

Mapping innate lexical features to grammatical categories: Acquisition of English *-ing* and *-ed*

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Abstract

One of the major questions in child language acquisition research is whether children and adults have the same mental organization for grammar. We consider the case of the acquisition of *-ed* and *-ing*. This has standardly been assumed to show that children organize their grammatical knowledge differently from adults. In contrast to models that claim that children's restriction on these morphemes argues for a noncontinuous view of grammar, we show that it is most parsimoniously accounted for by a privative aspect and tense model (Olsen, 1997), independently needed in the adult grammar. In particular, we show i) that one cannot attribute this pattern of development to children's simple modeling of restrictions in the adult data, and ii) that it is not necessary to assume initial hypotheses discontinuous with the adult state, or primitives not found therein. Rather, the data requires a strong innate component that both delimits possible adult grammars and defines early stages. Our model provides an account of why children show these restrictions, how they recover, and what cross-linguistic variation might occur in the emergence of adult competence.

Introduction

Previous research in child language acquisition identifies discrepancies between child and adult use of verbal inflectional morphology. In this paper, we consider a case of partial undergeneralization where children's use of English *-ed* and *-ing* endings seems constrained by the aspectual class of the host verb in a way unattested in the adult grammar. In contrast to models that claim that this restriction is an argument for a noncontinuous view of grammar, we show that it is most parsimoniously accounted for by a learning theory based on markedness and a cross-linguistically grounded aspect and tense model (Olsen, 1997). In fact, we show that one cannot attribute this pattern of development to children's simple modeling of restrictions in the adult data (cf. (Shirai and Andersen, 1995)), nor does it show that initial hypotheses are discontinuous or make use of primitives not found in the adult state. Rather it argues for a strong innate component that delimits possible adult grammars and defines early stages. In contrast to previous analyses, our model provides an account of why children show these restrictions, how they recover, and what cross-linguistic variation might occur in the emergence of adult competence.

Overview of previous work

It has been frequently observed that children observe restrictions on the use of progressive and past tense morphemes that are not wholly reflected in the adult grammars. For English, this characterization describes a stage where the *-ed* ending

is not normally found on verbs that denote unbounded events (*hug*, *paint*, or *walk*) despite the fact that these are fine in the adult grammar. Similarly, children resist using *-ing* with states, and indeed resist morphology altogether, for verbs such as *love*, *know*, *appreciate*, etc. In this case, the restriction found in young children is also partly observed in the adult state, as in *John was appreciating/?knowing his new job*.

Theories about the acquisition of the progressive and past tense morphemes in English differ mainly with respect to the factors that govern the child's initial hypothesis. A STAGE model explains early restrictions on the basis of more general cognitive principles, e.g. to claim that some level of linguistic organization that is active in the adult grammar is not yet available to a child at the appropriate level of development. Thus the child is forced to analyze adult input on the basis of a defective conceptual organization. Since the child's early cognitive organization is assumed to be different from that of an adult, restrictions on the form of adult grammars are irrelevant to the characterization of possible initial states. Once the child moves on to a stage where the relevant categories appear, the linguistic environment can play a role in forcing generalization of the initial hypothesis.

In the case at hand, Bloom (Bloom, 1973), inter alia, has adopted versions of the "defective tense hypothesis" (Weist et al., 1984), positing a period of development during which tense is simply not available to young children. They therefore cannot organize morphology according to tense but according to aspectual classes like "durative event" (*-ing*) or "completed event" (*-ed*) — giving rise immediately to the circumscribed state. As the child matures and has the relevant supporting cognitive experiences, the aspectual categorization is disconfirmed, e.g. by examples of *-ed* with state verbs.

A second style of explanation also eschews innate linguistic specifications, but places more weight on the role of the environment. In crude form, FREQUENCY-BASED theories claim that children's early production or comprehension models subtle differences between the presentation of categories in adult speech to young children and the full correct pattern at the adult stage (Brown, 1973; Li and Bowerman, to appear; Shirai and Andersen, 1995). Shirai and Andersen, for example, claim that grammatical categories are organized according to prototypes: a verb undergoing the progressive may have a core meaning of "action in progress," but may include other notions that form the full progressive class. Shirai and Andersen suggest that children search for prototypical patterns in the adult speech to children, generalizing across the core prototype, before acquiring the full category.

A third style of account relies on a different type of semantic circumscription drawn from the repertoire of adult languages. Bickerton (Bickerton, 1981), for example, proposes a “Language Bioprogram” hypothesis, based on data from PIDs-GINS AND CREOLES. He claims that adults speaking pidgin and creole languages organize their tense marking along two innate dimensions: a distinction between events and states, and a distinction between a punctual events with a definite end and non-punctual events that can continue indefinitely. Children follow these distinctions, reserving *-ing* for nonpunctual unbounded events like *paint* and *-ed* for bounded (punctual) verbs like *win*.

Bickerton’s account is similar to ours in that he assumes that the same innately specified features guide the child’s morpheme selection as are relevant for the description of the adult state. In both models, semantic circumscription comes from learnability considerations constrained by innateness. Following standard assumptions in generative linguistics, we assume that the child can choose from a repertoire of possible grammars given by an innate linguistic endowment. All of these options correspond to existing adult languages. The initial hypothesis must be an option that can be falsified using positive evidence from the types of sentences found in the child’s linguistic environment. Corrections of improper usage are not taken to be valid input data to this learning theory. Given this, the child will pick the most restrictive option given by the innate endowment. Positive examples can show that initial restrictions need to be relaxed in a particular language. If the child made the opposite assumption — picking the least restrictive hypothesis — he would overgenerate, producing examples that were not restricted by the rules of the language and would need correction (negative evidence) to retreat from overgeneralization. This idea is formalized as the SYNTACTIC SUBSET PRINCIPLE (Berwick, 1985).

The Model

Our account relies on Olsen’s analysis of aspect (Olsen, 1997), which describes principled relations between lexical and grammatical aspect, and between grammatical aspect and tense. LEXICAL ASPECT refers to the ability of verbs and other lexical items to describe how a situation (event or state) develops or holds in time. GRAMMATICAL ASPECT refers to the view some verbal auxiliaries and affixes present of the development or result of a situation at a given time, also known to as verbal or viewpoint aspect (Smith, 1991).

Lexical Aspect

The apparent nonindependence of lexical aspect verb classes and grammatical aspect morphology in the child may be explained within a framework in which lexical and grammatical aspect categories are part of the innate endowment, the UNIVERSAL GRAMMAR (UG). We first characterize the lexical aspect system in adults and then show how it relates to grammatical aspect.

Olsen observes that aspectual classification of verbs operates on the level of semantic features ((Olsen, 1994; Olsen, 1997), cf. (Smith, 1991)). Olsen further demonstrates that the features are semantically privative (+/unmarked) as shown in Table 1, rather than equipollent (+/-). Under this analysis, [+telic] verbs specify an inherent bound, whereas [0telic]

Table 1: Aspectual classes described in privative feature terms

Aspectual Class	Telic	Dynamic	Durative	Examples
State			+	<i>know, have</i>
Activity		+	+	<i>march, paint</i>
Accomplishment	+	+	+	<i>destroy</i>
Achievement	+	+		<i>notice, win</i>

verbs generally lack a bound, although they may acquire telicity in the appropriate sentential or discourse context. The model restricts the contribution of other sentential constituents and the pragmatic context to lexical aspect interpretation: they may add features but not remove them. Thus, although *paint* is unmarked for telicity, it may be used in sentences with both telic and atelic interpretations, as in *Degas painted (two blue dancers/for an hour)*. In contrast, [+telic] verbs like *win* and *destroy*, always entail a bound.

The privative feature model predicts that only marked features are semantically “real” and may be used as determinants of linguistic behavior. This holds cross-linguistically for phenomena as diverse as grammatical aspect, unaccusativity auxiliary selection, tense, and discourse movement of narrative time. The model therefore predicts similar results with the acquisition data: telicity, eventhood and duration will be operative, whereas their unmarked counterparts (atelicity, statehood, and punctiliarity) will not affect inflectional affixation.

Grammatical Aspect

We now discuss how the lexical aspect features interact with the inflectional morphology under consideration. We suggest that the *-ing* and *-ed* morphemes in English encode grammatical aspect in the child as well as in the adult (see Olsen 1997). Since grammatical aspect concerns time—both how situations develop over time and how speakers view situations at a given time—it has often been confounded with tense. Tense is DEICTIC: it “relates the time of the situation referred to to some other time.” In contrast, grammatical aspect looks internally at situations, independent of the time at which they are located.

Although other languages decouple these distinctions morphologically, languages like English use single morphemes in both tense and aspect systems. In English, the imperfective is marked by the affix *-ing*. Although it appears with the auxiliary *be* in its various tense forms (*is/was/will be painting*), it can also occur as a participle, without an auxiliary (*He observed the scene, painting the dancer*). The perfective is marked by the *-ed* affix and used with the HAVE auxiliary, or alone, as a “simple past” tense, or a perfect participle (*the painted pictures*). The perfective participle denotes a completed situation, because perfective grammatical aspect focuses on the bound of situations.

Olsen claims that grammatical aspect crucially interacts with the lexical aspect features, pointing out that these lexical aspect features presuppose a two-part event structure: [+durative] and [+dynamic] hold of the ongoing portion of an event, the event NUCLEUS. The presence of telicity indicates that the event progresses toward an eventual end or CODA. The resulting structure is as follows:

$\left[\begin{array}{l} +\text{durative} \\ +\text{dynamic} \end{array} \right]$	[+telic]
	CODA

Imperfective grammatical aspect may therefore be said to focus on the nucleus of an event and perfective aspect on the coda, each asserting that the relevant features hold. The application of grammatical aspect may also be restricted in predictable ways. Olsen provides numerous examples from the literature of imperfective grammatical aspect restricted to situations with one or both marked nucleus features. For example, the progressive may be said to be an imperfective that is restricted (although not completely in English) to verbs with a marked [+dynamic] feature. That is, as many observe, the progressive is fine with events but odd with many states, as in *John is learning/?knowing Greek*. In Mandarin, states are completely prohibited with the *zai* imperfectives in the adult language ((Li and Bowerman, to appear)). In contrast, we find perfectives restricted to verbs that have the coda feature [+telic]. In Korean, for example, the resultative aspect auxiliary '-e issta' can only occur with [+telic] intransitive verbs: E.g. *cwuk-ta* 'to die,' *nwup-ta* 'lie down,' *anc-ta* 'to sit down,' *se-ta* 'to stand', ... etc. cf. Ho-Min Sohn (1994:329)" (Lee, 1995)).

Developmental predictions of the models

In this section, we will outline some differing predictions between our model, and some of the others discussed above. Our model assumes an innately driven style of explanation for differences between the initial and adult state. As mentioned above, the restriction of relevant input to positive examples only requires that the child's initial hypothesis be the most restrictive, such that environmental input may serve to relax these restrictions. The notion "most restrictive" is defined with respect to the range of possible adult languages. For example, since the mapping between progressive affixes and verbal forms is restricted to the lexical aspectual class of events in Chinese, and since Chinese is a possible final state in the child's linguistic development, the syntactic subset principle (part of the child's innate linguistic endowment) requires that he assume initially that the restrictions that apply in Chinese also apply to English (Berwick, 1985). Since Olsen's system uses privative features, only marked (+), values can define lexical classes. The "event" class is defined by the feature [+dynamic]. Similar remarks apply to the perfective. Since the perfective is restricted to telic verbs in Korean, and since this is the most restrictive mapping between grammatical morpheme and verbal class, it must be the child's initial hypothesis for all languages. So children assume as an initial hypothesis in all languages that the imperfective is restricted to [+dynamic] verbs and the perfective to [+telic] predicates. Since [+telic] predicates are also [+dynamic], they occur with both *-ed* and *-ing* morphemes in the restricted child grammar our data.

If this assumption is incorrect for a given language, the child will see examples that disconfirm this initial hypothesis. To summarize, we predict that adult input in languages like English, which have aspectually unrestricted forms for the grammatical aspectual categories of perfective and imperfective, will help children recover from their initial undergeneralization. Therefore, we predict that we will see an initial

asymmetry between the child's data and the adult data. Children will use disproportionately fewer atelic verbs with *-ed* endings than do adults. Similarly, they will restrict the *-ing* ending to [+dynamic] and [+durative] verbs. We make the following additional assumptions, that the real world context associates verbs to lexical aspect classes, and that children assume that meanings and strings, grammatical morphemes in this case, map one-to-one, an assumption also known as the uniqueness principle (Wexler and Culicover, 1980; Clark, 1987; Pinker, 1984), or the less-is-more hypothesis (Newport, 1988; Newport, 1990; Goldowsky and Newport, 1992), cf.(Elman, 1993). Specifically, when tense and aspect are encoded by the same morpheme, as with *-ed*, we assume that the children assign the morpheme a single meaning: aspect, in this case, demonstrably closer to the verb than tense (see Slobin's introduction to (Newport, 1988)).

By contrast, environmentally driven theories like those of Shirai and Anderson, and Li and Bowerman derive evidence for grammatical classification from the linguistic environment of the child's own language. The child should tune to this environment, producing mappings that resemble what is heard in adult speech. Thus, even if the adult pattern is very different from the prototypical mapping between a morpheme and a verbal class, if the evidence for this divergence is strong enough in adult utterances, the child should show no asymmetry with respect to adult productions. The child utterances should mimic those of the adult's.

In the next section, we verify these predictions by the developmental evidence. We will see that children's initial production of the perfective and imperfective indicated by the *-ing* and *-ed* morphemes are semantically circumscribed in the way predicted by our theory, despite the fact that the CHILDES adult tiers include, for example, states with *-ing* in the imperfective and atelic verbs in the perfective. Children are clearly not tuning to the adult pattern; rather, adult input helps to drive the child from the semantically circumscribed stage to the adult state. Thus there is the predicted strong asymmetry with respect to the large number of atelic verbs appearing with *-ed* in the adult state and the small number appearing with this suffix at the earliest developmental stages. This asymmetry should gradually disappear over time given environmental cues that the child's initial hypothesis is incorrect.

The environmentally driven theory falsely predicts that the large number of atelic verbs appearing with *-ed* in the adult state should drive the child away from a hypothesis which restricts *-ed* to telic verbs and so we should see no asymmetry in the adult and early developmental states between telic and atelic verbs with *-ed*.

Our findings contrast with previous studies in which the relationship between lexical and grammatical aspect is not made clear. Bloom (Bloom, 1973), for example associates *-ing* with prototypical [+durative, -telic] situations and *-ed* (including irregular past tenses) with prototypical [-durative, +telic] events. In contrast, we focus on the positive features [+dynamic] and [+telic] and show that it is these, rather than their unmarked counterparts or frequency in the adult language that determines the distribution of the morphology in the child grammar.

Methodology

The data for this paper was drawn from four CHILDES file sets, representing eight children, several of whom appeared in previous studies on English verb morphology: the subjects in Bloom, et al. (Bloom, Lifter, and Hafitz, 1980). We hand-compiled an exhaustive list of the 664 verbs used by both adults and children in these files. Each verb was assigned an aspectual class composed of privative features based on its behavior on standardized tests (cf. (Dowty, 1979)), such as compatibility with time phrases like *in an hour* or *for an hour*, and entailment in the progressive. Verbs were tested in the most minimal frame: with singular subjects, and no object (*John ran* vs. *John ran a mile*) or a singular object (*John got a sandwich* rather than *John got sandwiches*). All raters agreed on 290 (43.7%) of the verbs, and two raters on an additional 326 (49.1%). For 48 verbs (7.2%), the three raters each had a different category. In this study, we examine only those verbs for which there was complete agreement.¹

Mean Length of Utterance was calculated for each of the children's files, also using the CHILDES tool. The children's files were grouped by stages, following Brown (Brown, 1973). Stages I and II were collapsed for several reasons. First, the file sets show a less consistent temporal development in these stages. It was therefore difficult to assign a set of files to Stage II, if a single file had the relevant MLU, and three or four later files were below the threshold. Second, collapsing these stages also allows for more parity of corpus size in each division. Files were divided as follows:

- Stage I-II (MLU 1.5-2.5): adam01-06, allison1-4, eric01-03, eve01-07, nina01-12, peter01-06, sarah001-039
- Stage III (MLU 2.5-3.125): adam07-18, eve08-11, sarah040-064, nina13-36
- Stage IV (3.125+): adam19-55, allison05-06, eve12-20, peter07-20, sarah065-139, nina37-56

It is not our purpose to examine the theoretical importance of the stages as crucial units in morphological development; rather we want to focus on the fact that the asymmetries are evident at the earliest stage, diminished in later stages, and absent in the adult data. Our results are based on the following token/type counts at each stage (see also Tables 2 and 3).

- Stage I-II: 1,060 tokens, representing 151 verb types
- Stage III: 1,634 tokens, representing 173 verb types
- Stage IV and up: 7,533 tokens, representing 223 verb types
- Adult: 21,220 tokens, representing 243 verb types

We counted verbs-morphology pairs in the relevant feature categories ([Otelic], [+dynamic] and [+durative] in the case of *walk*) as both tokens and types. In the token analysis, we incremented the frequency count once for every instance of a verb with the relevant feature and morphology at a given stage. In the type analysis, we incremented the frequency

¹We are currently analyzing the data using all of the verbs in the files. Our conclusions do not seem to be affected so far by incorporating the full set of these verbs.

STAGES I-II

	[Otelic]	[+telic]	[Odynamic]	[+dynamic]	[Odurative]	[+durative]
-ing	469	35	0	504	22	482
-ed	92	464	9	547	451	105

STAGE III

	[Otelic]	[+telic]	[Odynamic]	[+dynamic]	[Odurative]	[+durative]
-ing	636	174	15	795	121	689
-ed	274	550	19	803	503	321

STAGE IV and up

	[Otelic]	[+telic]	[Odynamic]	[+dynamic]	[Odurative]	[+durative]
-ing	2216	663	55	2824	445	2434
-ed	1677	2977	304	4350	2759	1895

ADULT

	[Otelic]	[+telic]	[Odynamic]	[+dynamic]	[Odurative]	[+durative]
-ing	5998	1328	164	7162	963	6363
-ed	9250	4644	1014	12880	4240	9654

Table 2: Verb tokens with tense/aspect morphology

STAGES I-II

	[Otelic]	[+telic]	[Odynamic]	[+dynamic]	[Odurative]	[+durative]
-ing	48	13	0	61	12	49
-ed	12	15	1	26	14	13

STAGE III

	[Otelic]	[+telic]	[Odynamic]	[+dynamic]	[Odurative]	[+durative]
-ing	73	20	2	91	18	75
-ed	23	22	3	42	21	24

STAGES IV+

	[Otelic]	[+telic]	[Odynamic]	[+dynamic]	[Odurative]	[+durative]
-ing	112	34	1	145	34	112
-ed	62	48	5	105	44	66

ADULT

	[Otelic]	[+telic]	[Odynamic]	[+dynamic]	[Odurative]	[+durative]
-ing	119	44	5	158	42	121
-ed	73	44	9	108	38	79

Table 3: Verb types with tense-aspect morphology

once for *one or more instances* at a given stage of a verb-morpheme pair. Thus, the hypothetical sentence *I'm walking, walking, walking* would add three instances to the token cells in the *-ing* row of [Otelic], [+dynamic] and [+durative] and one instance to the same cells in the type count. The token information is relevant for comparison with frequency based accounts that assume that more frequent verbs have greater effect on subsequent output. The type information abstracts away from the repetitions common in speech to and by children.

In both experiments, we tested both whether verb morphology and lexical aspect features were independent and what features of lexical aspect classification predicted the appearance of which morpheme. We also assumed that morphology was independent of age for verbs that had each of the six feature specifications ([+Otelic], [+Odynamic], [+Odurative]). We tested these hypothesis using χ^2 tests at significance levels of $p \leq .001$ and $p \leq .01$.

Results

Experiment 1: Tokens

Table I shows that the presence of the aspectual feature of telicity is significantly correlated with the presence of the 'ed' morpheme during all stages of development in children ($p \leq .001$). The adults showed a significant correlation in the opposite direction with respect to telic verbs. For adults, *-ed* occurred significantly more often with atelic verbs than with telic items ($p \leq .001$). The data also appear to show a correlation between the feature [Odurative] and the -

STAGES I-II

	Otel	+tel
-ing	80	46.4
-ed	20	53.6

STAGE III

	Otel	+tel
-ing	76.1	47.6
-ed	23.9	52.4

STAGE IV+

	Otel	+tel
-ing	64.4	41.5
-ed	35.6	58.5

ADULTS

	Otel	+tel
-ing	62	50
-ed	38	50

Table 4: Percent of inflected (a)telic verbs types with *-ing*, *-ed*

ed morpheme. However, closer inspection reveals that this is due to the high percentage of telic verbs that are [0 durative]. In fact, NONE of the [0durative] [Otelic] verbs occur with *-ed* in stages I-II and III.

Furthermore, there was a steady rise in the number of atelic verbs that appear with *-ed* as the child matures, evidenced by significantly different distributions between [Otelic] and *-ed* across all age groups ($p \leq .001$). Adults and children at stage IV showed a significant correlation between the [+dynamic] feature and *-ed* ($p \leq .001$), but this correlation was not observed at either Stage I-II or Stage III.

Experiment 2: Types

To further test our hypothesis, that lexical aspect features and morphology were related and changed by age, we compared the distribution of verb-morphology pair types with respect to [+0] features distribution and with respect to the six features by age. That is, the distribution of the tense/aspect morphology is correlated with the value for the lexical aspect features telicity and durativity only for children ($p \leq .01$). Again, verbs in the perfective-*ed* were overwhelmingly [+telic] or [0durative], and verbs in the imperfective overwhelmingly [Otelic] and [+durative].

Furthermore, the differences in distribution may be, with a weaker level of confidence ($p \leq .05$), attributed to only one member of the feature opposition: again we see the steady rise in the number of atelic verbs with *-ed*, as seen in Table 4. The distribution of both [Otelic] and [+durative] verbs differed between stages I-II and IV, I-II and Adult, III and IV, and III and Adult. In other words, there was a loose clustering of Stage I-II, III, and Stage IV, Adult.

As with the token data, no clear pattern emerges for the [+0dynamic] verbs on this test. No significant difference in distribution is observed for dynamic verb types within a given stage. We did an additional test, comparing the distribution of the [+0dynamic] verbs that appeared with *-ing*, *-ed*, or both with the verbs that did not appear with morphology at all. This

	States	Events
Stages I-II	10	52.5
Stage III	23.1	66.3
Stage IV+	35.7	81.3
Adult	56.3	80.2

Table 5: Percent of verbs with tense/aspect morphology, by type

test revealed that significantly fewer [0dynamic] verbs appear with tense/aspect morphology than [+dynamic] verbs. These results are expressed as a percentage in Table 5. The distribution of states with and without morphology at each child stage is significant at $p \leq .01$. Furthermore, there is a significant difference between the distribution of states ($p \leq .01$) and events ($p \leq .001$) between the youngest children and the adult. The adult distribution does not reach significance at $p \leq .01$ (although it is significant at $p \leq .05$).

Experiment 3: Verb classes

We also investigated the verb classes as composites of features, as represented in Table 1. The accomplishment verbs in this chart, since they have all the features, should be allowed to appear with all morphology, whereas verbs that differ in only in lacking [+durative] should be less likely to appear with the imperfective, and verbs lacking [+telic] should be less likely to appear with the perfective. These verbs should appear most freely with morphology. Although the accomplishment data is relatively sparse, especially in the early stages (only 3 accomplishments in I-II and 6 in III), preliminary conclusions support our hypothesis. Of the verb types that appear with morphology, a greater proportion of accomplishments appear with *-ing* than of achievements in the earliest stages, suggesting that the absence of durativity is operative for the children.²

Discussion

The results of Experiments 1 and 2 are consistent with the hypothesis that children initially choose the most restricted relationship between grammatical and lexical aspect, constraining the use of *-ed* to [+telic] verbs and the use of *-ing* to [+dynamic] and [+durative] verbs. Given that adults do not show these patterns, and in fact show the opposite pattern with respect to *-ed*, children's initial productions can not be the result of tuning to frequency in child-directed speech. These data show that, besides being too weak, a frequency-based account is too strong, in that patterns that are robustly attested in adult data, such as the relationship between *-ed* and [+dynamic], is not replicated in early child speech. Our theory explains the lack of replication of this pattern because this restriction does not govern the relationship between grammatical and lexical aspect cross-linguistically.

Both Experiments 1 and 2 show that the asymmetry in the child and adult data may be attributed particularly to changes in the verbs unmarked for the relevant feature: [Otelic] verbs change to allow *-ed* and [0durative] verbs change to allow *-ing*. Within our model, exposure to adult data that does not

²A greater proportion of inflected achievements appear with *-ed* at all stages.

conform to the initial restrictions set by Universal Grammar, forces the child to adopt one of the less restrictive alternatives it allows.

Although our model naturally accounts for the restrictions and age differences observed in experiments 1 and 2, the correlations are also consistent with a model that associates [Odurative] with the perfective (e.g. Bickerton) and [Otelic] with the imperfective. However, in this sample, the results on the feature [Odurative] can be completely attributed to the [Odurative] [+telic] verbs. Experiment 3 demonstrates that durativity (and not punctiliarity) is operative in explaining the difference between [+telic] verbs with respect to *-ing*. Moreover, restrictions based on unmarked features are completely absent in the cross-linguistic data Olsen discusses (e.g. Bickerton's punctiliarity).

Conclusion

In conclusion, the children learning English whom we studied show asymmetries in associating [+dynamic] and [+telic] lexical aspect features with the *-ing* and *-ed* morphology, not tracking adult frequency in any relevant way. Our model predicts that these asymmetries would exist, given that there are adult languages that show the relevant restrictions as well. The adult distribution provides positive evidence for relaxing the restrictions for languages like English, rather than a model for the child to follow, as in connectionist proposals such as Li and Bowerman (Li and Bowerman, to appear) and Shirai and Andersen (Shirai and Andersen, 1995). Furthermore, our model predicts that acquisition patterns will vary, depending on whether tense and aspect are conflated in a single morpheme (English) or not (Polish and other Slavic languages).

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