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## Acquiring Viewpoint Aspect One Level at a Time

### Abstract

This paper examines children's comprehension of viewpoint aspect at three levels: the pragmatic, the morpho-syntactic, and the semantic. Results (1) confirm Berman and Slobin (1994)'s finding that children have not mastered the pragmatic use of backgrounding for viewpoint aspect by five years old; (2) show that children have mastered the mapping of viewpoint aspect onto the morpho-syntax of English by age 3;7; (3) show that children aged 2;6, while they behave at chance levels in the morpho-syntactic task with viewpoint aspect, nevertheless demonstrate comprehension of the semantics of viewpoint aspect as they are carried through the open-class vocabulary.

### Comments

University of Pennsylvania Institute for Research in Cognitive Science Technical Report No. IRCS-97-01.

# Acquiring Viewpoint Aspect One Level at a Time<sup>®</sup>

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## Introduction

This paper examines children's developing understanding of viewpoint aspect beginning with their initial comprehension of the semantics, through their mapping of the semantics onto the appropriate morpho-syntactic elements, to their struggles applying this knowledge at the discourse level. The plan of the paper is as follows. I will first explain what I mean by viewpoint aspect and then will proceed in a top-down approach to the different levels of comprehension. The first experiment considers a discourse function of viewpoint aspect and (for children up to age 5;11) confirms the claim of Berman and Slobin (1994) that young children do not understand the "backgrounding" function of viewpoint aspect. This result has two possible explanations: children might not understand the pragmatics of viewpoint aspect fully, or, they may lack knowledge at a more basic level, such as how viewpoint aspect is encoded morphologically. The second experiment therefore moves down a level to investigate how children interpret the morpho-syntax of viewpoint aspect in a comprehension task. Consistent with much of the literature on this topic (among others, Antinucci and Miller 1976, Bloom, Lifter and Hafitz 1980, Harner 1989) the findings are that while relatively old children (mean age 3;7) succeeded in demonstrating comprehension, younger children (mean age 2;6) did not understand the morpho-syntax of viewpoint aspect. But once more, the failure of the younger children has two explanations: these children may have failed to understand how viewpoint aspect is mapped to the morpho-syntax of English, or their failure may represent a lack of knowledge at the deeper conceptual-semantic level, as has been suggested by several researchers (Antinucci and Miller 1976, Bronckart and Sinclair 1973). The final experiment, therefore, tests young children's ability to understand the semantics of viewpoint aspect as expressed in differing linguistic forms. In this experiment, even the youngest children demonstrated knowledge of viewpoint aspect. The locus of these children's difficulty with this element of language is therefore, as I will discuss, in a concept-to-form mapping problem, not with an immaturity of conceptual structure.

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### Viewpoint Aspect

The field of aspect studies is notoriously rich in terminology. This paper will be primarily concerned with what Smith (1991) calls “viewpoint aspect” or the imperfective-perfective distinction. The imperfective viewpoint is the interior point of view that considers an event as a work in progress. In English, it is marked with the progressive form. The perfective viewpoint is the exterior point of view that considers an event as a completed whole. English has no separate marking for the perfective, but the simple tenses are considered perfective by contrast with the progressive ones (cf. Comrie 1976, Smith 1991, Klein 1994 for various characterizations of these distinctions).

Viewpoint aspect is to be contrasted with what Smith (1991) calls “situation aspect”, also known as lexical aspect or Aktionsart. Situation aspect is an inherent property of a verb and its arguments (and adjuncts) and corresponds to the familiar Vendler/Dowty verb classes (Vendler 1967, Dowty 1979). The situation aspect of a VP is typically calculated from three features: stativity (distinguishing states like love, want, and know from processes like kiss, grab and think), durativity (distinguishing punctate events like hiccup, tap, and reach the top from those that extend in time like drink, write, and climb a mountain), and telicity (distinguishing events with a natural completive endpoint like win a race and make a sandwich from those which simply terminate like run and sing). These features are ways of describing the aspectual properties that a verb phrase has by virtue of what it means: make a sandwich is a durative, telic process (a Vendler accomplishment) precisely because it describes an event that involves a process that takes a certain amount of time and ends in a natural completion point (when the sandwich is made)<sup>1</sup>.

Viewpoint aspect, unlike situation aspect, contributes independent semantics to a sentence but its contribution is similar to the telicity feature of situation aspect. Comrie (1976) notes that we can think of the imperfective-perfective distinction as the sentential representation of what is coded lexically by telicity. Although viewpoint aspect shares this semantic affinity with telicity, we should not lose sight of its independent nature. Viewpoint aspect quantifies over sentences and imposes a perspective that can affect interpretations of all situation types. As will be discussed further below (in experiment two), it is fully acceptable to take the interior (imperfective) viewpoint on a telic predicate (Tina was making a sandwich) or the exterior (perfective) viewpoint on an atelic predicate (Tony danced).

In this, viewpoint aspect resembles tense, which also quantifies over whole sentences. Viewpoint aspect and tense share many properties. In addition to both quantifying over sentences, they both situate an event in time (tense does so deictically on a timeline while viewpoint aspect places the

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<sup>1</sup> This is not a claim about perception of events -- they may well afford many features. It is a claim about which features of an event the linguistic description entails.

speaker's perspective), and syntactically they are both part of the IP system -- in fact, they are often combined morphologically: the French imparfait, for example, is both past and perfective (cf. Dahl 1988 for many examples).

To summarize: viewpoint aspect indicates a speaker's perspective on an event and must be distinguished from situation aspect (with which it shares a semantic affinity) and tense (with which it shares syntactic properties).

### Discourse Use of Viewpoint Aspect

In adult narratives, progressive morphology (imperfective viewpoint aspect) serves a "backgrounding" function (Berman and Slobin 1994). Backgrounding provides information about the setting of the story -- the nature of the environment, states of mind of the characters, etc. -- and the plot is suspended while this occurs. By contrast, non-progressive morphology (perfective viewpoint aspect) moves the plot along. Consider the sentences in (1) and (2).

- (1) Sam was flying a kite (when/??and then) the string broke
- (2) Sam flew a kite (??when/and then) the string broke.

In sentence (1), Sam's flying of the kite is background information -- the plot element in focus is that the string broke. In sentence (2), where both clauses are in the perfective, both the kite-flying and the string-breaking have more or less equal status as events of the plot. The preferred connective for the two clauses (when/and then) is effected by this narrative relationship. This analysis is consistent with more formal treatments of the progressive (cf. Dowty 1984) which link the progressive to readings of "overlap" as opposed to the "succession" readings.

Berman and Slobin (1994) argue from their extensive transcripts of the "Frog Story" that children do not begin to use the progressive to background information until around the age of five and do not become proficient at backgrounding until as old as age nine. Before that, children's stories are pretty much strings of events, that is, a series of event descriptions that follow along a linear timeline. Note that the claim here is not that children under the age of five don't use the progressive form (the progressive is one of the earliest forms acquired, Brown 1973) but that before this, children don't use it for the purpose of backgrounding information in narratives. Berman and Slobin's task, however, is very open ended and how one chooses to tell a story from pictures is subject to a variety of factors, not least of them personal preference. The purpose of the first experiment is to evaluate children's understanding of the role viewpoint aspect plays in backgrounding information using a narrative context that is somewhat more controlled than free story-telling.

### Experiment I

In this experiment, I used a controlled narrative task: subjects were given the first sentence of a story (the test sentence) and asked to continue the story. The viewpoint aspect of the test sentence was manipulated to see how this factor influenced the story continuations. The prediction was that subjects who are sensitive to the backgrounding effect of the imperfective viewpoint would continue test sentences containing the progressive as if the event in the test sentence were not concluded. The opposite was expected of test sentences in the perfective viewpoint. In other words, imperfective test sentences were expected to be followed by phrases like while and during and perfective test sentences were expected to be followed by phrases like next and afterwards. Note that this task doesn't require subjects to use viewpoint aspect for backgrounding themselves, but only to be sensitive to this when someone else does it. Both adults and children were tested: the adult data served as a baseline against which the children's data could be judged.

### *subjects*

Subjects were 17 college students at the University of Pennsylvania and 26 girls aged 4;3 to 5;11 (mean age 5;0) attending a Philadelphia area school.

### *procedure and instructions*

The task was a story completion task. Subjects were given a set of sentences and asked, for each sentence, to complete the story begun by that sentence. The task was administered in written form to the adults and orally to the children. Children who were non-responsive or who simply repeated the test sentence were prompted with the tag question "and then?". The instructions for the subjects were the following:

#### *Instructions for adults:*

"You have been given 10 sentences. Treat each one as if it were the first line in a story and write down what comes next in the story."

#### *Instructions for children:*

"I'm going to tell you the first part of a story and I want you to tell me the next part."

### *stimuli*

All subjects were given ten sentences (6 test sentences and 4 distracters) that varied with respect to both situation and viewpoint aspect. Adult subjects saw two sentences of each of the following situation aspect type: accomplishment, activity (durative) and punctual. Child subjects saw slightly different sentences which encompassed only two situation types: accomplishments and punctuals. For all subjects, one sentence of each type occurred in the past progressive (imperfective aspect) and the other occurred in the simple past (perfective aspect). Individual combinations were

counterbalanced across subjects. A full set of test sentences used is in appendix A. Some example responses from adults and children are in figure 1.

Figure 1: Example test sentences and responses from Experiment one.

Jill was carrying the heavy box to the table "then someone took it" (age 4;11)
Jill carried the heavy box to the table "then she carried the light box to the table" (age 5;11)
Bill was mowing the lawn "while walking up and down the grass, he stepped on a butterfly" (adult)
Bill mowed the lawn "afterward, he went inside to have a drink and cool down" (adult)

*coding*

There were very few cases where story responses contained explicit acknowledgment of perspective (e.g. use of phrases such as while and after) so a slightly more subjective coding method was developed that evaluated the entire response for each item. If subjects continued the story as if the event described by the test sentence was completed, the response was coded as taking the Exterior perspective. If subjects continued the story as if the event described by the test sentence was still ongoing, the response was coded as taking the Interior perspective. For example, if the test sentence was John pushed the cart an Exterior response would be Then he emptied the cart and an Interior response would be He found the cart very heavy to push. Two coders (one was the author and the other was completely blind to everything but the content words of the test sentences) coded the responses as being Interior, Exterior, or Uncodable. For cases where both coders thought the data were codable, there was 100% agreement between the coders on whether the case was interior or exterior. For cases where one coder marked a response as Uncodable the response was classified however the other coder indicated. Responses classified on the basis of a single coder in this fashion accounted for 39% of the child responses and 32% of the adult responses. Cases which both coders counted as Uncodable were counted as missing data; this accounted for 21% of the child data and 14% of the adult data.

*results*

From this coding, I calculated the percentage of Exterior responses (the sum of Exterior responses divided by the total number of codable responses) for each subject for each of the two conditions: imperfective and perfective test sentences. The mean values of these percentages by condition and subject group are given in table 1.

Table 1: Proportion of Exterior responses

	Perfective (simple past)	Imperfective (past prog)
Adults n = 17	.46	.07
Children mean age: 5;0 n = 26	.69	.58

Applying the t-statistic to the difference scores (perfective test -- imperfective test) showed that for adults, the effect of the viewpoint aspect of the test sentence was significant ( $t = 4.40$ ,  $p < .001$ ) but there was no significant effect of target sentence for the children ( $t = 1.07$ ). Comparing adults to children using the difference score of the means of the two groups showed that the children were responding significantly differently from the adults ( $t = 2.18$ ,  $p < .05$ ). I also checked to see if the situation aspect of the test items influenced the responses (recall that the adult stimuli consisted of three different situation types and the child stimuli of two different situation types). The children's responses were not significantly influenced by the situation type of the test sentence ( $t = 0.17$ ) and in this respect children also did not differ from the adults ( $t=1.5$ ).

### *discussion*

The adult data show a strong trend: imperfective marking is a strong cue for adults to continue the story from an interior perspective. That is, adults are very sensitive to the backgrounding effect of the imperfective viewpoint. The child data, on the other hand, show a lack of such sensitivity. The viewpoint aspect of the test sentence seemed to have no effect on the children's rate of exterior responding. Thus, this study confirms the claims in Berman and Slobin (1994) that children even as old as 5;11 are still struggling with the pragmatic uses of viewpoint aspect.

Integrating viewpoint aspect into larger discourse structures, however, depends on understanding the syntax and semantics of each sentence in the discourse. It is possible that children's behavior in this experiment is better explained by a failure to understand how viewpoint aspect is used at the sentence level than by a failure of pragmatic comprehension. Therefore, I turn now to children's comprehension of viewpoint aspect at the sentence level.

### The Morpho-Syntax of Aspect

In English, morphological markers of viewpoint aspect (progressive -ing and simple past -ed) are among the earliest pieces of inflectional morphology used (cf. Brown 1973, Bloom et al. 1980) so there is no question

that even very young children have access to the appropriate forms for marking viewpoint aspect. However, several researchers have argued (Antinucci and Miller 1976, Bronckart and Sinclair, 1973, Bloom et al. 1980, Bloom and Harner 1989, Aksu-Koç, 1988 among others) that initially, children use these inflections as markers of situation aspect. The evidence for this claim comes from a striking distributional pattern found in analyses of children's utterances in naturalistic corpora and from elicited production studies. In both situations, children who are approximately 2;6 or younger (ages vary somewhat depending on the study) use telic verbs (verbs with a naturally bounded situation type) with the past perfective marker and atelic verbs (verbs with no natural endpoint to their situation type) with the imperfective marker. That is, children produce forms like riding and dancing -- atelic activity verbs with imperfective aspect -- but they don't match atelic verbs with perfective marking as in rode and danced. Conversely, children produce telic verbs in the perfective form (broke and made) but not the imperfective (breaking and making). Similar distributions have been found in several other languages: in French, telic verbs appear in the *passé composé* and atelic verbs in the *présent* (Bronckart and Sinclair, 1973); in Italian, telic verbs appear in the *passato prossimo* and atelic verbs appear in the *presente* (Antinucci and Miller 1976); and so on for Hebrew, Greek, Turkish, and possibly even Polish (cf. Cziko 1989 for a review).

The most common characterization of this distribution is that children are using tense morphology to mark situation aspect and thus it has come to be called the "aspect before tense" hypothesis. This name is somewhat misleading, however, and reflects a general confusion in the literature between viewpoint aspect and situation aspect. Recall that although viewpoint aspect semantically resembles the situation aspect feature of telicity, it in fact adds independent meaning and morpho-syntactically operates much like tense. Perhaps because of its semantic resemblance to situation aspect, viewpoint aspect has been largely overlooked but close examination of the data show that what is being characterized as tense marking can equally well be (and in one case, is better) described as viewpoint aspect marking. In French and Italian (Bronckart and Sinclair 1973, Antinucci and Miller 1976) the two relevant forms are a past perfective form (the *passé composé* in French and the *passato prossimo* in Italian) which is used with telic verbs and the present, imperfective form used with atelic verbs. These forms differ both with respect to tense and viewpoint aspect so it is unclear which contrast the child intends. In English (Bloom et al. 1980) the contrast is between the past tense -ed, which is also perfective, that is used with telic verbs and the progressive -ing, which is most clearly an imperfective marker, that is used with atelic verbs. Since children at this age (under 3 years old) do not reliably produce the auxiliary (where tense is marked) with the progressive form, all that can be said with certainty is that they are using an imperfective form in these cases. Viewpoint aspect thus seems to better characterize the inflections of the English speaking children. Finally, the data from Turkish (Aksu-Koç, 1988) also speaks against a global characterization of

tense for the inflections. Turkish shows the same general distributional pattern with different situation types appearing preferentially with a single inflection, but in this language, the three inflections that participate in the phenomenon are tense, viewpoint aspect and mood markers in the adult language.

Thus, a more appropriate characterization of this distribution is that children appear to be using sentence level verbal morphology to mark situation aspect. The precise verbal morphology used may vary from language to language, or all the verbal morphology may be somewhat undifferentiated for the child (cf. Bloom and Harner 1989's re-analysis of Weist, Wysocka, Witkowska-Stadnik, Buczowska, Konieczna 1984's Polish data in which it appears that children line up past tense, perfectivity and telicity). The best characterization of the inflections children use in this phenomenon in English is viewpoint aspect and that is therefore the premise under which the following experiments were conducted.

If this general account of the distributional phenomenon is correct, then the children are exhibiting a non-adult competence. Using viewpoint aspect morphology to mark situation aspect is an error for two reasons: first, children are marking a semantic distinction (telicity) that isn't marked at the sentence level and second, children are failing to mark a distinction (viewpoint aspect) that is marked at the sentence level.

There are reasons to be skeptical of the claim that adult viewpoint aspect morphology is initially used by children to mark situation aspect. Some researchers deny the claim by pointing to instances where children do in fact produce atelic verbs with perfective marking and telic verbs with imperfective marking (Smith 1980, Weist et al. 1984). However, few phenomena in child language are categorical and it would be quite surprising if there were no counterexamples to the claim. The fact that this is only a statistical regularity does not undermine the essential claim. A stronger reason to be skeptical of the claim is that the data which support it is all from children's production, and what children say is not necessarily an indication of what their grammar looks like. This objection has two parts.

First, there is a problem in most researchers' calculation of situation aspect. In the literature, the claim is that the viewpoint aspect morphology distributes over verbs of different types. Given the age of many of the subjects in question (some subjects were as young as 1;6) looking at the verbs seems like a good idea since many of the subjects were still at the "telegraphic" stage of speech. Situation aspect, however, is computed over the entire verb phrase -- that is, the verb plus its arguments (and sometimes adjuncts as well). Thus, sentence (3) below is atelic (it has no natural endpoint) but sentence (4) is telic (it is naturally bounded when Suzy reaches the store).

- (3) Suzy ran.
- (4) Suzy ran to the store.

Researchers who examine the situation type of the verb alone may be missing relevant aspectual information because children who do not utter complete sentences may intend aspectual information which they do not convey in speech. Moreover, it is unclear how to overcome this problem using production data as speakers have such latitude in what they can say. (In one particularly glaring attempt to overcome the problem, Bloom et al. (1980) actually used a verb's preferred inflection (the progressive) to classify its situation type as atelic, precisely the point to be proved.)

Second, viewpoint aspect is largely under the control of the speaker. A speaker can choose which perspective she wishes to take with respect to most events. Since no individual forms that the child actually produces is claimed to be incorrect (there is nothing wrong, or even unusual, about forms like dancing and made) we can only point to the distribution as a whole as something odd. There are many reasons, however, why children might show this overall distribution of forms. Shirai and Anderson (1995) argue that parental speech to children shows a distribution of perfective and imperfective marking very similar to that of young children. Perhaps, then, the distribution of forms in early child speech reflects something deep about the situations that young children are in (or about the way they choose to view their situations) and not something deep about their grammar.

In order to determine whether or not young children are treating viewpoint aspect morphology as adults do or as a marker of situation aspect we need a clearer indication of children's knowledge. In the following experiment, I used a comprehension task that controlled which perspective was appropriate to take and allowed children to display their knowledge (or lack thereof) of viewpoint aspect morphology without having to actually produce any forms.

### Experiment II

In order to disentangle knowledge of viewpoint aspect from knowledge of situation aspect, I took advantage of a well known interaction between the two: the (so-called) imperfective paradox (Dowty, 1979). When a telic situation type (one that has a natural endpoint) is placed in the imperfective viewpoint (as in 5a) it loses its entailment of completion. Thus while (6) is a fine completion for 5a in the imperfective it is a bad completion for 5b in the perfective.

- (5) a. Jane was building a house
- b. Jane built a house
- (6) ... but she never finished it.

In this interaction, notice that although the imperfective version (5a) can truthfully apply to both an in-progress house-building event and a completed house-building event, it is not only strange but actually false to use 5b for anything but a completed house-building event. This difference in truth conditions forms the core of experiment two.

If children are really using viewpoint aspect morphology to mark situation aspect then they should be unable to compute the imperfective paradox interaction. Moreover, if these children are truly using the perfective morphology to indicate a telic event and the imperfective morphology to indicate an atelic event, then combinations like 5a which are both telic and contain imperfective morphology, should be particularly difficult for the child to comprehend.

### *subjects*

Subjects were drawn from three Philadelphia area day care centers. For the older group, 13 children were tested, two of whom were eliminated from analysis for failing to meet the pre-test and counterbalancing criteria described below, leaving 11 children ranging in age from 3;3 to 4;4 (mean age 3;7). For the younger group, 16 children were tested, five of whom were eliminated, leaving 11 children ranging in age from 1;8 to 3;2 (mean age 2;6). Four adult subjects (graduate students) were tested as controls.

### *task*

The subject's task was to match a sentence to an event. All the test events were accomplishments (i.e., they were all telic; had natural completive end-points). The child was presented with two versions of a given event, one which was partially completed and the other which was totally completed. Subjects were then give two sentences that described the scenes, one in the past progressive and one in the simple past. Children were asked to match the sentences one at a time to the two events. Which sentence children were asked to match first was counterbalanced across trials. In order for the subject to be able to assign both sentences correctly, she must match the progressive form to the partially complete event and the simple past form to the wholly complete event. This is the way every adult consistently responded to the task.

### *stimuli and procedures*

There were four pairs of events presented to the children: driving/rolling to school, drawing a circle, filling in a puzzle, and emptying out a cup. The events were presented as the work of two stuffed animals, a bunny and a kitty. Children were told that one animal was responsible for one of the events and the other animal was responsible for the other. Each animal then told the child what he had done -- one animal using the past progressive to describe his action and the other using the simple past. The animals' descriptions were identical except with respect to the viewpoint aspect. Each animal repeated his description at least twice and the subjects were encouraged to repeat the descriptions. The subject was then handed one of the two animals and told to put it on top of (or next to) his event. The subject's response to this direction was counted as the dependent measure. The child was then handed the remaining animal and told to place him on

his picture. The test procedure is schematized in figure 2. The complete list of stimuli for this experiment is in appendix B.

Figure 2: Schematics of Experiment 2

Events:		
	whole circle	half circle
Bunny:	"I drew a circle"	
Kitty:	"I was drawing a circle"	
Directions:	"Put the kitty on top of his picture."	

Not all subjects were able to complete four trials, but subjects were thrown out only if they failed to complete at least two counterbalanced trials (i.e., the independent variable for one trial was the simple past and for the other trial it was the past progressive).

*pre-test*

All subjects were pre-tested on the basic procedure to insure that they were capable of the task demands. The pre-test used the same basic procedure with the stuffed animals and description matching, but only required the subject to match the animal to the noun it said it liked. Subjects who failed the pretest were eliminated from the analysis. See appendix B for all conditions.

*results*

Two measures were calculated for each child: the overall percentage correct (ranging from 0-100%) and the difference in performance between perfective test sentences and imperfective test sentence (%correct on perfective - %correct on imperfective). The younger group of children (mean age 2;6) had a mean score of .59 which was not statistically different from chance ( $t=0.8$ ). For the older group (mean age 3;7), the mean score was .80, which was statistically different from chance ( $t=3.96, p<.003$ ). The difference between the older group and the younger group on mean correct was only marginally significant ( $t=1.56, p < .10$ ). The difference between performance on the perfective test sentences and the imperfective test sentences was not significant for either the older or younger group ( $t=0.7, t < 0.01$ , respectively). The results are summarized in table 2.

Table 2: Results from Experiment two

	% Correct	Difference: perf -imperf
Younger Group mean age: 2;6 n = 11	.59	0
Older Group mean age: 3;7 n = 11	.80	.08

*discussion*

From this experiment we can see that by the age of 3;7 or so, children understand the morpho-syntax of viewpoint aspect: they know what the forms are and they use them to mark the right things. The younger children in this experiment did not show comprehension of viewpoint aspect -- they behaved at chance through the trials. Moreover, they didn't show the pattern of results that one would expect if they were using this morphology to mark telicity. The situation aspect of all the test sentences in this experiment was telic because only such types create the imperfective paradox interaction. If the perfective marker was really being used as a marker of telicity (and the imperfective marker indicated atelicity) then from the child's perspective, half of the test sentences were grammatical (the perfective ones) and half were ungrammatical (the imperfective ones). Assuming grammatical sentences are easier, we would expect a difference in successful performance between the perfective (grammatical) and imperfective (ungrammatical) test sentences. Absolutely no such difference was found. Thus, although this experiment confirms the claim that children do not at first understand viewpoint aspect morphology as adults do, it does not support the claim that they believe the morphology is an indication of situation aspect.

The Semantics of Viewpoint Aspect

From experiment two, it appears that when children around the age of 2;6 are given the morpho-syntactic instantiation of viewpoint aspect they don't come up with the right semantics. But is this because they don't have the semantics, or because they don't know how to map the semantics onto the morpho-syntax of English?

Within the previous literature, one line of thought comes from the Piagetian school and argues that this distribution of forms reflects a conceptual lack. Antinucci and Miller (1976) and Bronckart and Sinclair (1973) both analyze the distributional phenomenon as children understanding situation aspect but not tense and attribute this to the relative conceptual complexity of tense. I have argued for a viewpoint aspect interpretation of the morphology being used, and the conceptual difficulty arguments go through just as well with viewpoint aspect. As discussed

above, both tense and viewpoint aspect quantify over events and orient them with respect to the speaker. A child who is incapable of understanding the non-egocentric deictic relations of tense would plausibly be incapable of understanding the perspective taking properties of viewpoint aspect as well. Despite the claim that children lack the relevant concepts, neither Antinucci and Miller (1976) nor Bronckart and Sinclair (1973) actually tested their subjects for comprehension of viewpoint aspect (or in their case, tense) outside children's use of the inflectional morphology.

What is needed is a test of the semantics of viewpoint aspect that does not depend on these inflections. One way to do this is to use viewpoint aspect semantics as they are instantiated in the open class vocabulary -- adverbials, phrasal modifiers and the like. Open class items differ from the closed class vocabulary in a variety of ways (Gleitman and Wanner 1982) but most importantly for current purposes, children begin by learning open class items and they are acquired largely independent of syntactic development. Thus, it is possible for a child to have the concept and be able to express it via the open class route but not yet know how to express it through the morpho-syntactic route that depends on the closed class.

### Experiment 3

This experiment again uses the imperfective paradox to assess children's knowledge of viewpoint aspect. I am not presenting here anything even approaching a complete analysis of the semantics of viewpoint aspect; the open class cues I have used reflect the semantic effect of viewpoint aspect in the imperfective paradox situation.

#### *subjects*

Subjects were drawn from two Philadelphia area day care centers. Fifteen children were tested but four were removed for failing to pass the pre-test or for failing to complete two counterbalanced trials. The mean age of the subjects was 2;7 with ages ranging from 1;8 to 3;2.

#### *task and pre-test*

The task was the same as in experiment 2. All subjects in this experiment were also pre-tested as described in experiment 2.

#### *stimuli and procedures*

The events presented to the children were the same as in experiment 2: driving/rolling a car to school, drawing a circle, filling in a puzzle, and emptying out a cup. The procedure was also essentially the same, but with two changes. For all children the test sentences were presented with some sort of open class modifiers that indicated the viewpoint. Thus, the imperfective test sentences now correspond to sentences that contain modifiers like in the middle of or partway and perfective test sentences correspond to sentences that contain modifiers like all done and completely. For each perfective and imperfective test sentence, subjects received at least one open class cue, and in

most cases, they received several different cues (all of the same type). A complete list of the cues used is listed in figure 3. In addition, half the subjects (n=6) were tested using only a single event description (though of course, they were still presented with two events). The two test procedures are schematized in figure 4.

Figure 3: Open class cues used in Experiment 3

“imperfective” cues	“perfective” cues
in the middle of partway partially done little bit still working on	all done all the way finished completely totally fully already whole

Figure 4: Schematics for Experiment 3

Events:	
whole circle	half circle
2 sentence condition:	
Bunny:	"I finished drawing a circle"
Kitty:	"I was in the middle of drawing a circle"
Directions: "Put the kitty on top of his picture.	
1 sentence condition:	
Directions: point to the circle that is only partway drawn.	

*results*

Again, not all subjects were able to complete the four trials but subjects data were thrown out only if the subject failed to complete two counterbalanced trials. Overall percentage correct was calculated for each subject. There was no difference at all between the two sentence condition and the one sentence condition (t=0.31) so the data from these two conditions were collapsed. The mean percentage correct was .70 which is significantly better than chance (t=2.42, p<.03).

### *discussion*

Subjects in this experiment were able, at a rate significantly better than chance, to choose the right event. Thus it appears that children are able to understand the semantics of viewpoint aspect when it is carried by open class elements. The significance of this finding will be raised in the general discussion.

### General Discussion

Knowledge of a linguistic element like viewpoint aspect must be built up a layer at a time. The foundation of the knowledge must be conceptual-semantic: a speaker must understand the idea to be expressed. The next layer up is the mapping of the semantics to the language specific syntactic encoding of that meaning. This layer requires not only that a speaker have access to the right forms but that she link those forms up to the semantic layer it rests on. Finally, the top layer consists of knowledge of how to integrate this grammatical knowledge into the larger discourse.

A speaker who successfully masters a high level of knowledge must have mastered the levels below it, but a speaker who fails at a high (or an intermediate) level may fail for one of two reasons: she may not understand the particular level under investigation, or she may not understand a level on which it depends. In this paper, I have tried to pull apart children's understanding of viewpoint aspect from the top down. Experiment one examined children's ability to use viewpoint aspect within a narrative setting. I found that children as old as 5;11 are not sensitive to the narrative uses of viewpoint aspect in the way adults are. In other words, these children lack a complete understanding of the pragmatic level of viewpoint aspect. The development of pragmatic knowledge is known to come in relatively late and according to the work of Berman and Slobin (1994), it is not until children are 9 or 10 years old that they begin to show the facility with viewpoint aspect that adults do in narratives.

Moving down a level, experiment two looked at the morpho-syntactic encoding of viewpoint aspect. Previous research had suggested that children initially use viewpoint morphology to mark situation aspect and experiment two, therefore, pitted the two types of aspect against each other in the "imperfective paradox". Relatively older children (mean age 3;7) were able to correctly use the viewpoint aspect information in this task but the younger children (mean age 2;6) behaved at chance levels. Thus, the children in the younger group have not mastered this level of knowledge (the morpho-syntactic mapping) of viewpoint aspect. In previous literature, several researchers have claimed something much stronger. Using only production data these researchers have presumed the finding I have achieved here (namely that children do not initially map viewpoint aspect correctly to its morphology) and attributed this failure to a lower level -- the conceptual-semantic level. Bronckart and Sinclair (1973) and Antinucci and Miller (1976), coming from a Piagetian perspective, argue that children are cognitively incapable of calculating the kind of relationships necessary for

viewpoint aspect and hence use the morphology they know to mark situation aspect instead.

But this claim is hardly warranted. No one argues from children's failure to use viewpoint aspect as adults do in a narrative context that these children don't understand the syntactic encoding of viewpoint aspect. Nevertheless that is what is being argued here: children don't use the viewpoint aspect forms as adults do so they must not understand the concepts that underlie them as adults do. In experiment three, I looked directly at the semantics that underlie viewpoint aspect, at least as they arise in the test situation of the imperfective paradox. By using cues to the viewpoint semantics from the open class vocabulary, I was able to get children to succeed at this task where children the same age had failed in experiment two.

From these data, we can tell a coherent story about the development of viewpoint aspect. At the age of 2;6 (and perhaps as young as 1;8) children are already armed with the semantics of viewpoint aspect and face only a mapping problem: figuring out how these semantics are encoded in the particular language they are learning. As we saw in experiment three, this mapping of semantics onto linguistic form proceeds quite readily for open class vocabulary items and more slowly for mappings onto the closed class, morpho-syntactic domain. Finally, after children have mastered the sentence level encoding of viewpoint aspect, it takes some further time, a few years in fact, for them to be able to use viewpoint aspect for the discourse function of backgrounding.

These findings are reassuring on several counts. First, the finding of early comprehension of viewpoint aspect semantics is reassuring because it is unclear how this could be learned if it weren't implicitly known (cf. Fodor 1975): certainly no one has proposed a plausible account of how children could move from a representation based on situation aspect to one that also includes viewpoint aspect. Second, the developmental pattern documented here is a familiar one. It is not surprising that children have some initial difficulties in mapping particular semantic elements to the closed class, morpho-syntactic domain. Children's first words are all open class vocabulary items and closed class elements -- because of their phonologically reduced nature and links to syntactic structure -- often cause initial difficulties (e.g., Gleitman and Wanner 1982). Moreover, the finding that children understand sentential level syntax and semantics before discourse level uses is entirely plausible as individual sentences are a proper subset of the discourse.

At the same time, these studies leave several questions unanswered. For example, we saw (experiment two) that the comprehension performance of young children does not support an important claim derived from the production evidence: In comprehension, children do not systematically favor telic predicates in the perfective form over telic predicates in the imperfective form; that is, in our experimental situation it does not seem that they are marking situation aspect with viewpoint aspect morphology. How are such differences between production and comprehension in 2 and 3 year olds to be

understood? More than this, what is this morphology being used for? Could it be simply probability matching of forms in the input corpus (as Shirai and Anderson, 1995 suggest) and perhaps be semantically neutral? The present research did not address these important questions. However, it narrows down the solution-space by suggesting the domain in which the answer may be found: Whatever the young child's problem is, it is within the linguistic system and not the conceptual system.

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**Appendix A:** Test sentences for the story completion task

Adults

*Test sentences*

*(subjects saw only 2 from the 4 accomplishments)*

1. Bill mowed/was mowing the lawn (accomplishment)
2. Anne built/was building a house ( “ )
3. Jane read/was reading a book ( “ )
4. Mary walked/was walking to school ( “ )
5. Todd pushed/was pushing the cart (activity )
6. Gina ran/was running ( “ )
7. Kate tapped/was tapping the table (punctual )
8. Chris winked/was winking ( “ )

*Filler sentences: (subjects saw 4 from these 8)*

1. Tony will die someday
2. Nancy is happy
3. Andy had a truck
4. Anne wanted to buy a car
5. Tom will come soon
6. Beth liked to swim
7. Greg knew the answer
8. Bob is in the next room

Children

*Test sentences*

1. Annie made/was making a sandwich  
(accomplishment)
2. Jane built/was building a house ( “ )
3. Susie carried/was carrying the heavy box to the table ( “ )
4. Pam ran/was running to school ( “ )
5. Mary tapped/was tapping her finger on the mysterious bottle (punctual)
6. Ellie hiccuped/was hiccuping ( “ )

*Filler sentences*

1. Nancy wants to eat an apple
2. Leah like to go to the zoo
3. Amy knows how to make ice cream
4. Jill can't ride a bike yet.

**Appendix B:**

Events and sentences for sentence matching task (experiments 2 and 3)

Pre-test

- A. Events: a rug and a crib  
Test sentences: I like to sit on the rug  
I like to sit in the crib
- B. Events: a banana and a carton of milk  
Test sentences: I like to eat bananas  
I like to drink milk

Test trials

1. Events: whole and half circle  
Test sentences: I drew a circle  
I was drawing a circle
2. Events: completed puzzle and puzzle with half the pieces on the side  
Test sentences: I filled in the puzzle  
I was filling in the puzzle
3. Events: car next to toy schoolhouse and car about a foot away  
Test sentences: I rolled my car to school  
I was rolling my car to school
4. Events: empty cup next to blocks and cup with several blocks in it  
Test sentences: I emptied my cup  
I was emptying my cup