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Abstract: The acquisition literature has documented several different types of misinterpretations of telic sentences by children, yet a comprehensive analysis of these child interpretations has not been attempted and a crosslinguistic perspective is lacking. This task is not easy, for, on the surface, children's non-adultlike interpretations appear to be scattered and even contradictory across languages. Several cognitive biases have been proposed to explain given patterns (children initially adhere to a Manner bias, or alternatively a Result bias). Reviewing a wide range of studies on the acquisition of telic sentences in relation to tense-aspect markers, we show that children's non-adultlike interpretations fall into three different patterns. We conclude that the diversity of non-adultlike interpretations that is found across child languages is incompatible with accounts that rely on these cognitive, language-independent principles, but instead is triggered by language-specific properties. Analyzing these patterns in detail, it appears that child learners across languages have problems with tense-aspect forms with variable meanings, in contrast to forms with a one-to-one form/meaning mapping which are acquired earlier. While adults use a context-sensitive interpretation of forms with multiple meanings, various semantic-pragmatic sources can explain children's difficulties with interpreting such forms. All explanations that we identify across child languages rely on children's immature command of pragmatic reasoning, albeit in very different ways for the three different patterns. Thus, by taking a crosslinguistic semantic approach and integrating detailed insights in the tense-aspect semantics of specific languages with universal pragmatic effects, we explain the non-adultlike interpretation of telic sentences in a variety of child languages in a comprehensive way.

Keywords: aspect, telicity, (im)-perfectivity, first language acquisition, crosslinguistic semantics

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1 Introduction

Understanding when a sentence describes an event with an inherent endpoint (a telos) and when the endpoint has to be reached for the sentence to be true is a crucial step in the acquisition of sentence-level semantics.[1] The acquisition literature has documented different types of misinterpretations of telic sentences by children, yet a comprehensive analysis of these child interpretations across languages is still lacking. The task is not easy, for, on the surface, these non-adultlike interpretations appear to be scattered and contradictory, defying a unified account. This paper identifies three such patterns of non-adultlike interpretations (Table 1 below), with the goal of providing a uniform account for these recurring but seemingly contradictory patterns found in language development.

The first pattern of non-adultlike interpretations of telic sentences (Pattern 1 in Table 1) has been observed in many Germanic and Romance languages: children allow incomplete event interpretations more often than adults for perfective telic sentences such as *The boy built a bridge* (Anderson 2017 and Wagner 2002 on English; van Hout 1998 on Dutch and English; van Hout 2008 on Dutch and Italian; García del Real 2015 on Spanish; Schulz and Penner 2002, Schulz and Wittek 2003 and Wittek 2002, 2008 on German; see van Hout et al. 2010, van Hout 2016 and 2018 for a crosslinguistic overview). Pattern 2, which can be seen as the mirror image of Pattern 1, has been observed in the acquisition of Slavic languages (e.g. Russian, Polish): children attribute complete event interpretations more often than adults to past imperfective telic sentences such as *Ivan stroil most* 'Ivan was building/built a bridge' (Kazanina and Phillips 2007 on Russian; van Hout 2005, 2008 on Polish). Pattern 3 is similar to Pattern 2 in that children are overly restrictive, "over-requiring" event culmination. This pattern has been found in some East Asian languages, as well as in English. In Mandarin Chinese, children seem to interpret simple (monomorphemic) verbs like *guān* 'close' in perfective sentences as entailing a change-of-state, contrary to adults who also accept these in a no change situation (Chen 2005, 2008, 2017; Demirdache et al. 2016; Liu 2018). In a similar way, English children tend to interpret ditransitive *send*-verbs in perfective sentences as if they entailed a change-of-state, contrary to adults (Kazanina et al. this issue). Moreover, for the class of verbs such as *wash*, which in adult English merely imply a result without entailing it, English learners tend

1. Abbreviations used: CLF=classifier; IMP=imperfective; PFV=perfective; NEG=negation; SP= simple past; SV=simple verb; RVC=resultative verbal compound.

to use these verbs as causative verbs entailing the change-of-state (Marcotte 2005, 2006).

Tab. 1: Types of non-adultlike interpretations of telic sentences across languages

	Sentence type	Non-adultlike performance	Child language	Studies
Pattern 1	Perfective sentences with a telic predicate	Overly liberal: incomplete event interpretations	Dutch English German Italian Spanish	van Hout (1998, 2008) van Hout et al. (2010) García del Real (2015) Wittek (2002, 2008) Schulz and Wittek (2003)
Pattern 2	Imperfective sentences with a telic predicate	Overly restrictive: complete event interpretations	Russian Polish	Kazanina and Phillips (2007) van Hout (2005, 2008)
Pattern 3	Perfective sentences with verbs only implying a result	Overly restrictive: entailed-result interpretations	Mandarin English	Chen (2005, 2008, 2017) Demirdache et al. (2016) Liu (2018) Marcotte (2005, 2006) Kazanina et al. (this issue)

Why are some learners too permissive (e.g., Dutch children accept perfective sentences with telic verbs of consumption for incomplete events more often than adults), while others are too restrictive (e.g., Russian/Mandarin children enforce complete event interpretations for sentences with imperfective telic/perfective telic verbs)? Also, why are English learners too permissive with telic verbs of consumption on the one hand, but too restrictive with verbs like *wash* or *send* on the other?

This diversity in non-adultlike interpretations seems incompatible with an account in terms of language-independent cognitive principles. Gentner's (1978)

Manner Bias Hypothesis states that children show a general bias to include manner and ignore result information in their initial lexical semantic representations of verbs. This can account for Pattern 1 in child English, as indeed argued by Tomasello (1992).[2] Wittek's (2002) variant of this bias – the Weak Endstate hypothesis – posits that children initially represent German (telic) change-of-state verbs, such as *wecken* 'wake (up)', with an optional result state, as describing an action performed with the purpose of triggering a result state, but not necessarily reaching it. On both accounts the result state is *implied* rather than entailed by the verb across child languages.

Since the alleged biases underlying these accounts apply independently of language-specific properties, they predict that children learning any language, including Mandarin Chinese, Russian or Polish, should follow Pattern 1. But this is not the case: Mandarin children exhibit much less – in fact, hardly any – over-acceptance of incomplete event interpretations of perfective telic sentences as compared to English or Dutch children of the same age (Chen 2008, 2017; Demirdache et al. 2016; Li and Bowerman 1998; Liu 2018). Likewise, Russian and Polish children, age three and younger, perform like adults in their interpretation of perfective telic sentences (van Hout 2005, 2008; Kazanina and Phillips 2007; Stoll 1998; Vinnitskaya and Wexler 2001; Weist et al. 1984, 1991). Furthermore, in order to explain the non-adultlike Patterns 2 and 3, one would have to posit a *reverse* language independent bias towards *result-oriented* interpretations, according to which children would show a general tendency to focus on the result component in their representation of verbs. Behrend (1990) has in fact proposed such a principle, in order to account for children's early sensitivity to the result component encoded in verbal predicates. It is, however, by no means obvious how to reconcile these two conflicting conceptual biases: why would one bias win over the other in a given subset of languages, and/or for a certain subset of predicates? Moreover, two further problematic acquisition issues arise: 1) what leads a learner to give up her initial bias, and 2) how does she backtrack from her originally incorrect representations of these telic sentences? Therefore we reject explanations based on universal cognitive principles or biases, and instead argue for an approach that is sensitive to language-specific properties.

A novel contribution of this paper is that it explicitly identifies and contrasts the three Patterns in Table 1, providing an account of each of the three patterns that ensures mutual compatibility. Thus the scope of the paper surpasses what is

2. Tomasello (1992) claims that children perform what he calls 'packaging errors' in that they initially tend to interpret certain change-of-state verbs like *fix* or *inflate* as describing a manner of action (e.g. trying to repair something, blowing in a balloon) rather than the change-of-state meaning that these verbs encode.

typically present in the acquisition literature. The accounts differ in their specifics as they are based on the idiosyncratic morphosyntactic and semantic properties of a given language (specifically, the determiner system and the set of potential interpretations for a given tense/aspect marker). Nevertheless, we observe two global acquisition trends: 1) all non-adultlike acquisition patterns concern forms with multiple meanings (while forms with an invariant meaning raise much fewer difficulties), and 2) the source of all three patterns can be found in some form of pragmatic immaturity. These trends are summarized under what we call the One-to-Many Acquisition generalization in (1).

(1) One-to-Many Acquisition generalization

a. The locus of children's non-targetlike interpretations of telic sentences in a given language lies with tense-aspectual forms that are in a one-to-many correspondence with meaning;
b. Non-targetlike interpretations of telic sentences result from children's immature command of pragmatic reasoning, which, in the adult grammar, guides the context-sensitive interpretation of forms with multiple meanings.

Table 2 illustrates how the One-to-Many Acquisition generalization applies to the three patterns using a few illustrative examples which will be discussed in detail in later sections.

Tab. 2: Locus of children's non-adultlike interpretations of telic sentences

	Target-like	**Non-target like**	
Language of illustration	**Invariant meaning**	**Meaning 1**	**Meaning 2**
PATTERN 1			
SPANISH	Telic VPs with a non-incremental theme combined with perfective aspect *Juan abrió la puerta.* Juan open-**PFV** the door 'Juan opened the door.'	Telic VPs with an incremental theme (with a definite or indefinite NP) combined with perfective aspect *Juan comió la pizza.* Juan eat-**PFV** the pizza 'Juan ate the pizza.'	
	complete event	**incomplete event**	**complete event**
PATTERN 2			

Tab. 2: Locus of children's non-adultlike interpretations of telic sentences

	Target-like	**Non-target like**
RUSSIAN	Telic VPs combined with perfective aspect *Ivan narisoval zvezdu.* Ivan draw-**PFV** star 'Ivan drew (all of) a/the star.'	Telic VPs combined with imperfective aspect *Ivan risoval zvezdu.* Ivan draw-**IMP** star 'Ivan was drawing/drew a/the star.'
	complete event	**incomplete event** **complete event**
PATTERN 3		
MANDARIN	Verbs entailing a result with perfective aspect *Lulu guān-shàng-le nà shàn mén.* Lulu close-up-**PFV** that CLF door 'Lulu completely closed that door.'	Verbs implying a result with perfective aspect *Lulu guān-le nà shàn mén.* Lulu close-**PFV** that CLF door Lulu closed that door.'
	complete event	**incomplete event** **complete event**

The rationale for the One-to-Many Acquisition generalization is that forms with one meaning have a uniform, context-invariant interpretation. Forms that have variable interpretation, on the other hand, depend heavily on contextual factors, and may require sophisticated pragmatic reasoning not yet mastered by children. It has been shown that children, in general, fare better with the semantic than the pragmatic content of linguistic expressions; specifically, they have difficulties narrowing down the meaning of certain lexical items in context, retaining basic, non strengthened interpretations, but overlooking interpretations requiring pragmatic reasoning. A well-known example of children's difficulties with pragmatic interpretations is their reported failure to compute certain scalar implicatures (Noveck 2001, Guasti et al. 2005, Foppolo et al. 2012, Katsos and Bishop 2011, Katsos et al. 2016, among many others).[3] But there are also other

3. As a reviewer points out, recent studies have investigated other subtypes of inferences and surprisingly found that some of them are in fact derived at an adult-like rate by young children; see, e.g., Bill et al. (2016), Tieu et al. (2016), Pagliarini et al. (2018). Elaborating on an early suggestion by Chemla and Bott (2014), the latter authors suggest that the scalar implicatures raising difficulties for children are derived on the basis of alternatives generated by replacing one word of the assertion (e.g., *some* in *I ate some cookies*) by some other lexical material associated with it (e.g., *all*), while children perform better when the implicature is derived on the basis of alternatives generated otherwise (e.g., by truncating the assertion).

cases for which children have difficulty determining the appropriate meaning of a variable linguistic expression in context (e.g., see the discussion on abductive reasoning in Section 4.4.2).

The proposed generalization extends what van Hout (2008) calls the Form-to-Meaning Correspondence Hypothesis, repeated in (2).

(2) Form-to-Meaning Correspondence Hypothesis:
One-to-one correspondences between form and meaning are acquired earlier than one-to-many relations (van Hout 2008: 1754).

That a one-to-one form meaning correspondence principle drives development is not new and has been put forth be it for L1 (e.g., Slobin 1977) and L2 (e.g., Anderson 1984) acquisition. We will show that the prediction that forms with a one-to-one mapping with meaning are less challenging for L1 learners than forms in a one-to-many mapping with meanings is confirmed in many ways in the domain of tense/aspect for a variety of child languages. Admittedly, however, the explanatory power of the Form-to-Meaning Correspondence Hypothesis is rather limited in that it does not make any specific predictions for the exact developmental patterns to be observed for the different languages. One of the goals of the present paper is to develop hypothesis (2) in more detail, resulting in specific predictions on how these patterns are instantiated across languages.

Foreshadowing our approach, we will put forth a variety of sources to explain children's non-adultlike interpretations of telic sentences, pointing out which often subtle interactions between the semantic and pragmatic components of tense-aspect forms with variable meaning are involved, and how this contrasts with unambiguous forms whose meaning relies purely on semantics. Our overall goal is to show how, for each pattern, the acquisition problem is rooted in some element of the semantics-pragmatics interface, with different elements causing the various patterns depending on language-specific tense-aspect features.

The paper is structured as follows. Section 2 is devoted to Pattern 1 where children are overly *permissive* in their acceptance of incomplete event interpretations (for perfective sentences with telic predicates). Sections 3 and 4 are dedicated to Patterns 2 and 3 respectively, which have in common that children are overly *restrictive* in their acceptance of incomplete event interpretations, for imperfective sentences with telic predicates under Pattern 2 (Section 3), and for perfective sentences with implied-result predicates under Pattern 3 (Section 4). Section 5 concludes.

2 Pattern 1: Over-acceptance of incomplete event interpretations

On the first pattern of misinterpretation of telic sentences, children are overly liberal: they accept more incomplete event interpretations for perfective telic sentences than adults. This pattern of behaviour raises a number of questions, which we seek to address here. Why are such incomplete event interpretations for telic perfective sentences found considerably more often with verbs selecting an incremental theme, rather than with non-incremental theme verbs, be it in *child* or *adult* languages? Why are children even more permissive than adults in accepting such incomplete event interpretations? Why are there cross-linguistic differences among child languages, i.e., why do children allow more incomplete event interpretations of perfective telic sentences than adults in some (e.g. English), but not other (e.g. Russian), languages?

We start by identifying two independent, but interacting, sources for children's over-acceptance of non-culminating event interpretations for perfective telic sentences: (i) the availability of non-maximal readings for the incremental theme, and (ii) the use of a tense marker with more than one aspectual meaning.

2.1 Overview of previous studies: two types of Pattern 1 child languages

A range of studies in several child languages has demonstrated that children accept more incomplete event interpretations for perfective telic sentences than adults (for recent overviews, see van Hout 2016, 2018). This non-adultlike Pattern 1 is most prominent in English, though it is also found in German, Dutch, Italian and Spanish, albeit to a somewhat lesser degree (Anderson 2017; García del Real 2015; van Hout 1998, 2008; van Hout and Hollebrandse 2001; Jeschull 2007; Ogiela 2007; Schulz et al. 2001, Schulz and Penner 2002; Wittek 2002; Wagner 2002). In contrast, Pattern 1 is virtually absent in Slavic (i.e., Russian, Polish); the learners of these languages interpret perfective telic sentences targetlike from age 3 on (for child Russian, see Gagarina 2008; Kazanina and Phillips 2007; Stoll, 1998; Vinnitskaya and Wexler 2001; van Hout et al. 2010; for child Polish, van Hout 2005, 2008; Weist et al. 1991).

Crucially, for all the languages included in Pattern 1, incomplete event interpretations for perfective telic sentences are found more often – be it across child or adult languages – with incremental theme predicates, (e.g., consumption predicates like *eat a pizza*; creation predicates like *build a house* and *draw a flower*,

incremental change-of-state predicates like *fill the glass*) than with predicates with a non-incremental theme (e.g., *close the door, break the glass, blow out the candle*, henceforth 'non-incremental theme verbs'), see van Hout et al. (2010).[4] This pattern is clearly illustrated by García del Real (2015) for Spanish. García del Real carried out a truth-value judgment task (with 41 children and 20 adults, all monolingual native speakers of Spanish) to investigate 5-year-old children's comprehension of perfective vs. imperfective telic predicates referring to complete and incomplete events. Three incremental theme predicates (*dibujar* 'to draw', *hacer* 'to make', c*onstruir* 'to build') and three non-incremental theme predicates (*abrir* 'to open', *cerrar* 'to close', *apagar* 'to blow out') were tested. In the incomplete event condition, a clown partially draws a star or tries unsuccessfully to close a jar, and the participant's task is to judge a sentence with a telic perfective incremental theme verb, as illustrated in (3).

(3) a. *Mientras sonaba la música, ¿el payaso dibujó una estrella?* (Spanish)
While play-**IMP.**3SG the music the clown draw-**PFV.**3SG a star
'While the music was playing, did the clown draw a star?'

b. *Mientras sonaba la música, ¿el payaso cerró el bote?* (Spanish)
While play-**IMP.**3SG the music the clown close-**PFV.**3SG the jar
'While the music was playing, did the clown close the jar?'

The results revealed a significant difference in Spanish children's acceptance rate of perfective incremental vs. and non-incremental theme predicates in the incomplete event condition: 30% vs. 1% acceptance respectively. In contrast, Spanish adults rejected incomplete event interpretations with perfective telic predicates across the board (irrespective of verb type). A similar pattern was found in Wittek's (2002) study, with 4- to 5-year-old German children, testing 8 German verbs. Children accepted incomplete event interpretations more often for the incremental theme verbs *(füllen* 'fill' and *vollmachen* 'fill') in comparison to the non-incremental theme verbs (*zumachen/schliessen* 'close', *aufmachen/knacken* 'crack', *abmachen, pflücken* 'pick', *ausmachen/löschen* 'extinguish', *totmachen/töten* 'kill',

4. Following Beavers (2012), we extend the notion of *incremental theme* to use it for any argument that enters into aspectual composition the same way that the patient of a consumption verb does.

wachmachen/wecken 'wake', *kaputtmachen/zerbrechen* 'break'). The Appendix provides an overview of predicates tested in 18 of the studies reviewed for the other languages as well.[5]

The question then is why is such over-acceptance found with verbs that select an incremental theme, and not verbs that take a non-incremental theme. Sensitivity of incomplete event construals to the lexical semantics of verbs has been pointed out in the literature (for discussion of child language, see van Hout 2018 and references therein, and of adult languages, see Arunachalam and Kothari 2010, 2011, Smollett 2005, Wright 2014 on English; Singh 1994 on Hindi; Tatevosov and Ivanov 2009 on Russian; Martin et al. 2019 on French and German; see Martin forthcoming for a crosslinguistic overview).

Importantly, however, there are differences across child languages that need to be explained: while in child Spanish, incomplete event interpretations of perfective telic sentences are attested only with incremental theme verbs, as we have just seen, in child English, this pattern is not restricted to incremental theme verbs, but rather found across verb types, see van Hout et al. (2010) for a cross-linguistic comparison, and Anderson (2017) on child English.

Recapitulating, there are two types of child languages instantiating Pattern 1 to distinguish: (i) Spanish-like languages, where children assign incomplete event interpretations more liberally than adults only with perfective telic *incremental theme predicates*; (ii) English-like languages, where children allow more incomplete event interpretations for perfective telic sentences than adults *across predicate types.* Both types of languages contrast with Russian-like languages, which do not instantiate Pattern 1, where children reject incomplete event interpretations with perfective predicates across the board, and show adult-like behaviour from early on. We will explain this typology of child languages instantiating Pattern 1 by outlining two independent but interacting sources for children's acceptance of incomplete event construals under Pattern 1: non-maximal readings of (in-)definite descriptions (Section 2.2), and the polysemy of the past morphology (Section 2.3).

5. As the reader may appreciate, there is significant overlap in the types of predicates, and also even items tested; for instance, most studies have verbs of consumption and creation as test items. This, we think, reduces the possibility raised by an anonymous reviewer that the differences found across languages are due to a difference in the specific verbs used in the studies. The same reviewer suggests that some of the cross-linguistic differences may find their origins in differences in the methodology for testing across studies. We agree with the reviewer that a systematic comparison of the experimental designs used would be very interesting, but this goes beyond our present purposes.

2.2 Non-maximal readings of (in-)definite descriptions

This section addresses two related questions: (Q1) why are there more incomplete event interpretations of perfective sentences for incremental theme telic predicates than for non-incremental theme ones in adult languages? (Q2) Why do children allow incomplete readings with incremental theme telic predicates more liberally than adults?

2.2.1 The source of children's and adults' incomplete event interpretations

Our proposal is that incomplete event interpretations of perfective sentences with incremental theme telic predicates arise when the nominal description serving as the VP's incremental theme is interpreted *non-maximally.*

Maximal and non-maximal readings of nominal descriptions have been studied mostly for plural definites (Brisson 1998, Lasersohn 1999, Löbner 2000 among many others). Under the non-maximal reading of a plural definite in a sentence of the form *the Ns are F*, not all the entities satisfying the description *N* in the context have to satisfy *F* for the sentence to be judged true. As Lasersohn (1999) observes, (4) is commonly judged true even if not all the townspeople are asleep, and as Yoon (1996) points out, if you are expecting guests, you might agree that (6) is true even if only three out of six glasses are dirty. The availability of non-maximal readings is highly context-dependent (Krifka 1996, Malamud 2012).

(4) *The townspeople are asleep.*

(5) *The glasses are dirty (vs. clean).*

Non-maximal readings have also been observed for singular definites (see Križ 2016, Križ and Spector 2017, Löbner 2000). As Križ emphasizes, (non-)maximality appears more generally with predicates applying to mereologically complex objects (i.e., objects with multiple constituent parts). With a definite plural, the relation holding between the mereological complex object and its constituent parts is one of *individual parthood* in the sense of Link (1983) (the constituent parts of the plurality are individuals), while with a singular, this relation is one of *non-individual parthood* (its constituent parts are not individuals). Thus, under the non-maximal reading of the singular definite description, not all the subparts of *N* satisfy the predication. Examples (6), for instance, may be judged true although not all parts of the N satisfy the predication.

(6) a. *The kitchen is clean.*
b. *The wall is painted in red.*
c. *This book is interesting.*

Similar observations have been made about a wider range of nominal descriptions. Ogiela et al. (2014) note that with certain verbs, not only definite but also indefinite singular DPs can receive what they call a 'partitive interpretation', under which (7) is used to mean that Peter ate a proper part of the / a pizza, and not the whole thing.[6]

(7) *Peter ate the/a pizza.*

Non-maximal readings of quantized NPs are a potential source of incomplete event interpretations for incremental theme predicates (Piñón 2005, 2009, Kennedy and Levin 2008, Martin forthcoming); let us see why.

What is special about incremental theme predicates is the homomorphism that holds between the time course of the event described by the VP and some property of its internal argument; cf. Krifka (1989, 1992, 1998), Tenny (1987), Dowty (1991) and much subsequent work. Take the VP *paint the wall* in (8a); an incremental relation holds between the part structure of the event and the part structure of the internal argument (with every brush of paint, another part of the wall gets covered). The wall thus 'measures out' the progress of the painting event, since by looking at the extent to which its subparts are covered in paint, we can plot the progress of the event. It follows that the event described in (8a) will reach the terminal point beyond which it cannot continue if and only if the direct object 'the wall' is interpreted *maximally*, that is once Peter painted *all of the wall.* In contrast, with non-incremental VPs such as *open the door* in (8b), there is no homomorphic relation holding between the part structure of the opening event and the part structure of the theme: the theme does not measure out the progress of the described event. Thus, whether the theme argument receives a precise, maximal interpretation or not, the event described by a non-incremental theme verb will not be construed as 'more complete'. Take the event described by (8b), it may be judged to have reached the terminal point beyond which it cannot continue even if the door that Peter has opened is not a whole door (say, because it has a

6. Not all DPs allow for non-maximal interpretations. As observed by Krifka (2007), Lasersohn (1999) and Burnett (2012) among others, 'unround' numeral phrases (*three and a half apples, twenty seven students*) and determiners containing a 'non-maximality remover' such as *all* or *whole* (*all the apples, the whole apple*) strongly disfavor non-maximal interpretations.

missing part, a big hole in its middle). Therefore, an incomplete event reading of (8b) cannot be due the non-maximal use of the nominal description in the theme position.

(8) a. *Peter painted the wall.*
b. *Peter opened the door.*

Although non-maximality is clearly relevant for telicity, the literature on incomplete event construals of telic predicates and the literature on non-maximal readings of quantized noun phrases have largely ignored each other so far. An exception is Piñón (2005, 2009), who claims that the incomplete event interpretations of incremental theme telic VPs like *eat the apple* partly depend on a vague interpretation of the incremental theme (see also Kennedy and Levin's 2008 discussion on some previous examples by Kearns 2007). Piñón takes not only definite descriptions, but also singular indefinite descriptions to allow non-maximal interpretations.

Wrapping up, we now have a partial answer to question Q1 raised above: there are more incomplete event interpretations of perfective sentences for incremental theme telic predicates than for non-incremental theme ones in adult languages, because the non-maximal use of the nominal description in the theme position can give rise to such interpretations with incremental theme predicates only. We now turn to question Q2, namely, why children allow incomplete readings with incremental theme telic predicates more liberally than adults?

2.2.2 Why are children overly permissive?

Taking non-maximal readings of (in-)definite descriptions as a source of incomplete event interpretations for incremental verbs, children's interpretational behaviour under Pattern 1 can be explained as over-acceptance of non-maximal uses of (in)-definite descriptions. To be more specific, a first step towards our explanation for Pattern 1 is that children accept sentences such as (8a) more often than (8b) with incomplete events because the nominal description can be interpreted non-maximally with incremental theme verbs, but not with non-incremental theme verbs.

There are a few pieces of evidence supporting this idea. First, incomplete event interpretations are also attested in adult languages with incremental theme verbs, much more so than with non-incremental theme verbs (van Hout et al. 2010; Arunachalam and Kothari 2010, 2011; Wright 2014). A second piece of evidence is that children are more liberal than adults in allowing non-maximal readings of DPs in other constructions. For instance, Caponigro et al. (2012) probed children's

interpretation of plural definites with an Act-Out-Task where the children had to respond to requests such *Give me the things in the bucket*. The results suggest that English children under 6 do not interpret plural definites maximally (exhaustively), but rather interpret them on a par with indefinite nominals like "some things in the bucket". Crucially, they do assign the correct interpretation to quantified nominals like "*all* the things in the bucket", that are rarely used non-maximally in adult languages. Karmiloff-Smith (1981) and Tieu et al. (2015) reach a similar conclusion about child French, further suggesting that maximality emerges fairly late in acquisition, reportedly after 6 years of age.

If this explanation is on the right track, then Pattern 1 may ultimately have the same source as children's well-known difficulty computing certain scalar implicatures until age 6 or 7, in particular, implicatures derived on the basis of alternatives generated by replacing one word of the assertion (e.g., *some* in *I ate some cookies*) by some other lexical material associated with it (e.g., *all*) (see, e.g., Chierchia et al. 2001, Gualmini et al. 2001, Noveck 2001, among others). A similar line of reasoning has been used to explain children's failure to enforce maximality in their interpretation of plural definites by Tieu et al. (2015). These authors build on Magri's (2014) proposal for deriving maximality effects for plural definites "the N", interpreted as "all the N", as a scalar implicature.[7] Tieu and colleagues argue that children initially interpret plural definite descriptions with a literal, existential meaning; only later do they acquire the strengthened, universal meaning via an implicature.

That children are overly permissive in comparison to adults, and accept a non-maximal reading of the direct object noun phrase conforms with the One-to-Many

7. Magri's proposal is that maximality effects arise through a mechanism of "double strengthening". In a nutshell, the plain meaning of a plural definite such as *the boys* is existential, equivalent to the corresponding indefinite *some (of the) boys*. First the corresponding indefinite triggers the "only-some" (1st order) scalar implicature. The choice of the definite over the indefinite then triggers the "not-only-some" (2nd order) scalar implicature that this *"only-some"* implicature is false, thus yielding the universal/maximal reading of the plural definite. The prediction is then that a plural definite will allow a non-maximal reading in a given conversational context if and only if the corresponding indefinite does not trigger the "only-some" implicature in the first place (whose negation ultimately yields the maximality effects). He gives the following contrast to illustrate this prediction (Magri 2014: 120).

(i) Non-maximal reading available ((a) feels true even if only some of the doors are closed).
There is a corridor with five consecutive doors. We cannot get in:

a. *The doors are closed.*
b. ✓*Some of the doors are closed.*('only some' implicature not triggered)

Acquisition generalization, according to which the non-targetlike interpretation of telic sentences results from children's immature command of pragmatic reasoning with forms in a one-to-many correspondance with meaning. Nominal descriptions such as *a/the N* are examples of such forms, since they have both non-maximal and maximal meanings. In line with the Form-to-Meaning Correspondence Hypothesis, the prediction would then be that children should be adultlike in their interpretation of incremental theme VPs if we add to the nominal description a non-maximality remover, e.g., *the whole N* or *all the N*, thus ensuring a one-to-one form meaning correspondence.

2.3 Variable meaning of the past form

Recall that we distinguished two subtypes of languages falling under Pattern 1: Spanish-like languages, where children only allow incomplete event interpretations for perfective telic sentences with *incremental theme predicates* vs. English-like languages, where children over-accept incomplete event interpretations for perfective telic sentences *across verb types.* Child English stands out in the set of languages reviewed here in two respects. First, children allow incomplete event interpretations with non-incremental theme predicates (e.g. *open the door, blow out the candle*, although to a much lesser extent than with incremental theme verbs, see van Hout et al. 2010).

We propose that there is a further source for incomplete event interpretations in child English, in addition to the non-maximal interpretation of nominal descriptions serving as theme arguments of telic VPs, discussed in Section 2.2: the English simple past has both imperfective and perfective meanings (cf. among others Comrie 1976, Deo 2015, Schaden 2015, Smith 1997). In addition to its perfective use (compulsory with telic predicates), the English simple past also admits an

(ii) Non-maximal reading unavailable ((a) deviant if only some of the doors are closed): There is a corridor with five consecutive doors. We can get in:

a. *The doors are open.*
b. # *Some of the doors are open.* ('only some' implicature triggered)

This account could be extended to singular DPs in contexts where they serve as the theme of incremental vs. non-incremental theme predicates as follows: *Peter painted the door* ((8a)) is felicitous in the context where some parts of the door are painted because *Peter painted door parts* does not trigger the "only-part" implicature (that is, *Peter painted door parts* would also be fine in a context where the whole door happened to be painted). In contrast, *Peter opened the door* ((8b)) does not compete with #*Peter opened door parts*, which is deviant.

imperfective use with stative predicates, as well as with any predicate in generic or habitual contexts. We contend that English children who incorrectly accept incomplete past event interpretations with telic verbs (across verb classes) are over-generalizing the imperfective use of the English simple past to telic verbs.

As is well-known, the English simple past (SP) (invariably used in all experimental studies as the perfective aspectual form in English) clearly has perfective uses (Comrie 1976, Smith 1997). According to the standard neo-Kleinian definition, perfective aspect (PFV) encodes a relation between the temporal trace of the eventuality $\tau(e)$ and the reference time t, such that $\tau(e) \subseteq t$ ((9a)). This definition captures the intuition that a perfective sentence depicts an eventuality from the outside. The imperfective is assumed to express the reverse logical relation between reference time and event time ($t \subseteq \tau(e)$, (9b)), conveying the intuition that this aspect portrays the situation from the inside (we disregard here the imperfective paradox, cf. Dowty 1977).

(9) a. $[\![\mathsf{PFV}]\!] = \lambda P \lambda t \exists e[\tau(e) \subseteq t \wedge P(e)]$ (where P is a variable for an eventuality predicate).
b. $[\![\mathsf{IMPF}]\!] = \lambda P \lambda t \exists e[t \subseteq \tau(e) \wedge P(e)]$.

We follow the traditional view that on its perfective use, the English SP can only refer to past eventualities complete with regard to the encoded property P (see, e.g., Comrie 1976, Smith 1997).[8] The perfective interpretation of the English simple past is compulsory with telic predicates, as illustrated in (10)-(11):

(10) #*Mary walked to school and she's still walking.*
(Smith 1997:64)

(11) #*John ate the pizza, but he didn't finish eating it.*

However, the English SP also has imperfective readings in certain environments. Firstly, with stative predicates, the English SP has imperfective uses (Comrie 1976, Deo 2015, Martin and Gyarmathy 2019, Schaden 2015, Smith 1991).[9] For

8. This means that for incremental theme telic verbs like *eat the sandwich*, the perfective is *not* the source of felicitous incomplete event interpretations in adult English, since, as we have just seen in the previous section, it is possible to obey the event completion requirement imposed by the perfective and nevertheless get an incomplete event interpretation *via* the non-maximal reading of the determiner *the* in the VP *eat-the-sandwich*. On this point, see the difference between non-culminating vs. non-maximal uses of accomplishments discussed in Martin (forthcoming).

9. Accounting for this variation in the aspectual uses of the simple past is beyond the scope of this paper (but see next footnote). Note that the exact contour of this variation

instance, the most salient interpretation of (12) is the imperfective construal in (12a), although (12) also admits the marginal perfective interpretation in (12b). Also, as Schaden (2015) observes, (13) is not contradictory, confirming yet again that the English SP is construed imperfectively with stative verbs. In contrast, the translation for (13) in Spanish with the *pretérito perfecto simple* (*pasado simple*) is contradictory, as shown in (14), as expected since the latter does not admit imperfective uses (see among others García del Real 2015 and references therein).[10]

(12) *When I visited him, he was sick.*

a. reference time (*when*-clause) ⊆ event time (*be sick*) (most salient reading)
b. event time (*be sick*) ⊆ reference time (*when*-clause) (marginal)

(13) *There was a bar at the corner, and it is still there.* (Schaden 2015)

(14) *Hubo un bar en la esquina, #y todavía sigue allí.*
have-**PFV**.3SG a bar at the corner, and still continues there (Spanish)

Secondly, the English SP also has an imperfective reading in generic, habitual, or modal contexts, as in (15) from Deo (2015) and (16) from Boneh and Doron (2013). Once again, in Spanish, and more generally, across Romance, the simple past is excluded and the imperfective past (the *imperfecto* in Spanish) has to be used to express these generic or habitual meanings.

(15) *Nancy liked collecting sea shells.*

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still has to be delimited. With English simple past *activity* sentences, there is no agreement as to whether the imperfective, ongoing use is available. In particular, Smith 1997 and Bar-El 2005 hold opposite views on the matter.

10. Tellingly, (12a) is translated into Romance languages with an imperfective form, the *imperfecto* in Spanish, while (12b) is translated with a perfective form, the *pretérito perfecto simple* (also called *pasado simple*) in Spanish. We suspect that the reason for which the English simple past has both perfective and imperfective uses while Spanish only has the latter has to do with the fact that Spanish, but not English, has a grammaticalized imperfective which can be used across all predicate classes. English only has a subtype of imperfective, the progressive, which is incompatible with stative predicates.

(16) *Ruti was such a modest person. She went to work by bus.*

We propose that children can over-extend the imperfective use of the English SP to perfective telic sentences because they have difficulty determining the exact restrictions bearing on its imperfective use, i.e., they fail to restrict this construal of the English SP in an adultlike way to stative predicates and generic/habitual sentences. This is why children, unlike adults, allow English simple past telic sentences to describe incomplete events even with non-incremental theme verbs (e.g. *open*) and, moreover, even in so-called 'failed attempt' or 'zero change' situations, i.e., in contexts where the action is initiated by the agent, but no change of state has taken place, and which can be appropriately described with an imperfective sentence (e.g. *John was opening the door* can be true although the door is not opened at any degree yet, see Dowty 1977 and Martin 2015 for discussion).

Our proposal makes two straightforward predictions. First, we expect L1 learners of other languages in which a simple past tense has both perfective and imperfective meanings to overextend the imperfective meaning to telic verbs and, in particular, to admit incomplete event interpretation with non-incremental theme verbs, as well as failed attempt/zero change construals. This prediction is supported by Wittek's (2002) findings for child German. German children occasionally accepted simple past or present perfect sentences with non-incremental verbs, such as for instance *wachmachen* 'wake up', as descriptions of failed attempts/zero change situations. This behavior is expected on the Form-to-Meaning Correspondence Hypothesis since the German simple past (or present perfect) does indeed admit an imperfective use alongside its perfective use (see, e.g., Bäuerle 1988; Bott and Hamm 2014; Reyle, Rossdeutscher and Kamp 2007; Schaden 2011; Schilder 1997).

The second prediction is that non-adultlike failed attempt interpretations of non-incremental theme verbs will not show up in languages with a simple past category that is unambiguously perfective and never admits an imperfective use. Recall that this prediction is indeed borne out in child Spanish (García del Real 2015). Since the Spanish preterite, in contrast to the English simple past, does not admit imperfective meanings as established above, it follows from the Form-to-Meaning Correspondence Hypothesis that Spanish learners, unlike English learners, will not accept incomplete event interpretations for perfective past sentences with non-incremental theme predicates (e.g,. *open the door, blow out the candle*).

2.4 Why is Pattern 1 not found in Russian or Polish?

Recall from Section 1 that Pattern 1 is not found in child Russian or Polish (for Russian, see Kazanina and Phillips 2007, Stoll 1998, Vinnitskaya and Wexler 2001;

for Polish, see van Hout 2005, Weist et al. 1991). Crucially, this difference extends to the adult grammar. That is, unlike adult English (Arunachalam and Kothari 2010, 2011; Kearns 2007; Kennedy 2012; McNally 2017; Piñón 2005, 2009; Rappaport Hovav 2008; Smollett 2005; Wright 2014), Russian past perfective strictly rejects incomplete event interpretations even for incremental theme verbs, as illustrated in (17).

(17) *Ivan s'el buterbrod, #no kusocheck ostavil.* (Russian)
Ivan eat.**PFV.**3SG sandwich, but piece left.
'Ivan ate (all of) the/a sandwich, but left a piece.'

The question then is why this pattern of over-permissiveness with incomplete event construals holds of English, German, Dutch, Italian and Spanish, but crucially not of Russian or Polish? The answer is straightforward. Neither one of the two independent, but interacting, sources for Pattern 1 in child language – (i) the availability of non-maximal readings for the incremental theme DP, and (ii) the additional imperfective use of the perfective morphology – is available in Russian and Polish.

Firstly, as is well-known, Russian (and Polish) perfective morphology invariably has a perfective meaning (as defined in (10a); for Russian, see Grønn 2008a,b; Klein 1994; Smith 1991; for Polish, see Frackowiak 2015 and references therein). Therefore, unlike in English (or German), but just like in Spanish, there is a strict one-to-one mapping from perfective morphology to meaning, thus excluding one of the two sources for incomplete event interpretations. Secondly, Russian lacks determiners grammatically coding (in)definiteness altogether (Filip 2004, 2008 among others). The possibility of an incomplete event reading derived via the non-maximal construal of the (in)-definite description is thus excluded for Russian-like languages (see also Martin forthcoming). Event completion in Russian is, however, encoded by perfective aspect and, as the Russian paradigms in (18)-(19) show, non-exhaustive readings of either plurals or singulars are indeed excluded with eventive verbs marked with perfective morphology (irrespective of predicate type). In (18), with a perfective verb, the plural object NP only has an exhaustive reading, and thus only a definite such as *all the Ns* or *the whole N* is felicitous to render the English translation. In contrast, (19) with an imperfective verb is compatible with either an exhaustive definite or a non-exhaustive (in)definite reading of the plural object.

(18) *Vchera Ivan pokrasil/otkryl/zakryl dveri.* (Russian)
yesterday Ivan paint-/open-/close.**PFV.**3SG. doors
'Yesterday Ivan painted/opened/closed/ all of the doors.'

(19) *Vchera Ivan krasil/otkryval/zakryval/ dveri.* (Russian)
yesterday Ivan paint/open-/close-**IMP**.3SG. doors
'Yesterday Ivan painted/opened/closed all the/some of the doors.'

(20) Context: Ivan did coloring yesterday for exactly an hour between 4 and 5.

a. *Vchera Ivan raskrasil nebo v krasnyj cvet.* (Russian)
yesterday Ivan colour-in.**PFV.**3SG sky in red colour
'Yesterday Ivan coloured the whole sky in red.'

b. *Vchera Ivan raskrashival nebo v krasnyj cvet.* (Russian)
yesterday Ivan colour-in.**IMP**.3SG sky in red colour
'Yesterday Ivan coloured (some of) the sky in red.'

In (20), the incremental theme *(the) sky* is a situational definite, presupposing familiarity and uniqueness by virtue of its meaning. We see that (20a), containing a past perfective verb, is only compatible with a situation in which Ivan's coloring yesterday from 4 to 5 resulted in the entire sky being red. In contrast, (20b), where the verb is past imperfective, is ambiguous: Ivan's coloring from 4 to 5 could have resulted in either the entire sky being red, or in only parts of the sky being red.

In sum, we have provided a straightforward answer to the question of why children's interpretational behavior under Pattern 1 with incremental theme verbs is not found in Russian-like languages: non-exhaustive readings of either plural or singular NPs are not licensed in the first place with verbs bearing perfective past morphology. [11]

Tab. 3: The sources of crosslinguistic variation under Pattern 1

Language	Semantics of the perfective morphology	Has (in-)definite determiners?
English	$\lambda P \lambda t \exists e[\tau(e) \subseteq t \vee t \subseteq \tau(e) \wedge P(e)]$	**yes**
Spanish	$\lambda P \lambda t \exists e[\tau(e) \subseteq t \wedge P(e)]$	**yes**
Russian/Polish	$\lambda P \lambda t \exists e[\tau(e) \subseteq t \wedge P(e)]$	**no**

11. Note that in Russian, a subclass of accomplishment predicates can be used with the delimitative prefix *po-* 'for a while'. Used this way, Russian accomplishments felicitously describe terminated but incomplete events in perfective sentences with *po-* as perfectivizer (see, e.g., Mehlig 2012, Tatevosov 2008, Tatevosov and Ivanov 2009, Tatevosov this issue). However, when prefixed with delimitative *po-*, telic predicates become atelic predicates (Mehlig 2012, Tatevosov this issue). For this reason, we do not analyse accomplishments prefixed with *po-* as perfective accomplishments allowing for incomplete event interpretations.

To conclude Section 2, in line with our One-to-Many Acquisition generalization, we have identified two independent but interacting sources for Pattern 1 – that is, for children's (over-)acceptance of incomplete event interpretations for perfective telic sentences: non-maximal readings of singular/plural DPs and the aspectual ambiguity of the past morphology used. In English-like languages, both sources are available ((in-)definite descriptions triggering maximality implicatures, and past morphology with both perfective and imperfective meanings). This is why children assign far more incomplete event interpretations for perfective telic sentences than adults *across predicate types*. In Spanish-like languages, only one source is available: (in-)definite descriptions triggering maximality (since the Spanish *pretérito* has an invariant perfective meaning). This is why children assign incomplete event interpretations more liberally than adults but *only* with perfective telic *incremental theme predicates*. When neither source is available, as for instance in Russian which lacks determiners and in which perfective morphology has an invariant meaning, children should and do show an adult-like interpretational behaviour with perfective telic sentences from early on. Table 3 recapitulates the intricate pattern of crosslinguistic variation discussed in Section 2.

We end this section by spelling out predictions of this proposal for crosslinguistic variation. First, we expect Pattern 1 to be found with incremental theme verbs in languages that have (in-)definite determiners. Second, we also expect Pattern 1 to be found in languages where the morphology used to express perfectivity also has imperfective readings (e.g., Hebrew, and perhaps Korean), even if they do not have determiners (e.g., Korean).

3 Pattern 2: Over-rejection of incomplete event interpretations

On the second type of typical non-targetlike pattern of interpretation for telic sentences, children are overly restrictive: they allow only complete event interpretations for imperfective telic sentences, unlike adults who allow both complete and incomplete interpretations. Child Russian clearly instantiates this pattern, see Kazanina and Phillips (2007); child Polish likewise shows the same tendency, see van Hout (2005, 2008). We suspect other Slavic child languages with similar aspectual properties to behave the same way.

Section 3.1 discusses Kazanina and Phillips' (2007) findings exemplifying Pattern 2. In line with the Form-to-Meaning Correspondence Hypothesis, we argue

that Pattern 2 in child Russian is due to the fact that the Russian imperfective has both imperfective and perfective meanings (see Grønn 2008a,b, 2014). Our account of Pattern 2 is also applicable to van Hout's (2008) findings for child Polish, since the Polish imperfective similarly has perfective and imperfective uses (see, e.g., Frackowiak 2015, Karolak 2010, Śmiech 1971). In Section 3.2, we lay out predictions of the Form-to-Meaning Correspondence Hypothesis for the acquisition of the imperfective in languages where, unlike Russian or Polish, it has an invariant (imperfective) meaning. We contend that the Romance imperfective would be a good candidate and discuss some experimental data bearing on its acquisition.

3.1 Imperfective past in Russian and Polish

Kazanina and Phillips (2007) used a truth-value judgment task to examine the comprehension of perfective and imperfective sentences with incremental theme creation predicates (Experiment 1) and (non incremental theme) change-of-state predicates (Experiment 2) by 3- to 6-year-old Russian children; see the Appendix for a list of the predicates tested. In Experiments 1 and 2, the agent who had an opportunity to carry out the same event three times (once at each of three locations) performed it completely at one location, partially at another location, and not at all at the remaining location. The children were at ceiling in their responses to the perfective question *Where the monkey build.PAST.PFV*$_{\text{RU}}$ *the smurf?*, i.e., they always chose the complete location and never an incomplete location. However, in response to the imperfective question *Where the monkey build.PAST.IMP*$_{\text{RU}}$ *the smurf?*, the adults chose both the complete and incomplete locations, while 61% of the children never associated the imperfective with an incomplete event. Note that the children were explicitly given a chance to point to *all* locations making the sentence true (via a follow-up question asking if the described situation was satisfied anywhere else in order to ensure that the task targeted all *potential* interpretations of the aspectual operator, rather than just the preferred interpretation). Experiments 3 and 4 essentially differed from Experiments 1 and 2 in that the test sentence contained an overt temporal modifier (a *while*-clause providing an explicit reference time for the main clause; e.g., *While the boy was watering the flowers, the monkey build.IMP*$_{\text{RU}}$ *the smurf*). Interestingly, the same children who failed to accept the imperfective with incomplete situations in Experiments 1 or 2, now correctly accepted it with incomplete events in Experiments 3 and 4.

These major differences in the child interpretations of the Russian imperfective in Experiment 1/2 on the one hand and Experiment 3/4 on the other lead to two important conclusions. Firstly, as we argue below, Russian children's acceptance

of the Russian imperfective for complete situations (in Experiments 1 and 2) and their acceptance of incomplete situations (in Experiments 3 and 4) means that they are aware of the aspectual ambiguity of this morphology. Furthermore, the latter finding supports the view that they have acquired the notion of reference time (in the sense of Reichenbach) and can establish aspectual relations. If they simply had the event time and the utterance time in their grammar, as suggested by Weist et al. (1984), they would interpret the Russian perfective and imperfective in the same way, as past tense markers, independent of perfectivity and imperfectivity (see van Hout 2005:24 for a similar conclusion for Polish and Russian children).

Why did the presence of a *while*-clause dramatically improve children's performance on the Russian imperfective? In order to address this question and show how these results follow from our Form-to-Meaning Correspondence hypothesis, we first have to say more about the semantics and pragmatics of the Russian imperfective. It is standard to assume that the Russian imperfective has both imperfective and perfective interpretations;[12] one way to capture this underspecified meaning is to think of the meaning of this morphology as a disjunction: $\tau(e) \subseteq t$ or $t \subseteq \tau(e)$ as in Table 4; see in particular Grønn (2008a,b, 2014) for such a proposal.

Tab. 4: The sources of crosslinguistic variation under Pattern 2

Language	Semantics of the imperfective morphology	Imperfective morphology has perfective readings?
Russian, Polish	$\lambda P \lambda t \exists e[\tau(e) \subseteq t \vee t \subseteq \tau(e) \wedge P(e)]$	**yes**
Spanish, French	$\lambda P \lambda t \exists e[t \subseteq \tau(e) \wedge P(e)]$	**no**

Grønn (2008a) looks at the often quite subtle and complex ways in which the imperfective is in context-sensitive competition with the perfective in Russian. Leaving out the details, the critical point of Grønn's analysis is that the disambiguation of the Russian imperfective is easier for the hearer in the presence of an explicit element providing a discourse referent for the reference time, like a *while*-clause – as exactly was proposed for adult Russian and observed for child Russian by Kazanina and Phillips (2007). An explicit *while*-clause provides an overt discourse referent t for the reference time in the aspectual relations '$t \subseteq \tau(e)$' and '$\tau(e) \subseteq t$'.

12. For alternative views according to which the Russian imperfective has an invariant semantics, see Altshuler (2012) and Arregui et al. (2014), and see Grønn (2014) for empirical arguments against both these proposals.

In contrast, without a *while*-clause or another temporal adverbial, only the overt past tense morpheme of the sentence provides a value for the reference time t *via* the semantic contribution of PAST (which requires the reference time t to precede the utterance time). This underspecified interval t provided by the PAST operator essentially corresponds to "the whole past preceding the utterance time" (Grønn 2008a: 11). This large interval is perfectly suited for the perfective interpretation '$\tau(e) \subseteq t$'. But it is certainly too big for the imperfective interpretation '$t \subseteq \tau(e)$' which is the only one allowing the event not to culminate in the actual world. Allowing this imperfective interpretation, in the absence of an adverbial, requires *accommodation* of a narrower reference time t referring to "some point in the past" (Grønn 2008a: 11).

With this in mind, let us come back to Kazanina and Phillips' (2007) findings regarding the interpretation of the IMP_{RU} by Russian children. The children's inability to associate the Russian imperfective with an imperfective interpretation in the absence of an overt temporal modifier can be taken to reflect an inability to accommodate a discourse referent for the narrower time t required for this interpretation. Children, therefore, use the default, underspecified past interval provided by the past tense morpheme, and as a consequence, only admit the perfective interpretation for the imperfective, thus enforcing a complete event interpretation.

Young children's difficulty with interpretations requiring accommodation has been observed elsewhere. For instance, Krämer (2000) proposed that children have difficulties interpreting indefinites as free variables because this interpretation requires accommodation. We thus conjecture that the children's non-adultlike interpretation of the ambiguous imperfective morphology in the absence of an overt temporal modifier reflects a more general pragmatic difficulty in recovering discourse referents that are not explicitly provided in the sentence.

The same pattern of overly restrictive interpretations of the imperfective morphology was established for child Polish. Van Hout (2005, 2008) tested the interpretation of imperfective telic sentences by 2 and 3-year-old Polish children using a design that differs from the one of Kazanina and Phillips (2007) in two important respects. Firstly, van Hout uses a picture-selection task, with one picture depicting an ongoing-event, and the other a completed event. Arguably, this task is better suited to unveil *preferences* for the perfective vs. imperfective meaning for a given aspectual form. Secondly, as we shall see, the design is closer to that of Kazanina and Phillips' (2007) under Experiments 3 and 4, with a discourse context. After the child watched the beginning of the story (*One day Mickey decided to build a sand castle and got to work...*), the curtains closed, so that she cannot see what happened next. Fortunately, a hand puppet (a giraffe with a long neck) could look behind the curtains. The experimenter then asked the puppet "*Giraffe, what*

you see-PAST.PFV$_{PO}$ there?" and the puppet utters the test sentence "*Mickey build-PAST.IMP$_{PO}$ a sandcastle.*" The child is then asked to choose one of two pictures: a complete and an incomplete, ongoing, situation. As van Hout observes, the sentence preceding the test question (*Giraffe, what you see-PAST.PFV$_{PO}$ there?)* provides a reference time for the test sentence, hence, no accommodation of a reference time is required for the imperfective interpretation, but crucially, discourse integration is necessary to derive the anaphoric relation across the two sentences. Now, while the 4-year-olds mostly chose the picture representing an ongoing, incomplete situation, the 2- and 3-year-olds showed a robust preference for the picture representing a complete event. Van Hout (2008) attributes this preference for the complete event interpretation to a failure to use the question preceding the test sentence to recover an appropriate discourse referent for the reference time.[13] Our proposal is that consequently children use as the reference time for the test sentence the interval t introduced by PAST and corresponding to the whole past preceding the utterance time. This forces the perfective, and thus complete event, interpretation.[14]

Summarizing, we examined children's interpretation of imperfective in Russian and Polish because these forms are ambiguous in the target grammar and the Form-to-Meaning Correspondence hypothesis predicted problems with such ambiguous forms. We explained children's interpretational behavior under Pattern 2 – that is, their overly restrictive interpretation of imperfective aspect limited to complete events – as a failure to accommodate or retrieve a discourse referent for the reference time required for the imperfective aspectual relation '$t \subseteq \tau(e)$' (van Hout, 2005; Kazanina and Philips, 2007).

3.2 Crosslinguistic predictions for Pattern 2

According to the One-to-Many Acquisition generalization, the locus of children's non-targetlike interpretations of telic sentences in a given language lies with tense-aspectual forms that have variable meaning, not those with an invariant meaning.

13. Arguably, this is more difficult than recovering the temporal relation holding between an explicit *while*-clause and the main clause embedding it, since here, the two clauses are syntactically independent, uttered by different speakers, and realize different types of speech acts (question vs. assertion).

The main difference between van Hout's (2008) account and ours is that van Hout does not analyse the Polish imperfective as aspectually ambiguous.

14. To be sure, children could take a subinterval of that whole past and this way get the imperfective interpretation, but by hypothesis, accommodating such subinterval is precisely what they do not manage to do.

This proposal offers an account for the crosslinguistic differences in the acquisition of perfective past forms in Section 2.

Now, we might expect similar crosslinguistic differences in the acquisition of imperfective past forms. That is, we expect children learning languages in which the imperfective has invariant semantics to perform well on the interpretation of imperfective past forms (unlike Russian and Polish children, who show a non-adultlike pattern of interpretation with the imperfective morphology because, as we argued in Section 3.1, the latter is ambiguous). We contend that the Romance imperfective past is a good candidate since it invariably conveys the aspectual relation '$t \subseteq \tau(e)$', as argued in Grønn (2008b) for French. For instance, (21), from Spanish, where the *when*-clause provides the reference time, is typically understood to mean that the time of Pedro's letter-writing is still ongoing at the end of the reference time t (the time of the speaker's visita (the time of the speaker's visit).

(21) *Cuando fui de visita a su casa de 4 a 8 de*
when I visit-**PFV**.1SG for visit at-their place from 4 to 8 of
la tarde, Pedro escribía una carta. (Spanish)
the afternoon, Pedro write-**IMP**.3SG a letter
'When I visited them from 4 to 8 PM, Pedro was writing a letter.'

However, as Jayez (1999) observed for French and Bonomi (2004) for Italian, the configuration '$t \subset \tau(e)$' – encoding *proper* parthood – is too strict for the so-called 'narrative reading' of the Romance imperfective, illustrated in (22). We follow Grønn's proposal that on this reading, the event time $\tau(e)$ is *identical* to the reference time t, itself provided by the adverbial *at noon sharp* in (22). This leaves us with the relation '$t \subseteq \tau(e)$' with '$t = \tau(e)$' covering the extreme case of the narrative imperfective.

(22) *Al día siguiente, a las 12 en punto, Pedro encontraba una*
The day after, at noon sharp, Pedro find-**IMP**.3SG a
solución. (Spanish)
solution
'The day after, at noon sharp, Pedro found a solution.'

The crucial difference with the Russian or Polish imperfective is that the Romance imperfective cannot express the opposite, perfective, relation '$\tau(e) \subset t$', where the event time is properly included in the reference time (see also Grønn 2008b). The Spanish example (21) is therefore plainly false in a situation where Pedro finished writing his letter at 16.30. We can illustrate the difference in the truth conditions of the Romance imperfective vs. the Russian/Polish one as follows. If someone were

to ask in Spanish the question in (23), the answer would be 'No' in a situation where Pedro wrote the letter between 16.00 and 16.30 and then watched TV from 16.30 and 20.00. In Russian, however, the answer would be a definite 'Yes'.

(23) *Cuando fuiste de visita a su casa de 4 a 8 de la tarde,*
When be-**PFV**-2.SG for visit at his place from 4 to 8 PM
él escribía una carta? (Spanish)
he write-**IMP**-3SG a letter
'When you visited them from 4 to 8 PM, was he writing a letter?'

The interpretation of the imperfective by children vs. adults has been tested experimentally for Spanish (García del Real 2015). However, the experiments 1 & 2 that Kazanina and Phillips (2007) carried out in Russian (discussed in Section 3.1), where the imperfective was tested without a temporal modifier providing an explicit reference time (and where Russian children showed a non-adultlike behavior), were not conducted on Romance.[15] Our predictions are that Romance learners should not display the same pattern of behavior as learners of Slavic languages (that is, should not show a preference for complete event interpretations with the imperfective), since the Romance imperfective has an invariable meaning ($t \subseteq \tau(e)$, in contrast to the Russian imperfective which has a variable meaning ($\tau(e) \subseteq t$ or $t \subseteq \tau(e)$), as discussed in 3.1.

Also, truly perfective situations, where the event is completed significantly before the reference interval reaches its right boundary and, as such satisfying the $\tau(e) \subset t$ configuration which the imperfective cannot express, have to our knowledge not been tested for Romance languages. Take for instance García del Real's (2015) study from Section 2.1, who tested children's acceptance of complete and incomplete event interpretations for perfective and imperfective telic sentences (see (1) above and (24) below).

15. Van Hout (2008), however, did run on child Italian the same experiment as the one conducted on child Polish (see also 3.1) which, in its design is closer to Kazanina and Phillips' Experiments 3 & 4, in that the lead-in question was asked in a discourse context (*Giraffe, what did you see?*), where the giraffe's seeing time provides a reference time for the imperfective in the test sentence. Conforming to our expectations, the robust preference that the Polish 3-year-olds showed for the complete event interpretation of the IMP was not found with the Italian children of the same age.

(24) *Mientras sonaba la música, el payaso dibujaba una estrella?* (Spanish)
While play-**IMP.**3SG the music the clown draw-**IMP.**3SG a star
'While the music was playing, was the clown drawing a star?'

García del Real (2015) found no differences between adults and children in the comprehension of the Spanish imperfective: both groups accepted it with incomplete as well as complete events. Importantly, since the event is completed just before the music stops playing (i.e., just before the end of reference time t), the targeted complete event interpretation also corresponds to the configuration where $t = \tau(e)$ and, as such, still in the domain of interpretation of the imperfective. It is therefore not surprising that adults considered the test sentence (24b) as true where the event described is completed. The crucial test case for a truly perfective interpretation '$\tau(e) \subset t$' would be one in which the depicted incomplete event was interrupted significantly before the end of t.

To summarize, Pattern 2, found in Russian and Polish, is to some extent the mirror image of Pattern 1 in that children are far more *restrictive* than adults, allowing *fewer incomplete event interpretations with the imperfective*. We explained this pattern of behaviour as a failure to accommodate a discourse referent for the reference time required for the imperfective use. Our predictions are that Romance learners should not display the same learning pattern as learners of Slavic languages, given that the Romance imperfective unlike the Russian imperfective, has an invariant imperfective meaning.

Before concluding this section, we would like to briefly discuss children's non adult-like on the English progressive observed in Wagner (2002).[16] Wagner used a forced-choice selection task. The children were presented with pairs of toys depicting the different versions of the event, for instance a puzzle completely filled, and a puzzle partly filled, and were asked to match these two toys to sentence descriptions in the perfective (*I filled in the puzzle*) and imperfective (*I was filling in the puzzle*). For the progressive, all English children (aged 2;6, 4 and 5) selected both pictures equally often, i.e., selecting the complete situation about half of the time. Wagner concludes that "children behaved like junior formal semanticists, consistently matching the perfective sentence to the completed event (in accordance with the perfective's entailments), but remaining agnostic about where to match the imperfective sentence (in accordance with the imperfective's lack of entailments)"

16. We thank an anonymous reviewer for bringing us Wagner's (2002) study to our attention in the context of Pattern 2.

(Wagner 2002:120). Seeing that there was no actual *preference* for the completed situation, this does not instantiate our Pattern 2, as characterized above for the Imperfective in child Russian and Polish. Following the One-to-Many Acquisition generalization, and given that the English progressive only has an imperfective meaning, we do not expect the English progressive to be challenging.

It remains true, however, that the English progressive may describe both incomplete and complete events via its imperfective meaning, just like the Romance imperfective looked at above. As a result, English children may not be target-like when having to choose between complete and incomplete interpretations of the English progressive. Interestingly, Wagner's (2002) results with adult vs. children participants document such a case. Just like the children, the adults in Wagner's study selected both complete and incomplete situations at chance in a task where they were given just *one* (progressive) sentence to be matched to one of the scenes. In contrast when given *two* sentences (progressive vs. simple past) to match to two scenes, the adults always selected the incomplete event for the English progressive. We think that children's non-targetlike behavior on the progressive may reflect a drawback of the force-choice selection task. By comparing two alternative pictures, the only correct way is to match the progressive with a situation that the simple past cannot convey; with event predicates, the simple past is only compatible with the complete situation, hence the progressive must be matched to the incomplete situation. It is likely that children, even at the age of 5, do not engage in this type of pragmatic reasoning about the task, as a result of which they perform the task as if only one sentence was given.

4 Pattern 3: Over-rejection of implied-result interpretations

4.1 Introduction

The third non-targetlike interpretation of telic sentences we focus on appears with what has been called in Thai and Chinese 'implied-result verbs' (Thepkanjana and Uehara 2009), as opposed to 'entailed-result verbs'. In their perfective form, implied-result verbs are predicates that entail the occurrence of a process (an action with an agentive subject), but merely imply the occurrence of an actual result state. For instance, the English predicates *throw* and *wash* entail a process when used in perfective sentences, but the result state can be denied without leading to a

contradiction (at least with an agentive subject), which is typical for an implicature; see Talmy (1991), Beavers (2010) among others:[17]

(25) *Fidelis threw the ball to Parana, but Jairzinho caught it before it could reach Parana.*

(26) *I washed the shirt, but it came out dirty!*
(Talmy 1991:509)

Crosslinguistically, the class of 'implied-result predicates encompasses two subclasses that differ in their event structure, argument structure and in some cases morphosyntax. A first class of verbs have the event and argument structures of standard causative verbs, despite the fact that they fail to entail a result (Koenig and Davis 2001, Beavers 2010 for English; Alexiadou et al. 2017, Martin and Schäfer 2013 for French and German; Martin et al. 2018 for Mandarin Chinese). That is, by their morphosyntax, argument/event structure and event semantics, they are well and truly (bi-eventive) causative, but the occurrence of a result state is not entailed by the perfective form of the predicate.

A second class of implied-result verbs are manner (mono-eventive, non-causative) verbs (e.g., English *wash*): their event structure involves a process only, and the associated result state is consequently *not* part of it, despite the fact that its occurrence is often implied by the use of the verb in a perfective sentence. In English, many of these verbs come from Levin's (1993) class of *wipe* (*wash, scrub, sweep*) and contact-(by-impact)-verbs (*hit, touch, scratch*); see, for instance, Brisson (1994), Rappaport Hovav and Levin (1998), Levin (2015), for English, Wittek (2002) and Alexiadou et al. (2017) for German or French, Martin et al. (2018) for Mandarin Chinese.

In all languages mentioned, implied-result causative and manner predicates coexist with expressions that entail (rather than imply) a result. We will zoom in on Mandarin Chinese and English, the two languages for which the interpretation of implied-result verbs by children has been investigated. Table 5 summarizes the typology of relevant constructions, and provides a semantic representation for a

17. Crosslinguistically, predicates that imply a result with an agentive subject tend to entail the result with a non-animate subject; this is the essence of Demirdache and Martin's (2015) Agent Control Hypothesis. On (child vs. adult) Mandarin Chinese, see van Hout et al. (2016), Liu (2018), Zhang (2018); on Korean, see Beavers and Lee (this issue); on Russian, see Tatevosov (this issue); on French and German, see Martin and Schäfer (2012, 2013, 2017), Alexiadou et al. (2017) and Martin (2015, 2019). The influence of agentivity on the interpretation of telic predicates across child languages is beyond the scope of this paper.

predicate of each subclass of implied-result predicates (see Martin and Gyarmathy 2019 for a semantic analysis of RVCs).

Tab. 5: Typology of implied- vs. entailed-result verbs

	implied-result verbs	**entailed-result verbs**	
	manner verbs	**causative verbs**	**causative verbs**
English	*wash, wipe*	*send, offer*	*clean, give*
Mandarin	manner simple verbs (SVs) *chuī* 'blow' *xǐ* 'wash' $\rightsquigarrow \lambda e.$**wash**$(e)$	causative SVs *shā* 'kill' *guān* 'close' $\rightsquigarrow$ $\lambda e.\exists s($**cause**$(e, s) \wedge$ **closed**$(s))$	resultative verbal compounds (RVCs) *shā-sǐ* 'kill dead', *xǐ-gānjìng* 'wash-clean', *guān-shàng* 'close up'

The Form-to-Meaning Correspondence hypothesis predicts that the form that raises problems for child learners is the form with more than one meaning – in the case at hand, implied-result verbs. In the adult language, these predicates can be used in their perfective form to describe situations where the action fails to trigger any effect (no change situations, non-causative use), or in situations where the effect is successfully obtained (change situations, causative use). Implied-result verbs will thus be harder to acquire for learners since they can denote both no change and change situations. On the other hand, perfective entailed-result verbs invariably denote change situations, and are therefore, by hypothesis, much easier to acquire.

In Sections 4.2 and 4.3, we show that these predictions are supported in English, as well as in Mandarin, since implied-result predicates are often interpreted in an overly restrictive way by children as entailing a result. By contrast, entailed-result predicates are very quickly interpreted in a targetlike fashion in child Mandarin. In Section 4.4, we provide a new account for the bias towards the result interpretation consistent with the One-to-Many acquisition generalization. We take children's tendency to strongly favor the result use of these verbs to reflect an immature command of the abductive reasoning underlying the non-literal, enriched, meaning of these implied-result statements in the adult grammar.

4.2 Implied-result verbs in adult vs. child Mandarin

In Mandarin Chinese, a complex event made up of a process and a consequent result is usually expressed by a resultative verb compound (RVC). The first morpheme of an RVC (V1) is typically an activity, manner verb (e.g. *dǎ* 'shoot' in (27)), but

as Martin et al. (2018) extensively argue, V1 can also (albeit less often) encode a causation event (e.g. *shā* 'kill' in (28)), see also Lin (2004). The second morpheme (V2) is a verb encoding a consequent result (e.g., *sǐ* 'dead' in (27)-(28)).

(27) *John dǎ sǐ le Mary.* (Mandarin)
John shoot dead **PFV** Mary
'John shot Mary dead.'

(28) *John shā sǐ le Mary.* (Mandarin)
John kill dead **PFV** Mary
'John killed Mary dead.'

RVCs are unambiguously entailed-result verbs: perfective sentences (marked with the verbal aspectual marker *le*) with an RVC entail the occurrence of a full result, see Li and Thompson (1981), Lin (2004), and Xie (2009).[18]

Chen (2005, 2008, 2017) investigated the interpretation of RVCs in child and adult Mandarin using a truth-value judgment task. Participants watched videos where the encoded result is successfully obtained ('change condition') or where the action does not trigger the encoded result ('no change condition') and were asked to answer questions such as (29) with a perfective RVC for both conditions. [19]

(29) *Ayi zhāi-xià le pingguo ma?* (Mandarin)
Aunty pick-descend **PFV** apple question-particle
'Did aunty pick the apple?'
(Chen 2005)

Chen used eight different RVCs. Mandarin-speaking adults without exception answered 'Yes' to the RVC question in the change situation and 'No' in the no change situation.

The children's performance is very good: even 2.5-year-olds provided the target 'Yes' response in over 90% of change trials, and 'No' response in approximately 80% of no change trials where the attempt was not followed by the intended effect (e.g., a ringing alarm clock set by a woman failed to wake up a man). The performance was even more closely adult-like in older children.

18. On the aspectual meaning of the verbal *le*, see among others Smith (1991), Soh and Gao (2006, 2007), Klein et al. (2000), Koenig and Muansuwan (2000), Y. Sun (2013) and H. Sun (2014).

19. The videoclips used by Chen are the same as those used by Wittek (2002) (Chen, p.c.). These videoclips are described in Appendix 1 of Wittek (2002).

As mentioned above, the V1 in RVCs can be used by itself as a simple verb (SV), without V2. Notably, Mandarin SVs do not entail a result state even if they are causative and lexicalize a result according to event structure diagnostics.[20] This is illustrated with (30), taken from Martin et al. (2018).

(30) *Lùlu kāi le nèi-shàn mén, dànshì gēnběn jiù méi*
Lulu open **PFV** that-CLF door but at.all JIU NEG.PFV
kāi-kāi.
open-open
'Lulu opened that door, but it wasn't open at all.' (Mandarin)
(Martin et al. 2018)

Chen's findings on the interpretation of such implied-result SVs by children are intriguing. Like adults, children of all ages (from 2;6-6;1) correctly accepted SV sentences such as the first clause of (30) in the change condition in 100% of cases. However, in the no-change condition, whereas adults always accepted such SV sentences, none of the 2-and-a-half-year-olds did so for *chuī* 'blow at', *zhāi* 'pick' and *kāi* 'open'. Acceptance rates for other verbs were higher but far from adultlike, ranging from 20 to 60% depending on the predicate.[21] Overall, the performance on SV sentences improved with age, but an adult-like pattern did not emerge until age 6/7.[22]

(31) *Ayi zhāi le pingguo ma?* (Mandarin)
Aunty pick **PFV** apple question-particle
'Did aunty do a picking action on the apple?'
(Chen 2005)

20. Chen (2008, 2017) observes that in adult Mandarin, the defeasible result inference of these implied-result causative SVs is much stronger than with implied-result activity SVs, although she does not associate this difference with a difference in the event structure of the verbs.

21. Those verbs that have the stronger result inference among adults were also those that children tended to reject more in the no change situation across ages (Chen 2008). For instance, 6-year-olds accepted *kāi* 'open' and *zhāi* 'pick' for the no change condition only around 40%.

22. Note, however, that the developmental curve documented in Liu (2018) (who exclusively focuses on *causative* SVs) is a bit different. Liu observes that although 3-year-olds reject zero-change interpretations of causative SVs more than adults, they nevertheless perform significantly better than 5-year-olds (that is, 3-year-olds are much less restrictive in their acceptance of result-implied Mandarin SVs on the no-change condition then the 5-year-olds). We have to leave this issue open for further research, see Liu (2018) for an account compatible with the one proposed in Section 4.4.

To summarize, Chen's (2005, 2008, 2017) results suggest that Mandarin children tend to treat the result inference triggered by implied-result SVs under their perfective form as an entailment rather than an implicature. These results support the One-to-Many Acquisition generalization: the form that raises problems for Mandarin learners is the form with more than one use, namely the implied-result SVs. In contrast, RVCs are invariably used to describe change (causative) situations, and, as expected, are acquired much more easily. In Section 4.4, we link children's tendency to mistake the result inference for an entailment to the pragmatic, abductive reasoning involved in the enriched, non-literal meaning of these verbs.

4.3 Implied-result verbs in adult vs. child English

English has two types of implied-result verbs, as was shown in Table 5. The first type includes causative verbs like *send* or *offer*. These causative verbs are similar in their event structure to Mandarin SVs like *guān* 'close', which also involve two event components.[23] The second type includes manner verbs like *wash*. The acquisition of these two classes in child English has been respectively investigated by Kazanina et al. (2017) and Marcotte (2005, 2006), and will be discussed next.

Kazanina et al. (this issue) tested the interpretation of implied-result causative verbs like *send* and *throw* by English 3-to-6 year old learners. The verbs were used in their simple past form in a prepositional dative construction, e.g., *Jane threw a frisbee to Woolly* – a syntactic frame argued to be compatible with the denial of the result inference (as in *Jane threw a frisbee to Woolly, but Bill caught it*; see, e.g., Oehrle 1976, Beavers 2010). The goal was to test whether children know that such sentences do not have an entailment of transfer. In contrast to adults who mostly (90%) accepted *throw* or *send* simple past sentences in a no-transfer situation, approximately 50% of children rejected such sentences in situations where the throwing or sending event did not result into the transfer intended by the agent (e.g. Jane threw the frisbee in the air in the direction of Woolly, but it landed in someone else's hands due to the wind). The performance of 5- and 6-year-olds was more adultlike. Note the similarity with the learning pattern observed by Chen for

23. Note that there is an important difference in the semantics of English and Mandarin implied-result causative verbs. The 'no change' reading of the former originates from the sublexical modal component involved in the semantics of these verbs (see Beavers 2010, Koenig and Davis 2001, Kratzer 2013, Martin and Schäfer 2012). On the other hand, the source of the no change reading of Mandarin causative SVs is the partitive reading of the perfective operator *le*, see Altshuler (2014), Koenig and Muansuwan (2000), Martin (forthcoming, 2019), Smith (1991), and references therein.

child Mandarin: in both languages, learners tended to interpret the implied-result verbs as entailed-result verbs in perfective sentences.

Marcotte (2005, 2006) focuses on the acquisition of English manner (process) verbs like *push*, *wash, pull, kick, wipe, sweep* that are often used in situations where the process resulted into a change, even though these predicates do not entail this change, as illustrated in (32).

(32) *Kramer pulled the rickshaw, but it didn't budge.*
(Marcotte 2005:185)

Marcotte reports two interesting facts about the use of these verbs by English parents and their interpretation by children. Firstly, his search in the CHILDES database (his Experiment 4) revealed that parents of children younger than 4 predominantly use these verbs in change rather than no change situations, which is likely to bias the child towards the causative interpretation.[24] Secondly, Marcotte observed that children make more inchoative errors with *wash*-verbs – i.e., misuse them in intransitive frames with a theme subject, as illustrated in (33)-(34) – than they do so with transitive verbs which do not imply a result, such as *love* (see Experiment 5, Marcotte 2005: 202-207). He takes this second observation to support the idea that children misrepresent these implied-result manner verbs as truly causative verbs.

(33) [Carl 2,5, playing with toy cars and a garage, putting the cars through the carwash]:
They clean washed.

(34) [Adam 3,0]

a. Mother: *Why don't you wash them off?*
b. Adam: *dey, dey wash off.*
(Marcotte 2005:258)

To summarize, the experiments reported in this section show that implied-result verbs in their perfective form tend to be interpreted as entailed-result verbs by learners of two quite different languages, namely Mandarin Chinese and English.

Kazanina et al (this issue) provide an alternative explanation of the children's failure for these verbs in terms of the Actuality bias, see their paper for details. Note that their account focuses on verbs that have a causative event structure and

24. Table 6.3 in Marcotte 2008:201 summarizes the main results and his Section B.4 describes the coding scheme employed to code parents' uses of *wash*-verbs.

a modal sublexical component *à la* Koenig and Davis 2001 (where these verbs are in fact *modal* as far as the result is concerned: the encoded result has to take place only in those worlds where the agent's intention is fulfilled). Thus, Kazanina et al.'s account may not extend to all cases discussed in Pattern 3, since some of the verbs involved do not have a causative event structure, nor do they have the same type of semantic representation, involving a sublexical modal base.

The view we explore in the following section is that children's tendency to strongly favor the causative use of these verbs reflects an immature command of the abductive reasoning underlying the non-literal, enriched, meaning of these implied-result statements by adults.

4.4 An account for Pattern 3: A non-adultlike pattern in abductive reasoning

In order to understand children's tendency to require an obligatory result state for verbs that only imply one, we think it is insightful to explore how adults arrive at such a result inference. Gyarmathy and Altshuler (this issue) emphasize that research on non-culminating construals mostly tries to explain how the culmination inference can be defeated. As they note, the few alternative accounts that focus on how the culmination inference arises in the first place typically appeal to a (Neo-)Gricean pragmatic account, according to which the inference is triggered as a result of competition with alternative expressions. However, such an account immediately raises a problem for us. In Mandarin Chinese, a SV V1 has as stronger alternatives RVCs V1-V2, where V2 overtly expresses a result associated with V1. For instance, the (non-causative) V1 *xǐ* 'wash' is in competition with a stronger alternative, such as *xǐ-gānjìng* 'wash-clean'. Similarly, *shāo* 'burn' is in competition with a stronger alternative, such as *shāo-diào* 'burn-destroy', etc. An account based on the Maxim of Quantity thus predicts a perfective V1-statement to imply the negation of the stronger alternative perfective V1-V2-statement (e.g., NOT(PFV(wash-clean)), where V2 expresses a result conventionally associated with the process expressed by V1; i.e., *gānjìng* 'clean' for the V1 *xǐ* 'wash'). Since NOT(PFV(V1-V2)) entails that V2 does not obtain (cf. Tai 1984, Chief 2008:245 among others), a V1-assertion is therefore expected to trigger the inference that a V2-result did *not* occur; see (35).

(35) a. *Assertion*: PFV(V1)
b. *Alternative:* PFV(V1-V2)
c. *Implicature of* (a): NOT(PFV(V1-V2))=
d. NOT(V2)

But, in fact, the *opposite* pattern is observed, as a perfective V1-sentence regularly triggers the (defeasible) inference that a V2-result *did* occur. For instance, (39a) defeasibly implies (39b), and (40a) defeasibly implies (40b).

(36) a. *Lùlu* ***xǐ*** ***le*** *nèi-jiàn dàyī.* (assertion)
Lulu wash **PFV** that-CL coat
'Lulu washed that coat.'
b. Lulu washed the coat clean. (defeasible result inference)

(37) a. *Yuēhàn* ***shāo le*** *tā-de shū.* (assertion)
Yuehan burn **PFV** 3SG-DE book
'Yuehan burned his book.'
b. Yuehan destroyed his (whole) book. (defeasible result inference)

This suggests that an account of the culmination inference based on the competition with alternative V1-V2 forms as sketched in (38) is on the wrong track, and that the result inference may not be a scalar implicature to begin with. A competition-free account is thus to be preferred. It perhaps also suggests that something is wrong in the way competition between alternatives is depicted in (38). Possibly V1 does not trigger NOT V1-V2. because the alternatives to V1 are "too prolix": there may be too many of them, since the V2 position can be filled by many different predicates entailing a result state associate to V1.

Gyarmathy and Altshuler (this issue) precisely aim to offer a competition-free account of the culmination and result inferences, namely one that exploits *abductive reasoning*. As we will show later, our account of Pattern 3 in child languages provides further support for their alternative analysis of the result inference triggered by these verbs in adult languages. Below we first summarize their account, and then show that studies in conditional reasoning in children in fact report a learning pattern, which, applied to the case we are interested in, exactly predicts children to have more difficulty than adults to *inhibit* the result inference.

Abduction is the inference to the best explanation. To exemplify abduction, let us assume that *the street is wet* (OBSERVATION) and that *if it has been raining, the street would be wet* (THEORY). From OBSERVATION and THEORY, we therefore infer – abduce – that *it has been raining*, since it is one of the best explanations for OBSERVATION given THEORY in terms of simplicity, strength, likelihood, coverage, etc. Abductive inferences often amount to inferring P on the basis of a conditional $P \rightarrow Q$ and the observation Q (and an evaluation of the potential alternative explanations for Q in terms of simplicity, likelihood, etc.): If we see that *the street is wet* (Q), and we know that *if it has been raining, the street would be wet* ($P \rightarrow Q$), then we abduce (the antecedent) P, because it is at least among the

best explanations for Q. Of course, abductive inferences are cancellable, since the inference to the antecedent from the consequent of a conditional is not deductively valid. Rain is not the only possible sufficient cause for the street being wet; the street may be wet because a water-cart passed, etc.

The (abductive) inference from the consequent to the antecedent of a conditional is exploited by Gyarmathy and Altshuler to account for the result inference of implied-result statements. In the following, we exemplify their account with a statement built with the implied-result predicate *send.*

Gyarmathy and Altshuler's basic idea is that the observation on hearing a statement Q is the logical form of Q. Suppose that Q asserts the occurrence of a process described by the implied-result verb *send* (e.g., a sending of an e-mail to Mary). Suppose furthermore that P asserts the occurrence of a causation event consisting of such a process successfully triggering the targeted transfer (e.g., a sending of an e-mail successfully causing its transfer to Mary). The result inference of P is drawn abductively as follows: on the basis of a non-defeasible rule of reasoning $P \rightarrow Q$ that *if there is a transfer via sending (P), there is a sending (Q)*, we abduce from our observation Q (*there is a sending*) that *there is a transfer via sending* (P), because this is among the best (most simple, likely, typical) explanations for our observation.

(38) a. OBSERVATION (Q):
There is a process of type Q (e.g., someone sent a letter to Mary)

b. THEORY ($P \rightarrow Q$):
If there is a causation event of type P (e.g., a transfer of an e-mail to Mary via a sending of this e-mail to her), then there is a process of type Q (i.e., Q is a necessary condition for P).

c. EXPLANATION (P, abduced):
There is a causation event of type P.

In other words, a necessary condition Q for the antecedent P is treated as evidence for assuming that P holds.

Of course, there may be other competing theories $R \rightarrow Q$ which do not support the inference to P. For instance, *Paul sent an e-mail to all his friends including Mary* (R) is also a sufficient condition for *Paul sent an e-mail to Mary (Q)*, but the theory $R \rightarrow Q$ does not support the inference that an e-mail was successfully transferred to Mary. But we note that a theory such as (38b) is one of the most accessible and salient theories in a non-enriched, default context, probably because of the context-independent strong, typical association taking place between sending-events and transfer-inducing events.

What are the logical abilities of young children? Studies have shown that even very young (preschool) children can make logical inferences involving conditional reasoning, e.g., the *modus ponens* (see, e.g., Dias and Harris 1988, Rumain et al. 1983). Particularly relevant from our perspective is how children deal with the inference from the consequent of conditionals to the antecedent. In the literature, this is known as the (non-deductively valid) 'Affirmation of the Consequent (AC) Argument': from *If P then Q* and the observation *Q*, one infers *P*. Crucially, observe that this AC inference is precisely the same as the abductive inference addressed above. Interestingly, studies have consistently shown that young children tend to endorse the AC inference, and that unaided target-like logical reasoning does not clearly appear before of age (Markovits and Thompson 2008). One of the key sources for the erroneous acceptance of the AC inference appears to be the difficulty for young children to generate alternative models in their reasoning, that correspond to an alternative antecedent (Chantal and Markovits 2016). For instance, when submitted to the premises '*all streets on which it has been raining are wet*' and '*the street is wet*', and asked whether it is certain that *it has been raining on this street*, they tend to answer yes, because they forget about models where the street is wet for other reasons than the rain, e.g., because a water-cart passed (example ours). And moreover, children who are better at generating alternative ideas, are also those who resist better the non-deductively valid (although often pragmatically valid) AC inference.

In light of these results and Gyarmathy and Altshuler's analysis of the result inference in terms of an abductive/AC inference, we propose that the tendency among Mandarin and English young learners to take the result inference of *wash*- and *send*-verbs for an entailment finds its source in the tendency of these learners to infer 'too strongly' P from $P \rightarrow Q$ and Q (or to their inability to inhibit this inference). That is, they tend to interpret *wash* as entailing a *clean*(er)-result because they forget situations in which washing events have other sufficient conditions than successful (resultative) washing events. Similarly, children tend to interpret *send* as entailing a transfer, because they do not take into account models where sending events have other sufficient conditions than transfer-inducing sending events.[25]

25. Note that studies on category verification tasks performed on concrete objects (e.g. pieces of furniture, clothes, etc.) show that toddlers perform better in the categorization of typical objects than atypical ones, suggesting that children's categories are initially more narrowly defined in terms of typical objects, while atypical objects are only incorporated later (see, e.g., Jerger and Damian 2005). That children tend to reject implied-result verbs for unsuccessful actions could then be taken to reflect the same *underextension* pattern, that is, the tendency to reject atypical objects in categorization tasks, but this time in the

This account has several advantages. Firstly, it can be applied both to English and Mandarin and covers all subtypes of implied-result verbs, namely those that have a bieventive, causative, structure (e.g., Mandarin *guān* 'close', English *send*) as well as those that have a monoeventive, non-causative, structure (e.g., Mandarin *dǎ* 'shoot/hit', English *wash*). Secondly, it establishes a link between the reasoning at the source of the result inference among adults, and the one at the source of the same inference among children, and explains independently why children's abductive inference is 'too strong'. Thirdly, it accounts for the gradual improvement in the interpretation of these verbs between 3 and 6 years of age, since the logical performance on conditional reasoning also follows the same curve (Chantal and Markovitz 2016 and references therein). Fourthly, it does not rest on the assumption that children have a wrong literal meaning for implied-result verbs, since it links the tendency to mistake the result inference for an entailment to the *pragmatic* reasoning involved in their enriched, non-literal meaning. On the other hand, an account that assumes that children mistake these verbs for truly causative verbs has to explain why children sometimes accept such a verb in a situation where the result does *not* obtain. Recall Chen's (2008, 2017) and Kazanina's et al. (this issue) results above: young children do well and truly sometimes accept implied-result verbs in a no-change situation, although on average less often than adults.[26]

Note that there is in fact no conflict between this account for the overly restrictive 'successful' interpretations of implied-result verbs (*send, wash*) in child English (Pattern 3), and our account for the overly tolerant incomplete event interpretations of entailed-result non-incremental theme verbs (*open, blow out*) in the same child language (Pattern 1). We explained the latter as resulting from the misinterpretation of the simple past; the former pattern, on the other hand, is due to a non-adultlike pattern in the conditional reasoning involved in the interpretation of implied-result verbs. We therefore do not have to appeal to two irreconcilable opposite 'manner' and 'result' biases to explain these two sets of facts (cf. our discussion of Gentner's manner bias hypothesis in Section 1).

Since the account does not depend on any language-dependent properties, it predicts that children should show Pattern 3 cross-linguistically in their interpreta-

domain of events. To our knowledge, however, no category verification tasks have been performed on typical vs. atypical instances of event categories.

26. Importantly, *wash*-verbs have a different syntax than truly causative verbs (Alexiadou et al. 2017). This is also the case for *send*-verbs, which, differently from *break*-verbs, never enter the causative alternation. This may serve as a first hint to learners that the semantics of these verbs is different from the one of standard causative verbs, on top of the fact that *wash*- and *send*-verbs are also used by parents in situations where the result does not obtain.

tion of implied-result verbs. To our knowledge, the interpretation of these verbs by children only has been studied for Mandarin and English, but we expect it to appear in other languages with implied-result verbs as well. Also, we predict a correlation between children's performance on these verbs on the one hand, and on conditional reasoning tasks on the other.[27]

Before concluding, let us address a potential problem for the account just offered. Geis and Zwicky's (1971) influential paper on 'invited inferences' made widespread the view that conditionals (*If P then Q*) are regularly 'perfected' into biconditionals (*If and only if P then Q*). The AC 'abductive' inference is commonly viewed as one of the manifestations of this tendency. Since Geis and Zwicky, it is very common to analyse conditional perfection (and the AC inference is one of its manifestations) as a 'pragmatic enrichment' of the conditional akin to the pragmatic enrichment of scalar items like *some*, requiring additional interpretative work. But if true, this would be very problematic for us, since enriched readings generally occur less frequently among young children, although admittedly, this tendency has been mostly documented in the domain of scalar implicatures.

The discrepancy is in fact already pointed out by Noveck et al. (2011). As they note, the analysis of the AC inference as a kind of Gricean scalar implicature leads to the wrong prediction that this inference should occur with extra effort (with more processing time, more often with older than younger subjects), while a non-enriched reading should be linked with faster treatments or younger ages. In other words, it wrongly predicts that children should endorse the AC/abductive inference *less* often than adults (since, again, children draw generally *less* often scalar implicatures than adults, but see footnote 3). As Noveck et al. (2011) observe, data show that the extra effort is linked not with *accepting* the AC inference, but rather with *rejecting* or *inhibiting* it, suggesting that abductive inferences are automatic. They consequently argue against an analysis of the AC inference as a subkind of scalar implicature, a view we adopt here too.[28] In turn, the studies about children's excessive endorsement of the AC inference reinforces Gyarmathy

27. It may be, however, that Pattern 3 is particularly salient in Chen's studies because Chen tested the same children on the interpretation of RVCs of the form V1-V2s, as well as on the interpretation of the implied-result verbs (V1s) embedded in these RVCs. Indeed, it may be that the saliency of RVCs in the context of the experiments invited children to focus their attention on models involving *successful* actions (e.g. 'wash-clean', 'shoot die'), thereby discouraging them to seek alternative models involving unsuccessful events. The solution would be to adopt a between-subject design, where children hear either SVs, or RVC verbs, but not both.

28. An anonymous reviewer called attention to an interesting parallelism between the AC inference on the one hand, and the free choice inference of disjunction under existential deontic modals (*He may take a pear or an apple*, see Chemla and Bott 2014) on the other.

and Altshuler's (this issue) view that the abductive 'result' inference triggered by implied-result verbs has a different nature than Gricean scalar implicatures.

5 Conclusion and discussion

We have investigated three seemingly contradictory patterns of non-adultlike construals of telic sentences across child languages. We have sought to document a common trend across these three patterns – they appear with forms with more than one meaning – and to spell out the crosslinguistic predictions of our proposal. Our leading assumption has been that these non-targetlike patterns of interpretation of telic sentences result from children's immature command of the pragmatic reasoning, which, in the adult grammar, guides the context-sensitive choice of interpretations for forms with more than one meaning. On this proposal, the child's immature pragmatic reasoning interacts with different syntactic, semantic and pragmatic computations needed to interpret a given tense-aspectual category and yields three patterns of non-adultike behaviour related to aspectual interpretation, as summarized in Table 6, where we also give examples of untested predictions of our analyses.

As this reviewer points out, *not deriving* the AC or the free choice inferences is a costly phenomenon, while *deriving* scalar implicatures such as the one triggered by *some/may* is costly.

However, we are not sure that Chemla and Bott's (2014) explanation for why it is that the free choice interpretations of 'may-A-or-B'-sentences (e.g., *John may eat an apple AND John may eat a pear)* are quicker to derive than literal interpretations (e.g. *John may eat one of the two, but I don't remember which*) can extend to Pattern 3. Chemla and Bott suggest that the preference for the enriched, free choice interpretation, may be due to the fact that the alternatives needed to derive the free choice inference are *simpler* than the utterance, and in fact *contained* in the original utterance. But we have argued that the abductive result inference of Mandarin (or English) perfective result-implied sentences differs in a very important way from the free choice interpretation of 'may-A-or-B'-sentences studied by Chemla and Bott: while the latter are *scalar* implicatures obtained through a trimming off of stronger alternatives, the former are not scalar inferences.

Tab. 6: The One-to-Many Acquisition generalization across the 3 patterns of non-adultlike interpretations of telic sentences

Form with variable meaning/use (non-target like in **bold**)	Pragmatic reasoning	Example of untested predictions for a given language
PATTERN 1		
(in-)definite descriptions a) **maximal use** b) non-maximal use (over-accepted by children)	**computation of scalar implicature**	no over-acceptance of incomplete event interpretations for incremental theme VPs with (in-)definite descriptions without non-maximal use (e.g., *eat the whole pizza, draw an entire star*)
past morphology expressing PFV a) **PFV use** b) IMP use (over-accepted by children)	**identification of the restrictions for the disambiguation of an underspecified form**	over-acceptance of incomplete event interpretations for non-incremental theme VPs in other languages whose perfective morphology has IMP use (e.g., Hebrew)
PATTERN 2		
past morphology expressing IMP a) **IMP use** (over-rejected by children) b) PFV use	**accommodation of implicit time**	over-rejection of incomplete event interpretations for imperfective telic sentences in other languages whose imperfective morphology has PFV use
PATTERN 3		
implied-result predicates a) **non-resultative use** (over-rejected by children) b) resultative use	**inhibition of (abductive) AC inference**	over-rejection of non-resultative use for implied-result predicates across languages

Patterns 1-3 all reflect non-adultlike pragmatic skills, but the specifics of each case differ. In some cases, the problem lies in the disambiguation in context of forms with more than one meaning, like the English simple past, and the Russian imperfective. Children's difficulties in recovering the target meaning comes from a failure either to apply the restrictions bearing on one of the two meanings (for the English simple past (Pattern 1), Section 2.3), or to accommodate a time t in the common ground (for the Russian imperfective (Pattern 2), Section 3.1). In

other cases, the problem lies in making the right inferences to derive pragmatically enriched meaning, which we take to be the key to explaining children's over-acceptance of the incomplete event interpretation for the perfective form of telic predicates with incremental theme DPs (reinterpreted here as over-acceptance of non-maximal readings of nominal descriptions (Pattern 1), Section 2.2). The last case is that of implied-result (as opposed to entailed-result) simple verbs in Mandarin and English (Pattern 3). These verbs are hard to acquire because they can be used in their perfective form to describe change as well as no change situations. We argue that children's non-adultlike behavior results from an immature command of the pragmatic, *abductive* reasoning underlying the interpretation of these predicates (Section 4.4).

As far as we can see, the data we review is compatible with the view that the children showing a non-adultlike behavior know at some level that the 'culprit' form has multiple meanings. That is, we do not believe that the non-adultlike pattern observed is due to the fact that learners falsely believe that the form has one meaning only. The problem rather seems to lie in choosing the right meaning among the multiple ones in the right context. The Russian imperfective is a good example. While Russian children tend to reject imperfective telic sentences as descriptions of incomplete events in context A (i.e., in absence of an adjunct providing an explicit reference time t), the very same children accept them as accurate descriptions of such events in context B (i.e., in presence of such an adjunct). That these children are target-like in certain contexts but not in others suggests that they have acquired the meaning which raises problems. The problem of children seems rather to choose or admit the right meaning(s) in the right context.

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Appendix

Overview of (non-particle) verbs tested in 18 of the reviewed studies on the comprehension of telic sentences by children (For a list of particle verbs tested in nine such studies, see Appendix B of van Hout 2018). This table lists all (non-particle) verbs tested per study and per language.

Language	Study	Incremental theme verbs	Non-incremental theme verbs
Dutch	van Hout (1998)	*eat, drink*	
	van Hout (2008)	*lezen* 'read', *schrijven* 'write', *wassen* 'wash', *verven* 'paint', *bouwen* 'build'	*maken* 'fix'
English	Wagner (2002)	*fill, empty, draw*	*roll*

Language	Study	Incremental theme verbs	Non-incremental theme verbs
	Jeschull (2007)	*eat, drink*	*fold, wrap*
	Ogiela (2007)	*eat, drink, build*	*fix*
	van Hout et al. (2010)	*build, draw, make*	*open, close, blow out*
	Anderson (2017)	*eat, build, cut, drink, empty*	*fix, cross, unzip*
	Kazanina et al. (this issue)		*throw, send*
German	Wittek (2002)	*füllen* 'fill'	*schliessen* 'close', *knacken* 'crack', *pflücken* 'pick', *löschen* 'extinguish', *töten* 'kill', *wecken* 'wake', *zerbrechen* 'break'
Italian	van Hout and Hollebrandse (2001)	*mangiare* 'eat', *mettere* 'put', *costruire* 'build', *colorare* 'paint', *bere* 'drink', i 'write', *lavare* 'wash'	*riparare* 'fix'
	van Hout (2008)	*lavare* 'wash', *bere* 'drink', *scrivere* 'write', *mettere* 'put', *costruire* 'build', *verniciare* 'paint'	*riparare* 'fix'
Mandarin	Chen (2017)	SVs: *dào* 'pour' RVCs: *dào-mǎn* 'pour-be.full'	**SVs**: *nao* 'make.noise', *chuí* 'hammer', *jia* 'hold.tightly', *dǎ* 'shoot', *zhāi* 'pick', *guān* 'close', *chuī* 'blow' **RVCs:** *nao-xing* 'make.noise-be.awake', *jia-suì* 'hold.tightly-be.in.pieces', *dǎ-sǐ* 'shoot-die', *guān-shàng* 'close-ascend', *chuī-miè* 'blow-be.extinguished', *chuí-sui* 'hammer-be.smashed', *zhāi-xià* 'pick-descend'

Language	Study	Incremental theme verbs	Non-incremental theme verbs
Polish	van Hout (2005, 2008)	*przeczytała/ czytała* 'read-PFV/IMP', *napisała / pisała* 'write-PFV/IMP', *umyła/ myła* 'wash-PFV/IMP', *malowała/ pomalowała* 'paint-IMP/PFV', *budowała/ zbudowała-* IMP/PFV'	*naprawiała/naprawiła* 'fix-IMP/PFV'
Russian	Stoll (1998)	*pročital* 'read-PFV', *napisal* 'write-PFV', *postroil* 'build-PFV', *narisoval* 'draw-PFV', *nalil* 'pour-PFV', *perepisal* 'copy-PFV', *umylsja* 'wash-PFV', *vystiral* 'wash-PFV', *s'el* 'eat-PFV'	*vzjal* 'take-PFV', *položil* 'put-PFV', *otkryl* 'open-PFV', *vyrvala* 'tear-PFV'
	Vinnitskaya & Wexler (2001)	*stroit* 'build', *est* 'eat', *pit* 'drink', *risovat* 'draw', *pisat'* 'write, *čitat'* 'read',	*pereprygivat* 'jump over', *lovit'* 'fish', *sobirat'* 'pick', *pod'ezat'* 'come up', *podletat'* 'fly up', *podplyvat'* 'float up'
	Kazanina & Phillips (2007)	*sobiral/sobral* 'assemble-IMP/PFV', *stroil/postroil* 'build-IMP/PFV', *sostavlyal/sostavil* 'make-IMP/PFV', *lepil/slepil* 'mold-IMP/PFV', *napolnyal/napolnil* 'fill-IMP/PFV', *zakrashival/zakrasil* 'color-IMP/PFV'	*perevorachival/perevernul* 'turn-IMP/PFV', *razvorachival/razvernul* 'wrap-IMP/PFV'
Spanish	del Real (2015)	*dibujar* 'draw', *hacer* 'make', *construir* 'build'	abrir 'open', *cerrar* 'close', *apagar* 'blow out'

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