

Children with Down's syndrome: usage of grammatical morphemes

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Children with Down's syndrome are reported to have particular difficulty with grammatical morphology (e.g. Chapman, 1995; Rondal, 1996). This investigation set out to establish if the grammatical morpheme difficulties experienced by this language-disordered group could be explained within the Extended Optional Infinitive (EOI) hypothesis (e.g. Rice et al., 1995), or if children with Down's syndrome present with a general deficit in grammatical morphology (e.g. Chapman et al., 1998).

Analysis of elicited speech samples revealed that the Down's syndrome participants' usage of grammatical morphemes met with a number of expectations of the EOI hypothesis e.g. they had obvious difficulties with a range of tense-related grammatical morphemes. However, these participants also generally had difficulty with non-tense-related morphemes when compared to language-matched typically developing controls. Therefore, the Down's syndrome group is reported to have a generalised grammatical morpheme deficit.

Additionally, the typically developing participants had omission of grammatical morphemes in obligatory contexts across-the-board. This finding cannot be explained by a strict interpretation of Wexler's (1994) Optional Infinitive (OI) stage for grammatical acquisition.

Introduction

This paper is concerned with Down's syndrome children's ability to provide grammatical morphemes, it evaluates an Extended Optional Infinitive (EOI) account for English-speaking children with Down's syndrome.

Although it has been documented in the literature that most children diagnosed with the condition of Down's syndrome have difficulty with all components of language (e.g. Rondal, 1996; Rondal & Edwards, 1997), specific problems with grammatical morphology have been highlighted for this language-disordered population. For example, Chapman et al. (1998) report that when compared to language-matched typically developing controls children with Down's syndrome generally omit many more grammatical morphemes. Based on this finding Chapman et al. (1998) report the existence of a grammatical morpheme deficit for children with Down's syndrome. There are however two major limitations of Chapman et al.'s (1998) investigation of

grammatical morpheme usage by children with Down's syndrome. Firstly, the conclusions of the investigation were based on analyses of narrative speech samples, and as Chapman et al. note, narrative speech samples are not the most appropriate type of language sample for determining the ability to produce grammatical morphemes. It is difficult to make judgements about whether a particular child has problems with grammatical morphemes based on analyses of such language samples, as there may only be a limited number of obligatory contexts for use of grammatical morphemes. Secondly, Chapman et al. (1998) report patterns of production and omission of grammatical morphemes across the groups of participants, when it would have been much more informative to document the percentage omission and production of grammatical morphemes in obligatory contexts for each group. Based on such limitations, the need for an investigation that examines the grammatical morpheme usage of children with Down's syndrome more sensitively is apparent.

For the present investigation, elicited speech samples were collected from a group of English-speaking children with Down's syndrome and a group of typically developing controls matched on the level of language as measured by Mean Length of Utterance (MLU). These language samples were analysed to determine the participants' usage of a broad range of grammatical morphemes.

The main aim of this investigation was to establish if the grammatical morpheme difficulties of children with Down's syndrome could be explained as a generalised deficit in grammatical morphology, as Chapman's et al.'s (1998) findings would predict, where children with Down's syndrome have difficulty with a wide range of grammatical morphemes, or if the grammatical morpheme difficulties of children with Down's syndrome could be explained within the Extended Optional Infinitive (EOI) hypothesis (e.g. Rice et al., 1995).

The Optional Infinitive and Extended Optional Infinitive hypotheses

The Extended Optional Infinitive (EOI) hypothesis has received extensive attention as an explanation for the grammatical morpheme difficulties of English-speaking children with Specific Language Impairment (SLI) (e.g. Rice et al., 1995; Rice & Wexler, 1996; Rice et al., 1998). However, this hypothesis has never before been considered as an explanation for the syntactic difficulties of children with Down's syndrome. Rice, Wexler and colleagues in fact imply that the EOI hypothesis is specific to SLI.

This EOI account suggests that the grammatical morphemes that are particularly problematic for English-speaking children with SLI are those morphemes that are markers of finiteness (i.e. tense/agreement markers) (e.g. past tense -ed, third person singular -s, auxiliaries and copulas). The hypothesis that there exists an EOI stage for children with SLI has been derived from the proposal of an Optional Infinitive (OI) stage (Wexler, 1994) in grammatical acquisition by typically developing children.

Wexler (1994) has reported that young typically developing English-speaking

children go through a stage in grammatical acquisition when they use both finite and non-finite verb forms as possible options in matrix (main) clauses'. For example children within this stage will say things like *'he play'* alongside *'he plays'* and *'I hungry'* alongside *'I'm hungry'*. Nevertheless, during this stage children appear to know the relevant grammatical principles (Wexler, 1998). For example, young English speakers appear to have knowledge of movement. When they can produce auxiliaries (such as auxiliary 'do') they will adopt appropriate verb movement, producing statements like *'she does not go'* and not *'she not does go'*. In addition they appear to have knowledge of agreement (or checking), rarely making commission errors like *'we plays'* and *'they am happy'*.

Wexler (1994, 1998) has reported similar patterns in early child Dutch, German, Danish, Swedish and Norwegian. He termed this stage in grammatical acquisition by young typically developing children as the OI stage, as he proposed that the verb form children use when they omit markers of finiteness (tense-related morphemes) is in fact the infinitive/non-finite verb form.

A considerable body of research suggests that the predictions of the OI stage hold for English-speaking children with SLI. However, it has been reported that the OI stage is extended or prolonged for children with SLI, hence, the EOI stage (e.g. Rice et al., 1995; Rice & Wexler, 1996; Rice et al., 1998).

In this article it is hypothesised based on the comprehensive work that has reported the existence of an EOI stage as an explanation for the grammatical morpheme difficulties of children with SLI, that when analysed sensitively, the grammatical morpheme problems of children with Down's syndrome could also be accounted for by the EOI stage. That is, it is hypothesised that in an investigation of the usage of a wide range of grammatical morphemes, that only grammatical morphemes that are markers of finiteness would be affected in Down's syndrome. Therefore, it is proposed that when a broad range of grammatical morphemes are specifically elicited from children with Down's syndrome, and when percentage of occurrence in obligatory contexts is calculated, that evidence for a generalised grammatical morpheme deficit (e.g. Chapman et al., 1998) would not hold. Specifically the following predictions are made concerning the Down's syndrome participants' usage of grammatical morphemes:

1. The predictions of the OI stage will hold for children with Down's syndrome.
2. The OI stage will be extended or prolonged for children with Down's syndrome. Thus, it is predicted (as has been reported for children with SLI), that children with Down's syndrome have an EOI stage in grammatical acquisition.
3. The participants' with Down's syndrome will produce finite verb forms in obligatory contexts less consistently than the MLU-matched typically developing participants.

Methodology

Participants

Six children participated in this study, i.e. three children (aged 9;11-10;9) diagnosed with the condition of Down's syndrome and a control group of three MLU-matched children, developing normally (aged 2;8-2;11). MLU in morphemes averaged at 2.84 and 3.02 for the participants with Down's syndrome and the typically developing participants respectively.

The participants with Down's syndrome all attended primary schools for children with moderate learning difficulties and met with the criteria that were set:

1. Had hearing abilities that fell within normal limits at the time of the investigation and had no permanent hearing loss.
2. Used speech as their main means of communication (i.e. did not regularly use sign language or any form of sign or symbol system to communicate).
3. Had the ability to produce word final /d/-/t/-/z/- and /s/- in monomorphemic contexts (e.g. 'bed' and 'box').

The control participants were recruited from a day nursery. They were considered to be developing typically.

Procedure

Usage of ten morphemes was analysed. Seven of these morphemes are markers of finiteness or related to tense in the underlying representations of the grammar, namely, contractible auxiliary and copula {be}, uncontractible auxiliary and copula {be}, past tense -ed, third person singular -s, and auxiliary {do} and three are not related to tense namely, present progressive -ing, plural -s and possessive -s.

Tasks designed to elicit at least ten examples of each of the grammatical morphemes of interest were administered to each participant by the experimenter. For example, in order to elicit examples of possessive -s from a participant the following technique was employed: The participant was given the opportunity to play with two dolls (a female, Jo and a male, Jim). The experimenter then showed the participant a number of objects (clothes and accessories) that could belong to either of the dolls. The experimenter then said to the child, *'We are going to play a game now. I am going to show you something and I want you to tell me if it belongs to Jo or Jim'*. The participant was then shown an object (e.g. a hat) and was prompted by the experimenter asking, *'Whose is this?'* The participant's response was then awaited. That response usually took the following form: *'It is Jim's/Jo's'* or simply *'Jim's/Jo's'*. If the participant just pointed to the doll to which he/she thought the object belonged, the experimenter prompted him/her to verbally produce a response by saying, *'Oh I can't hear you, could you tell me?'* This elicitation procedure was repeated, showing the participant a different object each time until at least ten obligatory contexts for usage of possessive -s had been created.

The elicitation tasks were administered over two 30-minute recording sessions. A

spontaneous speech sample (lasting approximately 30 minutes) was also collected from each participant;² these were used to calculate the participants' MLU. MLU was calculated in accordance with Brown's (1973) criteria.

The elicited and spontaneous language samples were orthographically transcribed. The elicited samples were analysed for instances of production of the target morphemes in obligatory contexts. The mean percentage production scores for the morphemes across the members of each group were then calculated. The percentage omission of the grammatical morphemes in obligatory contexts is of course completely predictable from the percentage production scores that are recorded in Tables 1 and 2.

Results and discussion³

Table 1 illustrates the mean percentage production of the tense-related grammatical morphemes (the markers of finiteness) for the group of children with Down's syndrome and the MLU matched control group.

As predicted, these mean percentage results illustrate that both the group of participants with Down's syndrome and the typically developing younger language-matched participants omitted and produced verbal inflections and contractible and uncontractible copula and auxiliary in contexts where production of these grammatical morphemes was obligatory. A few examples taken from the transcripts illustrate this. The typically developing participants said things like '*He looked in the mirror*' alongside '*He kick the ball*' (during task designed to elicit past tense -ed) and '*He sends us letters*' alongside '*He ride the bike*' (during the task designed to elicit 3rd person singular -s). Likewise, the participants with Down's syndrome produced utterances such as '*I'm a boy*' alongside '*I twenty-two*' (during the task designed to

TARGET	Participants with Down's syndrome	MLU-matched Participants
Contractible copula {be}	52%	83%
Contractible auxiliary {be}	35% ⁴	73%
Uncontractible Auxiliary {be}	31%	48%
Past tense -ed	28%	42%
3 rd person singular -s	45%	36%
Uncontractible Copula {be}	27%	29%
Auxiliary {do}	51%	19%

Table 1. The mean percentage production of tense-related grammatical morphemes by the group of participants with Down's syndrome and the group of MLU-matched typically developing participants.

elicit contractible copula) and '*He's writing*' alongside '*She dancing*' (during the task designed to elicit contractible auxiliary).

Analysis of the elicited language samples also revealed as predicted that the participants had knowledge of agreement. Although the participants frequently omitted grammatical morphemes in obligatory contexts, there was only one example in the data when a child made a possible agreement error. The child was a participant with Down's syndrome and produced the utterance, '*Barbie have eyes*'.

Analysis of the data collected from the tasks designed to elicit interrogatives, namely, the tasks designed to elicit copula BE in questions such as, '*Is he hungry?*' and auxiliary DO in questions like, '*Do you want sweets?*' not only revealed that the participants had knowledge of agreement in relation to finiteness but that they also had knowledge of movement. On occasion, auxiliary DO or BE was omitted, resulting in utterances such as, '*Tom hungry?*' and '*You want a toy?*' but when the form was produced and moved to the front of the sentence to form an interrogative it was always correctly marked for agreement. There was never an example in the elicited data of say, '*Does you want a toy?*'

Another observation that can be made from the results concerning the groups' production of tense-related grammatical morphemes, is that the group with Down's syndrome generally produced the tense-related grammatical morphemes less frequently in obligatory contexts than the control group.

Based on these observations it would seem that the EOI stage could explain the grammatical morpheme difficulties of children with Down's syndrome. However, it cannot be ignored that on a few occasions the Down's syndrome participants' production of tense-related grammatical morphemes exceeded or equalled that of the control participants' (who it seems according to their usage of the tense-related morphemes are in an OI stage (Wexler, 1994)) (see 3rd person singular -s, uncontractible copula {be} and auxiliary {do} results). As far as usage of these three grammatical morphemes is concerned, the Down's syndrome group seems to be in an OI stage like the younger language-matched control group, but not in an Extended OI stage. That is, the Down's syndrome group's difficulty with 3rd person singular -s, uncontractible copula {be} and auxiliary {do} does not exceed delay.

This investigation also analysed the participants' usage of nominal grammatical morphemes and progressive -ing, forms that are not related to tense (these should not be produced variably by the typically developing group or by the group with Down's syndrome if these groups can be considered to be in an OI/EOI stage). The results for usage of these grammatical morphemes are illustrated in Table 2.

Participants with TARGET	MLU-matched Down's syndrome	participants
Present	85%	92%
Progressive -ing		
Possessive -s	78%	90%
Plural -s	97%	86%

Table 2. The mean percentage production of the non-tense-related grammatical morphemes by the group of participants with Down's syndrome and the group of MLU-matched typically developing participants.

An obvious observation is that the group of participants with Down's syndrome produced these non-tense-related morphemes much more frequently in obligatory contexts than the tense-related morphemes that were investigated. However, the participants with Down's syndrome omitted these grammatical morphemes more frequently than the young MLU-matched typically developing control group, that is of course with the exception of plural -s which may not cause problems for the Down's syndrome group because it is a more purely lexical marker.

The generalised grammatical morpheme difficulty that is evident for the group of children with Down's syndrome (i.e. for the most part the Down's syndrome group produced the tense-related and non-tense-related grammatical morphemes less consistently than the younger language-matched group) cannot be accounted for within the EOI hypothesis, where difficulty would only be expected with morphemes that are related to tense marking. Therefore, and contrary to what was hypothesised, it seems that the group of children with Down's syndrome has an across-the-board grammatical morpheme deficit, with just a few grammatical morphemes that seem delayed in acquisition for this group rather than deviant (i.e. 3rd person singular -s, uncontractible copula {be} and auxiliary {do}).

According to Wexler's (1994) observations of normative grammatical acquisition (and their percentage production of tense-related grammatical morphemes as presented in Table 1), the typically developing language-matched control group should be in an OI stage. However, they also had omission of non-tense-related grammatical morphemes in obligatory contexts (see Table 2) (though the results show that they had a considerably higher level of omission of tense-related morphemes). Such generalised grammatical morpheme omission by this group cannot be explained by a strict interpretation of Wexler's OI stage for grammatical acquisition.

Limitations of this study

This study is limited by having a very small number of participants. Larger samples of children with Down's syndrome and MLU-matched controls must be investigated for usage of a broad range of grammatical morphemes before we can make general conclusions concerning the grammatical morpheme usage of these groups. In addi-

tion, this investigation only analysed participants' usage of grammatical morphemes in elicited speech when it would have been appropriate to have also analysed usage of grammatical morphemes in spontaneous speech. A comparison of usage of the grammatical morphemes in elicited speech with usage of the grammatical morphemes in spontaneous speech would have determined if the low production of the morphemes was due to lack of comprehension of the elicitation tasks employed. A larger investigation concerned with Down's syndrome children's ability to supply grammatical morphemes is currently underway, this will look at usage of groups of tense-related and non-tense-related grammatical morphemes in elicited speech and spontaneous speech. Statistical analyses will be conducted on the findings.

Conclusion

The EOI stage cannot account adequately for the Down's syndrome participants' usage of grammatical morphemes. These participants had difficulty with a broad range of the grammatical morphemes investigated (i.e. tense-related and non-tense-related morphemes⁵), whilst demonstrating particular difficulty with the group of tense-related morphemes. It is concluded that the Down's syndrome participants seem to have a generalised grammatical morpheme deficit. However, it is noted that a few tense-related morphemes appear to be delayed in acquisition for this group rather than deviant. Furthermore, it is concluded that the range of grammatical morphemes omitted by the typically developing language-matched group cannot be explained by a strict interpretation of Wexler's (1994) OI stage for grammatical acquisition.

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Nederlandse samenvatting

In de literatuur wordt gemeld dat kinderen met het syndroom van Down specifieke problemen zouden hebben met grammaticale morfologie (bij voorbeeld door Chapman, 1995; Rondal, 1996). Deze studie werd uitgevoerd om vast te stellen of de problemen met grammaticale morfemen bij deze groep kinderen met taalproblemen verklaard konden worden door de Optional Infinitive-hypothese (Rice et al., 1995). Volgens deze hypothese zouden specifiek-taalgestoorde kinderen langer blijven ste-

ken in een stadium waarin onvervoegde en vervoegde werkwoordsvormen inwisselbaar worden gebruikt. Een andere mogelijkheid is dat kinderen met Down's syndroom een algemeen deficiet hebben in hun grammaticale morfologie, zoals Chapman et al., (1998) vaststellen.

Uit een analyse van samples uitgelokte taal bleek dat het gebruik van grammaticale morfemen bij de proefpersonen met Down's syndroom beantwoordde aan een aantal verwachtingen die voortvloeien uit de Extended Optional Infinitive hypothese. Zo hadden ze duidelijke problemen met een reeks morfemen die aan *tense* (werkwoordstijd) zijn gerelateerd. In vergelijking met normale proefpersonen met eenzelfde taalleefstijd hadden de proefpersonen echter ook moeite met *niet* aan *tense* gerelateerde morfemen. Daarom wordt geconcludeerd dat de groep met Down's syndroom een algemeen probleem met grammaticale morfemen heeft.

Daarnaast waren de weglatingen van grammaticale morfemen in een verplichte context bij de controlegroep evenmin beperkt tot *tense*-morfemen. Als men Wexler's Optionele-infinitiefstadium voor grammaticale verwerving (Wexler, 1994) strikt toepast, kan dit niet verklaard worden.

Notes

- 1 Even though non-finite matrix clauses are not permitted in the adult grammar of English speakers.
- 2 These samples were recorded in the participants' home by a parent.
- 3 It is just group results that are presented and discussed in this paper. However, it is noted that the individual participants (from the Down's syndrome group and the MLU-matched group) generally did not differ widely with regards to their percentage production of the morphemes investigated. For example, the individual Down's syndrome participants' production of plural -s in obligatory contexts was, 100%, 90% and 100% and the individual MLU-matched participants' production of contractible auxiliary {be} was 75%, 73% and 71% (statistic analysis is obviously not involved as the groups of participants are small).
- 4 It can be noted that relative to the other morphemes investigated, the participants with Down's syndrome produced the contractible auxiliary and copula morphemes much less consistently than the typically developing group. This finding may well be due to the procedures that were employed to elicit these forms. That is, in order to elicit the contractible copula participants were encouraged to describe themselves and to elicit contractible auxiliary participants were prompted by '*what is happening*' whilst a male or female figure was carrying out an activity. Perhaps the group of children with Down's syndrome found these relatively unstructured elicitation tasks more difficult than the typically developing group.
- 5 There are numerous models which have specifically been proposed to account for the grammatical limitations of children with SLI (see Leonard (1999) for a review) which could possibly be applied to children with Down's syndrome to

explain the breadth of grammatical morpheme omission documented. However, there is not room to debate if any such models can adequately explain the findings presented here

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