Young Children's Understanding of Ongoing vs. Completion in Present and Perfective Participles

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1. Introduction

There has been a vast amount of cross-linguistic research on the morphology of the grammatical aspect especially with respect to the perfective-imperfective distinction, starting with Brown (1973) and de Villiers and de Villiers (1973). Children's comprehension of perfective-imperfective distinction is discussed in Weist, Sysocka & Lyytinen (1991), van Hout (in press), Vinnitskaya & Wexler (2001), Wagner (2002) and others. However, not much research has been carried out on the acquisition of present and perfective participles.

Examples of the present and perfective participles that we are concerned with in this paper are listed in (1a) and (1b):

(1) a. burning candle / boiling water / melting ice cream (present participles)
b. burned candle / boiled water / melted ice cream (perfective participles)

The difference between (1a) and (1b) is intuitively very simple; in the first case, the candle must be in the middle of burning, whereas in (1b), the burning must be over. Klein (2002) argues that the addition of the *-ing* morpheme selects a subinterval of the verb stem, whereas, "the post time introduced by *-ed* overlaps with the second time in verb stems". Bresnan (2000) and Haspelmath (1993) point out that almost any verbs may undergo adjective conversion with the present participles, but that only telic verbs can appear as perfective participles; see (2) and (3):

(2) a. wilting lettuce — lettuce that is wilting (telic)
b. running child — child who is running (atelic)

(3) a. wilted lettuce — lettuce that has wilted
b. *run child — child who has run

Klein (1994; 2002) proposes that telic and atelic verbs have different 'argument-time' structures. Telic verbs such as *wilt* and *elapse* have '2-state contents': a source state and a target state. The post time of 'the lettuce wilted' is characterized by 'wilted lettuce' as in (3a). By contrast, atelic verbs have '1-state contents', which are not compatible with *-ed*. The post time of 'the child ran' cannot be characterized by 'the run child' as in (3b). This is because *-ed* picks out the second time variable and the verb *run* does not include this second time variable or the target state.

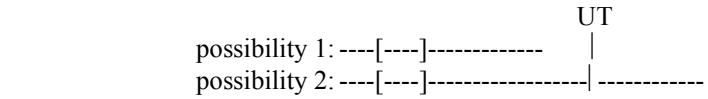
Weist, Sysocka and Lyytinen (1991) and Wagner (2002) investigated children's comprehension of the perfective-imperfective distinction in examples such as (4a) and (4b):

(4) a. The girl was drawing a flower.
b. The girl drew a flower.

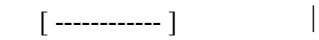
Weist, Sysocka and Lyytinen (1991) found that English and Polish children as young as 2;6 succeeded in a forced-choice sentence-to-scene matching experiment. These young children correctly matched a picture of an incomplete event to (4a) and a picture of a completed event to (4b). Wagner (2002), however, argues that in her experiment, children had to be at least 5 years old to succeed in matching (4b) to a picture of a completed event. Wagner (2002) argues that the participants in Weist, Sysocka and Lyytinen's (1991) experiment performed better at a younger age because they were given cues about the intention of the agent. The pictures used in the experiment included a smiling girl next to a completed event (the girl was happy to finish drawing a flower). In the incomplete picture, there was a girl who was in the middle of drawing a flower. Wagner (2002) proposes that young children are extremely sensitive in assessing the intention of agents; hence, the pictures of the agent helped the participants to perform well in the experiment. In Wagner's (2002) new study, there was no picture of an agent. For example, only the pictures of two flowers would have been shown in the stimuli such as (4) (Wagner used a sentence 'draw a face' in her experiment). The participants were not given any cue about the intention of the agent and the younger participants (ages 2 to 4) failed in matching a picture of a completed event to a sentence such as (4b). In the experiments reported in this paper, we followed Wagner (2002); no cues were given about the agents of completed and incomplete events.

There is one difference to note between the participle examples in (1) and grammatical aspect stimuli in (4). This is that the sentences in (4) include a past tense, while the stimuli in (1), being NPs (Noun Phrases), do not include any finite markers. According to Dowty (1979), Klein (1994), among others, the perfective aspect in (4b) entails that the event of drawing a flower is complete; on the other hand, the imperfective aspect in (4a) remains neutral about the completion of the event. Klein represents (4a) and (4b) as in (5a) and (5b) on the time line:

(5) a. The girl was drawing a flower.



b. The girl drew a flower.

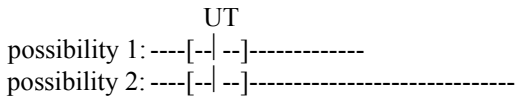


Let us look at the diagrams in (5) closely; ---- represents the situation when the girl was drawing a flower (Klein (1994) calls it *a situation time*), [ ] represents the *Topic Time*, for which the assertion 'the girl was drawing a flower' was made, and | represents the Utterance Time. Klein argues that the progressive aspect places the Topic Time within the situation time as in the two possibilities in (5a). A past tense places the Topic Time in the past with respect to the Utterance Time. Since it is left open whether or not the event of drawing a flower is completed or not, there are two possibilities. In possibility 1, the event of drawing a flower is completed before the Utterance Time. Alternatively, in possibility 2, the girl is still drawing a flower at

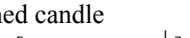
the Utterance Time. Let us now move to the perfective case in (5b). Klein (1994) argues that in (5b), the target state was reached within the Topic Time. This explains why the use of the past tense entails that the event has been completed.

As discussed above, the stimuli used in the experiments reported in the paper are tenseless; hence, the Topic Time is always placed at the same time as the Utterance Time. (1a) and (1b) are represented as in (6a) and (6b) on the time line:

(6) a. burning candle



b. burned candle



"A burning candle' in (6a) has the same interpretation as in (4a) in the sense that there is no entailment whether or not the event gets completed at the later stage. However, this later stage is irrelevant at the time of Utterance in (6a) because the event must be ongoing at the Utterance Time. This distinguishes (6a) from (5a). In (5a), it mattered whether or not the event is completed before the Utterance Time. Possibility 1 in (5a) included a completed interpretation whereas Possibility 2 included an ongoing interpretation. On the other hand, in (6a), both Possibilities 1 and 2 include an ongoing interpretation. This is because there is no past tense included in (6a) that places the Topic Time in the past with respect to the Utterance Time. Finally, (6b) is quite simple as it was the case in (5b). 'A burned candle' entails that the target state of 'burning' has been reached before the Utterance Time.

The first experiment reported here investigates whether or not young Dutch children succeed in matching (6a) to a picture depicting an ongoing event and matching (6b) to a picture depicting a completed event. The second experiment employed the grammaticality judgment task using three pictures. Picture 1 depicted the scene where a ship is starting to sink. Picture 2 depicted the scene where the ship is half-sunken. Finally, Picture 3 depicted the scene where the ship has sunk to the bottom of the ocean. The children were asked to judge whether a statement made by a moon-fish puppet such as "here is a sinking ship" is a grammatical description for each of the pictures. Adults accept 'a sinking ship' as a correct description of both Pictures 1 and 2 and 'a sunken ship' as correct for Picture 3.

2. Experiment 1: Methods

2.1 Subjects

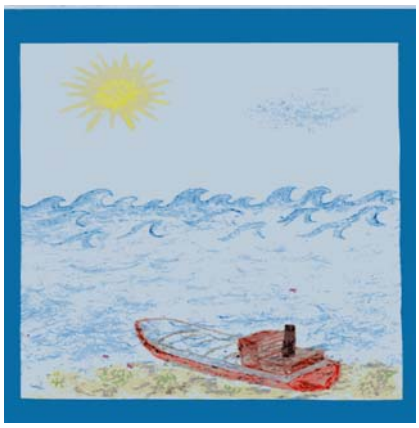
25 Dutch monolingual children between 2;0 and 5;11 plus six adults participated in the experiment. The experiment was carried out at Nijmegen area elementary schools in June 2002. The subjects were divided into four age groups.

2.2 Stimuli

There were two sessions: each session included seven different events. These events were all described using telic predicates (the Dutch forms *of burn, char, fall,*

run empty, melt, sink and *close*). The participants were shown 2 pictures (completed and incomplete events) and they were asked to choose one picture to answer a question such as 'give me the picture of the burning candle'. This method resembles the one in Wagner (2002) in that no agent cue was given. However, it differs from Wagner's in not being a forced choice task. The example pictures for 'zinken' "sink" are shown in (7). (7a) depicts an incomplete and (7b) depicts a completed scene:

(7)



The second session was run 2 weeks later. This session included the same 7 verbs as in the first session; however, the participants were asked to 'give me the picture of the burned candle', using a perfective participle, if they were asked about a present participle in session one (see (8)). Half of the participants did session 1 first and the other half did session 2 first. The test sentences were randomly ordered.

(8) stimuli used in 2 sessions in Experiment 1

session	verbs in English	verbs in Dutch	present/perfective participle?
1	burn	*brandende*	present
1	fall	*gevallen*	perfective
1	run empty	*leeglopende*	present
1	melt	*smeltende*	present
1	char	*aanbrandende*	present
1	sink	*gezonken*	perfective
1	close	*gesloten*	perfective
2	burn	*gebrande*	perfective
2	fall	*vallende*	present
2	run empty	*leeggelopen*	perfective
2	melt	*gesmolten*	perfective
2	char	*aangebrande*	perfective
2	sink	*zinkende*	present
2	close	*sluitende*	present

As discussed above, all the test sentences were tenseless in contrast to Weist, Sysocka and Lyytinen's (1991) and Wagner (2002).

2.3 Procedure

Each session consisted of 7 test and 4 control sentences. For children, 2 experimenters were involved; one experimenter showed them 2 pictures at a time and asked them to choose the right picture. The exact command was in (9):

(9) Wil je mij het plaatje geven met de brandende kaars?
Will you me the picture give with the burning candle
"Will you give me the picture with the burning candle?"

The second experimenter wrote down responses. Each session lasted 15 minutes; all the sessions were videotaped for later analysis. Adult participants were given a questionnaire with the same pictures as the child experiment. 3 adults were given sentences used in Session 1 and the other 3 were given sentences from Session 2.

2.3 Results

The overall results from 5 groups are shown in Figure 1. There was no verb that caused problems. As shown in Figure 1, 2-year-olds performed at chance in both perfective and imperfective (ongoing) trials, although the imperfective trial was slightly better. The performance by 3-year-olds improved in the imperfective trial but remained at a chance level in the perfective trial.

In the perfective trial, a sharp improvement in children's performance is observed between ages 3 and 4. Notice that this improvement was found between ages 4 and 5 in Wagner's (2002) results (reproduced in Fig. 2 below). After the improvement in the perfective trial, the performance in both perfective and imperfective trials stayed parallel and it gradually improved together across age groups. A paired-*t* test showed that there was no difference in the responses given to perfective and imperfective trials within each age group.

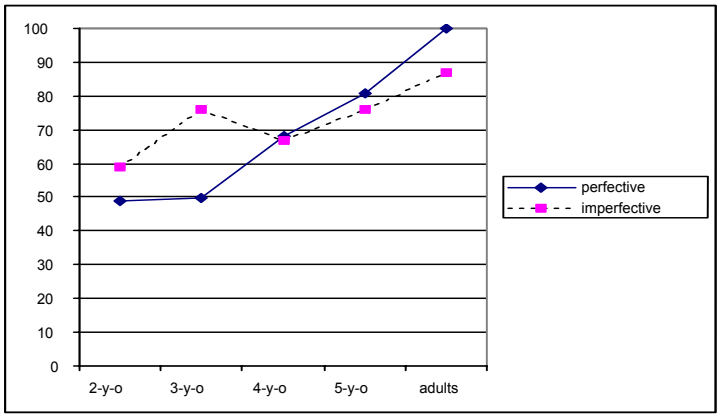


Fig. 1: % correct in Experiment 1 for 5 subject groups

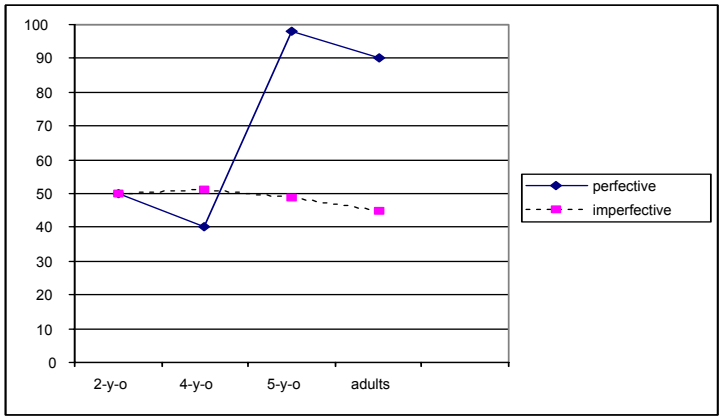


Fig. 2: % correct in Wagner (2002) for 4 subject groups[1]

A mixed design ANOVA was run with age group (2, 3, 4 and 5-year-olds) as a between subject factor and aspect (imperfective vs. perfective) as a within subject factor; there was a main effect of age ($F(3, 20)=4.812$, $p<0.01$) but no effect of aspectual types nor an interaction of age and aspectual types. Post-hoc comparisons were run to see which age groups were involved in the main effect of age. There was a significant difference between 2 and 5-year-olds ($F(1, 20)=11.291$, $p<0.003$); the difference between 2 and 4-year-olds failed to reach significance: ($F(1, 20)=3.317$, $p=0.08$). The difference between 2 and 3-year-olds on one hand and 4 and 5-year-olds on the other was also significant: ($F(1, 20)=6.199$, $p<0.03$). 3-year-olds were significantly difference from 2-year-olds ($F(1, 20)=6.269$, $p<0.02$) but they were not different from 4-year-olds.

2.4 Discussion

The results of this experiment, then, are consistent with Wagner's (2002) results and run contrary to those of Weist, Sysocka and Lyytinen's (1991). It seems as if younger children do not control the perfective/imperfective distinction (in the absence of cues about the agents' intentions). Using a different construction, namely present and perfective participles, and another language, namely, Dutch, again shows a gradual development in children's distinction of aspects.

The results diverged from those in Wagner's (2002), however, in two respects. First, Dutch 4-year-olds performed better in the imperfective-perfective distinction involving participles. Wagner (2002) claims that children do not understand the entailments induced by the imperfective-perfective distinction until age 5. In this experiment, Dutch children start performing like adults in the aspectual distinction at age 4.

Second, the imperfective trials in Wagner (2002) had a lower mean of correct responses, resulting in significant difference between perfective and imperfective trials by 5-year-olds (2002:118). This was due to the fact that the imperfective test sentences in Wagner lacked the completion entailment. Wagner (2002) notes "five-

[1] These figures are estimates based on Figure 1 on page 118 in Wagner (2002).

year-olds remain agnostic about where to match the imperfective sentence (in accordance with the imperfective lack of entailments)" (2002:120). As discussed in the Introduction, this entailment was irrelevant in the stimuli in the paper and there was only one answer for the imperfective trial: an incomplete event. Possibly, for this reason young children performed well in the imperfective trials from early on (age 3). Related to this point, it is worth noting that young children (2 and 3-year-olds) performed better in the imperfective trial than the perfective trial in both Wagner's and this study. This contrast (imperfective better than perfective) then diminishes as children show an improvement in the perfective trial, and eventually, the crossover emerges slightly earlier in the Dutch study of participles (around age 4) than the English study using grammatical aspect (between ages 4 and 5).

The second experiment tested something that Weist, Sysocka and Lyytinen's (1991) and Wagner (2002) were not concerned with; namely, how children behave when the events are depicted in three different stages, instead of two.

3. Experiment 2: Methods

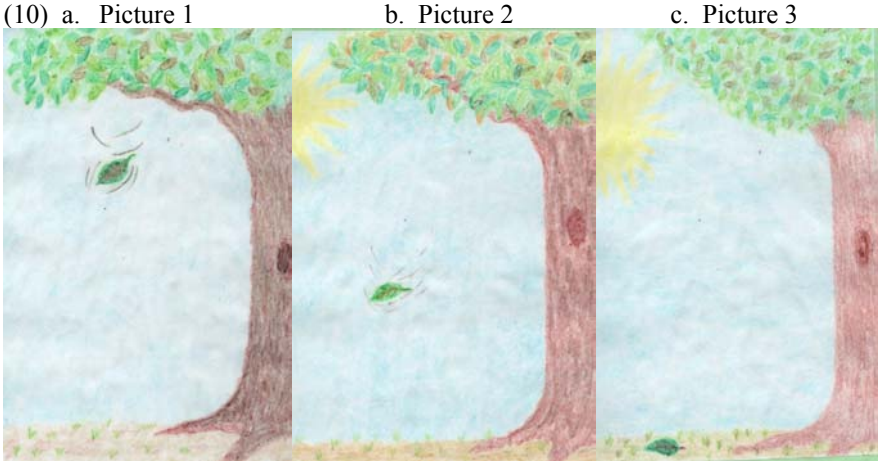
3.1 Subjects

64 Dutch monolingual children between 4;4 and 9;11 plus 7 adults participated in the experiment. The experiment was carried out at Nijmegen-area elementary schools in June 2003. Adult participants were tested at the Max Planck Institute and they were all native speakers of Dutch. There were no overlaps with the subjects who took part in Experiment 1.

3.2 Stimuli

The same 7 events as in Experiment 1 with telic predicates were used but with three pictures. One picture was added to show the 'in-between' event; the complete set of the pictures were now as in (10) (for *vallen* "fall"):

(10) a. Picture 1 b. Picture 2 c. Picture 3



(10a) represents the event that just started, (10b) depicts the event halfway between the beginning and its completion; finally, the completed event is shown in (10c). A

picture choice task used in Experiment 1 only detects the preference of the participants; in other words, it is rare for children to choose two pictures even when there are two pictures that match the description. To address this problem, the grammaticality judgment task (de Villiers and de Villiers (1974), McDaniel and Cairns (1990), and Hiramatsu and Lillo-Martin (1998)) was used, and separate questions were asked for each picture. There were 21 test sentences in each version (plus two warm-up sentences in the beginning). No subjects received both present and perfective participles for the same picture. All the test sentences were given in random order.

3.3 Procedure

For the experiment with child participants, there were two experimenters involved. The first experimenter wore a hand puppet and had a role of a moon-fish called Lulu. At the beginning of the experiment, we explained to the children that Lulu comes from the moon and she is learning Dutch. Since she is very young, she needs help from the children. The children were asked to give Lulu some stickers if she named the pictures in correct Dutch but asked to give Lulu some watermelon if she made mistakes. The children were told that watermelon makes Lulu smarter. After some warm up sentences (usually one grammatical and one ungrammatical), the second experimenter laid three pictures on a table in front of a subject. Lulu pointed at each picture and said something like the utterances in (11):

(11) a. Wat een grote boot! Het is een gezonken boot.
what a big boat this is a sunken boat
"What a big boat! This is a sunken boat."

b. Oh, hier is een zinkende boot.
oh, here is a sinking boat
"Oh, here is a sinking boat."

c. En, dit is een gezonken boot.
and, this is a sunken boat
"And this is a sunken boat."

We encouraged children to evaluate Lulu's Dutch; the ideal child participant should give Lulu a sticker in (11b) and (11c) but a watermelon in (11a). The experiment took between 25 and 30 minutes and all sessions were videotaped for further use. For adult participants, we employed a pen-and-paper grammaticality judgment task. We showed the participants the same pictures that were used in the child experiment and asked them to mark whether each description was grammatical or ungrammatical. We collected data from one adult subject for each of the 7 versions.

3.4 Results

The overall results from six different groups are shown in Fig. 3. All verbs in all versions produced similar results. Fig. 3 shows that the performance by children was not as good as in Experiment 1; this is not surprising given the added complication of an extra scene. In addition, the grammaticality judgment task is

more difficult than a picture choice task. Many children over accept Lulu's utterances as grammatical.

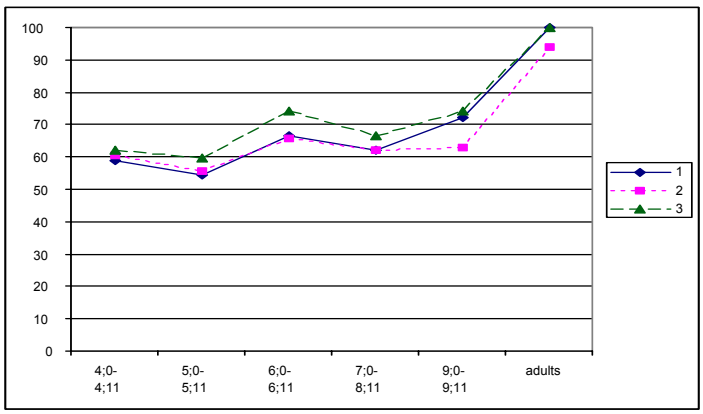


Fig. 3: percentage of correct responses for 3 stages in Experiment 2

As was seen in Experiment 1, 4 and 5-year-olds performed better in the perfective trial (picture 3) than the imperfective trials (pictures 1 and 2). In fact, for all 5 age groups, picture 3 was the easiest picture. We also observed a gradual improvement in both incomplete and completed scenes in pictures 1 and 3. However, picture 2 continued to be difficult even for 9-year-olds, where performance remains just above chance (63%). The following two figures in (Fig. 4 and 5) compare the % correct responses when the expected answers were 'correct' vs. 'wrong'.

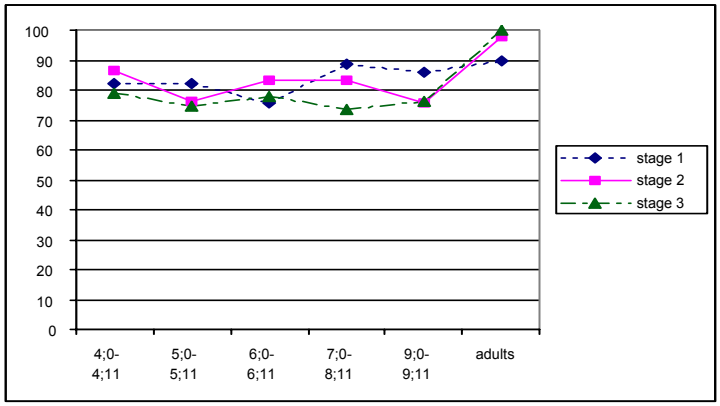


Fig. 4: % correct when the expected answer is 'correct'

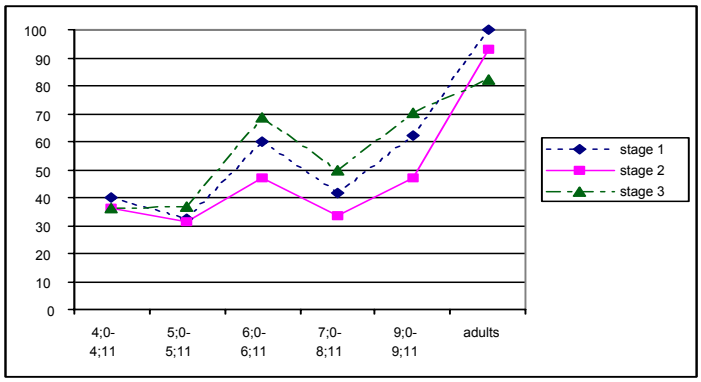


Fig. 5: mean correct when the expected answer is 'wrong'

Fig. 4 shows that even within the youngest group, children's performance is near ceiling in accepting a grammatical description. Fig. 5 confirms the traditional belief that it is difficult for children to evaluate ungrammatical expressions as ungrammatical; in other words, rejection is harder than acceptance. We observed some development across age groups; however, stage 2 remained to be the most difficult. Figure 5 narrows down children's difficulty in Experiment 2 as rejecting a description with a perfective participle such as 'a fallen leaf' as a grammatical description for a stage 2 picture. Combining Figures 4 and 5, what is found in this experiment is that young children consider that both 'a falling leaf' and 'a fallen leaf' to be grammatical for stage 2 pictures.

A mixed design ANOVA with age group (4, 5, 6, 7 and 8-year-olds) as a between subject factor, and aspect type (perfective and imperfective) and picture (stage 1, 2 and 3) as within subject variables with percentage correct as the dependent variable revealed a main effect of age ($F(4,59)=3.474$, $p<0.01$) along with a main effect of aspect type ($F(1,59)=25.382$, $p=0.0001$) and picture ($F(2,59)=3.265$, $p=0.04$). Post-hoc comparisons were carried out to find out exactly which pictures and which age group were responsible for the significant differences in the percentage of correct answers. As for pictures, it was clear that there was no difference in terms of the percentage of correct answers between pictures 1 and 3, or between pictures 2 and 3. There was a significant difference between pictures 1 and 2 ($F(1,59)=5.145$, $p=0.02$). The post-hoc comparison also shows that there is no difference between pictures 1 and 2 in terms of correct acceptance but there was a marginal difference in terms of correct rejection ($F(1,59)=3.033$, $p=0.08$). This again confirms that children's difficulty in Experiment 2 lies in correctly rejecting perfective participles as a grammatical description for Picture 2. As for ages, the post-hoc comparison revealed that 5 age-groups are significantly different from adult controls ($F(1,59)=41.598$, $p<0.0001$). Among children's age groups, 4-year-olds are significantly different from 9-year-olds ($F(1,59)=4.758$, $p<0.03$), and so were 5-year-olds ($F(1,59)=10.45$, $p=0.002$). Apart from these, there were no significant differences between other age groups. From these results, it is clear that significant development occurs between the ages of 7 and 9.

4. Discussion

From this experiment, it is apparent that although 4 and 5-year-olds may have performed well in Experiment 1, this does not mean that they have an adult-like understanding of ongoing vs. completed events as far as participles are concerned. Children are more successful in rejecting a perfective participle with Picture 1 than with Picture 2. Together with the results from Experiment 1, it is shown that the children older than 4 are slightly better at perfective than the imperfective trials.

There is no principled explanation for why the Dutch children had difficulty with Picture 2. According to Bresnan (2000) and Klein (2002), past participles should only occur with activities where a goal is supplied; in 'a half-sunken ship', the perfective participle is possible because a result state is defined by 'half'. In the absence of 'half', however, we cannot use a perfective participle to describe Picture 2. Children might have a problem with what Ackerman and Goldberg (1996) term "a general paradigmatic condition of informativeness" in (12):

(12) Paradigmatic informativeness (27; 1996)
An attributive perfective participle is not felicitous if it is based on a superordinate verb which contrasts with semantically more specific predicates.

According to Ackerman and Goldberg (1996), 'a run child' in (13b) is not a possible expression; however, when you supply 'away' as in 'a run-away child' as a goal phrase, the grammaticality of the expression changes; see (14b). By adding a goal phrase, a perfective participle becomes possible because the predicate becomes semantically more specific. I propose that younger children freely supply a missing goal activity such as 'half', resulting in the incorrect acceptance of 'a sunken ship' as a grammatical description for Picture 2. This proposal also predicts that children should accept both (13) and (14) although adults prefer (14) to (13):

(13) a. # a paid physician b. # a run child c. #fed child

(14) a. an unpaid physician b. a run-away child c. well-fed child

Ackerman and Goldberg's (1996) account of the contrast between (13) and (14) is based on the property that is implied by the head noun. For example, we expect doctors to be paid, and children to be running and fed. However, an attributive perfective participle must represent a property that is not implied by a head noun; thus, the expressions in (13) remain anomalous. Adding an adverb, suffix or a particle changes a property of a predicate into something that cannot be easily inferred; hence, this saves the expressions in (14). It is conceivable that children have difficulty in imagining what kind of properties are implied by a noun due to their limited years of exposure to the world. Children might accept the expressions in (13) as grammatical because they do not expect doctors to be paid or houses to be built. This goes with other experiments that found children's problems with pragmatics (Chien and Wexler 1987) and implicature (Papafragou and Mosolino 2003 among others). It is surprising, however, this difficulty should last as long as 9 years. More detailed study with different stages of incomplete events is necessary to

investigate whether this difficulty is real; whether the same difficulty can be found with grammatical aspect; and how the children come to have an adult-like interpretation of present and perfective participles.

5. Conclusion

The experiments reported here support prior results in Wagner (2002) which indicate children younger than 4 have problems in the interpretation of grammatical aspect morphology. Past research suggested that this problem lay in the absence of agency information. In Experiment 1, we showed that children faced the same difficulty in the perfective-imperfective distinction with present and perfective participles. The results from Experiment 2 revealed that although the children older than 4 seemed to have overcome the problem in the aspectual distinction in Experiment 1, their interpretation of participles was not quite adult-like when we modified the experiment by adding an intermediate stage.

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