

# I'll Never Grow Up: Adult and Child Understanding of Aspect

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## Abstract

This paper revisits the aspectual under-extension found in children's production data, in which children preferentially link telic predicates with perfective/past morphology and atelic predicates with imperfective/present morphology. I argue that these aspectual groupings reflect a deep property of linguistic/conceptual organization and are manifested in various ways throughout the lifespan. The results of a new sentence comparison task show that adults judge sentences which conform to the children's under-extended groupings as better than those which do not.

## Introduction

There is a well-documented pattern of under-extension in children's early production of verbal morphology. Until some time around the age of 2;6, children acquiring a variety of languages produce telic verbs with past and/or perfective morphology and they produce atelic verbs<sup>1</sup> with present and/or imperfective morphology. That is, children often say things like *riding* (atelic + imperfective) and *broke* (telic + perfective) but very rarely say things like *rode* (atelic + perfective) or *breaking* (telic + imperfective). These temporal/aspectual groupings have been discussed often because of their potential significance for the problem of language acquisition. This paper will argue that the groupings found in acquisition are just one manifestation among many others of a deep organizational property of language (or possibly cognition) itself. The departure point for this argument comes from the prototype account of Shirai & Andersen (1995; Andersen & Shirai 1996). This paper supports and extends their account, and provides new experimental support for the potency of the groupings in adults.

This paper is organized as follows: after briefly reviewing the temporal/aspectual groupings as identified through the acquisition data, several additional examples beyond the first language acquisition domain will be identified; finally, a sentence comparison experiment will be reported in which adults judged sentences which corresponded to the acquisition groupings as better than those which did not.

<sup>1</sup> The telic/atelic distinction does not, of course, rely just on the verb but on features of the entire predicate (e.g. *Tinkerbell ate* is atelic; *Tinkerbell ate a pizza* is telic). However, entire predicates are rarely available in early child speech, and the classifications here, as elsewhere, are based on plausible interpretations of the verb in context.

The basic pattern of temporal/aspectual grouping found in the first language acquisition production data is summarized in Table 1.

Table 1: Temporal/Aspectual Groupings

	Group 1	Group 2
Lexical Aspect	Telic (punctual)	Atelic (durative)
Grammatical Aspect	Perfective	Imperfective
Tense	Past	Present

Each row of the table shows an independent dimension of grammar. Lexical aspect (Aktionsarten) refers to inherent properties of a predicate. The primary semantic division is between telic predicates (i.e. achievements and accomplishments) and atelic predicates (i.e. activities and states); a secondary division in this domain concerns the subjective duration of the event – durative predicates describe events which last for some time while punctual predicates describe those which subjectively take no time at all. Grammatical aspect (or Viewpoint aspect) refers to the perfective/imperfective distinction. Tense refers to the distinction between past and present. In principle, each of these dimensions is independent of the other (with a few well known exceptions). The practice in children's early production, however, is to combine the values for each dimension into sentences according to the groups outlined in the columns. This grouping leads to a productive under-extension, as children fail to utter legitimate cross-group options, such as telic-imperfective-present sentences (*Wendy is making a sandwich*) or atelic-perfective-past sentences (*Peter flew*).

The existence of these groups in first language acquisition production has been well documented for a variety of languages, including English (Bloom, Lifter & Hafitz 1980, Shirai & Andersen 1995), French (Bronckart & Sinclair 1973), Italian (Antinucci & Miller 1976), Polish (Weist et al. 1984, Bronckart & Sinclair 1989), Mandarin (Li 1990), Japanese (Rispoli 1981), and Hebrew (Berman 1983).

Children's early comprehension abilities appear to be somewhat more flexible, and children three years of age and slightly younger have been shown to be able to understand cross-group pairs, particularly telic-imperfective pairings (Weist 1991; Weist, Atanassova, Wysocka & Pawlak 1999; Weist Lyytinen, Wysocka & Atanassova 1997; Smith

Naigles & Wagner 2002). However, other studies have found evidence for the continued influence of the groupings (though sometimes in a weakened form) even in comprehension (Wagner 2002, Wagner 2001a, Li & Bowerman 1999, Stoll 1998).

A variety of explanations have been proposed to account for children's early reliance on these temporal/aspectual groups. Some have proposed that children have a radically different semantic organization compared to the adult grammar (cf. Bronckart & Sinclair 1973; Bloom, Lifter & Hafitz 1980) while others have proposed that children have a subtly different semantic organization (Wagner 2002). Olsen & Weinberg (1999) derive the groupings as a product of children's application of the subset principle, while Bickerton sees the influence of the universal language bi-program (1981).

The account put forward by Shirai & Andersen (1995; Andersen & Shirai 1996; see also Li & Bowerman 1998 for a related position) argues that the groups reflect prototypes which anchor the temporal/aspectual categories; cross-group pairings reflect less prototypical cases. The under-extended use of tense and aspect morphology in early production is a result of children clinging strongly to the prototype. The precise force of this proposal depends largely on what the prototypes themselves are taken to be: they could reflect a radically different semantic organization (cf. Shirai & Andersen 1995) or they might reflect conceptual organization (see further the discussion in this paper). Regardless, because the prototypes are not, in and of themselves, products of the language acquisition process, one strong prediction made by the prototype account is that these aspectual groupings should be found in other situations.

For example, Andersen & Shirai (1996) considered adults engaged in the process of learning a language, that is, L2 acquisition. They surveyed a variety of studies examining aspectual knowledge and usage in L2 learners and found evidence that in general, they produced more combinations that corresponded to the prototypical temporal/aspectual groupings and appeared to understand these combinations better as well. Similarly, Bickerton (1981) has found evidence for the prototypical groupings in pidgins and creole languages, further bolstering the claim that these aspectual groups are important in language acquisition under all sorts of circumstances.

Another approach was taken in Shirai & Andersen (1995). They analyzed the speech of 3 parents talking to children and found that the adult production showed the prototypical groupings as strongly as the children's speech did. It is unclear if this is a general phenomenon in adult speech (see Olsen, Weinberg, Lilly & Drury 1998 for evidence that it is not wholly general even in speech to children) but it is suggestive that under some circumstances, adults may talk – aspectually speaking – like children.

Turning to the domain of comprehension, Wagner (2001b) found evidence that adults' understanding was subtly affected by the prototypical groupings. She

conducted a sentence-to-picture matching task in which subjects had to pair a telic-perfective sentence such as *The girl painted a flower* to a picture in which there was a completed flower, and a telic-imperfective sentence such as *The girl was painting a flower* to a picture showing an incomplete version of the same event. In a parallel set of trials, subjects also matched an atelic-imperfective sentence such as *The boy was sleeping* to a picture showing ongoing sleeping, and an atelic-perfective version such as *The boy slept* to a picture showing a boy playing next to a rumpled bed. The performance of children (aged 3 to 5 years old) in this task was better for the prototypical groupings; the effect was particularly pronounced for trials in which the pictures contained less information (i.e., children did worse when they had to choose between completed and incomplete flower paintings than when the picture choices also included the agent of painting).

Adult performance was well above chance in all conditions – clearly adults were able to understand non-prototypical groupings. However, within the narrow ceiling range of adults' success, a significant statistical interaction was found, in the direction of the prototypical groupings. That is, the few errors adults made were virtually all in the non-prototypical groupings (telic + imperfective or atelic + perfective). Thus it is possible to interpret these results as showing that the difference between adults and children in this task is not one of kind (adults understand something children do not) but one of degree: adults and children agree about what is hard, but adults are comparatively better at dealing with hard cases.

The aim of the current sentence comparison study is to investigate whether adults will be influenced by the prototype groupings in a completely different domain. Unlike previous investigations with adults (and with children), the current task requires subjects neither to freely generate items nor to make any explicit assessment of meaning. Subjects are not asked at any level to compare these sentences to situations in the world, but simply to consider them as sentences of their language.

Subjects are presented with two sentences, both of them grammatically correct, acceptable sentences of English. The sentences vary only in how well they correspond to the prototypical groupings. The subject's task is to choose which sentence is the better one. For example, in one trial, subjects were asked to choose between *The teacher carried the box* and *The child was tapping the table*; in another trial, between *The man has built a house* and *The woman is winning the race*.

If adults are influenced by the prototypical groups, then we expect them to consistently choose sentences which conform to the prototype as being better compared to those which do not. In particular, the telic + punctual + perfective + past sentence (*The woman won the race*) and the atelic + durative + imperfective + present sentence (*The teacher is carrying the box*) should be chosen as the better sentences when compared against every other sentence in the set (except, perhaps against each other). Moreover, because

subjects must make a full range of judgments (including many variants of non-prototypical cases), the results should allow us to understand the nature of the prototypical groupings in more detail.

For example, is there some subset of grammatical information that forms the core of the prototype? One likely candidate is a generalized notion of (potential) completion which links the lexical aspect dimension of telicity and grammatical aspect. Comrie (1976) has suggested that telicity and perfectivity express the same information in the lexical and grammatical domains respectively: telic predicates are those which have the potential to complete and perfective aspect signals actual completion; atelic predicates and imperfective aspect mark the opposite. Another potential core for the prototype might be created out of grammatical aspect and tense. In many languages, these two dimensions of meaning are conflated into unified forms (cf. English simple past which conflates past and perfective and French imparfait which conflates past and imperfective). Indeed some languages even opt to mark only one of these two, relying on adverbial expressions and pragmatic implications to signal the missing meanings (e.g. Mandarin marks only grammatical aspect and Modern Hebrew marks only tense). Alternatively, it may be that all the dimensions are equally important for the prototype and all that matters is how many dimensions come from the same group.

## Methods

### Subjects

12 undergraduate adults participated. They were recruited at NYU and given course participation credit for their time.

### Stimuli

The stimuli consisted of 16 sentences. Four base sentences were constructed by combining the two lexical aspect values of durativity and telicity (see table 2). All the sentences were transitive. Although there is a correlation in English between transitivity and telicity (telic predicates are more likely to be transitive and atelic predicates intransitive) it was thought that variation in argument structure would simply add a confound to the study.

Table 2: Base sentences

Telic	Durative	The man BUILD a house.
	Punctual	The woman WIN the race.
Atelic	Durative	The teacher CARRY the box.
	Punctual	The child TAP the table.

Each of these base sentences appeared in four forms corresponding to all the combinations of tense and

grammatical aspect. One base set is shown in Table 3 in the full four forms.

### Procedure

Subjects were seated in front of a computer. Via written instructions on the screen, they were told “You will see two sentences presented to you. Your task is to indicate which sentence you think is better. This may strike you as a funny question – you may believe that both sentences are perfectly OK. If you are unsure which sentence is better, just go with your gut instinct. In some cases, the differences between the two sentences will be very small, so please read the sentences carefully.” Subjects were also informed to press the “T” key if they chose the top sentence as better and the “B” key if they chose the bottom sentence as better.

Following the instructions, subjects were presented with every possible pairing of the 16 sentences for a total of 120 judgments. The two sentences appeared in 24 pt. font and were easily readable by the subjects. To encourage subjects to read both sentences before making their choice, the top sentence was presented alone for 500 ms, and 500 ms after both sentences were present on screen a row of three pink asterisks was flashed in the middle of the screen. Subjects were unable to choose either sentence until after the asterisks had flashed (subjects were informed of this on the instructions screen). Both sentences remained on the screen until subjects made a choice. Sentences were presented with Psyscope; presentation order was randomly generated by the program. Subjects were given two breaks during the study. The task took less than 20 minutes to complete.

### Scoring

Every time a sentence was chosen, it received 1 point. The mean number of points a sentence received across all subjects was taken and used to create an overall score for each of the sentences. The scores could range, therefore, from 0 (a sentence that was never chosen as better, regardless of what it was in competition with) to 15 (a sentence was chosen as better against every other sentence in the set).

Table 3: Full set of forms for one base

Past	Imperfective	The woman was winning the race.
	Perfective	The woman won the race.
Present	Imperfective	The woman is winning the race.
	Perfective	The woman has won the race.

### Results

The scoring method used creates a ranking of all the test sentences for each subject (though with higher scores corresponding to lower ranks). Accordingly, the data were treated as ordinal and non-parametric tests were conducted.

Higher scores indicate that a sentence was more often chosen as better. A non-parametric Friedman Anova was conducted on the scores of the full set of 16 sentences to determine if there were overall differences among the sentences. This analysis was highly significant:  $X^2_{(15)} = 79.65$ ,  $p < 0.0001$ .

As predicted by the prototype account, the highest scoring sentence was in fact a prototypical one: telic + punctual + perfective + past, *The woman won the race* (mean score = 11.75). The complementary prototype sentence was the fourth highest scoring sentence: atelic + durative + imperfective + present, *The teacher is carrying the box* (mean score = 9.5). The lowest scoring sentence was very non-prototypical, drawing equally from both temporal/aspectual groups: atelic + punctual + perfective + present, *The child has tapped the table* (mean score = 2.75). Indeed, all of the four lowest scoring sentences contained two values from each temporal/aspectual group.

To directly test the prototype account, the test sentences were re-coded for the number of values they contained that were drawn from the same temporal/aspectual group. The two most prototypical sentences (discussed above) drew all four of their values from the same group; an additional eight sentences drew three of their values from the same group; and five sentences split their values equally between the groups. A non-parametric Friedman Anova conducted over the scores of items sharing two, three, and four values from the same temporal/aspectual group was significant:  $X^2_{(2)} = 22.17$ ,  $p < 0.0001$ . Wilcoxon matched-pairs signed-ranks tests were used to compare the items. These tests showed that sentences sharing three values from the same group received higher scores than those sharing only two ( $Z = 2.9$ ,  $p < 0.004$ ; 11/12 pairs showed pattern) and those sentences sharing four values received higher ranks than those sharing only three ( $Z = 3.1$ ,  $p < 0.002$ ; 12/12 pairs showed pattern). The values of the scores for the three categories is shown in table 4.

Table 4: Mean score (std dev) for sentences sharing 2, 3, and 4 values from the same temporal/aspectual group

Mean Score (std dev)	
2 values shared	6.61 (0.7)
3 values shared	7.73 (0.3)
4 values shared	10.63 (1.28)

The fact that the scores are influenced by how consistent a sentence is in drawing its values from the same group suggests that all the grammatical dimensions are important. Nevertheless, it may still be the case that some dimensions may be more closely linked than others. To investigate this possibility, the sentences were re-coded to indicate which grammatical dimension values were coming from the same group.

The first analysis of this concerned the semantically related dimensions of lexical aspect telicity and grammatical aspect. A Wilcoxon matched-pairs signed-ranks test

showed that sentences which drew telicity and grammatical aspect values from the same group scored higher than those which did not (i.e. telic + perfective and atelic + imperfective scored higher than telic + imperfective and atelic + perfective):  $Z = 3.06$ ,  $p < 0.002$ ; 12/12 pairs showed this pattern. Similar support was also found for the dimensions of grammatical aspect and tense. Sentences which drew grammatical aspect and tense values from the same group scored higher than those which did not (i.e. past + perfective and present + imperfective scored higher than past + imperfective and present + perfective):  $Z = 2.55$ ,  $p < 0.01$ ; 11/12 pairs showed this pattern.

Table 5: Mean scores (std dev) for sentences drawing values from the same or different groups

	Same Group	Different Groups
Telicity and Grammatical Aspect	8.6 (0.71)	6.4 (0.71)
Tense and Grammatical Aspect	9.23 (1.54)	5.77 (1.54)

Analysis of the dimension of durativity showed that, just as with the other lexical aspect feature of telicity, sentences which drew durativity and grammatical aspect from the same group were better than those which did not (i.e. punctual + perfective and durative + imperfective scored higher than punctual + imperfective and durative + perfective):  $Z = 2.22$ ,  $p < 0.26$ , 8/12 pairs showed this pattern. However, there was only a marginal advantage to having telicity and durativity values drawn from the same group (i.e. telic + punctual and atelic + durative scored slightly higher than telic + durative and atelic + punctual):  $Z = 1.94$ ,  $p < 0.053$ ; 7/12 pairs showed this pattern) and no advantage at all to having durativity and tense values drawn from the same group.

The only comparisons which went directly counter to the prototype account concerned the analysis of tense and lexical aspect. Sentences which drew tense and telicity values from the same group actually scored significantly lower than those which drew from the same group (i.e. past + telic and present + atelic did worse than present + telic and past + atelic):  $Z = 2.11$ ,  $p < 0.034$ ; 9/12 showed this reverse pattern.

One potential concern with these effects arose from exit interviews with the subjects. A few subjects apparently allowed an odd sort of prescriptive judgment to interfere with their comparisons. They had mistakenly analyzed the present progressive constructions as passives and reported that they knew passive sentences were "bad". Other subjects reported finding the present perfect construction unnatural and unlike anything they would say. This claim is not unreasonable given the relative infrequency of the

construction<sup>2</sup>. Clearly these subjects are linguistically unsophisticated, but it is nevertheless possible that present tense interpretations are more difficult without any linguistic or contextual support, and this could have affected subjects' comparison judgments.

To insure that the effects found are not being driven solely by a dis-preference for certain present tense sentences, the previous analyses were re-performed using just test items in the past tense. This restricted analysis produced very similar results to the complete analysis. Solely within the past tense set of sentences, there continues to be an advantage for sentences which draw lexical and grammatical aspect values from the same group, and for sentences containing perfective aspect (i.e. past + perfective scores higher than past + imperfective). What's more, there is now also the expected prototypical effect between telicity and tense (i.e. telic + past scores higher than atelic + past,  $Z = 2.04$   $p < 0.04$  with 9/12 pairs showing the pattern). The connection between durativity and grammatical aspect is reduced to a marginal effect ( $Z = 1.88$ ,  $p < 0.06$ ), but the connection between durativity and telicity is raised to significance ( $Z = 2.18$ ,  $p < 0.029$  with 9/12 pairs showing the pattern). Thus, even discounting potential interference from subjects' unsophisticated meta-linguistic analyses, the effects of the prototypical groupings remains strong.

## Discussion

The results of the sentence comparison experiment reported here support the existence of prototypical groupings of temporal/aspectual information in adults. Although the original impetus for positing these groups comes from patterns of production found in young children, the data here converge with other results in the literature in suggesting that these prototypical groupings are a durable part of our language representations and last throughout the lifespan.

Adults were asked to compare pairs of sentences which conformed to various degrees to the temporal/aspectual prototypes found in children's early production of language. Despite the fact that all the sentences were acceptable grammatical sentences in English, adults consistently rated more prototypical sentences as being better. Four dimensions of the prototype were varied: tense, grammatical aspect, the lexical aspect feature of telicity, and the lexical aspect feature of durativity. The results suggested that how good a sentence was judged to be depended on how many of these dimensions were drawn from the same group, by and large, regardless of which dimensions were grouped together. Thus, although there are principled reasons to expect certain of these dimensions to be linked conceptually (telicity and grammatical aspect share a similar semantic

basis while grammatical aspect and tense share a similar syntactic form), and although the dimension of durativity did appear to be somewhat less important than the remaining three, nevertheless, the prototype appears to draw strongly from all dimensions.

One important implication of this view is to seriously constrain the interpretations of the first language acquisition data. The starting point for this line of research was the finding that children preferentially produce (and possibly comprehend) combinations of verbs and morphology that conform to the prototypical groups. Accounts of this phenomenon which argue that children have qualitatively different representations from adults – whether conceptually, semantically, or syntactically – are far less plausible in light of the current data. The difference between adults and children appears to be one of degree, not one of kind. Acknowledging this fact is not in itself a complete analysis of the children's performance and many open questions remain. For example, why do children resist the non-prototypical cases with the force that they do? How do they become more tolerant of these cases as they get older? Is it a development in the conceptual, linguistic, processing, or some other domain that allows children to better deal with the non-prototypical cores?

Further support for the existence of the temporal/aspectual prototypes need not come from the domain of language acquisition. This paper reviewed several strands of evidence that adults are equally subject to the prototypes: Adults may also produce prototypical forms more frequently, they acquire them better in second language acquisition, they comprehend prototypical forms better, and finally, based on the experiment reported here, they judge them to be better sentences. Additional support for the temporal/aspectual prototypical groups as a general organizing force in language comes from historical linguistics. In their examination of the historical evolution of tense, mood and aspect morphology, Bybee, Perkins & Pagliucca (1994) present strong evidence for the prototypical groupings, at least for tense and grammatical aspect. For example, past and perfective markers are typically grammaticalized out of the same sorts of linguistic elements (often completive and resultative markers). Similarly, imperfective and present tense markers are typically grammaticalized out of a different set of linguistic elements (often progressives, or lexical items related to being or standing). Bybee et al. do find evidence for the existence of the dimensions of tense and grammatical aspect independent of the prototypical groupings (e.g., historically, the development of past perfective marking seems to depend on the prior existence of overt past imperfective marking), but the genetic lines, so to speak, operate over the prototypical temporal/aspectual groups.

Let us turn at last to a slightly more speculative question, namely, what is the nature and origin of the temporal/aspectual prototypes? Shirai & Andersen (1995; also Andersen & Shirai 1996) suggest that the prototype groupings reflect a form of linguistic categorization; that the

<sup>2</sup> Another issue is the particular semantics of the present perfect construction. It has been argued that the perfect construction requires a telic predicate to be felicitous, and indeed, the reverse effect between telicity and tense appears to stem largely from the fact that telic + present + perfect scores substantially higher than atelic + present + perfect.

groupings presented here constitute the prototypical cores of the meaning of the grammatical dimensions (tense, grammatical aspect, and lexical aspect) themselves. This position seems difficult to defend on many grounds, not least of which is the violence it does to our intuitions about what the meanings of notions like PAST and IMPERFECTIVE actually are. But there is an alternative way to make sense of the temporal/aspectual prototypes. Perhaps the prototypical groups reflect conceptual and not linguistic organization. The particular combinations of information conveyed in each group may reflect an ideal situation in the world for illustrating, and possibly, assessing each grammatical dimension. That is, the situations that are most likely to make us want to talk about pastness also happen to be the ones that portray completion (i.e. perfectivity applied to an event described with a telic predicate). Similarly, the situations that most make us want to talk about presentness also happen to be ones that portray ongoing activities (i.e. imperfectivity applied to an event described with an atelic predicate). These prototypical situations are anchors in our cognition of events, and the linguistic descriptions simply follow along the path of our thoughts. Moreover, given the enduring nature of these paths throughout the lifespan, it appears that our fundamental understanding of the events happening around us remains constant in development.

### Acknowledgments

This research benefited from discussions with and technical aid from Ed Kako, Justin Halberda, Lisa Feigenson, Jesse Snedeker, and Dan Reynolds. The study reported was conducted while the author was supported by NRSA grant #MH12225.

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