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## **Imperfect imperfectives: On the acquisition of aspect in Polish**

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### **1. Introduction: Acquiring aspect as a form/meaning mapping problem**

In children's conquest of the form/meaning relations in the language they are learning, the acquisition of aspectual distinctions presents a particularly challenging goal. Confronted with paradigms of verbal morphology which may carry aspect, but also tense, finiteness and agreement among many other possibilities, the learner must consider what meanings to assign to which pieces of morphology. The fact that not all languages have dedicated aspectual morphology (or tense morphology, for that matter) provides an additional complication, as the learner cannot be sure to expect any kind of morphology on verbs. Aspect presents an even tougher form/meaning mapping problem than tense. Tense anchors events and situations in time in relation to the speech time of the utterance; temporal meanings have truth-conditional consequences: a sentence is judged true or false at the time when it is uttered (for a present) or before that time (for a past). Aspectual markers on the other hand play a more intricate game of conveying the speaker's perspective on a given event or situation which is often one of a number of possible perspectives; aspect is the speakers' choice. In describing a given event or situation, a sentence may carry one of several different aspects and still be true (or false). Tensing the same sentence with one of several tenses may yield conflicting truth values. As Comrie describes it: "... aspectual oppositions are often subjective rather than objective, i.e., do not necessarily lead to differences in truth-value ..." (Comrie 1976: 133).

Given the lack of clear trigger situations at which a certain form/meaning mapping may be discovered such as truth or falsehood of a sentence in the world, the semantics of the perfective-imperfective distinction presents a hard learnability problem. Referring to a situation in which somebody was involved in the activity of working, imperfective or perfective aspect on the verb *work* are both equally valid truth-conditionally. But this does not go for all verbs, as the imperfective paradox teaches. Referring to a situation in which somebody is involved in accomplishing a certain goal, say, cleaning a dog, it is true or false to report on that situation with a perfective aspect on a predicate like *clean the dog*; it is true only if the dog was clean in the end. An imperfective aspect, on the other hand, would be equally valid whether the dog was clean in the end or not.

Children start producing aspectual forms in their spontaneous speech from the earliest moments of inflectional marking on (Weist (1984) for Polish; Brun et al. (1999), Bar-Shalom and Snyder (2000) and Vinnitskaya and Wexler (2001) for Russian, and many authors on many other languages). But do these markings encode target-like semantics for children at this early stage of their development?

A comprehension study with Polish learners by Weist, Wysocka and Lyytinen (1991) shows that even their 2;6 year-old subjects distinguish the two aspects target-like suggesting that they know the proper semantics. Stoll (1998) found that Russian 3 year-olds behave target-like on perfectives (she did not test imperfectives). Vinnitskaya and Wexler (2001), also for Russian, get similar results in their comprehension task, concluding that 3-year olds know the aspectual semantics of the perfective-imperfective paradigm. So, in the light of this cross-linguistic, experimental evidence one would conclude that it has all been acquired by age 3. However, a recent study by Kazanina and Phillips (2002) casts some doubts. Here, 3 year-olds did not do well on the imperfectives. Moreover, Vinnitskaya and Wexler's subjects did not behave adult-like with imperfectives in a production task, overusing them vastly.

The three experiments with Polish learners I present in this paper also show that whereas children behave target-like on perfectives, their imperfectives are imperfect. I will argue that children as young as 2;6 probably have the aspectual semantics of both the perfective and imperfective right, but they have not yet acquired the interface with discourse which puts further restrictions on the proper interpretation of the aspects. Converging evidence comes from Italian learners who were tested on their interpretation of the *Passato prossimo* and *Imperfetto* (Hollebrandse and van Hout 2001). Italian does not have any aspect morphology, but the various past tenses conflate different aspectual meanings. Even the 5-year olds did not show full, discourse-appropriate understanding of the *Imperfetto*. Considering the results from the above mentioned comprehension studies, the semantics of aspectual morphology seems to be in place at an early age. However, knowledge integrating tense and aspect in discourse structure is not fully developed.

In section 2 I review the aspect acquisition literature on Polish and Russian. Section 3 presents the Polish comprehension experiments and their results. Taking into account the results from the literature, my explanation of these new Polish results involves an incomplete morphosyntax-discourse mapping, laid out in section 4. This explanation is supported by some references to other cases of syntax-discourse mapping in which children show incomplete knowledge in section 5. Section 6 raises the issue what exactly makes children fail on the morphosyntax-discourse interface.

## **2. Review of literature on acquisition of aspect in Russian and Polish**

This section reviews four studies on the comprehension of aspect on Polish and Russian, and one production study. The focus of these studies is transitive, telic verbs. The perfective verb forms that were used had the so-called neutral perfective aspect which does not change the meaning of the related imperfective verb.

### *Weist et al. (1991), Polish comprehension*

Weist, Wysocka and Lyytinen (1991) present a crosslinguistic study of English, Polish and Finnish children's development of temporal systems of which I will summarize here the results of the Polish children in an aspect comprehension task. The task was a sentence-picture matching task with two picture alternatives and two sentence alternatives. In the aspect task the pictures showed an ongoing situation versus a completed situation, for example, a girl involved in drawing a flower and a girl happily smiling next to a drawn flower. After describing the pictures in some detail, the experimenter read the two sentence alternatives and

then asked: *which one shows ...?*, repeating one of the alternatives. For the flower-drawing situations, the following Polish sentences two were given, (1).

- (1) a. Dziewczynka rysowała kwiatek. [Polish]  
girl drew-IMPERF flower  
'A/The girl was drawing a/the flower.'  
b. Dziewczynka narysowała kwiatek.  
girl drew-PERF flower  
'A/The girl drew a/the flower.'

They tested children in the age ranges of 2;6, 3;6, 4;6, 5;5 and 6;6, 12 in each age group. Each subject got 6 items with this contrast. Even the youngest subjects were able to do this task. They scored about 76% correct which was reliably different from chance (at a confidence level of  $p < .01$  in a Kolmogorov-Smirnov two-sample test). This suggests that these 2;6 year-old Polish subjects have acquired the aspectual semantics of the perfective/imperfective.

*Vinnitskaya and Wexler (2001), Russian comprehension*

The aspect comprehension study of Vinnitskaya and Wexler (2000) also used a sentence-matching task. Contrary to Weist et al.'s study, these Russian subjects heard one sentence, with either perfective or imperfective aspect, and had to choose one picture out of three. Two pictures differed as to whether the (same) action was completed or ongoing; the third was a distracting one (depicting the wrong verb). For example, the pictures would show three girls: one was reading a book, the second has finished reading a book and the book was closed, while the third was playing in the yard. For this picture set, half of the subjects were presented with an imperfective sentence, the other half with a perfective one, (2).

- (2) a. Devočka čitala knigu. [Russian]  
girl read-IMPERF book  
'A/The girl was reading a/the book.'  
b. Devočka pročitala knigu.  
girl read-PERF book  
'A/The girl read a/the book.'

Subjects got 4 transitive imperfective and 4 transitive perfective items. In addition, they were tested on 4 intransitive items with a PP, 2 of which were perfective and 2 imperfective. Thirty-six Russian children were tested of the ages of 3, 5 and 6;6, 12 in each age group. All subjects performed well on this task, including the youngest ones: the 3 year-olds scored 75% correct for the imperfectives and 79% for the perfectives which was significantly above chance. These results are similar to the Weist et al. findings. By age 3 Russian subjects have acquired the aspectual semantics of perfective-imperfective aspect.

*Stoll (1998), Russian comprehension*

Stoll (1998) used a different set-up. She prepared short video stimuli. Video's constitute an excellent format for testing comprehension of temporal development as the events are shown during their dynamic progress, whereas with pictures subjects have to infer and construct this temporal progress, which may be conceptually hard for young children. In Stoll's study each movie showed two puppets involved in a similar action, one after the other. One puppet

finished her action, while the other was continuously engaged in her action.<sup>1</sup> A typical movie would first show one of the puppets on one half of the screen, for example, continuously reading a book. This part of the screen would go black and the other puppet appeared on the other half. She would read the book all the way through and close it when she was finished. After a brief moment of a totally black screen both movies showed simultaneously on a split screen. At a given moment the movie would stop with a frozen image of each puppet and the experimenter asks a *who*-question. In this example, the question would be the following, (3).

- (3) Kto pročitál knigu? [Russian]  
who read-PERF book  
'Who read a book?'

All the verbs tested were morphologically perfective, so adults would always choose the finished event. The child's task was to answer the *who*-question by pointing to the right movie, a movie-matching task. Each subject was tested on 14 items. One hundred children took part in the study in the age range from 2 through 6, with 20 subjects in each age group. The results indicate that although the 2-year old subjects guessed (58% correct was not significantly different from chance), from 3 years old on they showed target-like knowledge of the semantics of perfective verbs (the 3 year-olds scored 75% correct).<sup>2</sup> Stoll did not test imperfectives.<sup>3</sup>

*Kazanina and Phillips (2002), Russian comprehension*

Kazanina and Phillips employed yet another set-up. They acted out stories in front of their subjects. A monkey puppet would go around the table stopping at three different landmarks and play with the toys at each location, the same set of toys being prepared at each location. At one location he would finish his play, e.g., assemble a smurf from several pieces; at another he does not finish, so there is an incomplete event of assembling a smurf and at the third he considers assembling the smurf but decides not to and goes home. With the result of these actions displayed on the table - a completed situation, an incomplete one and one without any effects - children were asked two *where*-questions, first one with a perfective verb and later, after a few distractor questions, an imperfective one, (4). When subjects pointed to one situation, the experimenter asked if there was another location where the monkey assembled/was assembling the smurf, giving the child the opportunity to give multiple locations as the full answer.

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<sup>1</sup>This was one of the contrasts tested by Stoll, using what she termed verbs of the telic Aktionsart. She also tested other aspectual classes (delimitatives, ingressives and semelfactives). I only review the results of her telic transitive verbs..

<sup>2</sup>Stoll does not specify the analyses she used to test for significance different from chance, so I can only repeat the percentages correct and accept that 75% correct was indeed different from chance, and 58% was not.

<sup>3</sup>There are no data as to which movie subjects would allow for imperfectives. Stoll's study cannot draw conclusions what they know of the semantics of the perfective-imperfective paradigm, only about the semantics of the perfective

- (4) a. Gde obez'yanka sobrala gnomika? [Russian]  
 where monkey assemble-PERF smurf  
 'Where did the monkey assemble a smurf?'  
 b. Gde obez'yanka sobirala gnomika?  
 where monkey assemble-IMPERF smurf  
 'Where was the monkey assembling a smurf?'

11 Subjects participated aged 3-5. This experiment differs from the previous ones because Kazanina and Phillips gave their Russian subjects a choice between a completed and an incomplete situation, whereas the other contrasts were between completed and ongoing. It turns out that in this set-up children choose the completed situation with the perfectives, like adults. Surprisingly, with imperfectives they do the same, choosing only the completed situation and rejecting the incomplete one. This is in contrast to adults who allow both situations for an imperfective.<sup>4</sup> So, contrary to the other studies, children do not always understand aspect, in particular, they do not behave target-like on imperfectives.

Kazanina and Phillips want to argue that children's aspectual semantics is intact given their adult-like behavior in previous studies. They look for an explanation for their diverging behavior on imperfectives here in the cognitive complexities associated with imperfectives (are the protagonist's unspoken intentions reached or not, do objects that are being created count as actual objects already? could the incomplete situation have progressed otherwise?). They claim that subjects have trouble assessing imperfective aspect for incomplete situations. An adult, in order to accept the imperfective for an incomplete situation, must apply the imperfective paradox in such a way that if the monkey was assembling a smurf, he may have stopped prematurely, contrary to his intentions. So an adult projects an incomplete event and an extended object from that what is actually there on the scene. An adult understands that the monkey's intention was to build a complete smurf which is not realized here. Kazanina and Phillips offer two possible explanations for children's rejection of an imperfective for incomplete situations. Children fail to imagine a counterfactual extension of the incomplete event or the rejection arises because of difficulties to relate an incomplete event to the agent's unrealized intentions (they suggest that the latter may relate to failure on Theory of Mind tasks which were, however, not included in their design).

*Vinnitskaya and Wexler (2001), Russian production*

Although Vinnitskaya and Wexler found target-like behavior on imperfectives in their comprehension task, children made mistakes in an elicited production task: they overused imperfectives in situations where adults used perfectives. The subjects were presented with a picture of an ongoing action, say, a bear eating an apple. The experimenter described the picture in the present tense (*The bear is eating an apple now*) and asked the child to complete a sentence starting with '*Before ...*' showing a picture of a completed apple-eating situation. The subjects were trained on using the same verb the experimenter used in the present tense sentence. The researchers wanted to find out if the subjects would provide perfective or imperfective verb forms. Adults most naturally give perfectives in this context. Each child got

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<sup>4</sup>Unfortunately, the overhead slides posted on Kazanina's web page on which I base this description of their experiment did not give any numbers or statistics.

10 items with 3<sup>rd</sup> person subjects and 10 more with 1<sup>st</sup> person subjects.<sup>5</sup> The children vastly overused imperfectives for the 3<sup>rd</sup> person items (3 year-olds 95%, 5 year-olds 77% and 6;5 year-olds 53%) whereas a control group of young adults only gave 11% imperfectives. The percentages of imperfectives with 1<sup>st</sup> person were even higher. An Anova analysis revealed effects of age and person.

Vinnitskaya and Wexler argue that children initially understand aspectual distinctions and produce both aspects from early on, but they misunderstand the pragmatics of aspectual use. They explain these results applying a general hypothesis on children's failure to understand other minds. One of the effects is that children will use incorrect forms to establish reference in a discourse (e.g., using pronouns believing mistakenly that the listener knows who is being referred to, cf. Karmiloff-Smith (1981)). Another one is that children misunderstand pronoun reference in Principle B binding contexts (such as *Mama Bear pointed to her*) where children may take the pronoun *her* to pick out any referent by a particular description, including the pointing bear herself, thus allowing co-reference (cf. Thornton and Wexler 1999). The pragmatic problem with aspectual forms arises from the fact that children mistakenly assume that the listener knows that some event is completed, knowing this information themselves.

Aspectual choice in adult Russian is influenced by pragmatic considerations. Certain situations in which an event was completed may suggest use of perfective aspect because of the completion, but if the speaker can assume that the listener knows that the action was completed, imperfective aspect is most natural. This property is referred to as the general factive use of imperfective aspect. It is associated with fore- and back grounding of information: if the information about the completion of the action is new, a perfective is used, but if it is old information known by speaker and listener, imperfective is preferred. Thus, Vinnitskaya and Wexler ascribe children's incorrect use of imperfectives in their elicited production task to a failure to establish correctly what the listener knows and what not. They incorrectly assume that the listener knows about the completion (even though he could not see the picture), so that an imperfective is warranted. Vinnitskaya and Wexler present supporting evidence of children's mistaken beliefs about the listener from another production study in which children reproduced a narrative. There was a correlation between subjects' production of null and pronominal subjects without proper antecedents and use of imperfectives.

#### *Summary of studies*

In three comprehension studies researchers conclude that young learners of Polish and Russian know the aspectual semantics of perfective and imperfective aspect (Weist et al., Vinnitskaya and Wexler, Stoll). But in two other studies, one comprehension, the other production, children show non-target like behavior (Kazanina and Philips, Vinnitskaya and Wexler). How can these contradictory results be reconciled? What do children know about the perfective-imperfective aspect of transitive telic verbs?

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<sup>5</sup>In a second session the researchers eliciting children's production of future-perfective tense with a mirror set-up, the experimenter describing her picture in the present tense and inviting the child to complete a sentence starting with '*After...*' for a picture in which the action was almost completed.

The discrepancy in conclusions reached by the different studies discussed above can partly be traced to the different methodologies these studies employed. Weist et al., Vinnitskaya and Wexler and Stoll let children choose between completed versus ongoing situations, given perfective or imperfective aspect, whereas Kazanina and Phillips gave them a choice between a completed and an incomplete situation. Apparently, the task is easier to resolve when the contrast is between completed and ongoing situations than when subjects have to assess completed and incomplete situations. Children seem to think that perfective aspect is associated with completion and imperfective aspect involves ongoingness. They also allow imperfective aspect for completed situations, both in comprehension (Kazanina and Phillips) and production (Vinnitskaya and Wexler). However, children do not associate imperfective with incomplete situations whereas adults allow these too; when an imperfective is given without any context, adults can make reference to any kind of situation.

Moreover, the discourse context of perfectives or imperfectives sentences differed in the various studies. When sentences are given in isolation, children can choose the right reference (completed or ongoing). But when an aspect selection production task was administered in a given a certain situation - describing a picture that the listener does not see - they overuse imperfective aspect where perfective aspect is required (Vinnitskaya and Wexler). Even though children may have the aspectual semantics of the perfective-imperfective aspect basically down, they do not employ it pragmatically appropriately. So, there seems to be some gap in their aspectual knowledge at the level of appropriate usage.

The results from three experiments that I will present now also point to inappropriate aspectual knowledge of imperfective aspect at discourse level. I will develop another kind of explanation arguing that children have problems linking event variables correctly in the discourse structure of a narrative. They are not restrictive enough and link the event variable to any moment in the discourse structure built up so far, whereas adults must anchor imperfectives to the last established reference time.

### **3. Three comprehension experiments with Polish learners**

Before one may conclude that children have full aspectual knowledge, they must not only be shown to judge when the aspects can be used, but also when they are not possible. Whereas the previous studies presented children with a choice of two different situations (albeit different choices), I used three kinds of situations in my experiments: ongoing, completed and incomplete situations and tested children's comprehension of perfective and imperfective aspect on transitive telic verbs.

#### *Design and set-up*

The child's task was to see if the right picture was there and put it in a picture slot as the final picture to a story. The first two pictures of the story were given and pointed at when the story was narrated. The beginning of the story shows the start of an event, say, writing a letter. But then the doors closed on picture 2, so one could not see what was happening further. A bird with big eyes could look through the doors and tells the child what he saw there. Then came the target sentence and the child was asked to see if the right picture was there. The target sentence contained either a perfective or imperfective verb form. We used transitive sentences with verbs taking incremental themes and used count noun objects, thereby creating telic

predicates. Children made their selection from 2 pictures. The choice of situations was given in pairs of pictures: in experiment 1 subjects had to choose between completed and ongoing situations, in experiment 2 between completed and incomplete ones and in experiment 3 between ongoing and incomplete ones. Subjects were also given the option to say that neither or both pictures qualified; the training and control items provided opportunities for giving Neither answers, encouraging the subjects that those answers were valid, in fact, necessary sometimes.

By presenting the situations pair-wise in 3 different combinations I created the possibility to find out if subjects who prefer one kind of situation given a certain aspect, would also allow another kind of situation. In some of the above studies (Weist et al., Vinnitskaya and Wexler and Stoll), children were asked to choose one situation given a certain aspect. In this way, researchers test children's preferred interpretations but cannot find out if they would allow more than one situation for a certain aspect, thus, what the full set of meanings is that a child attaches to a form. In my set-up, this objection was circumvented.

The design of each experiment was straightforward: aspect was the independent variable and the subject's choice of situation (or neither situations or both situations) was the dependent variable. Each subject got 3 items of each aspect, yielding 6 items per experiment, 18 in total for the 3 experiments together. The items of the 3 experiments were mixed in together and put in an arbitrary order in such a way that all perfective items were tested in one session and all imperfectives in a second session a few days up to a week apart. Which session came first (perfective or imperfective) and which second was counterbalanced across subjects.

### *Materials*

Subjects were shown the picture book and told that the experimenter dropped the book on the way to school and now some pictures are missing. Blue Bird is introduced to the child. The experimenter says that they are going to look at the pictures. But in every story the doors close and they cannot see what was happening behind them. Luckily the Blue Bird can see through the doors because his eyes are so big. He will tell the child what happened behind the doors and the child will see if the right picture is there. A typical story is the following, (5); the accompanying pictures are described in (6).

(5) Excerpt from Polish protocol with an imperfective past tense:

*Pewnego dnia dziewczynka postanowiła napisać list do babci, aby jej powiedzieć kiedy przyjedzie w odwiedziny. Wzięła więc kartkę i długopis i zaczęła pisać. Widzisz?  
Ale drzwi się zamknęły i nie widzimy co było dalej. Poprosimy teraz Niebieskiego Ptaka, aby zajrzał za drzwi. Ptaku, co tam zobaczyłeś?  
Dziewczynka pisała list  
Czy jest tu właściwy obrazek?*

“One day this girl needed to tell her auntie when she would come to visit her. She decided to write her a letter. So her auntie would know and would come to pick her up. See?”

But the doors closed, so we couldn't see what there was any further.  
We will ask the Blue Bird if he looked behind the doors. Bird, what did you see there?  
The girl was writing the letter.  
Is the right picture there?"

- (6) Pictures to letter-writing story
- a. Picture 1 [ girl at desk is starting to write a letter ]
  - b. Picture 2 [ closed doors ]
  - c. Empty spot, 2 pictures to choose from:
    - completed [ letter is finished, girl is not writing anymore ]
    - ongoing [ girl is still writing, just a few lines on the paper ]

The different situations on the pictures were depicted as follows. For an ongoing situation, the protagonist is involved in an activity, holding or touching the object he or she is manipulating, and the effect of his or her activities is visible to show that there has been some progress since the first picture. In an incomplete situation, the protagonist is no longer involved in the activity; often he or she is turned away from the object of action. The goal of the action is visible but only halfway completed, e.g., a half-eaten fish, a half-drawn flower, a half-eaten ice cream on the floor. In completed situations the protagonist is not involved in the action and there is a clear result of the action, e.g., an all-washed dog, an all-dressed baby, a fully built castle.

3 Training items were administered at the start of each session to make the child familiar with the bird and the picture book with missing pictures and the procedure of the picture selection task. One of them solicited a neither answer. During the training the experimenter would correct the child if she did not do it right. In such cases, an extra training item was run. Only children who were able to do the training continued with the actual test. Throughout each session of 9 items 4 control items were interspersed with the test items. These control items all required a Neither answer, so as to remind the child that Neither is a perfectly acceptable answer. Appendix 1 briefly lists all test items and training and control items.

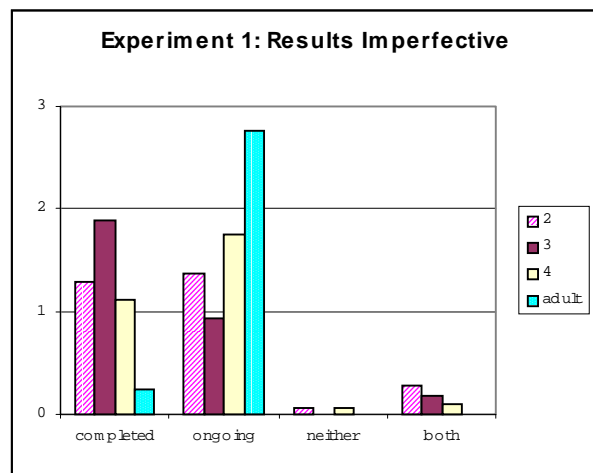
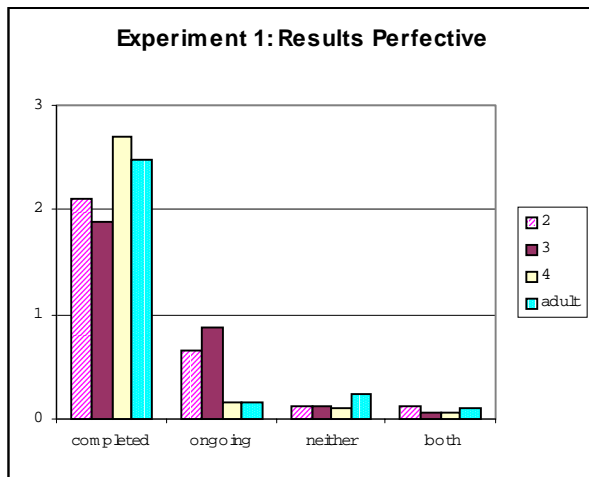
### *Subjects*

Subjects were two (n=18), three (n=17) and four (n=21) year-olds and a group of 20 adults. The children were tested individually at their day care centers in and near Wrocław, Poland, by native Polish research assistants. The adults were tested in groups of 5; they wrote down their answers to the questions after being told the same stories and shown the same pairs of pictures.

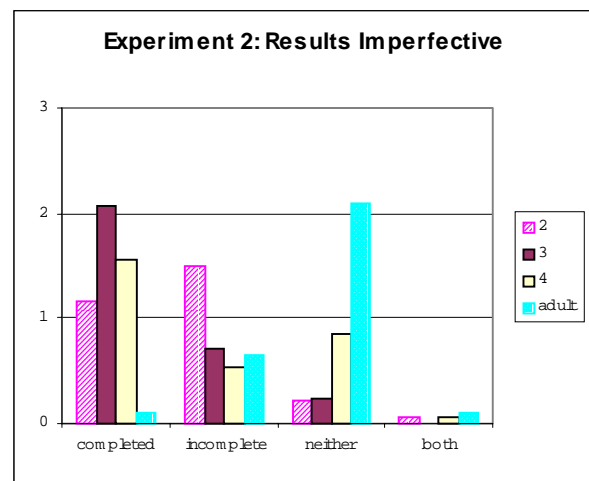
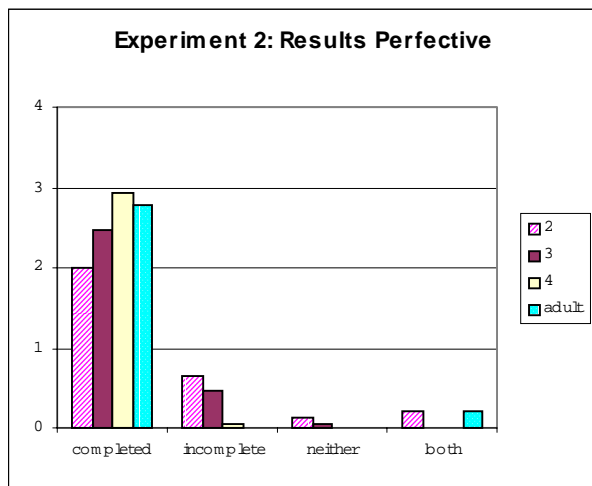
### *Results*

The following three pairs of graphs present the results in terms of percentages of situation chosen in each experiment (or Neither or Both), given perfective or imperfective aspect, per age group. The scale runs from 0 to 3, indicating the three items each subject got for a certain aspect.

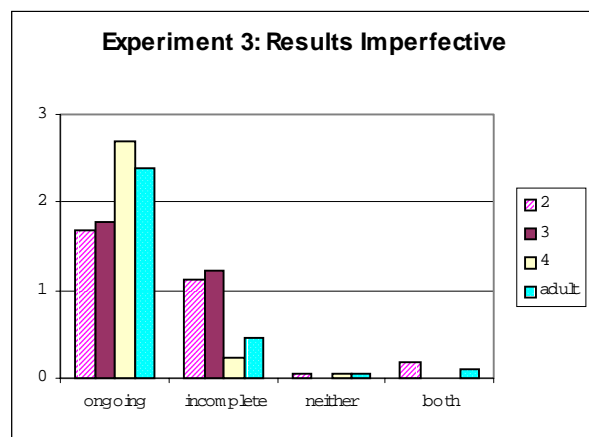
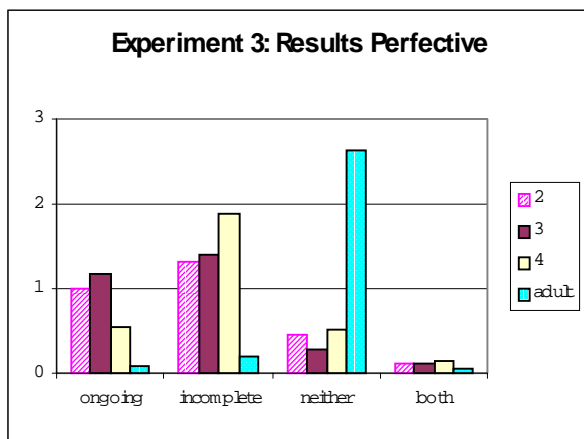
(7) Results Experiment 1



(8) Results Experiment 2



(9) Results Experiment 3



*Analyses*

For each experiment we ran some Anova analyses to get a rough indication of the effects of aspect and age on situation choice. Anova analyses were run for the percentage of completion choices in Experiments 1 and 2 and the percentage of ongoing choices in Experiment 3. In all three experiments there were main effects of aspect and the interaction of aspect by age. Age was also a main effect in experiments 1 and 2, but not in 3. See the summary in (10).

(10) Effects in Anova analyses

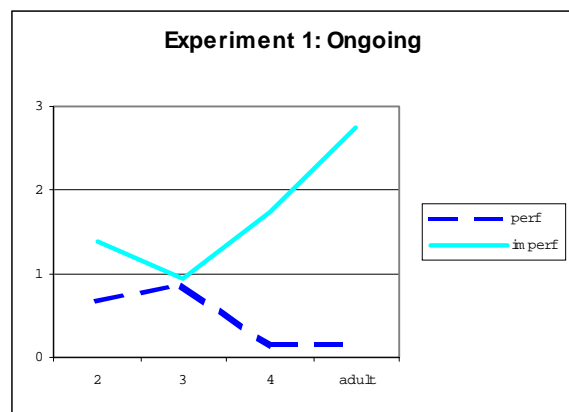
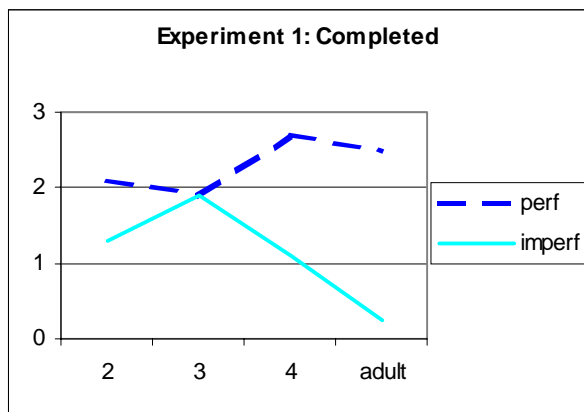
experiment 1 %completed	aspect	p<.000	F=65,414
	age	p=.035	F=3,038
	aspect x age	p<.000	F=11,103
experiment 2 %completed	aspect	p<.000	F=105,583
	age	p<.000	F=11,940
	aspect x age	p<.000	F=14,833
experiment 3 %ongoing	aspect	p<.000	F=118,621
	age	p=.218 n.s.	F=1,517
	aspect x age	p<.000	F=12,463

Looking in more detail how age and aspect contribute to subjects' choosing behavior we ran chi-square analyses to see if there were age effects within each of the aspects and aspect effects within each of the ages. Chi-square analyses allow us to consider the whole range of subjects' choices, instead of zooming in on the completed or ongoing choices which one needs to do for Anova analyses.

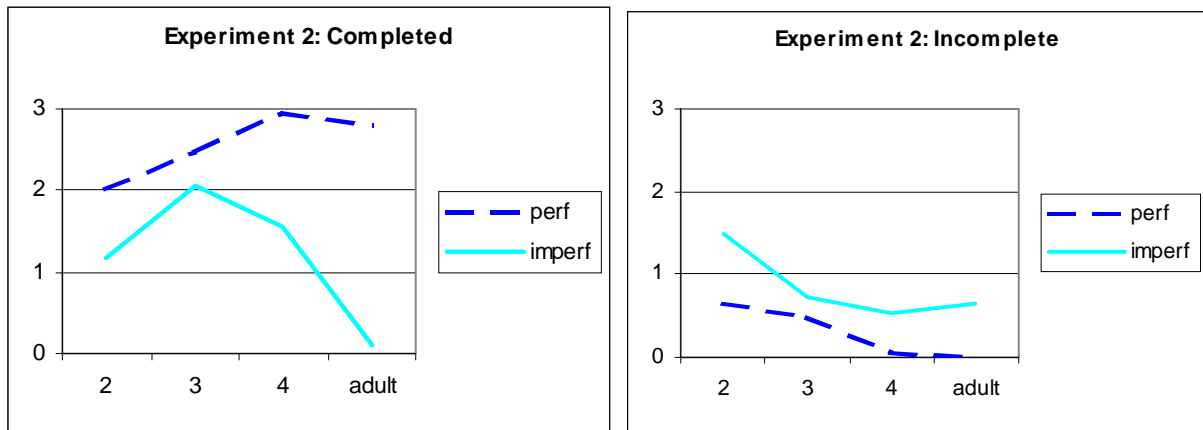
*Aspect effects*

Consider first in each experiment the effects of aspect for the choice of presented situations in the graphs below. A table that lists the chi-square analyses for aspect effects is presented in (16).

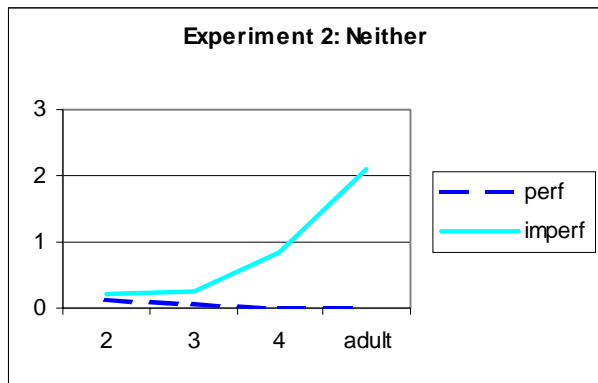
(11) Experiment 1: choice of Completed and Ongoing by aspect



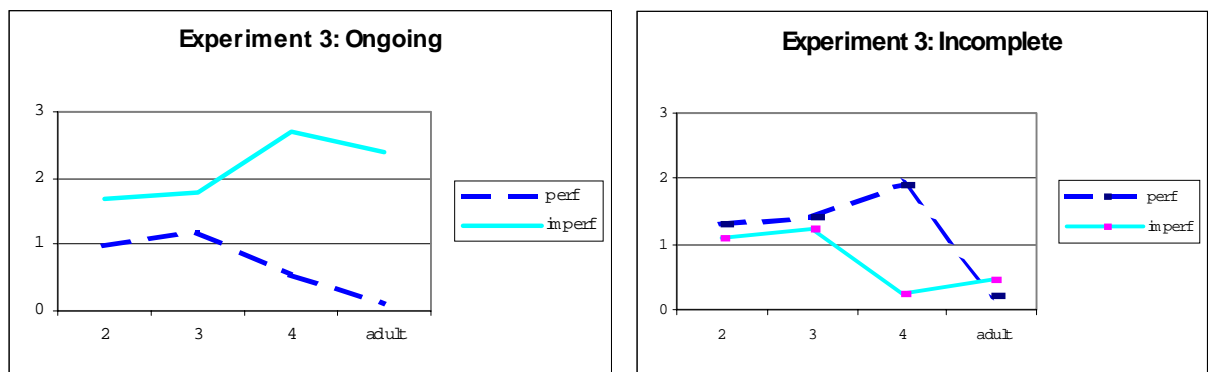
(12) Experiment 2: choice of Completed and Incomplete by aspect



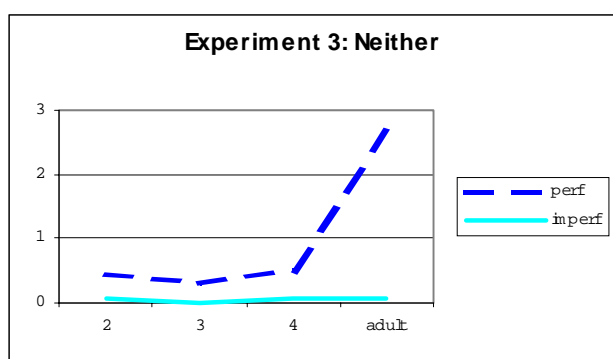
(13) Experiment 2: choice of Neither by aspect



(14) Experiment 3: choice of Ongoing and Incomplete by aspect



(15) Experiment 3: choice of Neither by aspect



(16) Effects of Aspect in Chi-square analyses

	experiment 1			experiment 2			experiment 3		
2	$\chi=9,875$	df=3	p=.02	$\chi=12,175$	df=3	p=.007	$\chi=8,974$	df=3	p=.03
3	$\chi=3,023$	df=3	p=.388 n.s.	$\chi=3,236$	df=3	p=.198 n.s.	$\chi=9,200$	df=3	p=.027
4	$\chi=41,088$	df=3	p<.000	$\chi=35,044$	df=3	p<.000	$\chi=62,135$	df=3	p<.000
adult	$\chi=90,439$	df=3	p<.000	$\chi=105,942$	df=3	p<.000	$\chi=94,650$	df=3	p<.000

The analyses summarized in (16) reveal that there were effects of aspect for all age groups except for the 3 year-olds in Experiments 1 and 2 who showed non-distinguishable behavior on perfective and imperfective preferring the completed situation for both (63%). In this respect the development from 2 to 3 to 4 year olds suggests a U-shape curve, the youngest and oldest child subjects showing a differentiation of perfective and imperfective aspect, but not the 3 year-olds.

*Age effects*

Turning to check for developmental effects, table (17) shows that there were effects of age in the chi-square analyses for both aspects in all three experiments.

(17) Effects of Age in Chi-square analyses

experiment 1	perfectives	$\chi=23,281$	df=9	p=.006
	imperfectives	$\chi=50,257$	df=9	p<.000
experiment 2	perfectives	$\chi=36,926$	df=9	p<.000
	imperfectives	$\chi=97,647$	df=9	p<.000
experiment 3	perfectives	$\chi=117,694$	df=9	p<.000
	imperfectives	$\chi=30,785$	df=9	p<.000

Leaving out the adults from the latter analyses to test if there were any age effects among the three child groups, table (18) reveals that behavior on perfective improved with age in

Experiments 1 (completed/ongoing) and 2 (completed/incomplete). The perfective in Experiment 3 - with a choice of ongoing and incomplete situations - remained a factor of confusion for all subjects alike. Behavior on the imperfective develops in Experiments 2 (completed/incomplete) and 3 (ongoing/incomplete), but not in Experiment 1 (completed/ongoing). suggesting that 2, 3 and 4 year-olds do not prefer the ongoing picture above the completed one given an imperfective in equal ways. This result is probably due to the 3 year-olds' preference for the completed situation, while the 2 and 4 year-olds choose completed or ongoing by chance.

(18) Effects of Age in Chi-square analyses, adults taken out

experiment 1	perfectives	$\chi=13,302$	df=6	p=.038
	imperfectives	$\chi=11,208$	df=6	p=.082 n.s.
experiment 2	perfectives	$\chi=23,755$	df=6	p=.001
	imperfectives	$\chi=26,697$	df=6	p<.000
experiment 3	perfectives	$\chi=8,157$	df=6	n.s.
	imperfectives	$\chi=26,157$	df=6	p<.000

*Interpretation*

The interpretation pattern of the adults is clear. Adults in this experiment only accept completed situations for perfective verbs and only ongoing situations for imperfective verbs; they occasionally allow an incomplete situation when given imperfective aspect, but prefer to reject this type of situation. So, while in principle imperfective aspect can be used to refer to any kind of situation, further limitations are at play here. These must lie at the interface of morpho-syntax and discourse. In particular, in a story context, every sentence must be anchored in time in relation to previous sentences. The adult results on the imperfective show that in the stories at hand the final trigger sentence must be linked to the one that comes right before which says that the bird was seeing something behind the doors. So, the event must still be in progress when the doors opened up; it cannot be completed or incomplete. These effects of discourse tense and aspect relations are well-known and are commonly represented in DRT frameworks (see section 4).

Children without aspectual knowledge may prefer one situation or other for extra-linguistic reasons. Maybe they will choose the completed situation because it represents the clearest exemplar of the denotation of a given predicate. Turning to the results of the children, we clearly see that this is not the case here. Aspect matters in children's interpretations. Their behavior differs on perfective-imperfective aspect, although not for the surprising U-shape effect the 3 year-olds give here (cf. chi-square results in (16)).

Given a perfective all subjects prefer the completed situation, from 2 year old on. When they are confronted with a choice without a completed situation in Experiment 3 (ongoing/incomplete), they are lost with the perfective and choose the 2 available options equally often. But when the completed situation is an option, as in Experiments 1 and 2, they clearly prefer that. Note that despite the training and control items on which they were

perfectly able to say Neither, children did not say Neither very often on the test items (albeit a little more in Experiment 3 than 1 and 2).

Given an imperfective aspect children do not have any clear preference for a specific situation. In fact, in all 3 experiments, they select the completed, incomplete or ongoing situations without clear preference for one over the other. The 3 year-olds even show a slight preference for the completed situation in Experiments 1 and 2. Only in Experiment 3 are the 4 year-olds able to select the ongoing picture and reject the incomplete one.

So, some knowledge of aspect is established, even at a very early age. But what do these children take aspect to mean exactly? It seems that target knowledge of perfective aspect is in place, but some property of imperfective aspect is still missing. Even the 4-year olds do not consistently choose the ongoing situation when given a choice between completed/ongoing. Interestingly, they are able to do so, however, when confronted with the choice between ongoing/incomplete.

In the next section I propose that subject's non-target-like choices for imperfectives can be explained if children are not yet able to properly link the final, trigger sentence to the previously mentioned event in the discourse. For these children, an imperfective aspect on a verb in the past tense may refer to any moment in the past, possibly further back on the story line than the moment of what was going on behind the doors. Thus, if they think that the event was in progress at some point in the past, but that surely it must be completed by now, they may choose the completed situation. But if that event in some further away past was interrupted, then maybe the incomplete situation is ok. Or the event may still be in progress, so the ongoing picture is chosen. Thus, all situations qualify.

#### **4. Explaining children's imperfect imperfectives**

Comparing my results to those found in other Slavic learners by Weist et al. (1991), Stoll (1998) and Vinnitskaya and Wexler (2001) we are confronted with a mystery. Why do learners do so well in previous studies, but not in the present study? In these studies children seem to have the basic semantics of the perfective-imperfective paradigm down. Yet, in my study as well as in Kazanina and Philips's (2002), the youngest children (2 year-olds) do well on the perfective, but the oldest ones (4 year-olds) still do not do well on the imperfective. I argue that some of the seemingly diverging results surface because of the different methodologies employed in the various studies. These different set-ups bring out different semantic properties of the perfective-imperfective paradigm. I will argue that although children know the basic aspectual semantics of the paradigm which they are able to show off when given sentences in isolation, they do not know the further limitations on discourse linking that are associated with the imperfective in particular. My explanation does not follow Kazanina and Philips who contribute children's imperfect behavior on imperfectives to cognitive complexities associated with it, nor does it need Vinnitskaya and Wexler's hypothesis on incorrectly assessing listener's knowledge. Instead, I offer an explanation on which they have insufficient knowledge of the rules of the morphosyntax-discourse interface and therefore cannot establish proper discourse relations.

In the experimental set-ups employed by Weist et al., Stoll and Vinnitskaya and Wexler subjects had to respond to isolated trigger sentences. They saw 2 pictures or movies, heard a sentence and had to choose one. In such a set-up, subjects as young as 2;6 (in Weist et al.) or 3 (in the other two studies) were able to perform well on perfective as well as on imperfective. The pictures or movies presented the adult interpretation for the perfective and imperfective: completed versus ongoing situations and subjects correctly matched perfective to completed and imperfective to ongoing.

I accept the authors' conclusions that this shows that subjects know the semantics of the perfective-imperfective paradigm.<sup>6</sup> Why, then, can they not employ this knowledge and apply it in my experiment, or in Kazanina and Philips's study? Discourse rules further limit the possible interpretation of perfective and imperfective and this is where children who are 4 still break down.

In a discourse perfectives and imperfectives play different roles. In a narrative with a sequence of sentences describing various events, the tenses, and lexical and grammatical aspect create the construction of the temporal relations among the events. They yield effects of simultaneity or sequential ordering of events. Thus, in English, when sentence (19) is followed by either a past progressive (20a) or simple past (20b), our interpretation of the temporal ordering of the events yields simultaneity for (20a) - writing was going on when the phone rang - and an ordering of the events for (20b) - after the phone rang, she wrote a letter.

- (19) The phone rang.  
 (20) a. Mary was writing a letter.  
       b. Mary wrote a letter.

In this discourse the event introduced by the second sentence must be temporally linked to the event mentioned in the previous sentence. Both sentences involve past tenses and are anchored before speech time. Lexical aspect is constant in (20). Grammatical aspect specifies a difference in how exactly the events must be anchored. Thus, the event variables introduced by *rang* and *was writing* or *wrote* are connected in the dynamic construction of the discourse structure in a precise way, which is determined by the aspects. An imperfective aspect given by the past progressive in (20a) adds the second event as a further description of the situation going on simultaneously with the event introduced by the first sentence; the two events must overlap, as represented in (21a). A perfective aspect as presented by the simple past in (20b), on the other hand, moves the reference time of the story line forward and the second event must be ordered after the first one: first ringing, then writing, as represented in (21b).

- (21) a.  $\exists e_1 [ \text{Ring}(\text{phone}, e_1) \wedge \exists e_2 [ \text{Write}(\text{mary}, \text{letter}, e_2) ] \wedge e_2 \subseteq e_1 ] ]$   
       b.  $\exists e_1 [ \text{Ring}(\text{phone}, e_1) \wedge \exists e_2 [ \text{Write}(\text{mary}, \text{letter}, e_2) ] \wedge e_1 \prec e_2 ] ]$

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<sup>6</sup>Learners understand the paradigm with telic predicates. Stoll (1998) shows they perform less well on other aspectual classes, when the perfective yields delimitative *po*-perfectives, ingressesives and semelfactives.

Such effects of grammatical aspect on the temporal progression of the story line have been described for languages such as English and French and are most often represented in a DRT framework which is designed with the necessary tools to represent such discourse effects (among others, Kamp and Rohrer (1983); Hinrichs (1981, 1986); Kamp and Reyle (1993); Lascarides and Asher (1991); De Swart (1998)).<sup>7</sup>

In the stories used in the experiment the trigger sentence comes after descriptions of previous events. Given the aspectual discourse rules, it must be connected to the event in the last mentioned sentence. Consider one of the stories in (22).

- (22) Mickey build sand castle - Mickey buduje zamek z piasku:
- a. *Pewnego dnia Mickey był na plaży i bawił się w piasku.*  
one day Mickey was on beach and played oneself in sand
  - b. *Postanowił, że zbuduje zamek i zabrał się do pracy. Widzisz?*  
decided that build-FUT-PERF and got oneself to work See ?
  - c. *Ale drzwi się zamknęły i nie widzimy co było dalej.*  
but doors oneself closed-PERF and not see what was further
  - d. *Poprosimy teraz Niebieskiego Ptaka, aby zajrzał za drzwiami.*  
*Ptaku, co tam zobaczyłeś?*  
ask now blue bird so that looked-PERF behind door.  
Bird, what there see-PERF
  - e. *Mickey budował zamek*  
Mickey build-IMPERF sand castle

“One day Mickey Mouse was on the beach. He was playing in the sand. He decided to build a sand castle and got to work See?  
But the doors closed, so we couldn’t see what there was any further.  
We will ask the Blue Bird if he looked behind the doors. Bird, what did you see there?  
Mickey was building a sand castle.”

The building event described by an imperfective used here needs to be connected to the previous sentence to overlap with the event of the bird’s seeing, represented as in (23).

- (23)  $\exists e_1 [ \text{See} (\text{you}, e_1) \wedge \exists e_2 [ \text{Build} (\text{mickey}, \text{sandcastle}, e_2) \wedge e_2 \subseteq e_1 ] ]$

So, only a situation where building is going on will qualify as a valid state of affairs for this discourse. Neither the situation where building the castle was completed nor the situation in which castle-building was terminated are good candidates for depicting this temporal overlap.

A perfective trigger sentence in the same discourse would give an opposite effect. Consider (24) as the final sentence to the castle-building story.

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<sup>7</sup>Temporal progression is also determined by effects of different lexical aspect classes and different tenses. I refer to the literature mentioned above for details.

- (24) *Mickey zbudował zamek*  
Mickey build-PERF sand castle

Now the perfective on *zbudował* 'build' moves the last established temporal reference, that of the bird's seeing, further and orders the new event subsequently, as represented in (25).

- (25)  $\exists e1 [ \text{See} (\text{you}, e1) \wedge \exists e2 [ \text{Build} (\text{mickey}, \text{sandcastle}, e2) ] \wedge e1 < e2 ]]$

This requires the building event to have been completed in the time interval of what was going on behind the doors when the bird watched. So, here only a picture of a completed castle-building situation qualifies.

The Polish adults in the experiment answered according to these aspectual discourse rules. The children did so too for the perfective, showing their knowledge that a perfective requires a completed situation. But they did not behave target-like on the imperfective where they allowed ongoing, completed and incomplete situations at equal rates, and sometimes even preferred the completed picture over the others (3 year-olds). What can explain their selection of the completed situation with an imperfective?

If children know that an imperfective presents an ongoing aspect, but do not know the discourse anchoring rules, they may anchor the imperfective past tense trigger sentence to any moment as long as it is past to the bird's watching, that is, to any moment when the doors were closed. If children let the event be in progress at some point in that interval, and they do not know what in fact happened behind the doors, any of three situations may hold. Children may think that surely the event must be completed, so they will choose the completed situation. Alternatively, if they think that the event behind the doors was interrupted, then the incomplete situation would be ok. Finally, they may think that event is still in progress, so the ongoing picture is chosen. The answer pattern that we found in which neither situation is preferred for an imperfective can be explained if children take more freedom than adults in anchoring their event variable in the temporal discourse set up so far and relate it to any moment behind the closed doors, instead of specifically to the moment of the bird's watching. This line of explanation claims that learners still need to acquire the precise discourse restrictions of imperfective.

## 5. Other developmental problems with discourse linking

The present study adds to a recent and growing literature that shows that while advanced learners have the syntax and semantics of a lot of their grammar under control, they do not properly integrate sentences in a discourse.

\*\*\* UNFINISHED FROM HERE ON \*\*\*

- (26) Avrutin and Coopmans (2000), bridging  
Situation: boat passes by a castle, flag on boat is blue, flag on castle is red.

*Er vaart een bootje voorbij. De vlag is rood.*  
there sails a boat by the flag is red

‘A boat is sailing by. The flag is red.’

- (27) Krämer (2000), interpretation of indefinites  
Situation: picture of group of children who go to zoo, separate group of children not in zoo.

*Kijk, hier zijn de kinderen. Ze gaan naar de dierentuin. (...)* [Dutch]

look here are the children they go to the zoo

*Een jongen voert de olifant.*

a boy feeds the elephant

‘Look here are the children. They are going to the zoo. A boy is feeding the elephant.’

- (28) Krämer’s Non-Integration hypothesis:  
Children acquire the predicative interpretation of indefinites early. The free variable interpretation is acquired later, because it requires discourse integration.

## 6. Conclusions

Why can children at 4 years old not build proper discourse structures and establish appropriate anaphoric links with the preceding temporal discourse? Avrutin and Coopmans argue that this is because of an insufficient amount of processing resources. If this were the case, one expects that children to do much better on similar tasks if the processing load is reduced. How could one test that with anchoring of temporal reference?

An alternative explanation would be to claim that the problem does not lie in insufficient processing resources, but rather, that children have incomplete knowledge of the syntax-discourse interface, a different explanation altogether. Let me take this approach and ask again why children cannot build the right discourse structures?

Do children not have a temporal reference marker? That is, are all past tenses represented as events prior to speech time, with no specific ordering among them, except possibly by what are natural cause and effect relations in the story? Alternatively do children have a temporal reference marker, but do they not know yet how and when to move further along appropriately?

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## Appendix 1:

*List of test stories in 3 experiments, aspects and situation choices*

<u>Experiment 1 - Completed/Ongoing:</u>	<u>Version A</u>	<u>Version B</u>
item 1: girl read book	Perfective	Imperfective
item 2: girl write letter		
item 3: woman wash dog		
	Imperfective	Perfective
item 4: mickey repair car		
item 5: woman paint fridge		
item 6: girl build bridge		
<u>Experiment 2 - Completed/Incomplete:</u>	<u>Version A</u>	<u>Version B</u>
item 1: mickey build castle	Perfective	Imperfective
item 2: girl draw flower		
item 3: mother dress baby		
	Imperfective	Perfective
item 4: girl unwrap present		
item 5: girl cut circle		
item 6: monkey eats banana		
<u>Experiment 3 - Incomplete/Ongoing:</u>	<u>Version A</u>	<u>Version B</u>
	Perfective	Imperfective
item 1: cat eat fish		
item 2: girl eat ice cream		
item 3: man smoke cigarette		
	Imperfective	Perfective
item 4: dog eat biscuit		
item 5: penguin eat fish		
item 6: horse eat apple		

*Training items:*

training 1 - mickey mouse has balloon in hand, mickey lets balloon fly

[ balloon in air, balloon in mickey's hand ]

training 2 - girl eats ice cream, girl drops ice cream on floor

[ ice cream on floor, ice-cream on table ]

training 3 - woman has a chicken in hand, woman puts chicken on head

[Neither chicken on table, chicken on floor ]

*Control items:*

control 1 - mouse is looking for a piece of cheese, he put it on his head

[ Neither cheese on floor, cheese in hands ]

control 2- woman eats pizza, puts it in a bag

[Neither pizza on floor, pizza in hand ]

control 3 - clown is making jokes in the circus, he makes a handstand

[ Neither clown with ball in hand, clown with coffee in hand ]

control 4 - girl putting a book on her head.

[ Neither book on floor, book on table ]

control 5 - woman putting an apple on the table

[ Neither apple on floor, apple in hand ]

control 6 - Mickey Mouse stands on his head.

[ Neither Mickey running, Mickey jumping ]

*Extra training/control item:*

- bird is thirsty, she drinks water from a bowl

[ bird drinks from bowl, bird drinks from bucket ]

## Appendix 2:

### *Tables of percentage situation choices in three experiments*

Experiment 1: % choices Complete, Ongoing, Neither (n) , Both (b)

	Perf				Imperf			
age	completed	ongoing	n	b	completed	ongoing	n	b
2	70	22	4	4	43	46	2	9
3	63	29	4	2	63	31	0	6
4	90	5	3	2	37	58	2	3
adult	83	5	8	3	8	92	0	0

Experiment 2: % choices Complete, Incomplete, Neither (n) , Both (b)

	Perf				Imperf			
age	completed	incomplet	n	b	completed	incomplet	n	b
2	67	22	4	7	39	50	7	2
3	82	16	2	0	69	24	8	0
4	98	2	0	0	52	18	28	2
adult	93	0	0	7	3	22	70	3

Experiment 3: % choices Incomplete, Ongoing, Neither (n) , Both (b)

	Perf				Imperf			
age	ongoing	incomplet	n	b	ongoing	incomplet	n	b
2	33	44	15	4	56	37	2	6
3	39	47	10	4	59	41	0	0
4	18	63	17	5	90	8	2	0
adult	3	7	88	2	80	15	2	3