Determiner Omission in Language Acquisition and Language Impairment: Syntactic and Discourse Factors

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1. Introduction

In this paper we will present the results of a study on the omission of determiners in Dutch children. These results will be compared with those of a similar study on Dutch agrammatic Broca aphasics, i.e. people that are linguistically impaired as a result of brain damage, usually caused by a stroke. The goal of this study is to shed light on the source of determiner omission in both language acquisition and language breakdown.

It is a well-known fact that in many languages, including Dutch, children often omit functional categories, such as Determiners (1) and Tense (2) (Hoekstra & Hyams 1995; Poeppel & Wexler 1993). The examples are from CHILDES, MacWhinney (2000).

(1) a. Daar komt trein. (Niek, 3;00;09)
there comes train
b. Hier is trekker. (Matthijs, 2;06;11)
here is tractor

(2) a. Brug maken. (Niek, 2;10;00)
bridge make-inf
b. Oma boek lezen. (Matthijs, 2;07;02)
grandma book read-inf

Interestingly, similar observations have been made for Dutch agrammatics, as shown in (3a), where *rekening* 'bill' has no determiner, and (3b), where *krijgen* 'get' is infinite (De Roo 1999).

(3) a. Rekening is voldaan. (patient HB)
bill is paid
b. 'T kindje eventjes wat krijgen. (patient GS)
the child just something get-inf

In this paper we will address the following questions: (i) What are the grammatical and extra-grammatical factors that constrain this omission? (ii) Are these factors the same for children and agrammatics? (iii) Is there a relation between D and T omission (as claimed by Hoekstra & Hyams 1998)? In order to

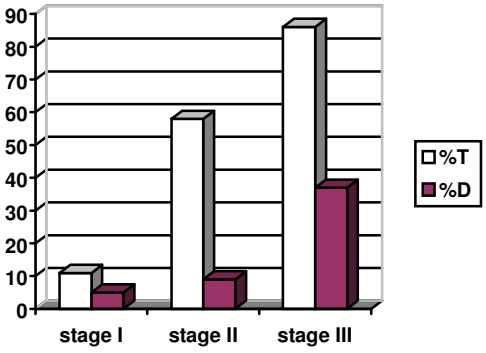
answer these questions we analyzed spontaneous speech production of two Dutch children, Niek and Matthijs (CHILDES, MacWhinney 2000). We selected all verbal uterances with at least one singular count noun. Proper names, plurals and mass nouns were excluded from the count, since determiners are not obligatory with these kinds of nouns. The child data were compared with data from eight Dutch agrammatics (De Roo, 1999).

2. Results

Let us first have a general look at the omission of finiteness and determiners in verbal utterances. In figures 1 and 2 we show the percentage of Ds, i.e., singular count nouns with a determiner, in three developmental stages.[1] The three stages are established on the basis of the percentage of Ts, i.e., finite sentences with at least one singular count noun. In the first stage children's use of finite sentences is around 30% or less. We will call this stage the "no T" stage. In the second stage, the so-called "optional T" stage, finite sentences are used roughly 50% of the time. In the third stage, the so-called "T" stage, 70% of the verbal utterances or more is finite.

Figure 1 (Niek)

Percent Ds and Ts in verbal utterances

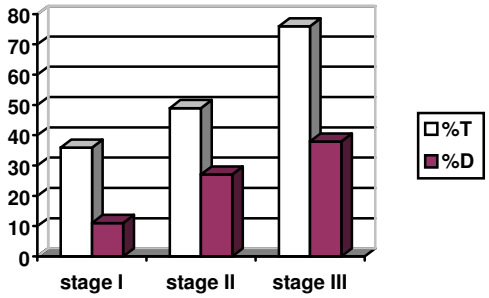


Stage I (no T): 2;07;00 – 2;11;10
Stage II (optional T): 3;00;09 – 3;01;18
Stage III (T): 3;01;25 – 3;04;27

[1] In the present paper we take the class of determiners to include definite articles, such as *de* (common gender) and *het* (neuter), indefinite articles (*een* 'a/an'), demonstratives, possessive pronouns and prenominal quantifiers. Also genetive constructions like *John's mother* are counted as nouns with determiners, given that prenominal possessors are assumed to involve a DP structure. Nouns preceded by so-called "proto-articles" (prenominal schwa), on the other hand, are disregarded, since their status is highly controversial.

Figure 2 (Matthijs)

Percent Ds and Ts in verbal utterances



Stage I (no T): 2;03;01 – 2;05;13
Stage II (optional T): 2;05;26
Stage III (T): 2;06;03 – 2;09;15

As can be observed, the acquisition of determiners lags behind with respect to the acquisition of tense, in both children and in all three stages (see also Van Kampen 2001, for a similar observation).

Let us now have a closer look at the relation between finiteness and determiner use. Hoekstra & Hyams (1998) have claimed that there is a correlation between article drop and finiteness in child Dutch. They argued that article omission is more frequent in infinite sentences than in finite sentences.[2] However, if children's production of determiners is analyzed per stage, like in the present contribution, it turns out that this correlation only holds at stage III, which is the stage at which children predominantly use finite sentences. This applies to both Niek and Matthijs, as can be seen in tables 1 and 2.[3]

Table 1 (Niek)

Singular count nouns in subject, (in)direct object and prepositional object position:

[2] Note, however, that Hoekstra & Hyams (1998) compare what they call "non-finite DPs" (bare singular count nouns) with "finite DPs" (singular count nouns with determiners, plural count nouns and pronouns). They found that subject non-finite DPs were more frequent in infinite sentences than in finite sentences.

[3] Note that the notions NP and DP in tables 1 to 8 are merely used as *labels* for bare nouns and nouns with determiners respectively. We do not want to exclude the possibility that "bare nouns" are in fact DPs with unexpressed and /or underspecified Ds. Note furthermore that nouns preceded by "proto articles" are excluded from the analysis, i.e., they are not labeled as either NP or DP (see note 1).

NP = bare noun; DP = det + noun
V-inf = infinite verbal utterance; V-fin = finite verbal utterance

Stage I

	NP	**DP**
V-inf	100	4
V-fin	9	2

Fisher's exact test,
p = 0.1012

Stage II

	NP	**DP**
V-inf	81	8
V-fin	101	11

Fisher's exact test,
p = 1.0000

Stage III

	NP	**DP**
V-inf	33	6
V-fin	134	99

Fisher's exact test,
p = 0.0012

Table 2 (Matthijs)

Singular count nouns in subject, (in)direct object and prepositional object position:

NP = bare noun; DP = det + noun
V-inf = infinite verbal utterance; V-fin = finite verbal utterance

Stage I

	NP	**DP**
V-inf	63	7
V-fin	24	2

Fisher's exact test,
p = 1.0000

Stage II

	NP	**DP**
V-inf	19	7
V-fin	14	5

Fisher's exact test,
p = 1.0000

Stage III

	NP	**DP**
V-inf	111	34
V-fin	167	146

$\chi^2 = 21.391$
p < 0.0001

Note furthermore that Hoekstra & Hyams (1998) made their claim only for subjects. However, our data do not support this claim. As can be seen in tables 3 and 4, in Niek no significant correlation between determiner drop and finiteness was found for objects. For subjects there is a significant correlation only in stage I.

Table 3 (Niek)

Singular subject count nouns

NP = bare noun; DP = det + noun
V-inf = infinite verbal utterance; V-fin = finite verbal utterance

Stage I

	NP	**DP**
V-inf	17	0
V-fin	3	2

Fisher's exact test,
p = 0.0433

Stage II

	NP	**DP**
V-inf	11	1
V-fin	30	5

Fisher's exact test,
p = 1.0000

Stage III

	NP	**DP**
V-inf	5	1
V-fin	60	75

Fisher's exact test,
p = 0.0948

Table 4 (Niek)

Singular (in)direct and prepositional object count nouns

NP = bare noun; DP = det + noun
V-inf = infinite verbal utterance; V-fin = finite verbal utterance

Stage I

	NP	**DP**
V-inf	83	4
V-fin	6	0

Fisher's exact test,
p = 1.0000

Stage II

	NP	**DP**
V-inf	70	7
V-fin	71	6

Fisher's exact test,
p = 1.0000

Stage III

	NP	**DP**
V-inf	28	5
V-fin	74	24

Fisher's exact test,
p = 0.3365

For Matthijs, table 5 shows that there is no significant correlation between finiteness and determiner drop in subjects. Table 6 shows that there is a significant correlation in objects, but only at stage III.

Table 5 (Matthijs)

Singular subject count nouns

NP = bare noun; DP = det + noun
V-inf = infinite verbal utterance; V-fin = finite verbal utterance

Stage I

	NP	**DP**
V-inf	7	0
V-fin	11	0

Stage II

	NP	**DP**
V-inf	0	0
V-fin	4	2

Stage III

	NP	**DP**
V-inf	25	9
V-fin	104	75

Fisher's exact test,
p = 0.1250

Table 6 (Matthijs)

Singular (in)direct and prepositional object count nouns

NP = bare noun; DP = det + noun
V-inf = infinite verbal utterance; V-fin = finite verbal utterance

Stage I

	NP	DP
V-inf	56	7
V-fin	13	2

Fisher's exact test,
p = 1.0000

Stage II

	NP	DP
V-inf	19	7
V-fin	10	3

Fisher's exact test,
p = 1.0000

Stage III

	NP	DP
V-inf	86	25
V-fin	63	71

χ^2 = 22.380
p < 0.0001

There is another important observation with respect to determiner drop in children. One child, Niek, showed significantly more determiner drop in objects than in subject, as shown in table 7. Again this correlation only becomes significant at stage III.

Table 7 (Niek)

NP = bare noun; DP = det + noun
Subj = subject; Obj = (in)direct and prepositional object

Stage I

	NP	DP
Subj	20	2
Obj	89	4

Fisher's exact test,
p = 0.3227

Stage II

	NP	DP
Subj	41	6
Obj	141	13

Fisher's exact test,
p = 0.3965

Stage III

	NP	DP
Subj	65	76
Obj	102	29

χ^2 = 27.582
p < 0.0001

Interestingly, a similar observation has been made for German speaking children by Schönenberg, Penner & Weißenborn (1997).

Let us now turn to the Dutch agrammatics and see whether they show the same correlation between finiteness and determiner omission, and whether they show a subject-object asymmetry with respect to determiner drop like some Dutch and German children. The data are displayed in table 8 (De Roo 1999).

Table 8 (eight Dutch agrammatics)

NP = bare noun; DP = det + noun
Inf = infinite utterance; Fin = finite uterance
Subj = subject; Obj = object

	NP	DP
Inf	9	5
Fin	6	81

Fisher's exact test,
p < 0.0001

	NP	DP
Subj	2	13
Obj	12	32

Fisher's exact test,
p = 0.4829

The data show that, like Dutch children (in stage III), the agrammatics exhibit a correlation between finiteness and determiner drop: Dutch agrammatic aphasics drop more determiners in infinite sentences than in finite sentences. There is, on the other hand, no subject-object asymmetry in Dutch agrammatics.

3. Analysis

We have seen that Dutch children and agrammatic Broca aphasics have in common that they show more determiner drop in infinite than in finite sentences. Before we address this correlation, let us first address the question why children drop determiners at all.

A possible explanation of determiner drop is that children's grammars differ from adult grammars, in the sense that children may initially make wrong parametric choices. This is not unreasonable, since, after all, many adult languages lack determiners. In fact, as shown by Matthewson, Bryant and Roeper (2001) for English, even children's non-adultlike *interpretation* of determiners appears to be similar to the adult interpretation of determiners in some languages with different determiner systems, like Salish (see also Schaeffer & Matthewson 1999).

However, there are arguments that cast serious doubts to the parametric approach. First of all, determinerless count nouns are not completely excluded in adult Dutch. In some registers they are perfectly grammatical, like in (4).

(4) a. Q: Wie heeft jou gisteren gebeld?
'Who called you yesterday?'
A: Oh, *meisje* van school
Oh, girl from school
b. *Deur* dicht!
door shut
'Close the door!'
c. Leuk *huisje* heb je.
nice house have you
'Nice house do you have.'

The same applies to the use of infinite verbs. As the examples in (5) show, Root Infinitives are possible in some contexts.

(5) a. Ik een huis *kopen*? Nooit!
me a house buy-inf never
b. Maria vertelde Peter een mop. Hij *lachen*.
Mary told Peter a joke he laugh-inf

This indicates that what children do is not fundamentally different from what adults do. Both allow determinerless count nouns and Root Infinitives, but whereas adults restrict them to specific contexts and registers, children use them

in a less constrained way. The parametric approach is not a priori incompatible with these facts, but it forces one to accept different parameter settings within one language in order to explain determiner drop and Root Infinitives in adults, which is, we believe, far from ideal.[4]

A second argument against the parametric approach is related to the first one. As we claimed, the possibility to drop determiners and to use Root Infinitives in adult Dutch is constrained by contextual factors. This at least suggests that it is discourse and not syntax that plays a central role in determining the possibility of determiner drop and Root Infinitives. Again, this does not make the parametric approach completely unfeasible, but it does make it intuitively suspicious.

For this reason we will propose a unified account of determiner drop and Root Infinitives in both child, aphasic and normal adult language that takes into account the central role that discourse factors appear to play.[5] According to this account children and agrammatics have the same grammatical system as normal adults, in the sense that they have D and T and the rules that regulate their use. The difference between children and aphasics on the one and normal adults on the other hand, are due to the extent to which both populations make use of functional categories, such as D and T, as devises to map lexical categories, such as N and V, to discourse entities.

In order to explain determiner drop and Root Infinitives in child, agrammatic and normal adult speech we make use of a model of syntax-to-discourse mapping that is inspired by Heim's file card semantics (Heim 1982; Avrutin 2001). According to this model functional elements, such as D and T, connect syntax with discourse, or more precisely, they allow lexical categories to have a representation in discourse. We assume that functional elements are associated with file cards that represent discourse entities. Not only individuals can be discourse entities, but also events. Concretely, we propose that D connects the NP with an INDIVIDUAL file card. This can be done either by introducing one, like in (6a), or by copying an existing one, like in (6b).

(6) a. Yesterday I met ***a*** *man*.
    b. ***The*** *man* had a moustache.

We further propose that T is responsible for the introduction of EVENT file cards. This means that a sentence like (7), with a tensed verb and two nouns, can be represented by the representation below it.

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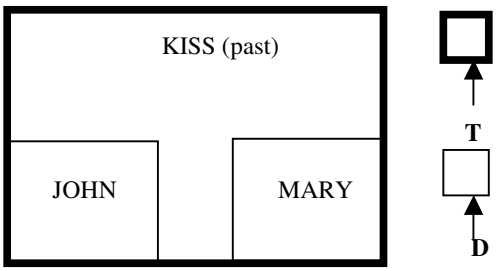
[4] The fact that determiner omission and root infinitives are often limited to special registers seems to favor a parametric approach. However, even in the registers that allow for omission of finiteness and determiners this is optional.

[5] See De Roo (1999, 2001) for a syntactic approach to the omission of finiteness and Ds and the relation between the two phenomena, in agrammatic Broca aphasics and children.

(7) John kissed Mary



However, file cards can sometimes be introduced extra-syntactically, by means of discourse presupposition. This option is normally restricted to special contexts, and accounts for cases of article drop in the Dutch examples of (4) and the infinite sentences in (5). We assume that in all these examples the discourse context provides enough information to allow the hearer to introduce the appropriate INDIVIDUAL and EVENT file cards, to the effect that functional elements like D and T are no longer required.

The option of extra-syntactic introduction of file cards is the key to understand determiner omission and Root Infinitives in children and agrammatic aphasics. We propose that these two populations omit determiners and tense because they overuse the possibility of extra-syntactic introduction of file cards, relying on discourse presupposition. This raises the question of why they these two populations rely on discourse presupposition instead of functional categories to connect their lexical categories with discourse entities. We propose that they do so because for both children and agrammatic aphasics discourse presupposition is an easier, more economic way to introduce file cards. In normal adults the use of syntax for this purpose is a fully automatized procedure. In children and aphasics, on the other hand, this is not the case, but obviuosly, in each population for a different reason. Whereas in children syntactic file card introduction is not yet sufficiently 'installed" or 'rooted" for it to be a fully automatized routine, agrammatic aphasics lost this automatism as an effect of brain damage.[6]

Note now that the fact that children's capacity to use syntax for the introduction of file cards grows in the course of language acquisition does not entail that it grows as rapidly in the nominal domain as in the verbal domain. In fact, the data represented in figures 1 and 2 showed that T is mastered much earlier than D.

Note also that when children and agrammatic aphasics rely on discourse presupposition, they do so both in the nominal domain and in the verbal domain. This explains the correlation between finiteness and determiner omission in

[6] See also De Roo (2001), for an account of agrammatic speech as a processing problem.

child language and agrammatic speech. However, children do this only when both T and D are sufficiently mastered, which explains the lack of a correlation between these two phenomena in the earlier stages. As figures 1 and 2 show, before stage III, children's use determiners does not reach the 30%. Interestingly, the interdependence between finiteness and determiner use appears to be supported by cross-linguistic evidence. Chierchia, Guasti & Gualmini (2001) found that children acquiring Italian ceased to drop determiners much earlier than English speaking children. As is well known, children acquiring null-subject languages, like Italian, do not show a Root Infinitive stage, unlike children acquiring English or Dutch. Apparently, when a language forces a child to use finite structures, i.e., to rely on syntax for the introduction of EVENT file cards, this prevents her from relying on discourse presupposition in the nominal domain, i.e., for the introduction of INDIVIDUAL file cards.

Let us now turn to the object-subject asymmetry found in Niek and some German children (Schönenberg, Penner & Weißenborn 1997). We propose that this asymmetry points at the existence of a lexical or syntactic factor in the omission of determiners. This is suggested by the fact that Dutch and German allow bare count nouns in some object-verb and preposition-object combinations, like in (8).

(8) a. Jan heeft piano gespeeld (*piano spelen* – piano play)
John has piano played
'John has played the piano.'

b. Peter reed auto. (*auto rijden* – car drive)
Peter drove car
'Peter drove a car.'

c. Ik ga naar bed (*naar bed* – to bed)
I go to bed

d. Jan zette het eten op tafel (*op tafel* – on table)
John put the food on table
'John put the food on the table.'

Crucially, no subject-verb combinations of this type can be made, as evidenced by (9).

(9) a. *Auto rijdt goed.
car drives well

b. *Piano speelt lekker.
piano plays nicely

The evidence indicates that children know that bare subject-verb combinations are ungrammatical, but apparently they still have to learn that not all object-verb combinations allow the omission of the article, like the ones in (10).

(10) a. *Jan heeft appel opgegeten
John has apple eaten
b. *Maria is in kamer
Mary is in room

Children need to acquire the language specific lexical restrictions that these constructions are subject to. [7] [8]

Let us now turn to the agrammatic aphasics. This population does not exhibit a subject-object asymmetry with respect to determiner omission, as table 8 shows. This is not surprising, though. Recall that we assumed that agrammatic aphasics have the same grammatical system as normal adults. We claimed that grammatical errors in agrammatics are due to their difficulties with the use of syntax as a devise to introduce file cards, and not to the loss of grammatical knowledge. If agrammatic aphasics do not lose grammatical knowledge, it follows that they will not unlearn the grammatical or lexical restrictions that bare object-verb and preposition-bare object combinations are subject to. As a result, no subject-object asymmetry with respect to determiner omission is expected.

4. Conclusion

In this paper we have shown that there are two factors responsible for determiner omission in child and agrammatic speech, (i) a discourse factor, and (ii) a lexical or syntactic factor. The first factor – the incapacity to properly use functional categories to connect lexical categories with discourse entities – is relevant for both children and agrammatic adults. The second factor – the incomplete

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[7] There is some cross-linguistic variation with respect to the possibilities to combine bare object nouns with verbs and prepositions. Whereas (ia) is grammatical in Dutch, it is not in English (ib). Even within one language there is variation, shown by (iia) and (iib), which are both possible in English.

(i) a. Jan reed auto.
b. *John drove car

(ii) a. Mary played piano
b. Mary played the piano

The fact that the constraints on bare noun-verb and preposition-bare noun are language specific and have to be learned by the child explains why not all children show an object-subject asymmetry with respect to determiner omission. In some children the acquisition of the relevant constraints may be simultaneous with or even precede the acquisition of determiners as devises to introduce file cards. These children are not expected to show a subject-object asymmetry.

[8] Soja (1994) shows that the English children she studied start to distinguish normal count nouns from what she calls NP-type nouns, such as *bed* and *school* in *I go to bed/school*, between 2 and 3;6 years. From that time on determiner omission declines rapidly in normal count nouns, but remains stable in NP-type nouns. This means that before the child stops dropping determiners in a non-adultlike way, she may often treat normal count nouns as NP-type nouns.

acquisition of lexical constraints on bare object-verb and prepostion-bare object combinations – is relevant only for children and only for objects. Hence a subject-object asymmetry is expected in some children, but not in agrammatic adults.

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