holes* (Aran file 18b, ll 614)

Similar examples appear in experimental contexts in some children's productions. In an experiment eliciting negative sentences with 2- to 3-year-old children, Thornton and Rombough (2015) report a child (pseudonym Jade) who produced the 3SGS in non-target positions quite consistently when testing a selection of boxes to see if they open. The child's succession of affirmative and negative utterances stating that some boxes open while others do not are given in (4). Of the 27 negative productions produced by this child in the experimental session, 21 realized inflection before the main verb, either as a contracted form on the subject NP or as the copula, and of the 42 positive productions, 19 featured preverbal inflection. The non-target inflection appears to be too frequent to result from performance considerations. The alternative is that the 'misplaced' 3SGS is likely to be a reflection of this child's grammar at this stage of her grammatical development.

(4)   *It's not working, This one opens, This one's opens, It's not open, Not open, That's open* (x2), *That is open, This opens, It's not, This is open* (x2)

As can be seen from the range of productions in (4), this child often puts the 3SGS morpheme in a 'high' position, presumably T.[5] It is of interest that in examples like *That is open* (assuming the intended meaning 'That opens') the 3SGS sometimes emerges as a stand-alone form of *be*; this may occur in those cases when the subject NP already ends in a sibilant.[6]

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[5] Another possible alternative to the proposal that children sometimes use the 3SGS morpheme in the T position would be to propose that children are simply using rote-learned high frequency combinations such as *that's* and *it's* and inserting them as unanalyzed wholes into the subject position (cf. Wilson 2003). Such a proposal is unlikely, given that such subject NPs do not occur with modals, sentences where a 3SGS morpheme is not required. That is, children have not been observed to produce utterances such as #*It's can open* or #*This one's won't open* in the longitudinal sample reported in Thornton and Tesan (2007, 2013) or in the data collected from 25 children in Thornton and Rombough (2015).

[6] Such utterances also occur with other verbs. For example, Jade also produces *This is drive* and *This is jumps*.

Before we simply assume that the *s* in utterances like (3) and (4) (other than the ones with *is*) is the 3SGS in a 'high' position, it is worth considering the alternative that the *s* could be an auxiliary form of *be*, and that the child has simply omitted the aspectual *-ing* morpheme in her productions. That is, utterances like *It's not open* or *It's not work* could, potentially, be intended as *It's not opening* or *It's not working*. First, omission of the *-ing* morpheme is not generally considered to be a characteristic property of the Optional Infinitive stage, given that this morpheme concerns aspect and not tense. At least for slightly older 3 year-old children, Rice and Wexler (1996) report that the accuracy rates differ greatly for tense/agreement and aspect, with 55% omission for 3SGS but only 10% for the aspectual *-ing* morpheme. Therefore, it is unlikely that children like Jade are simply omitting the aspectual suffix in productions like (3) and (4). Furthermore, if such omissions were a property of the Optional Infinitive stage, we would expect them to be more widespread across the population of children, and not confined to particular children. A second reason to doubt the alternative explanation is that the form with preverbal inflection also shows up with verbs like *fit* (Jade produces *It's fits*), which do not lend themselves to the aspectual form (**It's fitting*). Assuming that children have the knowledge that lexical verbs such as *fit* are not used in the present progressive form, productions such as *It's fit* would be unanticipated on the alternative explanation. Therefore, from this point forward, we will assume that in productions such as *It's fit*, the *s* is the 3SGS morpheme, positioned 'high', in T.

2.2. Negation in the Optional Infinitive stage

The classic study of negation is Bellugi's (1967) dissertation and the related paper by Klima and Bellugi (1966). Bellugi (1967) proposed that two stages precede the adult stage at which children can produce sentential negation using a negative auxiliary verb; at the first stage negation appeared either initially or finally in a phrase or utterance, and at the second stage, it could be viewed as internal to the sentence and expressed by *not* or *no*. For literature that reports on children's early acquisition of negation see Déprez and Pierce (1993); Drozd (1995); Cameron-Faulkner, Lieven, and Theakston (2007); Harris and Wexler (1996) among others.

As Bellugi (1967) noted almost 50 years ago, 2-year-old children in the Optional Infinitive stage frequently omit the 3SGS morpheme and produce sentential negation with *not,* as in (5a). Bellugi reported that soon after sentences like (5a) with *not* (or *no*) emerge, children use *can't* and *don't* as in (5b, 5c). These forms did not occur with progressive verbs, as in (5d). At the time *don't* and *can't* appeared, the children did not use the auxiliary verb system productively.

A similar progression was seen in the longitudinal development of a child (Brian) documented by Cameron-Faulkner, Lieven, and Theakston (2007). These data document Brian's 'multiword' negation, which includes both sentential negation and anaphoric negation. Brian's data are investigated from 2;3 to 3;3 years of age. It is worth reviewing his pattern of development, because the data are also compared with the parental input. At 2;3 his predominant form of negation is *no*, which accounted for 97% of the sample. There is no information concerning whether these uses of *no* are sentential negation or other uses. By 2;6, use of *no* has decreased to 60%, and *not* is used in 40% of utterances. The first negative auxiliaries are *don't* and *can't*, and are reported to be used productively by 2;9. By 3;3 *don't* accounts for over half of Brian's negative utterances, and *not* decreases, accounting for only 17% of negated utterances at 3;3. In the final sample at 3;3, negative auxiliaries *didn't* and *won't* emerge, but no cases of *doesn't* are documented. As part of the study, the parental input from 10 files

was analyzed, 5 files from each of two time periods. There is little difference between the two samples, so for brevity, the parental input when Brian is 2;8 is reported. In these files, *no* accounts for 30% of the multiword negation. Since *no* is not used for sentential negation in English, these uses are likely to be anaphoric negation, modifying DPs and so on. The negative marker *not* is used 21%, *don't* appears in 19% of the productions, *can't* 10%, *won't* 6% and other negative auxiliary verbs account for 13%. In other words, putting aside the 30% irrelevant uses of *no*, *not* accounts for 21% and negative auxiliary verbs account for the other 49% of the input data. The important point to take away from these data is that the parental input contains many negative auxiliary verbs, while they are absent from children's early productions.

In fact since the only negative auxiliary verbs used by the children early in acquisition were *can't* and *don't*, Bellugi concluded that these lexical items were unanalyzed 'chunks,' or what she termed "lexical representatives of the negative element" (Bellugi 1967: 59). For Bellugi, the only true negative marker in the children's grammars at this stage of development was *not* (or possibly *no*).

(5) a. *Tigger not fit*
  b. *Tigger can't fit*
  c. *Tigger don't fit*
  d. *#Tigger don't/can't sleeping*

As Schütze (2010) notes, other researchers, such as Bloom (1970) and Hyams (1986) have made similar proposals arguing that *can't* and *don't* are unanalyzed forms and are potential substitutes for *not*. Schütze argues that such proposals do not account for the empirical facts. For one thing, Schütze argues that *can't* and *don't* are not always the first negative-looking auxiliaries in children's grammars as Bellugi had proposed. Second, he claims that distributional facts argue against such proposals. For example, if the distribution of *don't* and *can't* were identical with *not*, examples such as the following would be anticipated (Schütze 2010: 238):

(6) a. *He('s) don't happy*
  b. *He might don't laugh*
  c. *He did don't laugh*
  d. *He('s) don't singing*

In a search of 5 children from the CHILDES database, he concludes that errors in the use of *don't*, *doesn't*, and *didn't* total less than 5% of the productions collected for the children he investigated.[7] Thus Schütze concludes "The fact that *not* and *don't* are used correctly the vast majority of the time makes it unlikely that children are confusing them" (Schütze 2010: 244). However, since non-adult agreement occurs quite frequently for *don't*, Schütze recognizes that the form *don't* is a grammatical option for some children. As a consequence, he offers a different account for children's uses of non-agreeing *don't*. (See Guasti and Rizzi 2002 for a further alternative account.)

In order to explain Schütze's account, we first need to outline his theoretical assumptions. First, as in Schütze and Wexler (1996), Schütze assumes that what characterizes the Optional Infinitive stage is that the Tense and/or Agreement features

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[7] Schütze (2010) investigated data from Abe (2;05–3;03), Adam (2;03–4;10), Sarah (2;09–5;0), Nina (2;00–3;03) and Ross (2;06–5;02).

may be underspecified in the sentence representation. Underspecification of features in the IP can result in omission of the 3SGS, yielding utterances like *Tigger not fit*. A further assumption is that a Mood projection, that signifies indicative mood, is generated above the IP projection. The head of the Mood projection hosts *do*, but can also be spelled out as null. It will be null in those cases when Infl affixes to a verb to its right. Turning to negation, Schütze assumes that *n't* is the contracted form of *not* and that both forms of negation are heads. Following Harris and Wexler (1996), Schütze assumes that children may have a preference for *n't* over *not* in their productions, irrespective of the features that are realized in Infl. With these assumptions in place, children's productions of *don't* can be explained. The proposal is that if children underspecify Infl and it spells out as null, then their preferred form of negation, *n't* has no host. In this case, use of *do* is triggered by "the need for an adjacent morphologically dependent element to have a host word" (Schütze 2010: 251). Therefore *do* steps in to provide a host for *n't*. The syntax for an utterance like *He don't cry* is summarized in (7).

(7)   He M$_{Indic}$ [$_I$ 0] n't [$_{VP}$ cry]

        In the study by Harris and Wexler (1996) on sentential negation in the Optional Infinitive stage, the focus is on the range of sentence types that should and should not occur, given the assumption that Tense is expressed 'optionally' during this stage of development (Wexler 1994).[8] Since children can fail to realize a morpheme for Tense, children are expected to produce utterances with *not*, as Bellugi (1967) had observed. For Harris and Wexler (1996), use of *do* is taken to indicate that a projection for Tense is present in the phrase structure representation. Therefore, even though (8b) is missing the 3SGS morpheme, it is still taken to express Tense, and thus, (8a) is expected to appear optionally alongside (8b, 8c) in children's productions.

(8)   a.   *Tigger not fit*
        b.   *Tigger don't fit*
        c.   *Tigger doesn't fit*
        d.   **Tigger not fits*

A further prediction followed from the assumption that *not* is a head. Harris and Wexler predicted that children would not produce utterances such as *Tigger not fits*, as in (8d), with inflection realized on the main verb, since such productions would violate the Head Movement Constraint (Travis 1984). Harris and Wexler conducted a search of 10 children's data in the CHILDES database which yielded results largely compatible with their proposal. There were some instances of inflected main verbs like (8d) but these were taken to be performance errors given that they did not exceed 10% (5/54 of *not-V* examples) in the children's data.

2.3. Data on negation from elicited production
        It is important to point out that both Schütze's (2010) study and the earlier study by Harris and Wexler (1996) test their predictions using spontaneous production data from transcripts available in the CHILDES database (MacWhinney 2000). As

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[8] Harris and Wexler (1996) only assume that Tense is expressed optionally. In their paper, it is not assumed that Agreement is also optional.

Snyder (2007) has argued, children tend to be 'grammatically conservative' in their spontaneous productions. Experimental techniques encourage children to attempt structures that they might otherwise avoid. Given that spontaneous production data do not yield an abundance of sentential negation, elicited production is an appropriate methodology to probe children's grammatical hypotheses.

In a longitudinal study of the development of inflection and negation in 4 children from age 2 to 3 years of age Thornton and Tesan (2007, 2013)[9] analyzed data that were evoked using elicited production techniques together with children's spontaneous productions. Thornton and Tesan's findings did not replicate Harris and Wexler's predicted pattern of utterances in (8). In their corpus of 497 examples of sentential negation elicited from the 4 children, Thornton and Tesan (2007, 2013) observed that medial negation sentences like *Tigger not fit* co-existed with alternatives in which a 3SGS morpheme was present in the utterance, but did not occupy its target position inside the lexical item *doesn't*. These non-target forms were eventually replaced by *doesn't*, but this form was not present in the early sessions with these children.

Table 1: Breakdown of sentential negation for children as reported in Appendix C in Thornton and Tesan (2013) (*N*=4).

Negative Sentence Type		Raw No. (% of corpus)		No. of Children
NP not V	(*Tigger not fit*)	101/497	(20%)	4
NP don't V	(*Tigger don't fit*)	80/497	(16%)	4
NP's not V	(*Tigger's not fit*)	30/497	(6%)	3
NP not V-s	(*Tigger not fits*)	77/497	(15%)	3
NP don't V-s	(*Tigger don't fits*)	22/497	(4%)	3
NP doesn't V	(*Tigger doesn't fit*)	187/497	(38%)	4

Table 1 summarizes the breakdown of the data from children's productions of sentential negation in the corpus. It can be seen from the rightmost column in the table that at least 3 of the 4 children produced all of the non-target versions of sentential negation.

To verify these findings in a larger sample of children, Thornton and Rombough (2015) conducted a study eliciting sentential negation from 25 2- 3-year-old children (mean age 2;11). The context used to elicit sentential negation had children test groups of items for a variety of properties. They tested whether toy characters fit in a bus, whether dog toys squeak, whether items stick on a magnetic board, and so on. Children were handed the items one at a time to test. In the 'fit' scenario, for example, children successfully got two toy characters to fit through the door of a toy bus, but the third character was too tall, and in this context a negative sentence was anticipated. In this context, a negative sentence like *Tigger doesn't fit* is natural for adults. Each child was exposed to at least 5 scenarios eliciting different verbs, though the actual number of opportunities each child had to produce negative sentences varied, depending on how successful they were, and their enjoyment of the task. Such differences are inevitable with young children. Using this protocol, 585 full

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[9] The children participated in the study at the following ages: Child 1 (Caitlyn) 1;9.4–2;8.29; Child 2 (Kristen) 2;0.12–3;0.8; Child 3 (Georgia) 1;10.23–2;8.20; Child 4 (Curtis) 2;1.9–3;8.03.

sentence productions were elicited. Once the productions with modals, past tense *didn't*, progressive *-ing* etc. were excluded, there were 442 productions remaining for analysis. These productions were all produced in a context in which adults would use *doesn't*. The breakdown of children's productions is given in Table 2 (and individual subject data are also detailed below in Tables 3 and 4).

Table 2: Children's full sentence productions excluding productions with modals, past tense and progressive *-ing* (*N*=25). Table 2 combines Tables 3 and 4 in Thornton and Rombough (2015).

Negative Sentence Type	Raw No. (%)
NP not V (*Tigger not fit*)	46/442 (10.4%)
No Subject V (*No it fit*)	8/442 (1.8%)
NP don't V (*Tigger don't fit*)	39/442 (8.8%)
NP's not V (*Tigger's not fit*)	19/442 (4.3%)
NP not V-s (*Tigger not fits*)	50/442 (11.3%)
NP don't V-s (*Tigger don't fits*)	22/442 (5%)
No Subj V-s (*No it fits*)	8/442 (1.8%)
*NP didn't V-s (*Tigger didn't fits*)	2/442 (0.5%)
NP's not V-s (*Tigger's not fits*)	4/442 (1%)
NP doesn't V (*Tigger doesn't fit*)	232/442 (52.5%)
NP's doesn't V-s (*Tigger's doesn't fits*)	12/442 (2.7%)

*Included because it has a non-target *s*

The study by Thornton and Rombough (2015) also evoked many negative sentences that were non-adult in form, as can be seen in Table 2[10]. As observed in the earlier study, children produced sentential negation with just a bare verb, and with inflection in preverbal position as well as on the inflected main verb. The group data obscure the fact that children divided easily into 2 groups, those children whose negative sentences were adult-like and negated with *doesn't*, and those children who used the non-adult forms. Taking as a criterion for placement in an 'Advanced' group 5 or more productions of *doesn't* during the experimental session, Thornton and Rombough classified 13 children as 'Advanced' while the other 12 were categorized as 'Less Advanced'. Of the 288 full sentences productions (including modals etc.) elicited from the Advanced group, 228 were productions of *doesn't*. This stands in contrast to the Less Advanced group. This group of children produced a total of 290 full sentence productions, but only 4 were productions of *doesn't*. This means that most of the non-adult forms reported in Table 2 were produced by this Less Advanced group of children. As we will see shortly, Thornton and Tesan (2013) propose that *doesn't* is a likely trigger for grammatical change from the 'Less Advanced' grammar that licenses the 3SGS in non-target positions to 'Advanced' status.

Table 3: Negative sentences of children in the Advanced Group (*N*=13) in Thornton and Rombough (2015)

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[10] The 4 children whose data were reported in Thornton and Tesan (2013) did not produce what has sometimes been termed 'external negation' because the negation is first in the string. There were 2 children in the Thornton and Rombough (2015) study who produced such utterances, and these are incorporated in Table 2. The syntax of these utterances falls outside the scope of this paper, but see Thornton and Rombough (2015) for discussion.

Advanced Group				
	It doesn't V	*It don't V*	*It can't V*	*Other*
Aaron	10	1		*It doesn't Vs* (1)
Jack	23			*It doesn't Vs* (2)
Ella	25		1	
Eliza	23	5	1	*It didn't V* (1)
Lauren	13	1	22	
Eva	14	3	6	*It didn't V* (2)
Heidi	22			*It doesn't Vs* (2)
Tyler	6			
Braxton	23		1	
Chelsea	17		6	
Jacob	12		3	
Summer	13		1	
Leah	27	1		
Total	228	11	41	8

Insert Table 4 from different file. Children in the Less Advanced Group.

The elicited production data are not compatible with Schütze's account for non-agreeing *don't*. As it stands, Schütze's theory accounts nicely for non-agreeing *don't*, but it is unable to account for the negative sentence variants in which there is a non-target 3SGS in some other position in the sentence. Recall that, according to Schütze, *do* is spelled-out in Mood only when there is an adjacent morphological element needing a host. Usually this is an affix for tense, but when Infl is underspecified, *do* can serve as the host for *n't*. Such a theory cannot explain instances of the 3SGS in non-target positions (e.g. *Tigger's not fit*, *Tigger don't fits* etc.). Non-agreeing *don't* should only appear when Infl is underspecified and *do* is a host for *n't*, so the appearance of the 3SGS on the main verb is unanticipated. Children's productions in which sentential negation is produced with an inflected main verb, in particular, led Thornton and Tesan to an alternative proposal. They propose that in early child grammars, the negative marker *not* is initially an adverb, not a head, as assumed by Harris and Wexler (1996) and Schütze (2010).

2.4 Thornton and Tesan (2013)

Drawing on Zeijlstra's (2004, 2008) theory of negation and learnability, Thornton and Tesan (2013) give a new interpretation to Bellugi's observation that children initially only use *not*, and do not use negative auxiliary verbs. Zeijlstra (2004) proposes a Negative Concord parameter. Basically, on one value, the negative marker is an adverb (Dutch, German etc.), while on the other value, negation is a head (Italian, Czech etc.). According to Zeijlstra (2008), children in the early stages of acquisition build maximally efficient phrase structure representations, incorporating only those functional categories instantiated in the linguistic input.[11] The proposal is that the default value of the parameter is that the negative marker is an adverb since this does not require the child to build a NegP functional projection to incorporate a negative head. If the positive input makes available a negative head, the child can

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[11] This assumption has a long history in generative linguistics. For discussion, see Fukui (1986, 1995, 2006); Lebeaux (1988); Radford (1990, 1996, 2000); van Gelderen (1993); Thráinsson (1996, 2003); Bobaljik and Thráinsson (1998); Vangsnes (1999); Fukui and Sakai (2003).

change the value of the parameter. English is more complex, if *not* is assumed to be an adverb, and *n't* to be a head. In this case, at least on one learning scenario, English must retain its negative adverb and a negative head must be added to the possible options on the basis of positive input. Applying Zeijlstra's proposal to child English, Thornton and Tesan (2013) propose that children initially only use *not* as an adverb, in keeping with the default value of the Negative Concord parameter.

In the absence of experience, children apparently hypothesize that *not*, like the negative adverb *never*, permits inflection to appear on the main verb. This gives rise to the productions like *Tigger not fits* observed in young children's productions. As Tables 1 and 2 revealed, children also produce *Tigger don't fits*. These productions can be explained if we adopt Bellugi's proposal that *don't* is a 'lexical representative' of the negative element. On the present proposal, it is a lexical representative of some kind of transitional adverb, not a head as Schütze (2010) took Bellugi to be claiming. The proposal now explains children's production of negative sentences that appeared to violate the Head Movement Constraint (cf. Harris and Wexler 1996).

This proposal means that it is worth returning to check Schütze's other reasons for rejecting Bellugi's proposal that *don't* and *can't* are initially unanalyzed lexical items. Schütze (2010) makes the point that these two items do not behave uniformly in children's grammars, with some children acquiring other negative auxiliary verbs first in their grammar. This is most likely correct. The data reported in Thornton and Tesan (2013) and Thornton and Rombough (2015) do not show that the modal *can't* is used with inflected main verbs. But, in principle, it appears that children could take any form of *do* to initially be an unanalyzed form. As Table 2 shows, one child used *didn't* with inflected main verbs, suggesting for this child, *didn't* is unanalyzed (e.g. *Tigger didn't fits*). The last reason Schütze (2010) gives for rejecting Bellugi's proposal is that *don't* doesn't distribute like *not,* since the predicted sentences in (6) are not found in children's transcripts. This is true, though perhaps not surprising, given that even simple sentential negation is relatively infrequent in the transcripts when children are in the Optional Infinitive stage, as the scant data set in Harris and Wexler (1996) makes clear.

For reasons that are not clear, children acquiring English appear to have some difficulty recognizing that negative auxiliary verbs such as *can't, don't, isn't* and so forth are multimorphemic. This is problematic as this is an important step in recognizing that *n't* is a head form of negation. This step brings Thornton and Tesan (2007, 2013) to propose that the most informative lexical item to trigger this change is the form *doesn't*. Given that in this item, the 3SGS morpheme is internal, it may provide more salient information that *n't* is a negative head. Furthermore, if *doesn't* is the negative auxiliary verb that signals that children have analyzed *n't* as a head form of negation, and progressed to the adult grammar, then non-target doubling with *doesn't* is not predicted to occur. A few such productions were observed (*It doesn't fits*) as shown in Table 2 (12/442). Five of these were from children in the Advanced Group and the other 7 came from one child in the Less Advanced Group. In addition to 7 instances of utterances like *It doesn't fits*, this child produced 12 examples of *It don't V* and 19 examples of *It don't V-s*. The data suggest that for this child, the form *doesn't* has not been sufficiently salient to trigger morphological analysis and thus change.

In summary, the data from these investigations showing the interaction of the 3SGS morpheme and negative markers suggest that English-speaking children start with a default adverbial form of negation *not*, and add the head form of negation *n't* later, once they have interpreted the linguistic evidence. Thornton and Tesan (2007)

left the status of *not* in the adult grammar as an open question. What they observed is that once children acquire the head form of negation, *n't*, the negative marker *not* disappears from children's grammars (for the time period studied). This could suggest that children temporarily refrain from using *not* because they are not sure if it is an adverbial (or a maximal projection in SpecNeg) or a head. It is important to note, though, that Thornton and Tesan were only investigating lexical main verbs. It could be that children might have continued to use *not* with *be*, where it is very natural (e.g. *He's not a student*) but these forms were not investigated. At any rate, no claims are made about the status of *not* once children acquire negative auxiliaries such as *doesn't*.

At this point, we do not have a good understanding of the syntax of children's non-target negative sentences. Why is it that they use the 3SGS morpheme on its own at first, and how can these facts be explained using current linguistic theory? And, why is it that once children acquire *do*, the non-target forms with the 3SGS magically disappear? In this paper, we aim to answer these perplexing questions.

3. Theoretical assumptions

We will develop an analysis along the lines of Zwart (2001) and Adger (2003). In both of these publications, verb movement is a question of spelling out the verb and its inflectional markers in the right position. Verb movement is syntactic in the sense that syntactic mechanisms underlie the Spell-Out mechanism they both propose, but the actual determination of which members of a chain to spell out occurs on the PF side. We will first review Zwart's (2001) approach, then Adger's (2003), before turning to our own analysis in section 4.

3.1. Zwart (2001)

Zwart (2001) develops an analysis of verb movement which starts out with the assumption that there are lexical and functional features, henceforth LEX-features and F-features. He follows Chomsky (1995) in assuming that movement is a function of a requirement of feature valuation. Zwart's specific proposal builds on the definitions in (9) and (10).

(9)   α and β are *F-related* if α is involved in a feature valuation operation
        involving F, where F is a formal feature of β. (Zwart 2001: 37)
(10)   Let γ be a chain of F-related elements (α, …, β), where α c-commands β. Then
        α must contain LEX-features, and β is spelled out in the highest position of γ
        containing the LEX-features of β. (Zwart 2001: 38)

Assuming that LEX-movement is a last resort mechanism, (10) predicts two possibilities: Either there is no movement (β is spelled out in β) because α has LEX features, or α has no LEX-features and thus the LEX-features of β have to move to α (β is spelled out in α). The last resort nature of the operation is triggered by "phonological requirements having to do with the spell-out procedure" (Zwart 2001: 38). These "phonological" requirements are to a large extent morphological, as the verb can either be pronounced at the tail or head of the chain, cf. (9).[12] That is, either

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[12] Zwart (2001) also discusses syntactically triggered verb movement which is not observable. In this paper, we will only focus on observable instances of verb movement.

the inflection combines with the root/stem in the base position of the latter or in the base position of the former.

Zwart illustrates how this view of verb movement successfully accounts for a range of examples. For reasons of space, we will not discuss these here, but instead move to a similar account on which we will build our own analysis.

3.2. Adger (2003)

Adger (2003: 170) develops an analysis where verbal inflection in English is the realization of inflectional features on a low head (*v* for Adger). The dependency between features is encoded via Agree (Chomsky 2000), and an important assumption here is that the tense feature on the verb is uninterpretable, it is only the tense feature on T which has a semantic meaning, thus the latter is an interpretable feature. The unvalued features are deleted prior to semantic interpretation.

Adger encodes the fact that auxiliaries always move past negation as a property of feature strength (cf. Chomsky 1995): A strong feature triggers movement, a weak feature does not. A strong feature must be local to the feature it checks or is checked by (Adger 2003: 179), which entails that the verb has to move to T whenever T is strong. The strong/weak distinction also enables Adger to articulate cross-linguistic differences, e.g., between English and French (cf. Pollock 1989).

When it comes to *do*-support, after discarding several other possibilities Adger develops a pronunciation approach based on chains. He suggests the rule in (11), which arguably is specific to English (and other languages that behave like English).

(11)   *Pronouncing Tense Rule (PTR)*
         In a chain (T[tense], *v*[*u*Infl:tense]), pronounce the tense features on *v* only if *v* is the head of T's sister (Adger 2003: 192)

This makes Adger's proposal similar to Bobaljik's (1995, 2003) proposal, which argues that adjacency is crucial for morphological realization. However, (11) is problematic in several ways, not least of which is that most proposals argue for a range of functional projections between T and *v*. However, we agree with the core intuition behind both Adger's proposal and Zwart's (2001) proposal, namely that the relationship between tense/agreement and the verb root/stem is one which should be given a PF analysis in terms of chains. In the next section, we will offer such an analysis, which also provides an analysis of the data from child language acquisition.

4. Analysis: Movement as Spell-Out

An analysis of negation and inflection in children acquiring English needs to respect the following assumptions outlined and argued for in section 2.

(12)   a.   Children start out assuming that *not* is an adverb.
       b.   During the stage when *not* is an adverb, children provide a range of non-target structures with the inflectional morpheme in the wrong position.
       c.   Children do not move main verbs, in line with their target grammar.
       d.   When children acquire the head form of negation, *n't* and *do*, their productions become target consistent and the inflectional morphemes in the wrong position disappear.

The data in section 2 also illustrate that the inflectional morpheme cannot appear just anywhere. It either occurs on the main verb or it occurs cliticized to the subject. It does not occur on adverbs or on negation prior to *do* being acquired.

Standard English is presumably the target grammar for the children in question. For that reason, we will first present our analysis of standard English before we turn to the child data.

Consider the structure in (13b) for the sentence in (13a).

(13) a. Sue eats cookies
      b.

```
                    CP
                  /    \
                 C      TP
                       /   \
                     DP      T
                Sue[3SG:AGR] /  \
                            T     vP
                        [3SG:AGR] /  \
                                DP      v
                                Sue    /  \
                                      v     VP
                                 eat[U:AGR] /  \
                                           V     DP
                                      eat[U:AGR] cookies
```
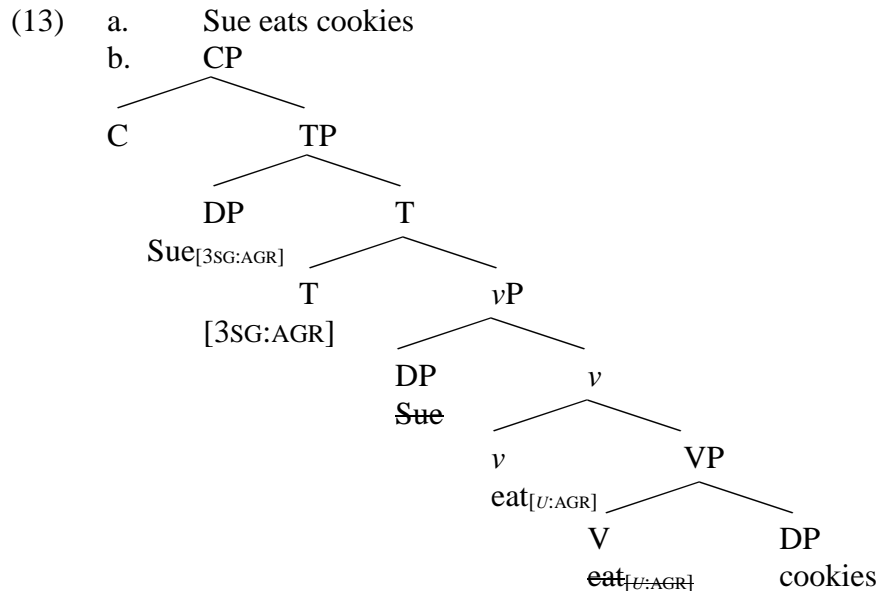
We assume that there is a v-layer that introduces the external argument, although we are not committed to its label: it could be either *v* (Chomsky 1995; Harley 1995) or Voice (Kratzer 1996); see Alexiadou, Anagnostopolou, and Schäfer (2015) for extensive discussion of the syntax of external arguments. We furthermore follow Larson (1988), Chomsky (1995) and others in assuming that the verbal root or stem moves to v. There is an Agree relationship between *v* and T where the root/stem carries an unvalued agreement feature, AGR. AGR encodes both tense and subject-verb agreement; we are simply using one feature for ease of presentation and because any finer decomposition does not matter for present purposes. The AGR feature on T is valued by the external argument, and T and *v* enter into an Agree relation whereby T values the features on *v*. This requires a 'downward' Agree relation, which we assume is independently justified (e.g., Adger 2003; Baker 2008; Haegeman and Lohndal 2010; Zeijlstra 2012). Once Agree has valued the feature on *v*, both T and *v* share the same feature value. Whether the feature bundle is spelled out on T or *v* is a question of variation. In English, it is spelled out on *v* for main verbs.[13] We can state this as the following language-specific PF condition which clearly has to be acquired.

(14) *Pronunciation Rule*
   Given an Agree chain involving verbal AGR,
      a. pronounce *v* iff the head of the chain is T and no other overt head intervenes between T and *v*
      b. elsewhere, pronounce the head of the chain.

---

[13] The condition needs to be so specific since the verb moves to v in double object constructions, viz. *Mary gave John a book* and not **Mary John gave a book*.

Note that this assumes that the PF component has access to chain memberships, and that PF cares about adjacency, much like in Bobaljik (1995, 2003) and much other work in Distributed Morphology.

The Pronunciation Rule (14b) entails that if the structure has an auxiliary or modal verb, AGR will be pronounced on T. The structure looks as follows, where we assume that the auxiliary is merged directly in T.[14]

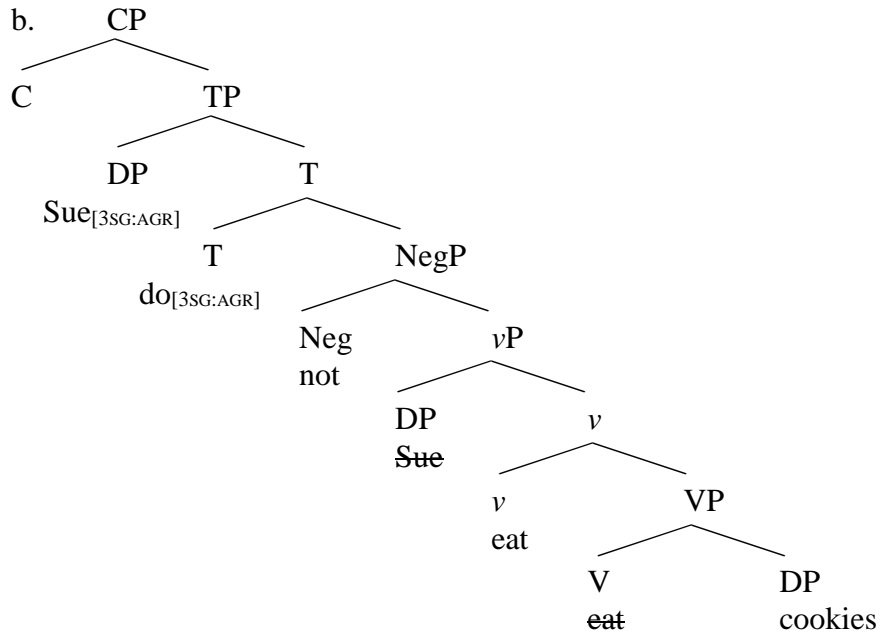(15) a.   Sue will eat cookies.
      b.   CP
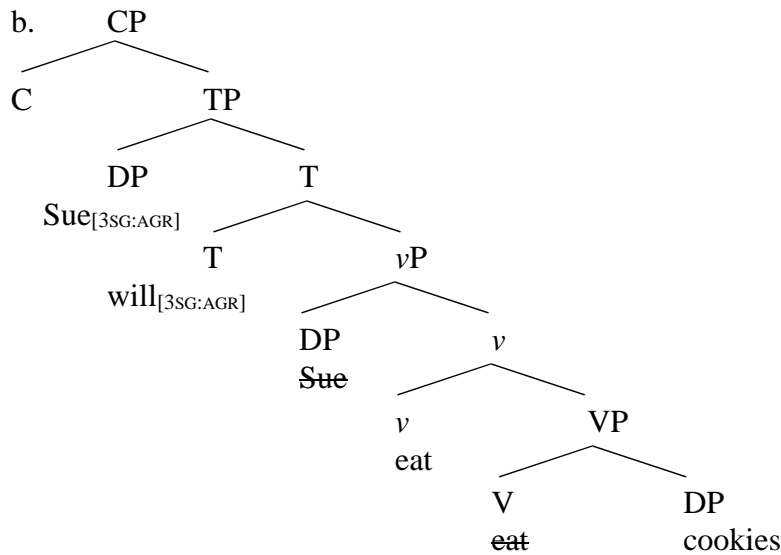
For a sentence involving negation, we assume the following representation, where negation is assumed to be a head (Adger 2003, among others).

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[14] Nothing hinges on this specific assumption. Furthermore, we set aside how the verbal morphology is realized on other verbs, e.g., the difference between *Sue will eat cookies* and *Sue has eaten cookies*.

(16) a. Sue does not/doesn't eat cookies.
      b.

```
                    CP
                 ┌───┴───┐
                 C       TP
                      ┌───┴───┐
                     DP       T
                  Sue[3SG:AGR]
                          ┌───┴───┐
                          T       NegP
                     do[3SG:AGR]
                              ┌───┴───┐
                             Neg      vP
                             not   ┌───┴───┐
                                  DP        v
                                  Sue
                                        ┌───┴───┐
                                        v       VP
                                       eat
                                            ┌───┴───┐
                                            V       DP
                                           eat    cookies
```

Our analysis will take as its starting point the standard analysis of *do*-insertion, outlined as follows by Roberts (2013: 560).

> *Do* is a dummy auxiliary, inserted exactly when the usual relation between Agr/T and V is blocked (e.g. by negation, emphasis or interrogation).

In a textbook, Lasnik (2000: 201) says that:

> I have not talked much about how *Do*-Support fits into the latest versions of the theory. I think this also works much the way it does in *Syntactic Structures*: a stranded affixal I is spelled out as the relevant form of *do*. That seems the simplest theory, just as it did 40 years ago.

This view is a last resort view of *do*-support, where a form of *do* is inserted in order to yield a convergent derivation. The present analysis will incorporate this last resort view of *do*-support. Importantly, recall that although negation triggers *do*-support, adverbs do not:

(17) a. Sue never eats cookies.
      b. Sue often eats cookies.

Thus, there is clearly a difference between heads, such as negation, and phrases, like adverbs. We assume that *not* blocks the Agree relation between T and *v*, requiring *do*-support to apply. Similarly, when C is involved by virtue of T moving to C, (14a) no longer applies, meaning that the head of the chain is pronounced.

(18) a. Sue eats cookies.
      b. What does Sue eat?

(14) is thereby able to accommodate the main aspects of the target grammar of English as far as the relationship between the verbal root/stem and the inflectional morpheme is concerned.

We would like to add that we do not regard (14) as a deep property. It is a highly descriptive PF account that does justice to the data. It may be objected that (14) is an unnatural or complicated condition. From our point of view, the important part is that (14) is language-specific and involves an aspect of grammar which has to be acquired, namely morphology. We assume that the grammar does not license stranded affixes in general (cf. Lasnik's (1981) Stranded Affix Filter).

Given this analysis of the target grammar, we now turn to the child data. Focusing on the non-contracted forms, we will analyze the cases in (19). That is, we will only focus on instances where the 3SGS morpheme is or should be overtly expressed.

(19) a. *Tigger not fit*.
      b. *Tigger's not fit*.
      c. *Tigger not fits*.
      d. *Tigger's not fits*.

The key ingredients of our analysis are: (i) children start out assuming that *not* is an adverbial, (ii) children have not acquired *do* in the early grammar, and (iii) children can either pronounce the 3SGS morpheme on *v* or T. That is, children have not yet mastered the specific pronunciation rules for English but instead assume a version of (14) as in (20).

(20) *Pronunciation Rule*
      Given an Agree chain involving verbal AGR,
      a. pronounce *v* or T iff the head of the chain is T and no other overt head intervenes between T and *v*
      b. elsewhere, pronounce the head of the chain.

Put differently, children have not yet mastered the specific conditions governing English verbal morphology. In what follows, we will argue that (20) provides an analysis of the child stage together with the two other assumptions just mentioned, and we will speculate on the transition from the child grammar to the target grammar.
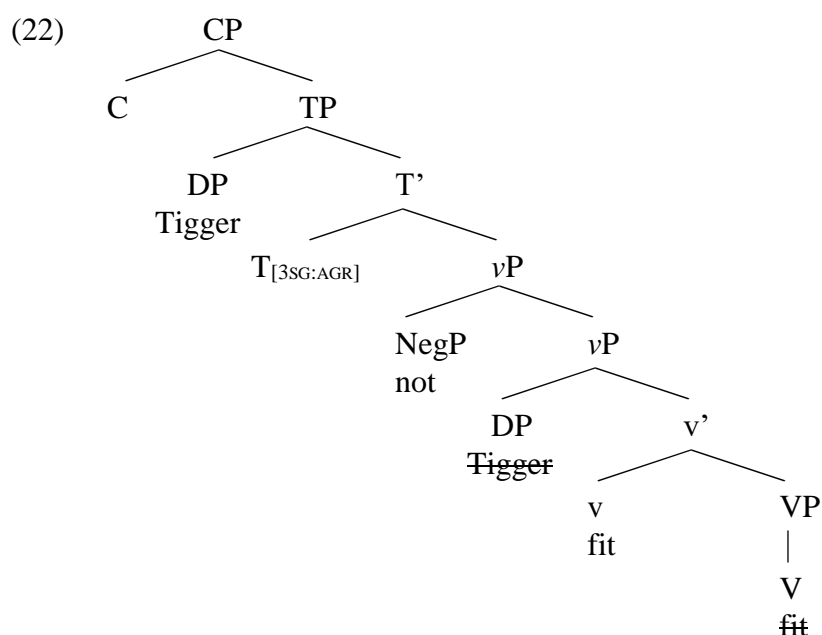
In examples like *Tigger not fit* (19a), inflection is absent. This can be seen as the manifestation of an Optional Infinitive stage in the relevant children, and the analysis in Wexler (1994, 1998) would be compatible with the perspective taken in the present paper. Children also say *Tigger don't fit*, in which case we argue that *don't* is an unanalyzed unit. This means that the syntactic representation for this sentence is the same as the one for (19a): There is no inflection and *don't* presumably occupies the same structural position as *not*, which is to be adjoined to *v*P as an adverbial.

The example *Tigger's not fit* in (19b) has a 3SGS morpheme but it is attached to the subject and not to *do* as we would expect based on the target grammar. Assuming that *not* is an adverbial, it will be adjoined to *v*P. The adult Pronunciation Rule in (14) dictates that the 3SGS morpheme should be pronounced on *v* and not on T. However, children who have not yet mastered (14) may spell-out inflection in T according to (20). Since the child obeys the Stranded Affix Filter, the 3SGS cannot be left in T without a host. Given that the child has not acquired *do* at this point in time, some children instead choose to attach the 3SG morpheme to the subject, which

matches in phi-features. As we noted in section 2, children also sometimes pronounce the head of the chain, even in affirmative sentences (see [3] and [4]). The attachment to the NP at the head of the chain is possible due to a match in phi-features, which also explains why 3SGS cannot attach to negation in English. Thus the imagined case in (21) does not occur in either corpora or the reported elicited production experiments in section 2.

(21)   *Tigger nots fit.

The child version of the Pronunciation Rule in (20) also allows the 3SGS to be pronounced on the verb, which is the case in (19c). Here, the 3SGS morpheme is pronounced on the verb in its base position. The structure will be as in (22).

(22)

```
                    CP
              _____|_____
             C            TP
                      _____|_____
                    DP          T'
                  Tigger    _____|_____
                        T[3SG:AGR]    vP
                              _____|_____
                            NegP              vP
                             not         _____|_____
                                       DP            v'
                                      Tigger     ____|____
                                               v         VP
                                              fit         |
                                                          V
                                                         fit
```

Since *not* is analyzed as an adverb, there is no overt head intervening between T and *v*. Some children choose to take up this option. Note that some children also produce *Tigger don't fits*, where we assume that *don't* is an unanalyzed unit on a par with *Tiger don't fit*. The difference is that there is inflection in this case, pronounced on the main verb, which is possible according to (20a) since *don't* is an adverbial adjoined to *v*P.

The fact that both (19b) and (19c) are possible demonstrates that in the child's early grammar, (14) has not been completely mastered but is rather assumed to be as in (20). The child seems to be exploiting the two possibilities: pronouncing the head of the chain or *v* while waiting for relevant input to decide which option is correct.

Examples like (19d), *Tigger's not fits*, show that children are also capable of pronouncing both members of the chain. These examples are not very frequent, which may be related to proposals arguing that only one member of a chain can be pronounced (cf. Nunes 2004). However, the example supports our claim that children have not initially acquired the adult version of (20), i.e., (14), a language-specific rule of their target grammar of English.

Let us assume that at some point, children take on board the positive evidence from adult simple affirmative sentences and that positive evidence, combined with indirect negative evidence from negative sentences, brings them to the conclusion that

they do not have the option of producing the head of the chain. Such indirect negative evidence would be the absence of sentences like *Tigger's not fit,* compared to the presence of *Tigger doesn't fit.* The linguistic evidence brings them to the adult version (14). This means that from this point on children will not pronounce inflection in its 'high' position. Since this requires indirect negative evidence, it may account for why some children take a while to acquire the adult pronunciation rules. Examples like (19b) and (19d) will no longer occur, as children know that inflection needs a verbal host and since negation now counts as an intervener, thus inflection cannot appear on *v*.

The next question is how do children drive out the non-adult uses of the 3SGS morpheme on the main verb in negative sentences, that is, sentences as in (19d)? There are three changes that need to occur in the child's grammar before the 3SGS is eliminated from the 'low' position. First, children need to acquire the head form of negation, *n't*. As noted in section 2.4., negative auxiliaries should provide the positive evidence for the child to successfully acquire this property. Second, they need to acquire *do* so that they can negate lexical main verbs with the negative auxiliary *doesn't*. Third, triggered by the acquisition of the negative head *n't*, we propose that children reanalyze *not* as a head form of negation, realizing that *n't* is the reduced form of *not*. As we noted, Thornton and Tesan (2007) left open the question of whether the adverb *not* undergoes reanalysis to a head, but it is critical to the explanation of how children converge on the adult grammar that we present in this paper. With these three changes in place, the non-target use of the 3SGS morpheme in (19c) and (19d) can no longer be generated. The 3SGS morpheme cannot be pronounced on *v* since the Neg head disrupts the chain so that the pronunciation rule cannot apply. Children have acquired *do*, so they can pronounce the inflectional features on *do*, in T. And, assuming that *do* is a better host than the subject constituent, children now use *do* as the host. At that point, the target grammar is in place.

In summary, the important ingredients of the analysis are (i) children start out assuming that *not* is an adverbial, (ii) children have not acquired *do* in the early grammar and (iii) they reanalyze *not* as a head. Together with the uncontroversial assumption that children have not yet internalized the input they are exposed to and start with a more permissive version of (14), we are then able to account for the stage where they produce the 3SGS morpheme in positions which the target grammar does not license.

5. Conclusion

This paper has provided an analysis of children's non-target production of the 3SGS morpheme in English and their transition to a target-like grammar. We have argued that children who grow up learning English start out with a pronunciation rule that does not specify whether the head or the tail of the chain should be pronounced. This means that the 3SGS morpheme can either appear high or low in the structure, viz. on *v* or on T. Part of this involves the starting assumption that *not* is initially an adverbial in children's grammars. Children also have not acquired the paradigm for *do*. When they acquire the latter, two additional changes also happen in tandem: the head form of negation *n't* is acquired alongside a reanalysis of *not* as the head of a NegP. Lastly they acquire the correct pronunciation rule for English, in which 3SGS is pronounced on *v* if the affix is not stranded.

The paper demonstrates the relevance of incorporating data from acquisition when investigating questions concerning grammatical architecture. We have argued that the data from child language support a specific analysis of head movement, one in which head movement is both syntactic and phonological. The developmental data have also shown that any kind of analysis of head movement needs to be able to accommodate children's stages of acquisition. The data we have presented show that children do not converge immediately on the adult grammar. Children take some time to master the phonological part of head movement, which coupled with the fact that negation is not initially analysed as a head, gives rise to non-adult productions of sentential negation. In time, children recover, and recategorize negation as a head which triggers convergence on the adult grammar.

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