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Agent Control and the Acquisition of Event Culmination in Basque, Dutch, English, Spanish, and Mandarin

Angeliek van Hout, María J. Arche, Hamida Demirdache, Isabel García del Real, Ainara García Sanz, Anna Gavarró, Lucía Gómez Marzo, Saar Hommes, Nina Kazanina, Jinhong Liu, Oana Lungu, Fabienne Martin, and Iris M. Strangmann

1. Acquisition of Event Culmination

Verb meaning describes the temporal contour of an event. Telic verbs include a culmination point, whereas atelic verbs are continuous and lack such a point. Tense-aspect marking interacts with telicity: telic verbs combined with perfective aspect describe complete, culminated situations, whereas telic verbs with imperfective aspect can be used to describe both complete, culminated events as well as incomplete, non-culminating ones. Acquiring the language used to describe event culmination thus involves two grammatical dimensions. i) The learner must discover for all verbs whether or not the notion of culmination is part of their lexical meaning, i.e. whether a verb is telic or atelic. ii) The learner must find out for any given tense-aspect form in the language whether culmination is entailed or implicated.

Previous studies across various languages have found that L1 learners occasionally accept non-culmination for telic-perfective clauses: children sometimes accept telic verb phrases combined with a perfective aspect form as proper descriptions of ongoing or incomplete events (English, Polish and Finnish: Weist et al. 1991; Dutch and English: van Hout 1998, 2008a; Mandarin: Li & Bowerman 1998; Russian: Stoll 1998; German: Schulz et al. 2001 and Wittek 2002; English: Wagner 2002; Spanish: Garcia del Real 2015). These and several other studies show wide variation in the levels of non-culmination

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acceptance, depending on language, design, materials, task, verb type, object type (for recent overviews, see van Hout 2016, submitted and Martin et al. in preparation). The explanations for this phenomenon in this literature mention various causes: types of telicity (predicate or compositional), problems with perfectivity (aspect shift, aspect grammaticalization) and types of inference (completion entailment or implicature).

In this paper we investigate if there is a connection between the acceptance of non-culmination in child language and a seemingly similar phenomenon in certain adult languages. In Mandarin, among other languages, adults accept telic-perfective clauses for non-culminating situations. The types of verbs that allow such readings are referred to as non-culminating accomplishments. Recently, novel developments in semantic theory have established that subject type plays a role in the acceptance of non-culmination in these languages. According to the Agent Control hypothesis (Demirdache & Martin 2015), denying the result as encoded by such accomplishment verbs is easier when the subject's referent is an intentional Agent than when it is an inanimate Cause. Our study revisits non-target-like acceptance of non-culmination in learners by asking: does non-culmination in child language reflect the same cause as non-culmination in languages like Mandarin?

2. Grammar of Event Culmination

According to formal-semantic theory, inferences of culmination depend on the interaction of temporal properties of verbs and verb phrases—telic or atelic—on the one hand, and grammatical aspect as expressed by tense-aspect morphology and other tense-aspect markers—perfective or imperfective—on the other. Telicity is sometimes determined by the lexical meaning inherent in the verb: whether it includes an inherent result component (*break, kill*). Furthermore, other elements in the verb phrase play a role, for example, particles in the Germanic languages (*eat up, blow out*) and resultative verb-verb compounds in Mandarin (*qiao-sui* 'hit-break'). Moreover, for incremental theme verbs, the quantization semantics of the direct object plays a role too (*drink water* versus *drink a glass of water*) (Krifka 1989; Verkuyl 1993). Grammatical aspect involves temporal perspective taking and is carried by tense-aspect morphology and markers (Klein 1995). Perfective aspect involves the inclusion of the run-time of an event in some reference time interval such that the whole event from beginning till end is part of it; in other words, the event has reached its completion or termination point after which it does not continue (e.g., *the child has washed* (and so she is clean now)). Imperfective aspect involves the inclusion of a reference time in the run-time of the event, so that the event was ongoing at that reference moment and might in principle continue (e.g., *the child was washing, when the phone rang*).

The typical inferences of the combination of telicity and grammatical aspect are: i) a telic verb phrase plus perfective entails culmination; ii) a telic verb phrase plus imperfective aspect lacks this entailment (Dowty, 1979). However, there is an intriguing line of research in the semantics of typologically varied

languages that has shown that inference i) does not hold in all (adult) languages. In languages in which inference i) does not hold, there are so-called non-culminating accomplishment verbs: telic change-of-state verbs, such as *kill* and *burn*, which, when combined with perfective aspect, do not entail culmination, but instead allow an incomplete event interpretation (Soh & Kuo 2005 for Mandarin; Singh 1994 for Hindi; Pederson 1998 for Tamil; Bar-el et al. 2005 and Jacobs 2011 for two Salish languages). This is illustrated for Mandarin *guan* ‘close’ combined with perfective marker *le*: (1) is acceptable in a situation where the agent makes an effort to close the door, but the door gets only partially closed. (1) is even acceptable when the door is not closed at all, for example, because something is blocking it (Liu, in preparation).

- (1) Zhangsan guan-le na shan men, dan men hai kai-zhe
 Zhangsan close-PERF that CLF door, but door still open-DUR
 ‘Zhangsan closed the door, but the door was still open.’

Recent developments in semantic theory reveal that the type of subject plays a role in judgments about the possibility of non-culmination with these verbs (Demirdache & Martin 2015; Martin 2015; Martin & Schäfer 2015). Note the contrast between (1) and (2) in Mandarin: when the subject is an intentional Agent, as in (1), there is no contradiction. But when the subject is a natural Cause, as in (2), a non-culminating situation is not a possible interpretation; the *but*-phrase triggers a contradiction (Liu, in preparation).

- (2) #Yi zhen da feng guan-le na shan men, dan men hai kai-zhe
 One CLF strong wind close-PERF that CL door, but door still open-DUR
 Intended: ‘The strong wind closed the door, but the door was still open.’

Investigating patterns associated with event culmination and different subject types, Demirdache and Martin (2015) conclude that agentivity matters. They generalize this as the Agent Control hypothesis (ACH): “Zero-result non-culminating construals require the predicate’s external argument to be associated with “agenthood” properties” (2015:201).

Building on Demirdache and Martin’s (2015) theory we develop a method for experimentally testing the ACH, both in adults and children. The research question is: Do incomplete event interpretations in children have the same source as adults’ non-culminating construals in languages like Mandarin? We investigate the hypothesis that children initially mistake their language as a language that allows non-culminating construals. If so, child language, like Mandarin, should reflect the ACH. Our prediction is therefore that there will be higher acceptance rates of incomplete situations for Agent than Cause subjects in telic-perfective sentences. All previous acquisition studies used Agent subjects. In the present study we manipulate subject-type—Agent versus Cause—and test to what extent learners of five languages (Basque, Dutch, English, Mandarin and Spanish) accept non-culminating situations for telic-perfective clauses with change-of-state verbs for both types of subjects.

3. Method

3.1. Participants

The participants were 3 and 5-year-old children learning Basque, Dutch, English, Spanish and Mandarin (n=224) and adults (n=94), as shown in Table 1.

Table 1: Participants

	3-year-olds N (mean age)	5-year-olds N (mean age)	Adults N (mean age)
Basque	-	20 (5;8)	14 (30;0)
Dutch	20 (3;6)	20 (5;9)	10 (22;6)
English	-	23 (4;9)	10 (23;4)
Spanish	20 (3;4)	20 (5;4)	10 (n/a)
Mandarin Mono	20 (3;4)	20 (5;6)	30 (33;6)
Mandarin V-V	20 (3;2)	20 (5;3)	20 (33;5)

3.2. Design and materials

Participants were shown short movie clips showing events with either a full change or no change at all, and with either an Agent or a Cause, as illustrated in Figures 1 and 2. We chose zero-result rather than partial-result situations, because situations with a zero result constitute the strongest case of non-culmination. For Mandarin, telic-perfective sentences are acceptable even in those extreme situations, see (1) (Soh & Kuo 2005). Moreover, Wittek (2002) found that German children occasionally accepted zero-result situations for verbs like *wecken* ‘wake up’, as if it meant ‘try to wake up’. The comparison between full versus zero-result situations will set a baseline for testing the ACH.

Table 2: Sample test sentences

English	Did the clown / explosion break the glass?
Basque	Pailazoak / Eztandak edalontzia puskatu al du? clown-ERG / explosion-ERG glass.ABS break.PERF INT has
Dutch	Heeft de clown / explosie het glas gebroken? has the clown / explosion the glass broken
Spanish	¿El payaso / La explosión ha roto el vaso? the clown / the explosion has broken the glass
Mandarin mono	Xiaochou / Baozha sui-le na-ge bolibei ma? clown / explosion break-PERF that-CLF glass INT
Mandarin VV comp	Xiaochou / Baozha qiao-sui le na-ge bolibei ma? clown / explosion hit-break PERF that-CLF glass INT

Participants judged sentences with change-of-state verbs and perfective marking, see Table 2. We used the present perfect in Basque, Dutch and Spanish, the simple past in English, and verb marker *le* in Mandarin. The subject

argument was either an Agent (clown, pirate) or a Causer (explosion, storm). The experiment thus has a 2x2 design, crossing Situation-type (Full / Zero) and Subject-type (Agent / Causer). Seven transitive change-of-state verbs were tested, once in each condition, varying the direct object referents: “break”, “open”, “shut”, “destroy”, “blow out”, “cover up”, and “take off”.

For Mandarin, two paradigms were tested—monomorphemic verbs and resultative V-V compounds, Table 2. Monomorphemic verb forms have been argued to reveal the ACH effect, while resultative V-V compounds do not (Liu in prep.). Using both paradigms allowed us to see if there were different effects among these two types of Mandarin constructions.



Figure 1: Agent in full-result situation (“destroy”)



Figure 2: Agent in zero-result situation (“blow out”)



Figure 3: Cause in full-result situation (“blow out”)



Figure 4: Cause in zero-result situation (“destroy”)

4. Results

Culminating situations were accepted in all languages by all age groups and are not shown in the graphs below. Figures 5—10 show mean percentages of acceptance of telic-perfective sentences for non-culminating situations per language. The graphs have Agent subjects (black bars) and Cause subjects (grey bars) for 3-year-olds (left), 5-year-olds (middle) and adults (right). Note that no 3-year-olds have been tested for Basque and English yet.

Even though we do not present any analyses here, visual inspection of Figures 5—8 shows no effects of Subject Type in Basque, Dutch, English and Spanish. The results for Mandarin in Figures 9 and 10 show a different picture, however: there is more acceptance of non-culmination in Mandarin than in the other four languages, especially for Mandarin monomorphemic verbs, which all age groups accepted to some extent for the zero-result situations (Figure 10). Mandarin resultative VV-compounds were firmly rejected for zero-result situations by the adults and 5-year-olds, whereas the 3-year-olds accepted them to some extent (Figure 9).

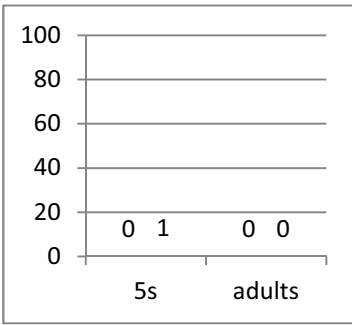


Figure 5: Results Basque

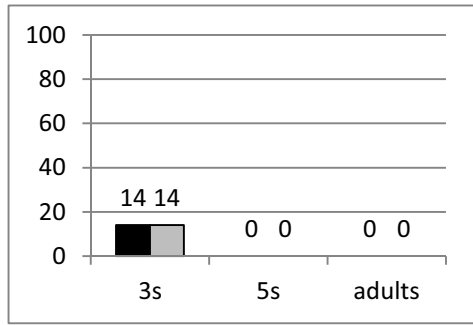


Figure 6: Results Dutch

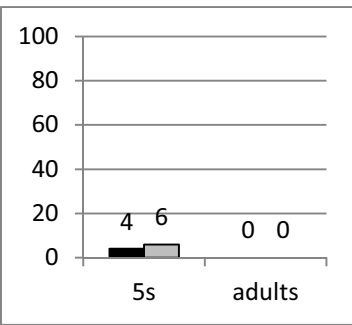


Figure 7: Results English

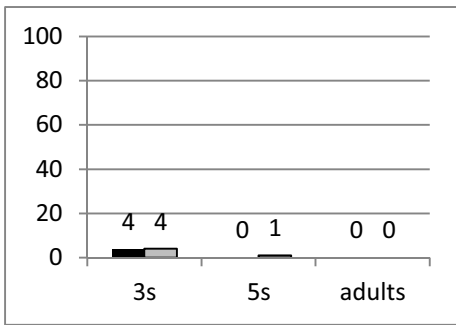


Figure 8: Results Spanish

Most importantly for our purposes, for the Mandarin monomorphemic verbs, there seems to be an effect of Subject Type in the expected direction: acceptance of zero result situations was higher for Agent subjects than for Cause subjects, at least for the adults and 3-year-olds, not really for the 5-year-olds. Future analyses are required to confirm the significance of these numerical tendencies.

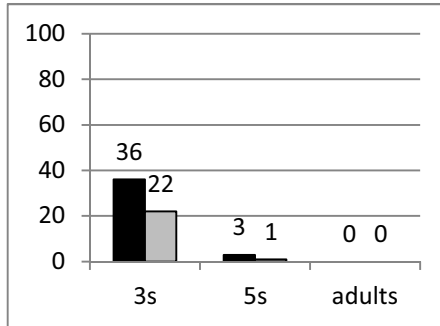


Figure 9: Results Mandarin resultative V-V compounds

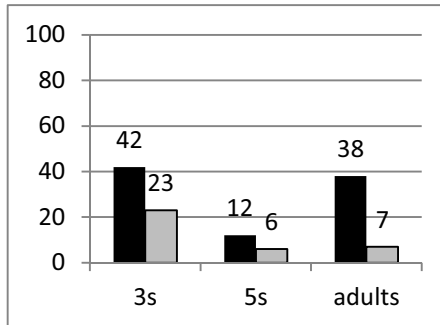


Figure 10: Results Mandarin monomorphemic verbs

5. Discussion

This study asked if incomplete event interpretations in children have the same source as adults' non-culminating construals in languages like Mandarin, as in example (1). Non-culminating interpretation patterns have been found in several child languages: in contrast to adults, children learning Germanic or Romance languages to some extent accept telic-perfective clauses for incomplete or ongoing situations (Dutch: van Hout 1998, 2008a,b; English: van Hout 1998, 2008a; German: Schulz et al. 2001 and Wittek 2002; Italian: van Hout 2008b; Spanish: Garcia del Real 2015). Non-culminating accomplishment verbs have been established for adults as possible descriptions of situations with

a partial or even a zero result in a different set of languages, including Mandarin (Soh & Kuo 2005 for Mandarin; Singh 1994 for Hindi; Pederson 1998 for Tamil; Bar-el et al. 2005 and Jacobs 2011 for two Salish languages). Such interpretations have recently been argued to be governed by a requirement on the agentivity of the subject. Demirdache and Martin (2015) advanced the Agent Control hypothesis, which states that non-culminating accomplishment verbs can only be used to describe situations with a partial or zero result if the subject is an Agent, but not when it is a natural Cause, see example (2). We asked if this constraint also governs children's acceptance of telic-perfective sentences for non-culminating situations, hypothesizing that Germanic and Romance learners initially mistake their language as one that allows non-culminating construals, like Mandarin. If so, we expected to see the ACH reflected not only in Mandarin children and adults, but also in children learning Basque, Dutch, English and Spanish, albeit not in adult speakers of these languages.

The results from Mandarin, in particular, those with monomorphemic verbs, support the ACH, as there was an effect of subject type: more acceptance of incomplete situations for Agent than Cause subjects. The results from the present experiment for the other four languages, on the other hand, do not support this hypothesis.

6. Conclusions

Bringing together two strands of literature—semantic analysis of non-culminating accomplishment verbs in adult languages on the one hand and the acquisition of culmination inferences of telic-perfective clauses on the other—this study has introduced a novel angle on the acquisition of event culmination by looking at the role of Agent control for this inference. Our study provides for the first time experimental support for the ACH for Mandarin monomorphemic verbs in adults and children. The lack of effect in Basque, Dutch, English and Spanish does not support the ACH in these languages (neither in children nor adults), at least not in the present experimental set-up with zero-result situations. Basque, English, Dutch, Spanish and Mandarin preschoolers as young as three know that change-of-state verbs encode a full change, sometimes explicitly marked in English and Dutch particles (van Hout 1996) and Mandarin resultative V-V compounds (second V encodes a result state). They also know that when these verbs occur with perfective aspect marking there is an entailment of culmination.

Drawing a cautious and preliminary conclusion, we believe that these results suggest that non-adult-like non-culminating construals—as reported for L1 acquisition—do not have the same source as adult non-culminating construals—as reported for languages like Mandarin. Further research should, however, look into non-culminating set-ups with a partial result. Moreover, the role of inherent verb semantics needs further exploration, in particular, the difference between punctual change-of-state verbs as used in the present study,

durative change-of-state verbs (*melt, burn*) and incremental-theme verbs (*eat, build*).

This conclusion brings us back to the acquisition phenomenon we set out from: L1 learners in previous studies allow perfective-telic sentences for non-culminating events. The contrast between Germanic and Romance languages on the one hand and languages like Mandarin on the other adds an extra acquisition dimension to this phenomenon: how do L1 learners find out whether or not their language has non-culminating accomplishment verbs that allow non-culminating construals? And moreover, why are they initially overly liberal in languages that do not allow such construals, as established in results coming from other studies, and why not in the present study? We believe that further research on children's development of inferences in the domain of tense-aspect and other domains will shed light on these questions.

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