Do children and adults associate *elk*(*each*) with distributivity and *ieder*(*every*) with collectivity?

(Bachelorproject)

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Abstract

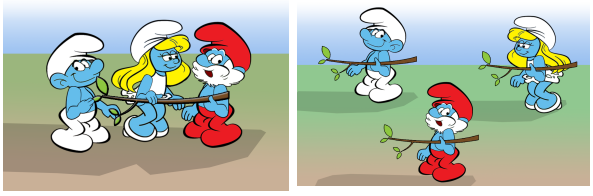
In this study two Dutch quantifiers were considered: *elk* and *ieder*. We investigated whether or not there is a distinction between them like there is between *each*, which induces a strong preference for distributive readings, and *every*, which allows both distributive and collective readings. In Experiment 1 we tested adults, older children(age 7-8) and young children(age 5-6) with a preference task. We found that Dutch does not distinguish between the two quantifiers in terms of distributivity. Older children preferred collective readings for both quantifiers, which is like child preferences for *every*, while adults preferred distributive readings for both *elk* and *ieder*. Young Dutch speaking children do not distinguish between the quantifiers; perhaps they do not understand *elk* or *ieder* yet, just like English speaking young children. The results of the first experiment showed signs of masking due to its forced choice design. We tested another group of adults in a follow-up experiment. It featured a *both* option, beside collectivity and distributivity. Adults overwhelmingly choose *both*. That preference, together with the child preferences of Experiment 1 indicate that both *elk* and *ieder* are like *every*. Dutch does not appear to have a quantifier like *each*.

1 Introduction

Consider the following sentence:

(1) Three smurfs are holding a branch.

This sentence has two readings, a collective reading and a distributive reading. The collective reading would be one where there are three smurfs, one branch, and each smurf is holding the one branch, this is depicted in Figure 1a. The distributive reading would be one where there are three smurfs and three branches and each smurf is holding its own branch, this can be seen in Figure 1b.



(a) Collective reading **(b) Distributive reading**

Figure 1: Interpretations of example (1)

To clarify which reading is intended, lexical markers can be used. In this study we explored the Dutch markers *elk* en *ieder*. They are deemed similar to the English *each* and *every*, which are universal quantifiers that can be used with distributive readings. Consider the sentence:

(2) Each smurf is holding a branch

This sentence can be used to describe a distributive event such as in Figure 1b. However, if you were to describe a collective event such as in Figure 1a, (2) is not correct. *Each* is a universal quantifier for distributivity and atomization. This is different for *every*. Consider the sentence:

(3) Every smurf is holding a branch.

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The sentence in (3) is true for both Figure 1a and Figure 1b. *Every* can be used to describe both distributive events and collective events.

Novogrodsky, Roeper, and Yamakoshi (2012) showed three stages of the understanding of the quantifiers *each* and *every* in English. The first stage is at until the age of 5, they do not yet grasp the understanding of the quantifiers and they interpret them as if there was no quantifier at all, choosing both collective readings and distributive readings equally for both markers. Around the age of 7, in the second stage, they start differentiating between collectivity and distributivity and the preferences for *each* and *every* start to differ. English speaking children start preferring distributive readings for *each* and simultaneously they start preferring collective readings for *every*. In the final stage children still prefer distributive readings for *each*, however they become more flexible with the quantifier *every* accepting several gradations of collectivity and distributivity. The final stage is the same as adult intuitions.

In this paper we investigate the Dutch quantifiers *elk* and *ieder*. It is unclear whether the Dutch quantifiers have similar meanings and learning patterns as are shown in English for *each* and *every*. There are several studies comparing the Dutch quantifiers to the English, by redoing research in Dutch or by directly comparing the two languages. Which quantifiers are considered translations of each other varies per study, and there is no clarity about the Dutch quantifiers and the intuitions people have for them. It could be that *elk* translates into *each* and *each* into *every*, or both *elk* and *ieder* could be akin to the same English quantifier in terms of distributive qualities. It would be not be suprising to find the English differences between *each* and *every* reflected in the Dutch *elk* and *ieder*. The results of several linguistic studies depend on the distributive and collective qualities of *elk* and *ieder*. In this paper we explore the distributivity, preferences and differences between them of *elk* and *ieder* and this is one of the motivations for this work.

The next section presents the theoretical background and relevant previous research. Experiment 1 was a binary preference task with children and adults, it is discussed in section three. This experiment suggested that the quantifiers might be ambigious A follow-up experiment was done to explore a third *both* option. This experiment is laid out in the fourth section. This experiment showed similarity to *every* for both quantifiers. In section five we discuss the results and conclude that both quantifiers are like *every* and that dutch does not have a distributive quantifier like *each*.

2 Background

We suspect that *elk* and *ieder* are similar to the English *each* and *every*. Before we can ascertain similarity we must define *each* and *every* and their influence on preferences.

Each and *every* are two of many quantifiers existing within English. They are generally considered distributive markers. Vendler (1962) supported this. He supposed that in English *each* and *every* are rejected with collective interpretation and are therefore distributive markers. Theoretical research by Tunstall (1998) specified the difference between *each* and *every*. Tunstall (1998) suggests that the difference between *each* and *every* is due to an event-differentation requirement contributed by *each*. In other words, *each* requires individualised events where *every* does not. Brasoveanu and Dotlacil (2015) did experiments to support this theory. Consider the following sentences from their research:

(4) A helper dyed each shirt.

(5) A helper dyed every shirt.

When interpreting the sentence in (4), one way of achieving individualised events is by inverting the scope and assuming there are several helpers each dying a shirt. Brasoveanu and Dotlacil (2015) did a study to show that native English speakers invert the scope significantly more when *each* is used in comparison to when *every* is used. This confirms the event-differentation Tunstall suggested. Consider the following sentences:

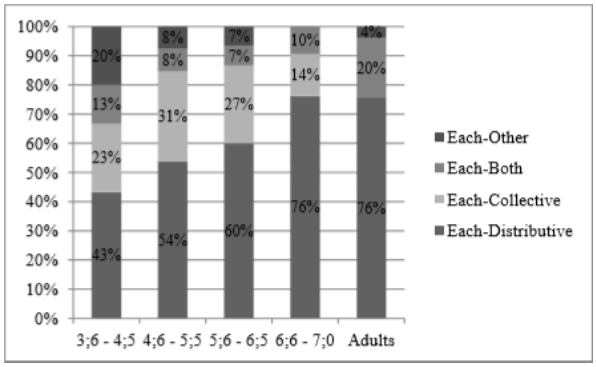
(6) A helper dyed each shirt blue.

(7) A helper dyed every shirt blue.

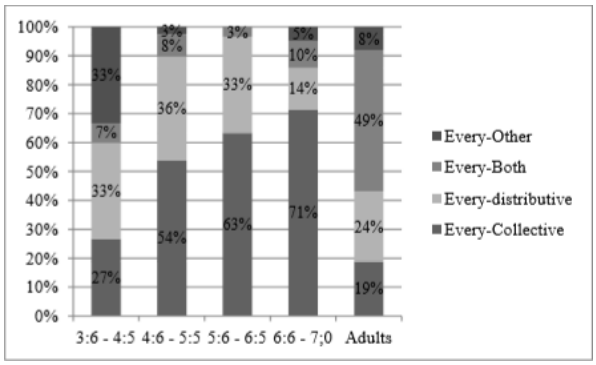
Because the result state "being blue" is in itself a distributive event, *each* in (6) is already satisfied with an individualised event. There is no longer a need to invert the scope so the amount of inverted scope interpretations for both *each* and *every* are

expected to be the same. This proved true in both experiments of Brasoveanu and Dotlacil (2015).

The acquisition path for the differences in interpretation for the two quantifiers has also been investigated. Novogrodsky et al. (2012) researched adult and child preferences for *each* and *every*. They tested 40 children aged 3;6-7;0, and 80 adults. The participants were shown stories with two characters where one acted collectively and the other acted distributively. In total there were six stories. Participants were asked a question about the actions of the character in the story with either *each* or *every*. All answers fell into four categories. Collective, Distributive, Both or Other. The results for Novogrodsky et al. (2012) are shown in Figure 2.



(a) Preferences for Each



(b) Preferences for Every

Figure 2: Preferences of English Speaking Adults and Children

For *each*, children have a slight preference for distributive readings at a young age and their preference for distributive readings increases as they grow older. Adults have a preference for distributive readings, similar to older children. For *every*, children have little to no preference at a young age. They grow into a collective reading of *every*, increasing towards a distinct preference for collective readings at the age of 7. Adults seem to have little preference and predominantly chose *both*. These results can be summarized into three stages of understanding of *each* and *every*. Children progress from indifference to preferring distributive readings for *each* and collective readings for *every*, until they become adult-like and allow *every* to have a distributive interpretation as well.

Now that *each* and *every* and the intuitions adults and children have about them are established, we can compare them with *elk* and *ieder*. Van Koert, Koeneman, Hulk, and Weerman (2015) did a picture preference study, directly comparing the Dutch *elk* to the English *every*. Van Koert tested 77 Dutch children and 75 English children between the ages of 5 and 9. Each child was presented six target trials, with two pictures: one showing a distributive interpretation and one showing a collective interpretation, similar to Figure 1 and Figure 3. Together with the pictures they showed a sentence. Participants were asked which picture best fitted the sentence. Both a Dutch and an English example sentence are displayed in (8) and (9).

(8) Deze twee plaatjes gaan over kietelen. Als ik zeg: "Elke beer kietelt een schildpad" welk plaatje past daar dan het beste bij, volgens jou?

(9) These two pictures are about tickling. If I say: "Every bear is tickling a turtle", which picture would that be, do you think?

Young Dutch speaking children chose the collective picture in 35% of the cases. This is in contrast to *every* where the young English speaking children chose the collective picture in 65% of the cases. For *elk* the distributive event is preferred most of the time by older Dutch speaking children and adults. For the older English children there is little preference for either the collective reading or the distributive reading. This is in contrast to the English speaking adults that prefer distributive readings 80% of the cases. In her dissertation Van Koert (2016) discusses *elk*, *ieder*, *alle*, *each*, *every*, and *all*. She finds that Dutch responses for both adults and children prefer distributive readings more than their English counterparts. She suggests that both

elk and *ieder* are distributive like *each* is.

De Koster (2015) confirm the difference for *elk* and *ieder*, but their results dispute the similarity with *each*. De Koster tested 114 children and 40 adults with a truth value judgement task. Participants were simultaneously presented with a picture, either of Figure 3, and a sentence, either (10) or (11).

(10) Ieder meisje wast een hond.
Each girl is washing a dog.

(11) De meisjes wassen een hond.
The girls are washing a dog.

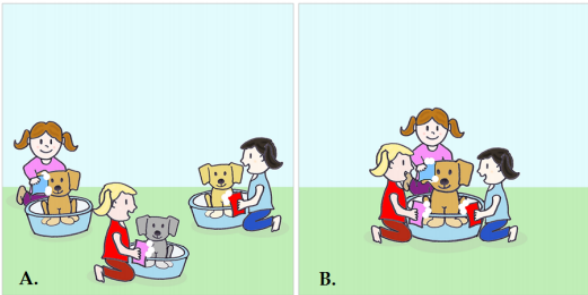


Figure 3: Pictures in Koster (2015)

Participants accepted *ieder* with a distributive picture and *de* with a collective picture as expected. 75% of 5-year-old children accepted *ieder* with a collective picture. This percentage decreased over age to 35% for 9-year-old children and adults. 35% of adults and older children accepted collective pictures with *ieder*. Since *ieder* was presumed akin to *each* these results were surprising. Instead, preferences for *ieder* seem similar to the preferences for *every*.

De Koster speculated that instead of *ieder*, *elk* could be like *each*. She tested another 24 adults with *elk* instead of *ieder*. She did not retest with children. The setup was exactly the same except that instead of (10), (12) was used.

(12) Elk meisje wast een hond.
Each girl is washing a dog.

The results of the second experiment were very similar to the results of the first experiment. Exchanging *ieder* with *elk* did not explain the acceptance of collectivity with a translation of *each*. Neither *elk* nor *ieder* appear to be translations of *each* and are more alike to *every*.

Pagliarini, Fiorin, and Dotlacil (2012) did a similar study to De Koster et al. (2015) in Italian. *Ciascun* is used as translation for *each* and *le* as translation for *the*. They used a comparable design to De Koster et al. (2015). Each participants was shown a picture and a sentence and was asked whether the sentence described the picture. The picture was either showing a distributive situation or a collective situation, similar to Figure 3, and the sentence was either (13) or (14)

(13) Ciascun bambino costruisce un pupazzo di neve.
Each boy build.3Psing.PRES a puppet of snow.
'Each boy is building a snowman.'

(14) Le bambine costruiscono un pupazzo di neve.
The girl.PL build.3PPl.PRES a puppet of snow.
'The girls are building a snowman.'

They found that children of all ages and adults accept *ciascun* with distributive and *le* with collective. This is the same as De Koster et al. (2015) found for Dutch and the same ad in English. However in italian *ciascun* is rejected with a collective picture by both adults and older children, similar to English and in contrast to the Dutch results of De Koster et al. (2015).

In summary there is evidence that intuitions of *each* and *every* differ for English speaking adults and children (Novogrodsky, 2012). It also appears to hold for other languages, which was shown for Italian (Pagliarini et al., 2012). There are strong pointers that it does not hold for *elk* and *ieder* with Dutch speaking children and adults, but current results are unclear. De Koster et al. (2015) has found evidence that both *elk* and *ieder* show similarity to *every*. In contrast, Van Koert (2016) has found evidence for both *elk* and *ieder* being like *each*. Results are not conclusive and there is thus a lot of uncertainty about the two quantifiers. To determine the distributivity preferences for *elk* and *ieder* we carries out two experiments described below.

3 Experiment 1

3.1 Methods

To ensure that our results will be easily comparable to English results, Novogrodsky et al. (2012) are a guideline for the design of our experiment.

We tested three groups of participants, adults, older children, and younger children. The ages were chosen in accordance with the learning stages apparent in English. For the category "older children", we tested 16 children from the Dutch fourth grade (ages 7 and 8). For "young children", we tested 13 children from the Dutch second grade(ages 5 and 6). Both age categories of children were tested in person at a school. We tested 17 adults, in an online environment (mean age = 32, range = 21-53, 6 male). All participants were native Dutch speakers.

The task in this experiment is a preference task with stories. Every participant is shown 12 randomized trials. Each trial consists of a story, a picture and two questions. An example of the interface of Experiment 1 is available in the Appendices. The experiment was a 2x1 design, with the Quantifier Type (*elk*, *ieder*) as controlled variable. The measured variable is the response, the collectively or distributively acting character. Stories were balanced for which event type is presented first. Questions were balanced for which quantifier appeared first. Each participant saw an equal amount of *elk* and *ieder* questions.

The stories were simple and consisted of two actors and three objects. An example of a story is given below:

(15) In het weiland staan drie dieren: een koe, een geit en een kip. De boer voert ze alle drie tegelijk. De dieren krijgen 's nachts ruzie, dus de volgende ochtend geeft de boerin ze om de beurt eten, eerste de koe, dan de geit en als laatste de kip.
There are three animals in the field: a cow, a goat and a chicken. The farmer feeds them all at the same time. The animals fight overnight, so the following morning the farmer's wife feeds them one by one. First the cow, then the goat and finally the chicken.

To determine what interpretation participants prefer, we asked them one of two questions. Example questions are given in (16) and (17).

(16) Wie gaf elk dier eten?
Who fed each animal?

(17) Wie gaf ieder dier eten?
Who fed every animal?

Underneath the question were two buttons: one with the actor of the collective reading and one with the actor of the distributive reading.

To distract attention from the questions about *elk* and *ieder*, simple questions about details of the story were asked. An example of such an extra question is shown in (18).

(18) Wie gaf de dieren 's ochtends eten?
Who fed the animals in the morning?

Underneath the question were two buttons, with two possible answers. For this question the possible answers were: "de boer" and "de boerin", the farmer and the farmer's wife respectively.

Adults were tested online. They received no reward. In written instructions, they were reminded that the experiment was designed for children and may be simple. The stories were recorded by a native speaker that is not the examiner, stories were only available auditory. The audio of the stories start automatically at the start of each trial and a replay-button is available.

We tested child participants individually and each experiment took 10-15 minutes. Participants were collected from their classroom and taken to a quiet room. The supervisor explained the setup of the experiment, told them that the stories were simple and for children of a younger age, and ascertained they had good view of the screen. For each trial the supervisor started the audio file and showed the picture on a screen. Subsequently, the supervisor read the participant a target questions and the two corresponding answers. Participants were encouraged to answer and if the participant was unable to answer, the possible answers were repeated again. Answers were registered on the laptop. Besides that, all experiments were recorded. After the target question, the filler question was asked in the same manner. Participants were told they did well for both right and wrong answers. After the experiment they were asked whether or not

Table 1: Fixed effects of full logistic mixed-effects model

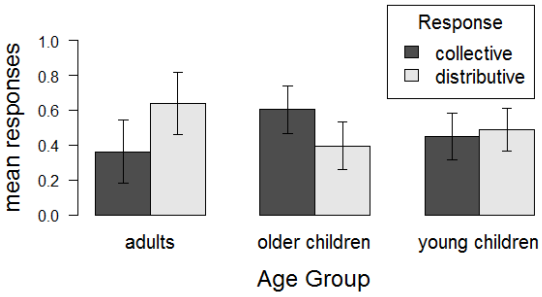
Formula: Response ∼ Quantifier Type * Age Group + (1+Age Group|Item) + (1|Subject)
Reference variable: Age Group: Adult; Quantifier Type: Elk

Predictor		SE	z-value	p-value
Intercept	*	0.35145	2.177	0.02947
Ieder		0.33295	0.171	0.86396
Young children		0.51925	-1.296	0.19486
Older children	**	0.49513	-2.592	0.00954
Ieder:Young children		0.48479	-0.184	0.85387
Ieder:Older children		0.46180	-0.348	0.72789

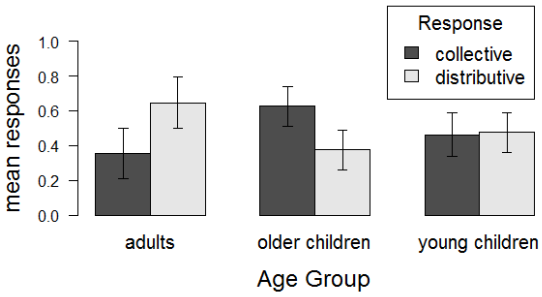
they liked it and whether or not they considered it a difficult task. They were rewarded with a sticker.

3.2 Results

The results are shown in Figure 4. No data was excluded from the analysis.



(a) Results for *elk*



(b) Results for *ieder*

Figure 4: Results per Quantifier Type

Young children made little to no distinction for both *elk* and *ieder*. Older children had a preference for a collective reading for both *elk* and *ieder*. Adults showed a preference for a distributive reading of both *elk* and *ieder*.

There was little to no difference in distributivity preferences between *elk* and *ieder* for any of the age groups.

We used R (R core team, 2016) and lme4 (Bates, Maechler, Bolker, and Walker, 2015) to perform linear mixed effect analysis on our data. Both Age Group and Quantifier Type were used as a predictor. The Response was the target variable. The resulting model output can be seen in Table 1.

The AIC values were compared to determine which model best fit the data, with a complex model being preferred over a simpler model only if its AIC value was less than two.

We found a significant effect for Age Group, but not for Quantifier Type. The interaction between the two was not significant either. Random slopes for Subject were not significant by model comparison fitted either by Quantifier Type or Age Group. Random slopes for Item were best fitted by Age Group and were significant by model comparison.

To further specify the effect of Age Group, a Tukey all-pair comparison was used. Older children chose the distributive option significantly less often than adults chose the distributive option(z=-2.595, p=0.0256). There was no significant difference between young and older children (z=-1.183, p= 0.4632). There was no significant difference between adults and young children (z=-1.299, p=0.3955). A summary of the model that best fits the data is given in the appendices.

3.3 Discussion

Young Dutch speaking children showed no preference for either reading for both *elk* and *ieder*. This is the same as it is in English, as seen in the results of Novogrodsky et al. (2012). Similarly to young English speaking children, young Dutch speaking children did not seem to understand the distributive distinction between these quantifiers until they are older.

Dutch speaking children showed a preference for a collective reading for both *elk* and *ieder*. This is in contrast to English intuitions, where children develop different preferences for *each* and *every*. The event-differentiation requirement that defines the difference between *each* and *every* seems absent in Dutch, as was also found by Van Koert (2015) and De Koster (2015). The difference between *elk* and *ieder* seems unrelated to distributivity Both quantifiers are treated like *every*.

We found that Dutch speaking adults show a strong preference for distributive readings with both *elk* and *ieder*. This was unexpected. English speaking adults have little to no preference for either a distributive reading or a collective reading with *every*. The similarity to *every* found for both Dutch quantifiers with older children is not present in adult results. English speaking adults do have a preference for a distributive reading with *each*. Adult preferences for both *elk* and *ieder* seem like *each*.

One of the problems of using stories for child research is that the stories have to be listened to, since not all children can read. Listening to the stories requires a lot from the working memory. To aid in remembering all the objects, a picture was added to each trial that depicts the three objects in the story.

The stories used are quite simple and short. To prevent adult participants from guessing the purpose of the experiment fillers were used.

With only two responses available, when there is no difference in preference you expect people to pick randomly. This would result in an equal distribution between both options, collectivity and distributivity in this experiment. Considering the size of the test population, this distribution might not be completely even, despite actual preferences being equal.

In the study by Novogrodsky et al. (2012) adults choose *both* for *every*. A *both* option might give clearer results, since the distributive tendency of adults disputed similarity with *every*. If both quantifiers are truly like *every*, adults preferences should skew towards both. We performed another experiment to test this, which is described in the following section.

4 Experiment 2

4.1 Methods

We tested a group of six adults (mean age=22, range=18-26, 1 male). Due to time constraints we could not redo the experiment with children as well. People that participated in Experiment 2 did not participate in Experiment 1.

As with Experiment 1, the interface consists of an image with 2 questions underneath it. Each participant is shown 12 random trials. The stories and questions are balanced for quantifier, similar to Experiment 1. Experiment 2 is performed online, just like Experiment 1. The same 12 stories were used, with the same audio files. The questions were the same as well. Instead of two buttons underneath the target question there were three buttons, one with the collective actor, one with the distributive actor, and one with the text *both*. An example of such a question is shown in Figure 6. The procedure

Figure 5: Results for second experiment with *both* option

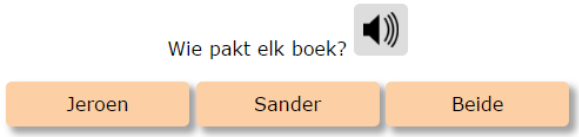


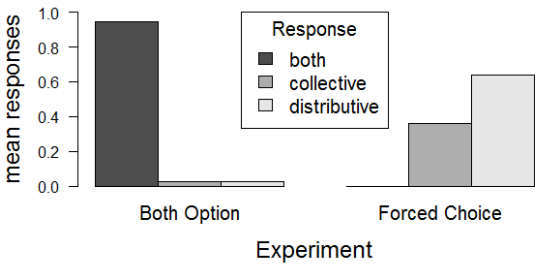
Figure 6: Example Both Question

was the same as Experiment 1.

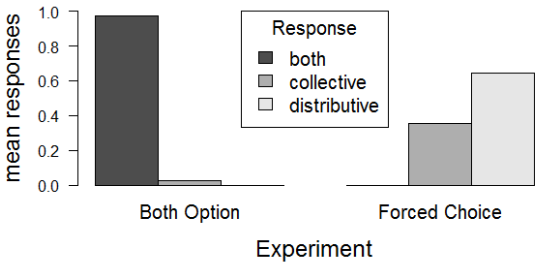
4.2 Results

The results can be seen in Figure 7. Participants overwhelmingly choose the *both* option. Again there is little to no difference between *elk* and *ieder*.

Because the amount of participants is too low to show significance, no further analysis is performed.



(a) Results for *elk*



(b) Results for *ieder*

Figure 7: Results for second experiment with *both* option

4.3 Discussion

When the option for both interpretations is provided almost all adults choose it for both *elk* and *ieder*. The forced choice design of the experiment was indeed masking similarities.

The adults abandoned their previous preference for distributivity and showed that they indeed treated the Dutch quantifiers like the English *Every*. This is similar to the older Dutch speaking children that already showed comparable preferences and younger children that act as young English speaking children do as well.

The number of participants for the follow-up experiment is very low. Due to the circumstances a significant difference could not be proven. The results are merely an indication of preferences of the actual population.

5 General Discussion

The first thing that stands out in our results are the different intuitions for *elk* and *ieder* we found compared to the intuitions Novogrodsky et al. (2012) found for *each* and *every*. The Dutch and the English quantifiers are thus not 1 on 1 translations. *Each* and *every* are distinct from other markers in their distributive qualities (Vendler, 1962). The difference between *each* and *every* is an event-differentation requirement contributed by *each* (Tunstall, 1998; Brasoveanu and Dotlacil, 2015). Both *elk* and *ieder* have the same distributive character as *each* and *every*. However, the event-differentation quality is missing. Neiter *elk* nor *ieder* require individualised events like *each* does. They do show similarity to *every*. Dutch does not seem to have a distributive marker that requires individualised events like *each* does. The translations of markers may not be as straightforward as we thought. Other markers may have different properties as well. Van Koert (2016) proposes similar differences for *alle*(*all*). In her dissertation she remarks that there is no quantifier in Dutch that pushes for a consistent collective interpretation, since *alle* receives both distributive readings and collective reading. There appears to be a difference between quantifiers in Dutch and in English across the entire distributive spectrum.

The second thing that stands out is that there seems to be no difference between *elk* and *ieder*. In both experiments for all groups the results for *elk* and *ieder* differed little to none. De Koster (2015) found the same when she replaced *ieder* with *elk*. *Elk* and *ieder* still exist separately and some semantic difference may exist. The difference may be related to whether or not it is used for an non-person or a person. *Elk* is preferred for non-persons and *ieder* is preferred for persons (ANS, 1997). In this research both non-persons and persons were used to quantify over. They were not balanced over trials so their influence cannot be ascertained. Further research is needed to determine if quantifying over persons or non-persons does explains the difference between the quantifiers *elk* and *ieder*.

Novogrodsky et al. (2012) found that English speaking children have a preference of distributivity for *each* and a preference for collectivity for *every*. Research into child preferences has shown that they sometimes prefer symetric or maximal

responses instead. An explanation for this is that instead of evaluating and thus preferring collectivity or distributivity, many children simply prefer exhaustive situations. Roeper, Pearson, and Grace (2015) support this with the results of a truth-value judgement task. They tested 38 children, aged 5;4 to 9;4, and 40 native English speaking adults. An example of an item is shown in Figure 8. In this picture three options are shown:

- A: collective(not distributive) and not exhaustive
- B: distributive and not exhaustive
- C: not 1-1 distributive and exhaustive

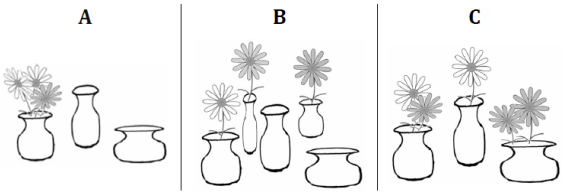


Figure 8: A Trial of Roeper et al. (2011)

Each participant was told a sentence, first one with *every* (19) and then one with *each* (20). Participants were asked which picture best fitted the sentence. Children could answer with none, all or any of the options in the picture (Figure 8).

(19) Every flower has a vase.

(20) Each flower has a vase.

The main difference between adults and children is that adults accept all options for *every* while children mostly prefer option C, preferring all flowers to have vases and thus exhausting the vases There is also a strong difference between adults and children for *each*. Adults show a preference for B. Children, however, specifically reject B, preferring one of the other options. Instead of evaluating distributivity children appear to evaluate exhaustivity.

Brooks and Braine (1996) further clarified the relation of exhaustivity and child preferences with a picture preference task. They tested 70 children and 10 adults. Two types of pictures were used, one with extra subjects and one with extra objects. People where shown both pictures and asked which one best fitted the sentence shown. For *each* either of two sentences was used:

(21) Each man is lifting a box.

(22) A man is lifting each box.

When *each* is in subject position (21) a picture with excess subjects is not correct and a picture with excess objects is correct. Each man is lifting a box even if there are two boxes left, but not when there are men not lifting anything. Consequently, when *each* is in object position (22) a picture with excess objects is not correct, but excess subjects are okay. Children were shown either sentence and were asked which picture best fitted the sentence. They found that until seven children randomly guess, accepting both correct and wrong scenarios. It takes until the age of 7 for children to correctly reject excess subjects when *each* is in subject position. Children do not correctly reject excess objects with *each* in object position until the age of 9.

Drozd and Loosbroek (2006) suggest that, when making these mistakes, children check for expected frequencies based upon context rather than applying the relational interpretation of the quantifier. In example (21) that means they check if the set of box-lifting men matches the amount expected due to context, rather than checking if a set of men is lifting boxes. They propose children are trying to analyse "*each* man" when a set of men has not been determined. Their experiment shows that children perform better when the set that is quantified over is explicitly brought to their attention before presenting the trial. For the similarity between *every* and *elk* and *ieder* to hold, similar spreading behaviour for *elk* and *ieder* should exist in Dutch. Spreading was not present in this experiment, since there were no extra objects or subjects in any of the trials.

The learning appears to differ depending on the position of the quantifiers. There may be other differences between the positions underlying these differences. Consider the following sentences:

(23) Each smurf holds a branch.

(24) A smurf holds each branch.

There are two sentence positions that leave room for quantifiers, the subject position (23) and the object position (24). When in subject position, the quantifier directly influences the number of people or objects involved, but the events can happen simultaneously. While a quantifier in object posi-

tion can also induce time distributivity. In (24) the smurf may hold each branch at a different point in time, thus distributing the events over different moments in time. All stories used in this study were time distributive.

In English the the difference between *each* and *every* seems stronger when quantifiers are in subject position. This was already pointed out by Brasoveanu and Dotlacil (2015), who showed that the inverse scope specifically takes place in subject position. That children take longer to learn adult behaviour for object position (Brooks and Braine, 1996) also supports this. This research has quantifiers in object position which may make it harder to discern a difference in meaning. Novogrodsky et al. (2012) did an experiment where quantifiers were also in object position and found the known difference clearly. Therefore English-like tendencies should still have showed in this research, but they didn't. In addition, De Koster (2015) did a study with quantifiers in subject position and she found no difference between *elk* and *ieder*, supporting that a difference is really absent in Dutch.

5.1 Conclusions

In this study we compared the Dutch quantifiers *elk* and *ieder* and the intuitions that adults and children have for them. We compared them to the English quantifiers *each* and *every* and intuitions of both adults and children for them. To do this we performed a binary preference task and a preference task with a *both* option. Young children choose randomly, elder children preferred collective options and adults preferred distributive in the forced choice experiment. When a *both* option was introduced adults stopped choosing distributive and choose *both*. The second experiment was not done by children. In neither experiment was there any difference in the intuitions for *elk* and *ieder* for any age group. Originally there seemed to be no similarity with either of the English quantifiers. After the adult preferences changed in Experiment 2, however, both quantifiers seem to be treated like *every* is in English.

The data suggest that there is no quantifier like *each* in Dutch. Van Koert (2016) noted that there is a discrepancy between *all* and *alle* as well. In English *all* mainly receives collective interpretations. While in Dutch, *alle* received an near equal amount of distributive and collective readings. She proposes that instead of having three types of distributivity markers, Dutch has a dichotomy. This clearly suggests cross-language differences. Further research should be done to compare other quantifiers in English and Dutch.

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Appendix A Example of Experiment

Figure 9: Example of Interface

Appendix B Final Model

Table 2: Fixed effects of the final logistic mixed-effects model

Formula: Response $\sim$ Age Group + (1+Age Group|Item) + (1|Subject)

Predictor		Estimate	SE	z-value	p-value
Intercept	*	0.8539	0.3701	2.307	0.0211
Young children		-0.7186	0.5473	-1.313	0.1892
Old children	*	-1.4865	0.5984	-2.484	0.0130