Knowing versus producing: the acquisition of grammatical gender and the definite determiner in Dutch by L1-TD, L1-SLI, and eL2 children

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Knowing versus producing

The acquisition of grammatical gender and the definite determiner in Dutch by L1-TD, L1-SLI, and eL2 children

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Dutch nouns are divided into two groups according to grammatical gender which is, among others, marked on the definite determiner: common nouns take the definite determiner *de* and neuter nouns take the definite determiner *het*. This study is unique in systematically investigating the acquisition of grammatical gender and the definite determiner in the production and knowledge data of the same Dutch children. Three groups of children were examined: (i) typically developing monolinguals (L1-TD: 6;7–9;11), (ii) monolinguals with Specific Language Impairment (L1-SLI: 8;4–12;0), and (iii) typically developing bilinguals, which are early second language learners (eL2: 6;7–10;0). The three groups of children reveal different stages in discovering that *de* and *het* cover the gender paradigm. At comparable ages, the L1-TD children have completed this paradigm discovery, however, the eL2 children have not yet completed it, and the L1-SLI children are only at the first stage of the discovery of the gender paradigm.

Keywords: language acquisition, grammatical gender, bilingualism, SLI, production, knowledge

1. Introduction

The Dutch language classifies nouns into two grammatical gender categories: common and neuter nouns. Grammatical gender is reflected in a number of agreeing elements accompanying the noun or referring to it. Definite determiners are a clear case: singular definite determiners vary morphologically according to the

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gender of the noun, as illustrated in Table 1 below. Nouns that take the singular definite determiner *de*, such as *de hond* (the dog) are called *de*-words and have common gender. Nouns that take the singular definite determiner *het*, such as *het konijn* (the rabbit), are called *het*-words, and have neuter gender. There is no gender distinction on the singular indefinite determiner, which is *een* for both neuter and common nouns, and on the plural definite determiner, which is *de* for both genders.

Table 1. Dutch morphology of definite determiners

	Definite determiners	
Gender of noun	*Singular*	*Plural*
common	**de**	de
neuter	**het**	de

Experimental results have revealed that monolingual acquisition of neuter gender of the Dutch definite determiner is a long process as children do not acquire the target system before the age of seven (cf. Blom, Polišenská, & Weerman, 2008; Bol & Kuiken 1988; De Houwer & Gillis, 1998). The developmental literature distinguishes four stages in the acquisition of Dutch determiners, as summarized in Table 2.

Table 2. Stages of acquisition of the definite determiners *de* and *het*

Stage 1:	only bare nouns
Stage 2:	indefinite determiner *een* 'a(n)' or schwa-element + noun which can be interpreted as the indefinite determiner
Stage 3a:	definite determiner *de* with both [common] and [neuter] nouns
Stage 3b:	first appearance of *het*, but massive overgeneralization of the definite determiner *de*
Stage 4:	target system (L1-TD: not before the age of seven)

Table 2 reveals that monolingual children overgeneralize the definite determiner *de* and use it incorrectly with neuter nouns that require the definite determiner *het*. What is needed for the acquisition of determiners and grammatical gender is (i) the presence of the syntactic position D (determiner), (ii) the lexical and grammatical properties of the noun (N), (iii) agreement between D — N and (iv) features and morphology of the determiner (Cornips & Hulk, 2008). However, there is little evidence for grammatical gender in Dutch input compared to German, Spanish and French for instance. In Dutch, gender is not directly marked on the noun, but is only visible on single definite determiners and demonstratives. However, there is no gender distinction on indefinite determiners and plural definite determiners. Furthermore, there are frequency differences between neuter (25%) and common (75%) nouns and there are very few morpho-phonological cues for the different

gender forms of the determiner, with the exception of diminutives. Although there are some morphological and semantic regularities, these are limited and many exceptions exist (see Blom, Polišenská & Unsworth (2008) for an overview).

In previous studies (Brouwer, Cornips, & Hulk, 2008; Cornips & Hulk, 2008; Roodenburg & Hulk, 2008, 2009; Unsworth & Hulk, 2010) it has therefore been argued that young children acquiring Dutch, initially have no gender specification in their grammar. They only use the feature specification [definite] for which they choose *de* as the 'default' value, possibly due to its overwhelming presence in the input and syncretism between singular (common) and plural. At a certain point in development, children become aware of gender as an abstract grammatical specification. In other words, they are aware that *de* and *het* are related to grammatical gender, but they do not know the correct gender specification (yet). In light of the sparse evidence for grammatical gender in the Dutch input and the developmental paths of the children, it is assumed that children do not start classifying nouns according to gender. Rather, the child's grammar contains a definiteness feature only, which results in the default production of *de* with all definite nouns (cf. Hulk & Cornips, 2010). In addition to typically developing monolingual children, monolingual children with SLI and early bilingual children have been investigated regarding their acquisition of grammatical gender and the definite determiner in Dutch. The comparison of these three groups of young language learners is relevant as it provides us with more insight into the subsequent stages children go through in acquiring grammatical gender (cf. Cornips, Van der Hoek, & Verwer, 2006).

Previous research has shown that bilingual children who acquire Dutch as a second language early in life have more difficulties, and for a longer period of time, with the acquisition of neuter gender than monolingual children, irrespective of their other language (Cornips & Hulk, 2008; Cornips et al., 2006; Hulk & Cornips, 2006a, 2006b). Similarly, monolingual children with SLI between the ages of 6;1 and 8 years extensively overuse *de* where *het* should be used, namely in 62% of the cases (cf. Orgassa, 2009, p. 133; Orgassa & Weerman, 2008). In almost all studies, only data were presented from production tasks concerning the accurate use of the definite determiners *de* and *het*. However, Brouwer, Cornips and Hulk (2008) have examined both production and judgment data. They found a difference between the production and judgment data of bilingual children between 11 and 13 years. Their production data showed an extreme overgeneralization of *de*, while their judgment data revealed that these children did have some awareness of *de* and *het* as gender markers, and that these forms belong to the same paradigm. In the same study, monolinguals between 11 and 13 years performed target-like in production and judgment. However, Unsworth and Hulk (2010) found a similar difference between production and judgment for a younger group of L1-TD children

between 4 and 7 years. This data reveals a striking two-way difference between, firstly, the development of monolingual and bilingual children, and secondly, between production and judgment data. Therefore, a more systematic investigation of the acquisition of the definite determiner in Dutch from both a production and a knowledge perspective is needed.

The main aim of this paper is to systematically examine and compare different groups of children in age ranges not investigated in previous studies and for both their production and knowledge. Therefore, we conducted a study in which the same children were examined on their acquisition of the Dutch definite determiner on both production and knowledge tasks (Keij, 2009). Three groups of children were examined; that is, a monolingual (L1-TD) control group (6;7–9;11), a bilingual (eL2) group (6;7–10;0) and a monolingual group with SLI (L1-SLI) (8;4–12;0). The comparison of these last two groups is a relevant and common procedure in L2 and SLI research, as comparable linguistic problems often emerge in these two groups (Grüter, 2005; Håkansson & Nettelbladt, 1993; Paradis, 2004, Paradis & Crago, 2000). Orgassa (2009) also applied this approach in her investigation into the acquisition of grammatical gender and the definite determiner in Dutch.

The specific aim of this paper is to reveal the developmental path for the acquisition of the gender of the definite determiner. The questions addressed in this paper relate to differences between the three groups of children, to differences between production and knowledge within the groups, and to differences between the age groups. Previous research results lead to our prediction (i) that the monolingual children will show more target-like patterns than the eL2 children and children with SLI (Orgassa, 2009). Among other accounts[1], Ellis Weismer and Evans (2002) consider SLI as a processing limitation which would lead children with SLI to have problems with analyzing linguistic input. Consequently, they need more input, or input over a longer period of time, to acquire certain grammatical features of language, which possibly causes the delay in language development. Given that both monolingual children with SLI and bilingual children encounter serious problems with the acquisition of neuter gender in Dutch, Orgassa and Weerman (2008) suggest that any similarities between bilingual children and children with SLI can be understood in terms of factors that influence the intake, rather than in terms of access to grammatical principles. Children with SLI have a processing deficit and bilingual children have received less Dutch input, both factors causing reduced intake. Orgassa (2009) therefore hypothesized that the language development of early second language learners of Dutch is similar to that of monolingual Dutch children with SLI. Based on Orgassa (2009), our prediction (ii) is that eL2 children will perform as accurately as the L1-SLI children on, at least, the Production task. Given the literature, our further prediction (iii) is that all children will perform

more target-like in knowledge than in production (Brouwer et al. 2008, Unsworth & Hulk 2010). With respect to the question of development, our prediction (iv) is that the older children will perform more target-like than the younger children within all three groups.

In the following section the participants, the design and the methodology are described. In the third section the group results of the Production and the Knowledge tasks are presented, as well as the children's individual strategies. The fourth and final section is devoted to the discussion and the conclusions.

2. Participants, design and methodology

We collected data from 74 children on both a Production and a Knowledge task. Before doing these two tasks, the children were required to perform a lexicon task, to ensure they were familiar with the nouns used in the experiments. The group of participating children is comprised of (i) 26 monolingual children (L1), (ii) 28 bilingual (eL2) children and (iii) 20 monolingual children with SLI (L1-SLI). The age of onset of acquisition of Dutch for the 28 bilingual children is difficult to determine, because they were born in the Netherlands, but were not raised in so-called one-parent-one-language families and language choices in the home domain are inconclusive (Cornips & Hulk, 2008). Previous studies suggest a complex interplay between the factors of input quantity and age of onset, in particular with respect to the acquisition of grammatical gender in Dutch (Unsworth et al., 2011). It is therefore important to note that the exact age of onset of acquisition is not the most determining factor in the acquisition of grammatical gender in Dutch (Cornips & Hulk, 2008, Unsworth et al., 2011). The other languages (L1s) of the children varied considerably: namely 15 different L1s and several multilingual children (speaking more than two languages) (Appendix A).

The 26 monolingual children with SLI were diagnosed by a qualified speech therapist based on exclusion criteria, that is; they have language problems without any sensory, general cognitive, motoric, psychological or input related causes underlying the deficit (Leonard, 2003; Orgassa, 2009; Schaerlaekens & Goorhuis-Brouwer, 2000). Finally, since the aim is to examine the developmental path, all three groups of children were selected from two age ranges according to school levels in the Netherlands. The monolingual children with SLI were two years older, because research has shown that they typically demonstrate a two year delay behind typically developing monolingual children (Bishop & Leonard, 2000; Orgassa, 2009; Southwood, 2007). The exact age ranges are given in Table 3.

Table 3. Number of children and their age ranges for the three research groups and the two school levels

	Monolinguals Age range	**Bilinguals Age range**	**Monolinguals-SLI Age range**
School level 1	6;7–7;7 N=11	6;7–8;5 N=11	8;4–11;3 N=11
School level 2	8;6–9;11 N=15	8;6–10;0 N=17	10;2–12;0 N=9
N=74	N=26	N=28	N=20

2.1 The lexicon task

A word-to-picture-matching task was conducted (Van Emmerik, Van Hout, Van de Craats, & Klatter-Folmer, 2009) whereby the child was expected to point at the picture that represented the word presented to them by the researcher. The words were presented to the children both in written and in spoken form. Four different pictures were presented to them simultaneously and the children were asked to point at the picture that matched the word. Figure 1 shows an example of the task using the noun *auto* 'car' and four photographs: the correct picture (the car), a semantically related picture (the motorcycle), and two unrelated pictures (the egg and the teddybear). An overview of the nouns used in the lexicon task is provided in Table 4. The items which are shaded were used in the Production task as well as in the Knowledge task[2]. All the participants scored a 100% correct on the task, demonstrating they were familiar with all nouns presented to them.

Auto

Figure 1. Example of a test item in the lexicon task

Table 4. The nouns in the word-to-picture-matching task

Common nouns	Translation	Neuter nouns	Translation
baby	baby	Huis	house
boot	boat	Boek	book
klok	clock	Bad	bath
boom	tree	Paard	horse
pen	pen	Konijn	rabbit
beker	cup	Bord	plate
sleutel	key	Vliegtuig	airplane
broek	pants	Hemd	shirt
auto	car	Potlood	pencil
jongen	boy	Meisje	girl
koe	cow	Horloge	watch
lepel	spoon	Mes	knife
stoel	Chair	Bed	bed
flat	Flat		

2.2 The Production task

Unsworth (2008) developed a sentence completion task, based on Blom, Orgassa and Polišenskà (2008) (cf. Unsworth & Hulk, 2010, Unsworth et al. 2011). This task investigates the target-like productive use of the definite determiners *de* and *het* with respect to common and neuter test items. The participants were asked to produce 14 singular nouns twice (seven common and seven neuter nouns), preceded by a definite determiner and an adjective. The stimuli were presented to the participants visually on a laptop screen in *Microsoft PowerPoint* and the outcomes of the task were recorded with *Audacity* and later transcribed. The laptop screen showed two pictures: for example, a boy standing next to a brown horse and a girl standing next to a white horse, as illustrated in Figure 2. Both pictures were introduced: ((I)nterviewer) "Here you see two horses. A brown horse and a white horse" and then the child ((C)hild) was required to complete the following sentences started by the interviewer:

I:	Het meisje staat naast..	'the girl stands next to..'
C:	***het*** *witte paard*	'the white horse'
I:	De jongen staat naast..	'the boy stands next to..'
C:	***het*** *bruine paard*	'the brown horse'

This test format required the child to complete the sentence with a noun phrase consisting of a definite determiner, an adjective and a singular noun. An example of a test item picture of this Production task is presented in Figure 2.

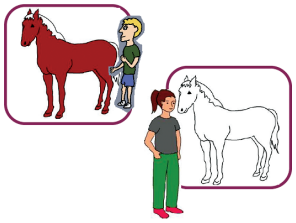

Figure 2. Example of a test item in the sentence completion task.

2.3 The Knowledge task

The third task was a multiple choice task designed to 'tap into the knowledge' of the children. Keij (2009) adapted a task, which was originally developed for adults (cf. Van Emmerik et al., 2009). The stimuli consisted of 20 test items (10 common and 10 neuter nouns) presented visually in words and a picture on a laptop screen in *E-prime* and auditorily through headphones as auditive support. The participants were provided with the instruction that an alien girl is learning Dutch and that she needs some help from the child. Every experimental item consisted of the noun presented with a correct and an incorrect definite determiner. Through E-prime, the child was asked:

> *Which is correct?* ('Wat is goed?')
> 1. **Het auto* 'the car' (neuter) 2. *De auto* 'the car' (common).

The participant was required to choose the correct determiner-noun combination by pressing key 1 or 2 on the keyboard. Figure 3 gives an example of a test item.

The participants were tested individually in a quiet room in their school. Each participant required approximately 15 minutes to complete the three tasks.

Figure 3. An example of a test item in the Knowledge task

3. Results

3.1 Group results

3.1.1 *Production task*

First, the group results on the Production task for both *de*- and *het*-words will be discussed. The results are presented in the box-plots of Figures 3 and 4 and in Table 4.

Level 1 represents the 6–8 year olds in the L1-TD and eL2 group, and 8–10 year olds in the L1-SLI group. Level 2 represents the 8–10 year olds in the L1-TD

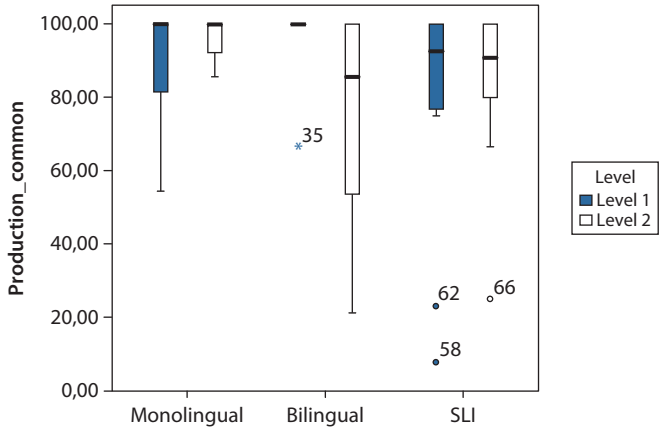

Figure 3. The percentage correct responses for both age levels on the Production task for de-words.

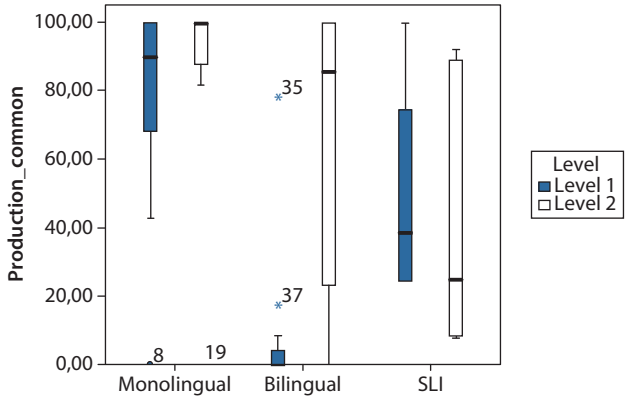

Figure 4. The percentage correct responses for both age levels on the Production task for het-words.

and eL2 group and 10–12 year olds in the L1-SLI group. The box-plot in Figure 3 shows that there is a wide range of scores in all groups across the school levels in the production of the determiner. The variation is reduced in the monolingual groups because the bilingual and SLI groups include participants demonstrating a bias for the common gender option of *de* (high scores) or the neuter gender option of *het* (low scores on this part of the task).

Most noteworthy of the box-plot in Figure 4 is the revelation that the scores are lower than in Figure 3. The bilingual and SLI groups appear to perform below the level of .80 in both age levels. Table 4 gives the average score per group and age level. The large standard deviations illustrate the within-group variation. Most monolinguals approached complete acquisition, but there were still exceptions at the age levels investigated.

Table 4. The percentage correct responses of the (produced) definite determiners on the Production task for the three groups, the two age levels and the factor grammatical gender.

Group	Age level	Common nouns (de)	Neuter nouns (het)
Monolingual (N=26)	1	89% (SD: 15.3) 137/154	77% (SD: 31.3) 110/143
	2	97% (SD: 6.1) 204/210	89% (SD: 25.7) 174/195
Bilingual (N=28)	1	97% (SD: 10.1) 149/154	9% (SD: 23.3) 13/143
	2	77% (SD: 26.9) 183/238	58% (SD: 39.0) 128/221
SLI (N=20)	1	78% (SD: 32.6) 120/154	49% (SD: 35.0) 70/143
	2	83% (SD: 24.7) 105/126	45% (SD: 37.7) 53/117

An analysis of variance on all data revealed two strong effects (partial eta squared > .30). The first effect was a general gender effect distinguishing *de*- and *het*-words ($F(1,68)=31.430$, $p<.001$, partial eta square = .316). The second strong effect was the group factor ($F(2,68)=31.954$, $p<.001$, partial eta square = .484). A Tukey post hoc test showed that the bilingual group ($p=.000$) and SLI group ($p=.000$) differed significantly from the monolingual control group. The bilingual group and the SLI group, however, did not differ significantly from each other ($p=.930$). All other effects, including all interactions, were less strong (partial eta squared < .30), but significant. The complexity of the differences between the groups is illustrated in Figure 5 which shows the interaction pattern between the three groups and age level for the neuter nouns. It shows no overall development for the SLI group, whereas the bilingual group seems to perform better at a higher age level. Given the complexity of the patterns it was decided to do a separate analysis of variance per group.

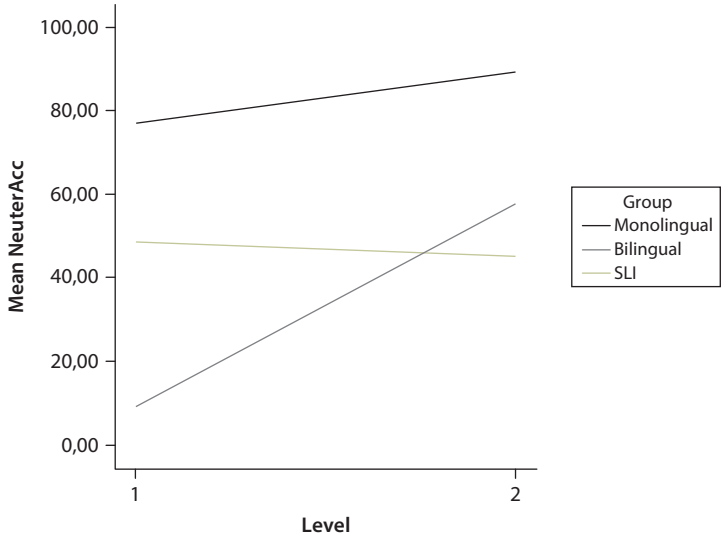

Figure 5. The interaction between the factors group and age level for percentage correct responses of the produced definite neuter determiners on the Production task.

The monolingual data returned a strong gender effect (F(1,24) = 21.183, p=.000, partial eta squared =.469). The monolingual children perform better on *de*-words. A main age level effect was found as well (F(1,24)=5.906, p=.023, partial eta squared =.197). There was no interaction for gender by age level effect (F(1,24)=1.586, p=.220, partial eta squared =.062).

The results for the bilingual group only returned a significant effect for age level (F(1,24) =6.967, p = .014, partial eta squared = .211). No effect was found for gender (F<1) and the interaction of gender by age level (F(1,24)=1.586, p=.220, partial eta squared =.062). In interpreting the results, it must be taken into account that due to the amount of variation between the children, only large effects can be revealed. A high level of variation is found in both groups of nouns.

The outcomes for the SLI group did not deliver any significant effect. There is no main effect for gender (F(1,24) = 3.039, p = .098, partial eta squared = .144) and age level (F < 1), and no interaction effect for gender by age level (F(1,24) = 2.081, p = .166, partial eta squared = .104). The group of SLI children is marked by large differences between the children, resulting into high levels of variation, as can be seen in Figures 3 and 4.

3.1.2 *Knowledge task*

The results on the Knowledge task are presented in the box-plots of Figures 6 and 7 and in Table 5. The box-plot of the knowledge of the *de*-words in Figure 6 shows that there is a lot of variation in the bilingual and SLI groups, however most

children have a clear preference for the determiner *de*. All monolingual children turn out to perform at a high level which implies a clear reduction in variation.

The boxplot of the *het*-words in Figure 7 shows more variation for the monolingual children compared to Figure 6, indicating that they have more problems with *het*. The other two groups clearly show divergent achievements between the children, and there is no clear age level effect.

Table 5 gives the average scores per subgroup and age level. The standard deviations are large, except for in the monolingual group. The monolinguals approach complete acquisition, but there are exceptions at the age levels investigated.

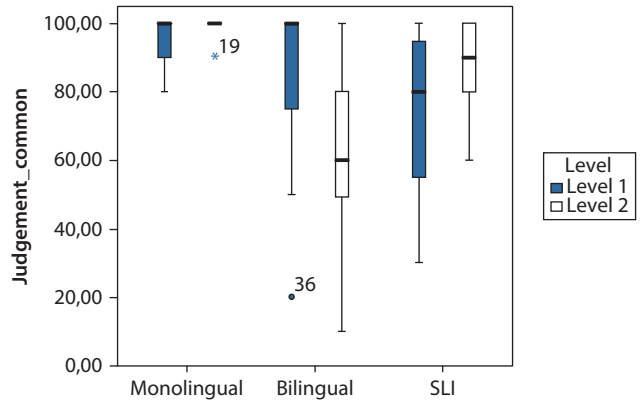

Figure 6. The group results for de-words on the Knowledge task.

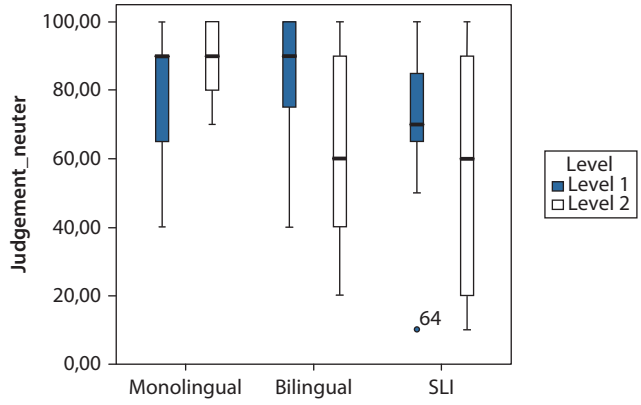

Figure 7. The group results for het-words on the Knowledge task.

Table 5. The percentage correct responses on the Knowledge task for the three groups, the two age levels and the factor grammatical gender.

Group	Age level	Common nouns (de)	Neuter nouns (het)
Monolingual (N=26)	1	95% (SD= 6.9) 105/110	78% (SD= 19.4) 86/110
	2	99% (SD= 2.6) 149/150	90% (SD= 10.6) 135/150
Bilingual (N=28)	1	83% (SD= 26.5) 91/110	82% (SD= 20.9) 90/110
	2	62% (SD= 26.3) 105/170	65% (SD= 26.5) 111/170
SLI (N=20)	1	73% (SD= 26.9) 80/110	70% (SD= 24.5) 77/110
	2	87% (SD= 14.1) 78/90	58% (SD= 33.8) 52/90

An analysis of variance on all data revealed three significant effects: a gender effect ($F(1,68)= 6.271$, $p=.015$, partial eta squared = .08), a group by age level interaction effect ($F(2,68)=5.658$, $p=.005$, partial eta squared =.143), and a group effect ($F(2,68)=12.051$, $p= .000$, partial eta squared = .262). A post-hoc Tukey analysis gave the same outcomes as the Production task. There was an overall difference between the monolingual group (performing better) and the two other groups ($p= .000$), but there was no overall difference between the bilingual and SLI group ($p= .979$). All other effects were non-significant (gender by group, $F(2,68)=1.949$, $p=.150$, partial eta squared = .054; gender by age level, $F < 1$; gender by group by age level, $F(2,68) = 1.817$, $p=.479$, partial eta squared = .051). Overall, the results for the Knowledge task produce less, and also less obvious, effects than the results for the Production task. Because of the significant interaction in which the group factor was involved, separate analyses of variance were applied to the three groups.

The analysis of variance for the monolingual group gave two significant main effects, i.e. gender ($F(1,24) = 21.183$, $p = .000$, partial eta squared = .469), and age level ($F(1,24) = 5.906.$, $p = .023$, partial eta squared = .197). The interaction effect of gender by age level was not significant ($F(1,24) = 1.586$, $p = .220.$ partial eta squared = .062). The conclusion can be drawn that although the knowledge scores are high, there is still progress between the two age levels, for both genders. The neuter gender remains the more difficult category.

The results of the bilinguals seem to be straightforward. There is no gender effect ($F < 1$) and no interaction between gender and age level ($F < 1$). The only significant effect is age level ($F(1,26) = 6.967$, $p = .014$, partial eta squared = .221), but this effect goes in the opposite direction of our prediction. The children in the

second age level seem to have more doubts about the proper gender, both for the common and neuter gender, than the children in the younger bilingual group.

The results of the SLI group are clear in the sense that none of the effects are significant (gender ($F(1,18) = 3.039$, $p = .098$, partial eta squared = .144), gender by level ($F(1,18) = 2.081$, $p = .104$, partial eta squared = .104), age level ($F < 1$)). That means that the outcome is different from the bilingual group because of the absence of an age level effect. In addition, the results hint at a gender effect, but given the wide range of scores, potential effects are difficult to trace.

3.1.3 *The production and knowledge data compared*

The production and knowledge outcomes for each of the three groups of children are summarized in a separate table. Table 6 gives the outcomes for the monolingual control group. The younger children have somewhat higher scores on the Knowledge task, but the standard deviations are several times larger for neuter, indicating larger differences between the children. The older children perform at ceiling, both in the Production and the Knowledge task.

Table 6. The monolingual group: the Production and the Knowledge task compared.

Group	Age level	Grammatical Gender	Production task	Knowledge task
Monolingual (N=26)	1	Common (de)	89% (SD= 15.3)	95% (SD= 6.9)
		neuter (het)	77% (SD= 31.3)	78% (SD= 19.4)
	2	Common (de)	97% (SD= 6.1)	99% (SD= 2.6)
		neuter (het)	89% (SD= 25.7)	90% (SD= 10.7)

The analysis of variance returned two significant outcomes, both main effects. The first one was gender ($F(1,24) = 9.526$, $p = .005$, partial eta squared = 284), the second one was age level (($F(1,24) = 6.944$, $p = .015$, partial eta squared = .224). *Het* is more difficult than *de* and the monolinguals still show progress growing older, both in production and knowledge. All other effects had F values below 1, including the main effect for task (Production versus Knowledge), and the interaction between task and the other factors. Therefore, no task effect whatsoever was found.

Table 7 presents the scores for both tasks for the bilingual children. The results are more varied than for the monolinguals. The younger group of children show a remarkable difference between the Production and the Knowledge task. In their production they achieve very high scores on *de* and very low scores on *het*. The result is an extremely complex pattern.

Table 7. The bilingual group: the Production and Knowledge task compared.

Group	Age level	Grammatical Gender	Production task	Knowledge task
Bilingual (N=28)	1	common (de)	97% (SD= 10.1)	83% (SD= 26.5)
		neuter (het)	9% (SD= 23.3)	82% (SD= 20.9)
	2	common (de)	77% (SD= 26.9)	62% (SD= 26.3)
		neuter (het)	58% (SD= 39.0)	65% (SD= 26.5)

All effects were significant except for the main effect of age level ($F < 1$). The effects are not only significant, but often strong as well: task ($F(1,26) = 10.821$, $p = .003$, partial eta squared = .294); task by age level ($F(1,26) = 18.7911$, $p = .000$, partial eta squared = .421); gender ($F(1,26) = 29.395$, $p = .000$, partial eta squared = .531); gender by age level ($F(1,26) = 13.402$, $p = .001$, partial eta squared = .340); task by gender effect ($F(1,26) = 15.286$, $p = .001$, partial eta squared = .370); task by gender by age level ($F(1,26) = 5.451$, $p = .028$, partial eta squared = .173). The two tasks clearly render different results for the bilingual children. In both tasks they are sensitive to the gender distinction, but the way they deal with it seems to be completely different. There is a clear development for *het* in the production but a small one in the Knowledge task. As for *de*, it is striking that there is regression over time in both production and knowledge.

Table 8 shows the results of both tasks for the monolingual children with SLI. Given the large standard deviations and the absence of large differences, the question is whether any significant outcomes will be obtained.

Table 8. The monolingual group with SLI: the Production and Knowledge task compared.

Group	Age level	Grammatical gender	Production task	Knowledge task
SLI (N=20)	1	common (de)	78% (SD= 32.6)	73% (SD= 26.9)
		neuter (het)	49% (SD= 35.0)	70% (SD= 24.5)
	2	common (de)	83% (SD= 24.7)	87% (SD= 14.1)
		neuter (het)	45% (SD= 37.7)	58% (SD= 33.8)

The only significant effect was gender ($F(1,18) = 11.703$, $p = .003$, partial eta squared = .394). No effects were found for task ($F(1,18) = 2.734$, $p = .116$, partial eta squared = .132), task by age level ($F < 1$), gender by level age ($F(1,18) = 1.436$, $p = .246$, partial eta squared = .132), task by gender ($F(1,18) = 1.010$, partial eta squared = .053), task by gender by level ($F < 1$), and age level ($F < 1$). It is obvious that the SLI group does not perform the same as the bilingual group.

3.1.4 *The seven identical items in the production and knowledge data*

The Production and the Knowledge task have seven nouns in common. The scores on these seven items are presented in Table 9. For a more systematic comparison it is interesting to look at these seven nouns in detail. For all the items, performance is better on the Knowledge task than on the Production task. However, the differences are much larger for the neuter nouns than for the common nouns.

Table 9. Mean scores on the seven items identical in the Production and Knowledge task

Common nouns (de)	**Production task**	**Knowledge task**
klok (clock)	82% (SD= 32.7)	86% (SD= 34.4)
pen (pen)	80% (SD= 35.0)	84% (SD= 37.1)
beker (cup)	74% (SD= 35.5)	81% (SD= 39.6)
Neuter nouns (het)	**Production task**	**Knowledge task**
huis (house)	53% (SD= 50.3)	91% (SD=29.5)
paard (horse)	57% (SD= 43.3)	73% (SD= 44.7)
bord (plate)	57% (SD= 44.3)	84% (SD= 37.1)
vliegtuig (airplane)	47% (SD= 46.0)	81% (SD= 39.4)

Paired samples t-tests show that the task effect is significant for all neuter nouns: *huis* 'house' (t(73) = -6.011, p = .000), *paard* 'horse' (t(73) = -2.510, p = .014), *bord* 'plate' (t(73) = -4.752, p = .000), vliegtuig 'airplane' (t(73) = -5.926, p = .000), but for none of the common nouns: *klok* 'clock' (t(73) = -.895, p = .374), *pen* 'pen' (t(73) = -.686, p = .495), *beker* 'cup' (t(72) = -1.150, p =. 254). This means that the participants perform significantly better on the Knowledge task than on the Production task when it concerns these particular neuter nouns, but they perform equally well on the Production task and the Knowledge task for these particular common nouns.

A test of within-subject effects again shows that there is a significant effect of task (F(1,68) = 93.496, p = .000) and also a significant interaction of task by level (F(1,68) = 3.608, p = .028). This interaction is shown in Figure 8. An analysis of variance gives a significant effect of the factor level in the Production task (F(1,73) = 7.367, p = .008), but this effect of level is not significant in the Knowledge task (F(1,73) = .559, p = .457). This means that there is a clear development in production for the participants between level 1 and 2, while this development is not present in the knowledge of the participants. A test of between-subject effects shows that there is a significant effect of group (F(2,68) = 15.968, p = .000) and level (F(1,68) = 4.783, p = .032). This means that the scores of the three groups and between the two levels also differ on only these seven items.

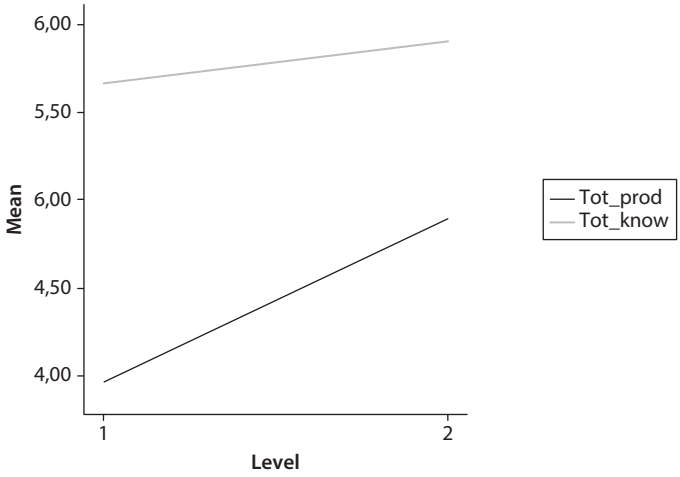

Figure 8. The interaction of task by level for the seven nouns identical in both tasks

An analysis of variance shows that there is only a significant effect of group in the Production task for the neuter nouns *paard* 'horse' ($F(2,73) = 5.932$, $p = .004$), *bord* 'plate' ($F(2,73) = 6.697$, $p = .002$), and *vliegtuig* 'airplane' ($F(2,73) = 8.388$, $p = .001$) and in the Knowledge task for only the neuter noun *bord* 'plate' ($F(2,73) = 4.539$, $p = .014$) and the common noun *beker* 'cup' ($F(2,73) = 8.166$, $p = .001$). Furthermore, there is only a significant effect of level in the Production task for the neuter nouns *huis* 'house' ($F(1,73) = 6.792$, $p = .011$), *paard* 'horse' ($F(1,73) = 4.246$, $p = .043$), and *bord* 'plate' ($F(1,73) = 4.562$, $p = .036$) and in the Knowledge task there is no significant effect of level for any of the nouns. Therefore, a similar pattern is visible for the effect of the factors group and level, both effects are specifically for neuter nouns in the Production task and are not visible or unspecific in the Knowledge task. This means that both the groups and the levels differ mostly on the production of *het*. The differences between the groups are shown in Figure 9.

3.2 Individual Patterns

3.2.1 *Production task*

The individual response patterns were examined in order to find out (i) which patterns are most frequent and (ii) which children do or do not show a target-like response pattern. Therefore, we have counted every token of *de* for the common nouns and every token of *het* for the neuter nouns. An 80% cut-off level is used to create the different response patterns (a response pattern occurring 80% or more gets a + ; a response pattern occurring less than 20% gets a −). For example, if a

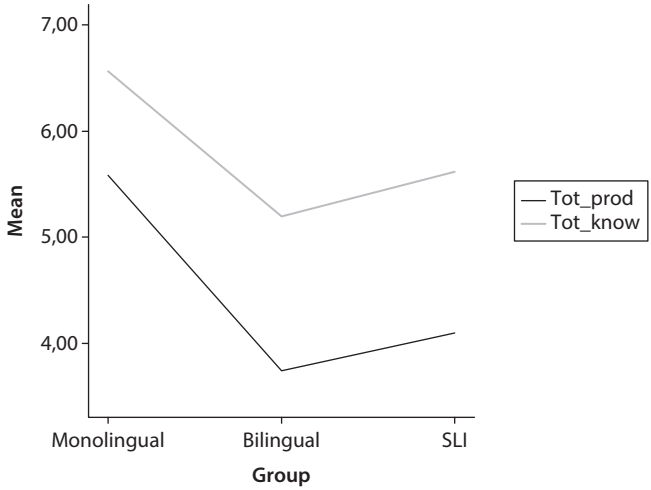

Figure 9. The results of task by group for the seven nouns identical in both tasks

child produced the article *de* for common nouns 9 out of 10 times, but also produces the article *de* for neuter nouns 8 out of 10 times, this child receives a cross for *de* with common nouns and a cross for *de* with neuter nouns. This means that the columns in Table 10 and 11 contain a plus if the score is above 80% and a hyphen if the score is below 20%. Two zeros for the same gender category means that the scores are between 20% and 80%. Table 10 reveals that the target like response pattern (+−−+) is the most frequent one (25 out of 74 children (34%), see black row). The children in the L1-TD group produce this pattern most often (20/74, 77%). The most frequent response pattern in the bilingual (13/74, 46%) and the L1-SLI (6/74, 30%) group is the one that is indicative of the overgeneralization of *de* for neuter nouns (see grey rows) (comparable to the results of Cornips and Hulk (2008) and Van Emmerik et al. (2009)). The total occurrence of this pattern is 21/74 (28%).

Another frequent pattern is the third pattern in which the common nouns are also target-like, but in which children mix *de* and *het* for neuter words (+− 00). It occurs 13 out of 74 times (18%), and it is especially frequent in the bilingual and SLI group. Other patterns occur as well, showing that the children are using different strategies in an attempt to deal with the gender puzzle. Complete overgeneralization of *het* for common nouns is rare, occurring once, in a child with SLI (−+−+).

Table 10. The individual response patterns on the Production task; + more than 80%,– less than 20%, 0 between 20 and 80% of the occurrences .

Pattern	Monolingual	Bilingual	SLI	Common (de)		Neuter (het)	
				de (C)	het (N)	de (C)	het (N)
1. (N=25)	20	2	3	+	–	–	+
2. (N=21)	2	13	6	+	–	+	–
3. (N=13)	2	6	5	+	–	0	0
4. (N=8)	1	5	2	0	0	–	+
5. (N=6)	1	2	3	0	0	0	0
6. (N=1)	0	0	1	–	+	–	+

3.2.2 *Knowledge task*

The most frequent pattern on this task was also the target pattern. This pattern is most often produced by the L1-TD children (33/74 (45%)). It is again by far the most frequent one for the monolingual children (77%). The second most frequent pattern occurring in the monolinguals is the mixed pattern for the neuter gender (+–00). This pattern also plays a main role in the other two groups (bilingual group 6 times, 21%; SLI group 6 times, 30%). The most remarkable observation is the low frequency of the pattern of overgeneralization of *de* (+–+–). It occurs only twice (3%), which is a drastic drop in comparison to the 21 times it occured in the production data (28%). This drop indicates that children apply a different strategy in the Knowledge task, that they are aware of the gender distinction when forced to make a choice, and that they know, above chance level, which words have neuter gender. Twelve children seem to make their choice randomly (their pattern is 0000). Complete overgeneralization of *het* for *de*-words is rare again, occurring once in one of the bilingual children (–+–+).

Table 11. The individual response patterns on the Knowledge task; + more than 80%,– less than 20%, 0 between 20 and 80% of the occurrences.

Pattern	Monolingual	Bilingual	SLI	Common (de)		Neuter (het)	
				de (C)	het (N)	de (C)	het (N)
1. (N=33)	20	8	5	+	–	–	+
2. (N=18)	6	6	6	+	–	0	0
3. (N=12)	0	8	4	0	0	0	0
4. (N=8)	0	5	3	0	0	–	+
5. (N=2)	0	0	2	+	–	+	–
6. (N=1)	0	1	0	–	+	–	+

4. Discussion and conclusions

The aim of this paper was to examine the hypothesis that children do not start classifying Dutch nouns according to gender. Rather, the child's grammar contains a definiteness feature only, and this results in the default production of *de* with all definite nouns (cf. also Hulk & Cornips, 2010; Unsworth et al., 2011). Children are required to establish that (i) Dutch has grammatical gender, (ii) there is agreement between D — N and (iii) acquire the features and morphology of the determiner. Our predictions were that (i) monolingual children would show more target-like patterns than the L1-SLI and the bilingual children (Orgassa 2009), that (ii) bilingual children would perform as accurately as the L1-SLI children in production tasks (Orgassa 2009), that (iii) all children would perform more target-like on the Knowledge task than on the Production task (Brouwer et al., 2008), and that (iv) in regards to development, the older children would perform more target-like than the younger children within all groups.

The results show that the monolingual group as a whole shows a typical developmental pattern of the acquisition of the definite determiners for both *de* with common nouns and *het* with neuter nouns, on both the Production and the Knowledge task, as is expected for their age. This result is confirmed by the analysis of the individual response patterns. As we predicted (iv), the older children perform better than the younger ones.

It is clear that the bilingual children and the monolingual children with SLI are delayed in comparison to the monolingual control group. Both the Production and Knowledge task show a large overall distinction between the monolingual control group and the bilingual and SLI group. This finding confirms prediction (i) that the monolingual children show more target-like patterns than the eL2 children and the L1 children with SLI. We will come back to this prediction when discussing the individual response patterns, as these reveal that the children's performances and development is not completely similar. Furthermore, the findings for the bilingual children and the monolingual children with SLI do not support prediction (iv) of an age effect. No general age effect was found.

The same negative conclusion can be drawn for prediction (iii) that all children perform more target-like in knowledge than in production (Brouwer et al., 2008; Unsworth & Hulk, 2010). There was no difference between the two tasks for the monolingual children (due to their ceiling performance), nor for the L1-SLI children, whereas the result was contrary to our predictions for the bilingual children. They performed worse on the Knowledge task. The analyses of variance gave different effects for the bilingual and L1-SLI groups indicating that the two groups did not perform alike. All groups behave differently on their path towards

target-like acquisition of grammatical gender of the definite determiner in Dutch. This difference is not only quantitative but also qualitative in nature.

With respect to the same neuter and common nouns that were offered in both the Production and Knowledge task, the children performed better on the Knowledge task than on the Production task for the neuter nouns, but they performed equally well for the common nouns. This result confirms the hypothesis in previous studies in which it is claimed that young children acquiring Dutch initially do not have a gender specification in their grammar, but a definiteness feature only which is spelled out as *de*. In this early stage of acquistion, they overgeneralize *de* to neuter nouns (Brouwer et al., 2008; Cornips & Hulk, 2008; Roodenburg & Hulk, 2008, 2009; Unsworth et al., 2011)

The individual patterns of the children convincingly reveal the distinction between the Production and the Knowledge task. A different strategy was evident in the two tasks, especially for the monolingual children who often showed the target pattern for both *de*- en *het*-words in the Knowledge task. That means that they are aware of Dutch having grammatical gender, that they have knowledge of which words are neuter and common and of how to spell-out this grammatical gender feature on the determiner. Not all stages of acquiring the gender distinction produce higher scores for knowledge than for production. The differences in response patterns between the bilingual and L1-SLI groups may indicate that these two groups are not similar in their development (contra to Orgassa 2009, p. 155: suggesting that "(..) all child groups [both SLI and bilingual groups] used the same error types (..)" and contra to prediction (ii)).

In summary, the evident differences in production and knowledge between the two age groups and the three different groups of child acquirers can be accounted for as follows: In the first stage of acquisition of Dutch, young children have no gender specification in their grammar. They only use the feature specification [definite] for which they choose *de* as the 'default' value. In a later stage, they become aware of gender as an abstract grammatical specification. In other words, they are aware that *de* and *het* are related to grammatical gender, but they do not know the right gender specification (yet). In that stage, they do not only overgeneralize *de* to neuter nouns, but they also sometimes overgeneralize *het* to common nouns (cf. Cornips et al. 2006).

We argue that the three groups of children in this study reveal different stages in the discovery that *de* and *het* are forms that both belong to the gender paradigm. Since the oldest monolingual children (level 2) produce and have knowledge at ceiling level for both *de* and *het*, they have completed this paradigm discovery. The bilingual group has not yet completed it. However, the bilingual children at level 2 have an increasing awareness of Dutch grammatical gender. This was demonstrated in the Knowledge task where they are less certain about the proper gender of

the nouns than the younger children. As a result, they may show a contrastive pattern i.e. they may use *het* for *de* instead of *de* for *het*. Subsequently, the bilinguals perform better in using *het* with neuter, but simultaneously perform worse in using *de* with common nouns on the Knowledge task, compared to the Production task. These children performed worse on the Knowledge task overall.

The children with SLI, however, are in the first stage of discovering the paradigm. They do not show any development in production or knowledge (contrary to the bilinguals), but they are aware of the gender distinction. The next step for them would be the one revealed by the bilinguals: a development in the accurate use of *het* with neuter nouns in production. The variation among the children in the L1-SLI group is too strong to trace developmental patterns. Further research with larger populations is needed to investigate the way L1-SLI children proceed in acquiring the gender distinction.

To conclude, the monolingual control group has completed the discovery of the gender paradigm, the bilingual group has not yet completed it and the children with SLI are in the first stage of discovering the paradigm at the ages investigated.

Notes

1. Alternative accounts of SLI include linguistic accounts on the one hand, such as the Missing Agreement Hypothesis (Clahsen, 1988), the Missing Feature Hypothesis (Gopnik, 1990a, 1990b) and the Extended Optional Infinitive (EOI) account (Rice, Wexler, & Cleave 1995), and non-linguistic accounts on the other hand, for example Short Term (phonological) Memory (STM) deficits (Gathercole & Baddeley, 1990), problems in the temporal processing of speech (Tallal, 1994), and the Procedural Deficit Hypothesis (Ullman & Pierpont, 2005).

2. Not all items were used in both tasks, because the production task was an extension of the initial research plan added at a later stage, and this task came from a different source than the Knowledge task.

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Appendix A

Table A.1. The first language(s) of all bilingual Dutch children tested.

Test age	Sex	L1
6;8	M	Arabic
6;10	M	Kurdish and Turkish
6;11	M	Papiamentu
7;0	M	Kurdish
7;1	M	Farsi
7;4	M	Arabic

7;5	M	Sranan Tongo
7;6	M	Papiamentu and English
7;9	M	Arabic
6;7	F	Spanish
6;10	F	Farsi
6;10	F	Moroccan-Arabic and/or Berber
6;10	F	Arabic
7;3	F	Moroccan-Arabic and/or Berber
7;3	F	Sarnami Hindustani
7;5	F	Arabic
8;1	F	Farsi or Pashto
8;4	F	Papiamentu and English
8;5	F	Brazilian Portuguese
8;0	M	Georgian
8;9	M	Spanish
8;11	M	Spanish
9;1	M	Arabic
9;1	M	Sranan Tongo
9;3	M	Arabic
9;4	M	Sarnami Hindustani
9;5	M	Papiamentu and English
9;7	M	Farsi or Pashto
10;0	M	Moroccan-Arabic and/or Berber
8;6	F	Farsi or Pashto
8;6	F	Kurdish
8;9	F	Kurdish
8;9	F	German
9;1	F	Mandarin Chinese
9;1	F	Papiamentu and English
9;4	F	Armenian
9;6	F	Sarnami Hindustani
9;10	F	Arabic

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