

# The expression of reference by Dutch children of 4, 6 and 8 years old

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**Purpose:** this study examines the use of linguistic means for the expression of reference by Dutch children of 4, 6 and 8 years old.

**Method:** 110 children are included in this study. The expression of reference was studied in a narrative task of a Dutch language test and compared to an adult control group existing of 10 adults.

**Results:** A significant effect was found for number of words and sentences (MLU) in the narratives. Furthermore there is a significant effect of age on the percentages correct and incorrect references. Age has a significant effect on some, but not all, categorized errors.

**Conclusions:** the findings suggest a relationship between age and expression of reference: 8 years old children use more reference in their stories than the 4 year old group, and incorrect reference use diminishes with age. In contrast to the literature, an 8 year old child does not perform adultlike in expressing reference.

**KEY WORDS:** reference, narrative, language development

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## Introduction

How is it possible that a child's narrative is sometimes incomprehensible for an adult listener? How do narrative skills develop in children from age ranges 4 to 8 years old? Which linguistic means does a child use to refer to persons or objects mentioned before? All these questions are interesting and international research exists about the production of reference by young children. Up till now, investigation with young speaking children and their reference use, has focused more on *comprehension*, than on *production* of reference. Research of reference use by Dutch speaking children is rather scarce. There are a few studies on the production of reference by Dutch children (Van Kampen 2001, 2004, 2010; Baauw 2002, Koster et al. submitted).

This study tries to contribute to our knowledge of the production of reference in Dutch children from 4 to 8 years old. The literature is not conclusive about the age children start using reference correctly. This study will elaborate on how Dutch children use linguistic means to introduce persons in a narrative and how they refer to persons and objects already mentioned. The several errors children can make in reference use will be analyzed.

Referential expression in a story generates cohesion. The question whether or not children are able to verbally express cohesion to an adult listener and at what age they are able to do this, will be analyzed in this study.

## **Theoretical background**

When a child is about three years old, it begins to tell stories. From that age on children are able to talk about the past. Children who tell a story in this developmental phase, are not able to generate consistency in their story and they can not take the listener into account yet. They choose unimportant details and do not tell the story chronologically, which makes it difficult to follow (Schaerlaekens 2000). Between the ages 4 and 9 children develop the ability to express reference and to introduce persons in a story (Baker et al. 2000). In this developmental phase they develop narrative abilities and they learn that they have to take the knowledge of a listener into account. The development of narrative abilities is related to *theory of mind* (Frith & Happé 1994 in: Gillis & Schaerlaekens 2000). Gradually, children develop a *plot structure* in their stories (Baker et al. 2000; Berman & Slobin 1994). According to Berman & Slobin (1994), who investigated narrative development, and Baker et al. (2000), children learn that a consistent story exists of an *orientation*, where time and place of an event is told and the main character(s) is introduced, a *complication*, where the event is elaborated and an *evaluation*, where the child can give his opinion or feeling about the event (Baker et al. 2000). Roelofs (1998) has shown that 4-year old children only tell the complication. They do not express time and place and – more important – they do not introduce the main characters of the event, which makes the story of a 4-year old child incomprehensible (Baker et al. 2000). Children start using evaluation when they are around 5 years old and orientation (introducing characters) when they are around 6 or 7 years old (Roelofs 1998). On the other hand, Baauw (2002) claims that a child of 6 or 7 years old still does not introduce persons in the correct way, because it is not familiar with the concept *familiarity*. This means that not only the speaker, but also the hearer has to be familiar with the object that is mentioned (Baauw 2002). Baauw (2002) claims that the introduction of a new person mostly occurs by using a pronoun instead of a noun, which is incomprehensible for the listener. The stories children tell when they are around 7 years old are mostly tedious, because they only focus on

the main event in the story. Children will make the story more interesting when they are around 8 years old, by focusing more on details and therefore use more words in storytelling. According to Berman & Slobin (1994), 8 year olds will perform adultlike in expressing background information.

### **Reference**

Children acquire the use of pronouns when they are between 2;6 and 5 years old. Nevertheless, the first words children use, are already situation-bound. Words like *this*, *that* and *these* (demonstrative pronouns) are used by very young children (Baker et al. 2000). It is therefore plausible that when children cannot remember a specific noun, they will use *this* or *that* instead, because these words are familiar and children know their reference function. Roelofs (1998) shows that the percentages incorrect introductions in conversations decreases when a child is between 5 and 6 years old (Baker et al. 2000). Several errors in reference use will be elaborated here.

### **Overgeneralization male gender (for female)**

Dutch children refer to female words more often with *he* or *him*, than with *she*, see Van Kampen and Wijnen (2000) and references cited therein. At a young age, children overgeneralize the use of *hij* ('he') and *hem* ('him'), over *zij* ('she') and *haar* ('her'), as in example (1).

(1) Er was *een meisje* en die had een ballon in *zijn* hand. (AnneV, 4;06)

There was *a girl* and that had a balloon in *his* hand.

'There was a girl with a balloon in his hand'

De Houwer (1987) investigates the production of one 3 year old child. She claims that Dutch children of 3 years old are already familiar with the *natural gender rule*: male words have to be referred to with a male pronoun (he) and female words with a female pronoun (she).

### **Omission of articles**

Baauw et al. (2002) present some linguistic explanations for the acquisition of reference by young children. They show that children up till 3 years old often omit articles in an obligatory context. Children produce sentences as in example (2).

(2) (Het/een) meisje heeft (een) ballon.

(The/a) girl has (a) balloon.

‘The/a girl has a balloon’

Baauw et al. (2002) claim that the omission of articles lasts until a child reaches the age of 3, see also Van Kampen (2004, 2010). So, the *production* of articles is adultlike when a child is around 3 years old. Nevertheless, the *interpretation* of the child is not adultlike at all.

Baauw (2002) investigates the differences in language acquisition between Dutch and Spanish children and pays particular attention to the acquisition of reference. He concludes that children from 4 to 5 years old have mastered the syntax of their native language. They produce correct sentences and no longer omit function words, like articles and personal pronouns, where these are obligatory. Baauw (2002) further claims that the production of articles and personal pronouns is adultlike when a child reaches the age of 4 or 5, instead of when the child is around 3 years old.

### **Overgeneralization definite article *het* (the) (for indefinite *een* (a))**

When Dutch children acquire how to use articles, they firstly develop that there is a difference between a definite article, in Dutch common gender *de* and neuter gender *het* (the), and an indefinite article, *een* (a). When they ‘choose’ a definite article, they have to choose between *de* and *het* (Van Kampen & Wijnen 2000 and references cited therein). Children often start with the use of the article *een* (a), because this article is the least specified. Soon after this, children start using *het* and *de*. When they have started to use *het* and *de*, they will overgeneralize the definite articles and use it instead of the indefinite article *een* (Van Kampen & Wijnen 2000). We know that children, before they actually start using articles, use a schwa which fills the empty position in the sentence. Children know that at some places in the sentence a word is necessary, but they do not know which word they have to use there. It takes some time before children use articles completely correct.

### **Overgeneralization of pronouns (for nouns)**

A recent study by Koster et al. (submitted) investigates the comprehension and production of pronouns, by using a narrative test. Koster et al. (submitted) propose the *Asymmetric Grammar Hypothesis* in order to explain the fact that young children often produce reference correctly at a young age, but that it takes longer before they completely comprehend referential expressions. Therefore a gap between production and comprehension around the age of 5 years exists (Koster et al. submitted). Koster et al. (submitted) predict that children use pronouns more often, even in situations where an adult uses a noun. This prediction is based on previous investigation (Burzio 1998, Gundel, Hedberg & Zacharski 1993), which

has shown that pronouns are often preferred over nouns. Children seem to prefer sentence (3a) above (3b), because they do not take into consideration whether the person has already been introduced (Koster et al. submitted).

(3a) Ze heeft een ballon

She has a balloon

‘She has a balloon’

(3b) Een meisje heeft een ballon

A girl has a balloon

‘A girl has a balloon’

Koster et al. (submitted) show a significant difference in the use of nouns: 95.7% of the adult control group chooses a noun, where only 37.6% of the children do so. Furthermore the children used more pronouns to refer to subjects than adults did (Koster et al. submitted).

Wigglesworth (1990), in an earlier study on the production of referential elements in narratives of English speaking children ages 4, 6 and 8 years old, find that the preference of pronouns over nouns decreases with age. Wigglesworth (1990) shows that 4 year old children often omit articles and that the 6 year old children most often repair their own errors of all four groups (4, 6 and 8 year olds and adults).

### **Research questions**

In the literature the *interpretation* of reference by young children has drawn much attention. Less is known about the *production* of reference by Dutch children. Therefore, this study investigates the production of reference by Dutch children of 4, 6 and 8 years old.

The present study will examine determiner omission and pronoun use, in order to find out at what age a child produces articles and personal pronouns in an adultlike way.

This study examines the prediction of De Houwer (1987), to find out whether or not young children are able to make a distinction between *hij* (‘he’) and *zij* (‘she’). Koster et al. (submitted) investigated a group of 31 children, with an age range of 4;3 – 6;5. It is recommendable to research larger groups of participants. In the present study, larger groups of participants are studied and 8 year old children are included. Therefore the present study forms an addition to the investigation of Koster et al. (submitted). The outcomes of the present study with Dutch children, will be compared to the Wigglesworth (1990) study with English children.

The main research question of this study is: *“What development do we see in the use of linguistic means for the expression of reference by children of 4, 6 and 8 years old?”* In answering this question, several related questions will be answered as well. First of all, what error types can be identified? Secondly, does incorrect reference use decrease with age? At what age does a child perform adultlike? And lastly, if a child has a higher MLU, does it use more references then?

The main prediction is that there is a development in the expression of reference for the investigated groups: errors will diminish with age. Furthermore the predictions are that age will have an influence on MLU and that 8 year olds will perform adultlike. We also predict that 8 year old children will express more background information in their stories. At last the prediction is that omission of articles will reduce with age.

## **Method**

### **Participants**

This study includes 110 normal developing Dutch children (64 boys, 46 girls), in three age groups (4, 6 and 8 years). The children are selected from four schools in the province of Utrecht, The Netherlands. Two schools are situated in Utrecht (city), one in Maarssen (suburb) and one in Montfoort (village). Furthermore an adult control group of 10 native Dutch speakers is included (6 males, 4 females).

### **Procedure**

Two stories of 8 pictures each were presented to the participants (appendix A). Both stories are part of the TAK, a Dutch language proficiency test (Verhoeven & Vermeer 2001). This sub-test measures the narrative skills of a child. The stories differ in complexity. In the first story, all characters are introduced in the first picture. There is no background information. In the second story the different characters appear on several pictures throughout the story. The man (appendix A) disappears on picture 4 and then reappears in picture 6. Furthermore the second story contains more background information.

Mean scores of the participants on other sub-tests of the TAK are shown in table 1. The adult control group only took part in the narrative task.

The instruction of the storytelling task is: *“Here you see a comic strip. Look at it very closely. When you have watched it carefully, you may tell the story. Tell it very clearly. Someone who cannot see the pictures must be able to understand the story as well.”*

**Table 1.** Background measures of participants

	<b>4 year olds</b>	<b>6 year olds</b>	<b>8 year olds</b>	<b>Adults</b>
	<b>(N = 34)</b>	<b>(N = 40)</b>	<b>(N = 36)</b>	<b>(N = 10)</b>
<b>Measure</b>	<b>M (sd)</b>	<b>M (sd)</b>	<b>M (sd)</b>	<b>M (sd)</b>
<b>Age in months</b>	54.59 (2.47)	77.50(2.66)	100.89 (3.63)	408.90 (169.77)
<b>Male/female ratio</b>	1.47	1.40	1.39	1.40
<b>Raven CPM standard score</b>	5.82 (1.46)	6.29 (1.73)	6.64 (1.73)	-
<b>TAKfw*: raw score</b>	31.32 (5.59)	36.98 (2.41)	40.44 (1.81)	-
<b>TAKfw: norm score</b>	27.10 (5.70)	36.10 (3.30)	40.00 (1.80)	-
<b>TAKzp*: raw score</b>	28.47 (3.64)	35.37 (2.88)	38.31 (2.39)	-
<b>TAKzp: norm score</b>	25.20 (6.30)	34.70 (3.90)	39.10 (2.50)	-
<b>TAKpw*: raw score</b>	54.59 (11.67)	75.35 (9.83)	87.78 (6.05)	-
<b>TAKpw: norm score</b>	42.50 (14.10)	67.40 (12.00)	83.80 (7.50)	-
<b>TAKwv*: raw score</b>	12.59 (3.39)	17.05 (5.31)	22.78 (1.38)	-
<b>TAKwv: norm score</b>	11.40 (4.30)	16.10 (4.10)	21.30 (3.00)	-

\* = Language skills measured with TAK (Verhoeven & Vermeer 2001), compared to TAK norm tables

TAKfw = comprehension of function words in sentences

TAKzp = comprehension of sentences patterns

TAKpw = receptive vocabulary

TAKwv = word morphology

### Scoring and coding

The narrative tasks were digitally recorded on a laptop with Audacity. The audio files were transcribed in CHAT (MacWhinney 2000). A second rater transcribed 10% of all files. The inter rater-reliability at word level is 96.1% and 85.2% at coding level.

To get an insight in the different errors children make in reference, the various errors are categorized and scored in seven categories: type A up to type G. Furthermore, omission of articles, repetition and correction errors are measured. The errors are operationalized according to divisions found in the literature.

### Type A: error in gender

Type A errors are errors in gender. As De Houwer (1987) mentioned, children of 3 years old not seem to make overgeneralizations of masculine pronouns over feminine forms anymore, that is when *hij* ('he') and *hem* ('him') are used instead of *zij* ('she') and *haar* ('her').

(4) Toen ging *dat meisje* vallen met *zijn* ballon. (ElizeS, 4;06)

Then went *that girl* fell with *his* balloon.

‘Then the girl fell with his balloon’

### **Type B: error in using a pronoun instead of a noun**

Type B errors occur when a person has not been introduced yet, but is referred to with a pronoun instead of a noun.

(5) *Hij* gaat het ijsje eten. (JamieE, 4;06)

*He* goes the ice cream eat.

‘He is going to eat the ice cream’

### **Type C: errors in introduction with definite articles**

Here children use the definite articles *het* or *de* (‘the’) instead of the indefinite article *een* (‘a’) to introduce a person for the first time.

(6) *Het* meisje heeft een ballon. (IsaF, 6;03)

*The* girl has a balloon.

‘The girl has a balloon’

### **Omission of articles**

In omission of article errors, a child omits an article where this is obligatory.

(11) *meisje* die laat hem los. *Ballon* is hoog. (SanderB, 4;10)

*Girl* that let him go. *Balloon* is high.

‘(the/a) girl lets him go. (the/a) balloon is high’

### **Type D: use of deictic terms**

In type D errors a child refers to a person with *die* (that), while it is not clear which person is meant.

(7) *Die* koopt een patatje. *Die* eet hem op. *Die* heb een ballon. (SanderB, 4;10)

*That one* buys chips. *That one* eats them. *That one* has a balloon.

‘That one buys chips. That one eats them. That one has a balloon’

### **Type E: not interpretable references**

Type E are errors where it is unknown where the child refers to. The child does not use any linguistic mean to express reference.

(8) Gebroken (...) Nieuwe (...) Vallen. (LieckeK, 4;00)

Broken (...) New one (...) Fall.

‘Broken (...) New one (...) fall’

### **Type F: error in plural forms**

Type F errors occur when a singular pronoun is used where a plural form is obligatory or vice versa. Children most often know that they have to use a single or a plural form (what is clear in the use of the third person plural form of the verb) (Van Kampen & Wijnen 2000), but it is hard for them to implement this knowledge in the production of a sentence.

(9) Toen gaat *de meneer* eten. En toen gingen *ze* weggooien (ElizeS; 4;06)

Then goes *the man* eating. And then went *they* throw away.

‘Then the man is going to eat. And then they threw it away.’

### **Type G: noun instead of a pronoun**

Here, children use a noun instead of a pronoun. This might not be incorrect, but it is not adultlike language use.

(10) *De man* is aan het betalen. *De man* is aan het eten. *De man* gooit het weg. (SuusK, 6;05)

*The man* is paying. *The man* is eating. *The man* throws it away.

‘The man is paying. The man is eating. The man throws it away’

### **Repetition**

A phenomenon which was observed frequently is the repetition of the same error. Once a child starts with an error, these errors are mostly not corrected, but the child maintains it, as example (12), where *ze* (‘they’) are not introduced yet.

(12) *Ze* hadden een kar. *Ze* hadden hem gemaakt. (JamieE, 4;06)

*They* had a car. *They* had him made.

‘They had a car. They made him’

### **Correction**

Correction of errors, is when a child repairs an error, as example (13).

(13) *Hij* gooit het zakje weg. *De man* gooit het zakje weg. (CaspervanL, 6;08)

*He* throws the bag away. *The man* throws the bag away.

‘He throws the bag away. The man throws the bag away’

### **Background information**

In the second TAK story some persons are functioning in the background, like the woman who is selling chips and the clown who is selling balloons (Story 2, appendix A). These persons are not seen as main characters in the story and measured as background information.

(14) En daar is *een clown* en die meneer. (MikeE, 6;07)

And there is *a clown* and that man.

‘And there is a clown and that man’

In the present study an ANOVA one-factor design is used. The independent variable is age: the 4 different age groups will be compared. The dependent variables are MLU, correct expression of reference, reference errors (Type A-G and omission of articles), background information and correction and repetition of errors.

The errors and correct references are coded for every child in CHAT. The CLAN program is used to count correct and incorrect references. Proportions correct and incorrect references are computed: 24 correct references and 6 incorrect references is a correct score of 80% and an incorrect score of 20%. Errors are divided by the total number of references: 6 type C errors out of 30 total references (correct and incorrect), is a type C error score of 20%.

Retracings are not included in MLU computations. Reference use was regarded as incorrect when a person was not (re)introduced correctly or referred to incorrectly in the progress of the story . When a child used ‘*the* father’ instead of ‘father’ in introducing the father for the first time (story 1) , this was coded as a type C error.

Omitting an argument (subject or object) is regarded as a grammatical error instead of a reference error and therefore not coded in this study. An example of correct reference use is included in appendix B.

## **Results**

### **Influence of age on MLU**

Measuring the effect of age on MLU yields a significant difference between all four groups ( $F_{3,116} = 29.61$ ;  $p < 0.001$ ). The MLU in the 8-year old group increased: they use more words and longer sentences for storytelling. Nevertheless, the 8 year old group does not perform adultlike: the adult control group has a higher MLU than the 8 year olds, while the 6- and the 8-year old groups almost perform the same (table 2).

**Table 2.** Mean and standard deviation Utterances, words and MLU

<b>Groups</b>	<b>Mean (sd) Utterances</b>	<b>Mean (sd) Words</b>	<b>Mean (sd) MLU</b>
<b>4 year olds</b>	20.29 (5.18)	108.82 (37.15)	5.31 (0.97)
<b>6 year olds</b>	21.85 (5.99)	137.60 (44.37)	6.27 (0.90)
<b>8 year olds</b>	21.92 (4.30)	146.03 (36.72)	6.66 (1.04)
<b>Adults</b>	39.50 (20.10)	325.90 (152.05)	8.53 (1.25)

### **Development in the expression of reference**

Measurements show that there is a significant effect of age ( $F_{3,116} = 35.21$ ;  $p < 0.001$ ) on reference use. The adult control group uses significantly more references in their stories than the 8 year old group. Post hoc testing showed that the 4 year olds, 8 year olds and control group differ significantly from each other ( $p < 0.05$ ). Differences between the 4- and 6- year olds group are not significant. We predicted MLU and reference use to correlate with each other. Measuring the correlation between both variables shows that there is a significant positive correlation of 56.4%.

The percentage correct and incorrect references was measured as well. We found a significant effect of age on the percentage correct ( $F_{3,116} = 32.70$ ;  $p < 0.001$ ) and incorrect reference use ( $F_{3,116} = 32.83$ ;  $p < 0.001$ ). Post hoc testing showed that all four groups differ significantly ( $p < 0.05$ ) Table 3 shows the percentage of correct (CREF) and incorrect references (EREF) per age group. Again we predicted a correlation between correct and incorrect score and MLU. Outcomes show a significant positive correlation between MLU and correct reference use of 69%. In addition we find a significant negative correlation between MLU and incorrect reference use of 69.4%.

Percentage of incorrect references significantly decreases. Children of 4 years old produce significantly more errors than the 8 year olds and the adult control group. The 4 and the 6 year old children and the 6 and the 8 year old children significantly differ. Nevertheless, the 8 year old group does not perform adultlike (figure 1).

**Table 3.** Mean and standard deviations correct and incorrect references in percentages

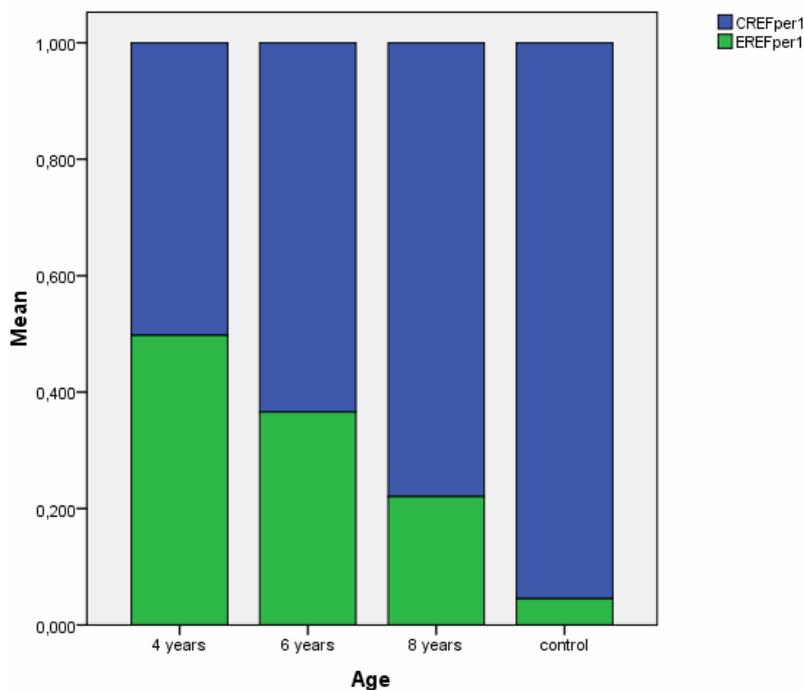
Age	Mean (sd) CREF	Mean CREF Raw scores	Mean (sd) EREF	Mean EREF Raw scores
4 year olds	0.50* (0.15)	0.52* 542/1037 <sup>-1</sup>	0.50 (0.15)	0.48 495/1037 <sup>-2</sup>
6 year olds	0.63 (0.17)	0.66 953/1449	0.37 (0.17)	0.34 496/1449
8 year olds	0.78 (0.15)	0.80 1184/1480	0.22 (0.15)	0.20 296/1480
Adults	0.96 (0.04)	0.96 731/762	0.04 (0.04)	0.04 31/762

\* = differences in mean scores: the first column shows mean and standard deviation of percentages of all children. The second column shows the raw amounts for all children.

<sup>-1</sup> = Total correct / total references

<sup>-2</sup> = Total errors / total references

**Figure 1.** Proportions of Correct references (CREF) and incorrect references (EREF) for every age group



## Reference errors: type A – type G

Table 4 provides the results of all errors for every age group.

**Table 4.** Mean and standard deviation proportions of all types of reference errors. Error types are divided by the total reference use of the child.

Age	Type A (sd)	Type B (sd)	Type C (sd)	Type D (sd)	Type E (sd)	Type F (sd)	Type G (sd)
<b>4 years</b>	0.01 (0.02)	0.17* (0.13)	0.17* (0.08)	0.06* (0.08)	0.08* (0.11)	0.00 (0.01)	0.01 (0.02)
<b>Raw</b>	0.01 14/1037	0.16 168/1037	0.17 174/1037	0.05 54/1037	0.08 78/1037	0.00 1/1037	0.01 6/1037
<b>6 years</b>	0.01 (0.21)	0.13 (0.09)	0.14 (0.81)	0.03 (0.04)	0.05* (0.11)	0.00 (0.01)	0.00 (0.01)
<b>Raw</b>	0.01 20/1449	0.12 178/1449	0.13 191/1449	0.03 40/1449	0.04 59/1449	0.00 3/1449	0.00 5/1449
<b>8 years</b>	0.00 (0.01)	0.07* (0.08)	0.09* (0.06)	0.02* (0.03)	0.03* (0.08)	0.01 (0.01)	0.01 (0.02)
<b>Raw</b>	0.00 6/1480	0.06 95/1480	0.08 123/1480	0.01 22/1480	0.02 33/1480	0.01 8/1480	0.01 9/1480
<b>Control</b>	0.00 (0.00)	0.01 (0.01)	0.03* (0.03)	0.01 (0.01)	0.00* (0.00)	0.00 (0.01)	0.00 (0.00)
<b>Raw</b>	0.00 0/762	0.01 5/762	0.03 21/762	0.00 4/762	0.00 0/762	0.00 1/762	0.00 0/762

\* = significant effect between groups

No significant effect of age was found for type A errors. Type B errors were seen most frequent in all groups. Even the adult control group sometimes uses a pronoun where a noun is obligatory. There is a significant effect of type B errors ( $F_{3,116} = 10.77$ ;  $p < 0.001$ ). Post hoc testing yielded a significant difference between the 4- and the 8 year old group and the control group ( $p < 0.05$ ) for type B errors. No significant effect was found between the 4- and 6 year old group. The 6 year olds and the control group are significantly different.

In a type C error, an obligatory indefinite article is substituted by a definite determiner. The 4 year old children have the highest type C error score (17%). A significant effect of age is found for type C errors ( $F_{3,116} = 13.08$ ;  $p < 0.001$ ). Post hoc testing showed that the differences between the 4 year olds and the 8 year olds and the control group are significant ( $p < 0.05$ ). The percentage of omitting articles is divided by total references. Measurements show a significant effect of age on the omission of articles ( $F_{3,116} = 5.22$ ;  $p < 0.005$ ). Post hoc

testing yielded a significant difference between the 4 year olds and the 6 and 8 year olds and the control group ( $p < 0.05$ ), see table 5.

The type D errors were expected to occur in particular in the 4 year old group. A significant effect of type D errors is found ( $F_{3,116} = 4.42$ ;  $p < 0.05$ ). Post hoc testing yielded a significant difference between the 4 year olds and the 8 year old children ( $p < 0.05$ ). The 6 and 8 year olds and the control group do not significantly differ from each other.

Measuring type E errors yields a significant effect of age ( $F_{3,116} = 2.80$ ;  $p < 0.05$ ). There is a significant difference between all four groups.

Proportions of the F and G type errors are quite low in all four groups. Therefore it is not possible to draw significant conclusions about these kinds of errors.

### Background information development

The prediction is that adults and 8 year olds will include more background information than 4 and 6 year old children. In the present analysis the correct and incorrect reference use in background information is analyzed. No significant effect is found for the correct and incorrect use of reference in background information. 8 year old children and adults do not express more background information than 4 and 6 year old children (table 5).

### Repetitions and corrections

Repetitions in type B were observed most. When a child starts using the pronoun *he* for the noun *the man*, this error often remains uncorrected. Proportions of repetitions and corrections are quite low in all four groups. Therefore the results of the ANOVA measurement do not show a significant effect from age on the repetition of an error. Also in the correction of a reference error no significant effect of age was found.

**Table 5.** Raw scores omission of articles (significant) and background information (insignificant)

Age	Omission articles Raw scores	Background information Raw scores
4 years	0.03* 30/1037	0.03 30/1037
6 years	0.01* 14/1449	0.03 38/1449
8 years	0.01* 16/1480	0.02 35/1480
Control group	0.01* 4/762	0.02 18/762

\* = 4 year olds make significantly errors in omitting articles, compared to 6 and 8 year olds and the control group.

## **Discussion**

This study examined the development of the use of linguistic means for expressing reference by 110 children from 4, 6 and 8 years old. Furthermore, an adult control group existing of 10 participants is included.

One of the main limitations of this study lies in the task the children received. They had to tell both stories in such a way that someone who could not see the pictures would be able to understand the story as well. The investigator was sitting opposite to the child, so he could also see the pictures. The children told the stories to the investigator, which might have led to more reference errors than when a different experimental design was used where the investigator could not see the pictures.

A difficulty in coding the reference errors is that it is not always clear whether an error is a reference error or a grammatical error. In this study is chosen not to code the omission of an argument (subject or object) in a sentence. Nevertheless, omitting a subject could lead to problems in reference in the rest of the story, which makes it difficult to ignore argument omissions.

Lastly, the problem with having an adult control group is that they know it is an investigation. The TAK is designed for children and the adult controls produced extensive discourses, with many details about both stories. They did not know the aim of the study, but probably “over performed”. For children the TAK could be a good manner to elicit a narrative, for adults this approach can be questioned.

## **Conclusion**

Based on the findings, we conclude that there is a development in the use of linguistic means for the expression of reference by children from 4, 6 and 8 years old. MLU and reference use highly correlate: when a child talks more, it will use more references. 8 year olds do not perform adultlike on MLU and reference use. There is no effect of age on expressing background information: 4 year olds do not express less background information than the 6 and 8 year olds and the control group.

Type B errors decreases with age: 4 year old children make more type B errors in their reference use than 8 year old children and adults. The 8 year old children do not perform adultlike in this respect. Type C errors decrease with age as well: 8 year olds make less errors in using a definite article instead of an indefinite article. The omission of articles diminishes with age. We predicted that proportions of type D errors would be high in the 4 year old group

and we did find this effect. Type E errors decrease with age and are not observed in adults anymore.

De Houwer (1987) showed that children of 3 years old are familiar with the use of *hij* ('he') and *zij* ('she'). In the present study, there is evidence found for the prediction that children of 4 years of age are familiar with the *natural gender rule*: there is no significant effect of age on type A errors. The present investigation claims that a child does not produce reference adultlike at age 8. The 8 year olds and the control group perform too differently to conclude that 8 year olds perform adultlike. The omission of articles, which was predicted to diminish with age, significantly decreases.

Based on the findings we can conclude that the use of pronouns above nouns (type B) will diminish with age, which was also shown by Wigglesworth (1990). Therefore, we can conclude that English and Dutch speaking children are comparable in their reference use.

### **Further investigation and clinical implications**

In future research using a picture narration task, the investigator should be positioned in such a way that he can hear the child but cannot see the pictures, to make the task more valid. Arguments omission (subjects or objects) should be included in future research.

Results from this study could be compared to reference use by children with developmental language disorders. Specific knowledge about reference use in typical children and children with language disorders, could improve therapy of these children.

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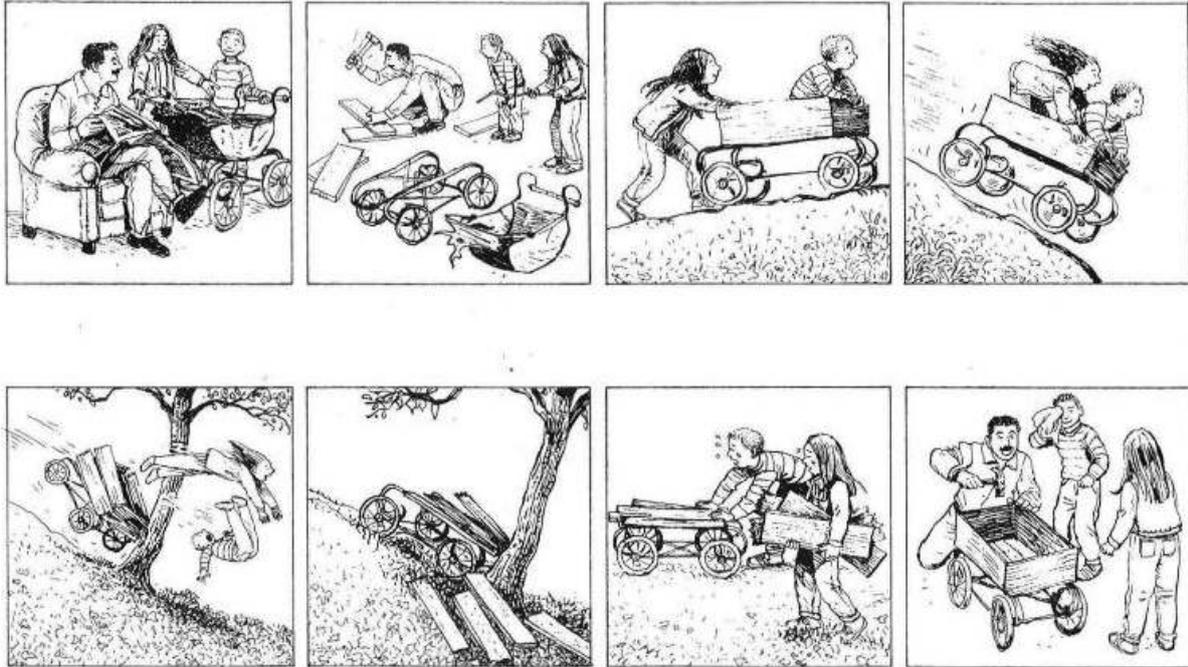
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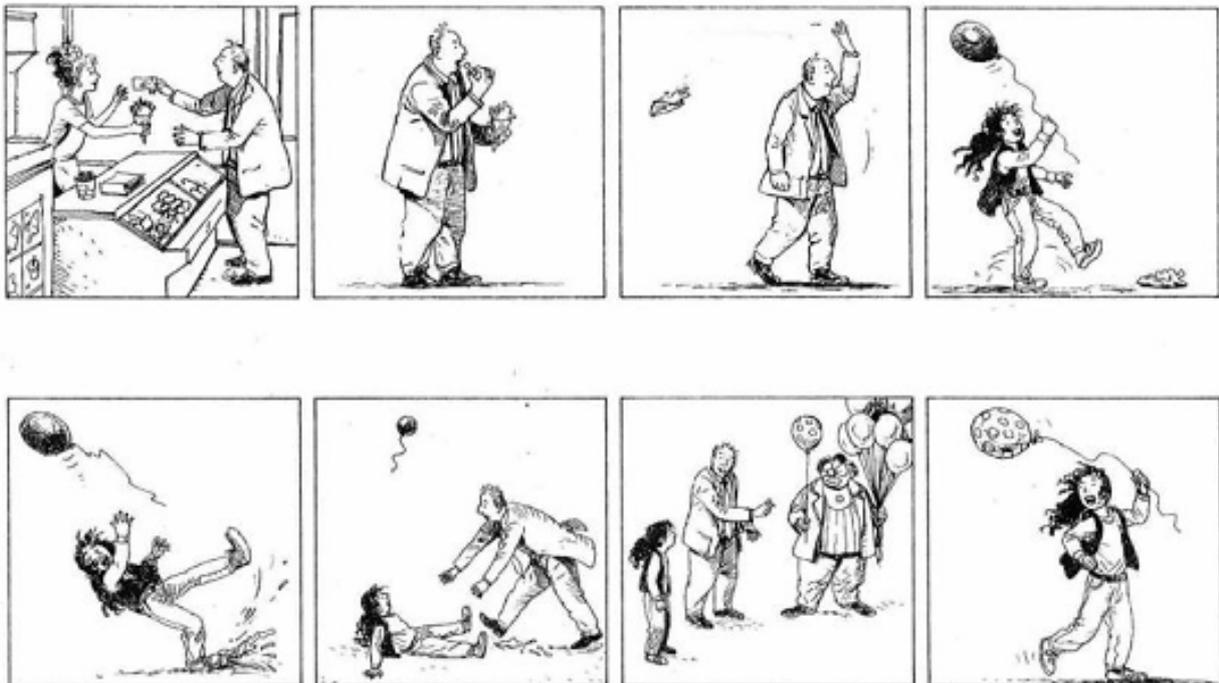
# Appendix A

## TAK

Story 1: all persons introduced in the first picture



Story 2: persons introduced throughout the whole story



## Appendix B

### Verhaal 1 / story 1

**Twee kinderen hebben een kinderwagen.**

‘**Two children** show a **buggy to their father**’.

**Ze** vragen aan **(hun) vader** of **hij** van **de wagen een kar** wil maken.

‘**They** ask **their father** whether **he** wants to make a **car** out of **the buggy**’.

**Vader** maakt **de kar**.

‘**Father** is making **the car**’.

**Het meisje** duwt **het jongetje** in **de kar** de heuvel op.

‘**The girl** pushes **the boy** in **the car** up **the hill**’.

**Ze** geeft **een duwtje** en gaat dan ook in **de kar** zitten.

‘**She** pushes and then steps into **the car** as well’.

**Ze** gaan heel hard naar beneden.

‘**They** are going down the hill really fast’.

Maar **ze** zien niet dat er **een boom** op **het pad** staat.

‘But **they** do not see that there is a **tree** on **the pathway**’.

**Ze** knallen tegen **de boom** aan en **de kar** is helemaal kapot.

‘**They** fall against **the tree** and **the car** breaks’.

**De kinderen** pakken **alle planken (van de kar)** en lopen huilend terug naar huis.

‘**The children** grab **all pieces (of the car)** and walk back home crying’.

Dan gaat **papa/vader de kar** weer opnieuw maken.

‘Then **daddy** is going to make **the car** again’.

### Verhaal 2 / story 2

**Een meneer** koopt **een frietje** bij **een mevrouw**.

‘**A man** is buying **chips** from a **woman**’.

**Hij** eet **ze** buiten lekker op.

‘**He** eats **them** outside’.

Als **hij ze** op heeft, gooit **hij het zakje (van de friet)** achter zich weg.

‘When **he** has eaten all **the chips**, **he** throws **the bag (of the chips)** away behind **his** back’.

Er komt **een meisje** aan, met **een ballon**.

‘There appears a **girl** with a **balloon**’.

**Ze** ziet **het zakje** niet en glijdt **erover** uit.

‘**She** does not see **the bag (of the chips)** and slips over **it**’.

**Het meisje** schrikt en **haar ballon** vliegt weg.

‘**The girl** is frightened and **her balloon** flies away’.

**De meneer** komt terug gerend en helpt **het meisje** overeind.

‘**The man** returns and helps **the girl** stand up’.

Dan zien **ze een clown** met allemaal ballonnen.

‘Then **they** see **a clown** selling balloons’.

**De meneer** koopt **een nieuwe ballon** voor **het meisje**.

‘**The man** buys **a new balloon** for **the girl**’.

**Het meisje** is helemaal blij en loopt vrolijk verder.

‘**The girl** is happy and walks away’.