A developmental perspective on the Imperfective Paradox

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Abstract

Imperfective or progressive verb morphology makes it possible to use the name of a whole event to refer to an activity that is clearly not a complete instance of that event, leading to what is known as the Imperfective Paradox. For example, a sentence like ‘John was building a house’ does not entail that a house ever got built. The Imperfective Paradox has received a number of different treatments in the philosophical and linguistic literature, but has received less attention from the perspective of language acquisition. This article presents developmental evidence on the nature of the Imperfective Paradox, based on a series of four experiments conducted with Russian-speaking 3 to 6 year olds. Despite the fact that Russian is a language in which the morphological form of imperfectives is highly salient and used appropriately at a very young age, younger children show a clearly non-adultlike pattern of comprehension in our experiments. The results from Experiments 1 and 2 suggest that Russian-speaking children incorrectly ascribe completion entailments to imperfectives. However, Experiments 3 and 4 indicate that the children recognize that imperfectives can describe incomplete events, and that their problem instead concerns their inability to find a suitable temporal interval against which to evaluate imperfective statements. Specifically, children are only willing to accept an imperfective predicate as a description of a past incomplete event when the sentence contains an explicit temporal modifier that highlights a time interval that ends before the failure point of
the event. These findings are taken as support for an account of the imperfective that makes use of temporal perspectives in solving the Imperfective Paradox.

Keywords: Imperfective Paradox; Acquisition of aspect; Completion entailments; Development of aspectual semantics; Slavic aspect

1. Introduction

Expressions of natural language typically encode straightforward form-meaning correspondences. Noun phrases and propositions or predicates often map directly onto entities and events in the world. For example, (1a) makes reference to a toy house that resulted from a building event and (1b) describes an event of driving from Washington to Boston.

(1) a. John built a toy house.
    b. Mary drove from Washington to Boston.

Examples like (2) show that the form-meaning relation is less straightforward in sentences with progressive verb morphology. The main clause in (2a) may be used to describe an event that was ongoing while Katy talked on the phone, but with no assertion about the eventual outcome of the house-building event. (2a) is consistent with the possibility that the toy house was never completed. Sentence (2b) can be used in a situation where Mary, who was scheduled to give a talk in Boston, set out northwards from Washington but got no further than New York City because her car broke down.

(2) a. While Katy talked on the phone, John was building a toy house.
    b. Mary was driving from Washington to Boston.

Sentences like (2) show that predicates like build a house or drive to Boston that have a clearly defined endpoint or telos can be used to describe an incomplete event when marked with progressive morphology. In languages that distinguish perfective and imperfective verb forms the same point can be made using imperfective morphology. Examples of this kind reflect a puzzle that has been known to philosophers and semanticists at least since the time of Aristotle (Metaphysics, Book IX, Chapter 6; Aristotle, 1941). The puzzle has come to be known as the Imperfective Paradox (Dowty, 1977, 1979; Kenny, 1963), and encompasses two closely related questions. First, from the perspective of form-to-meaning mappings, how is it that a telic predicate that is defined by its endpoint can fail to entail that the endpoint is reached? For example, how does the main clause predicate in (2a) not entail that a toy house got built? We will refer to this as the completion entailment problem. Second, from the perspective of meaning-to-form mappings, how is it that an incomplete event can be
labeled with a telic predicate, even though the endpoint defined by the predicate is not reached? In other words, how are incomplete events identified as being parts of specific larger events? For example, how can an event that consisted of a drive from Washington to New York be described as an event of driving to Boston in (2b)? We will refer to this as the event projection problem. Both of these questions have received a number of different treatments in the semantic and philosophical literature, which we summarize in Section 2. The aim of this article is twofold: first, to investigate whether young children succeed in dealing with these problems, and subsequently to use the developmental findings to contribute to semantic theories of the imperfective and progressive.

One approach, referred to as the perspective-based approach in the following sections, focuses upon the form-to-meaning mapping and takes the completion entailment problem as central. According to this approach, the crucial property of progressives and imperfectives is that they suspend completion entailments because they describe an event in terms of a specific temporal interval or ‘perspective’. If the perspective covers an interval that precedes the endpoint of an event, then the description of the event is effectively blind to its ultimate outcome. For this reason, progressive or imperfective predicates have often been characterized as reflecting the perspective of an ‘insider’, who sees a portion of the event but is oblivious to the endpoints of the event, contrasting with the perspective of an outside observer who can see the event in its entirety (Comrie, 1976; Isačenko, 1968; Smith, 1991). Under this view it is interesting to investigate young children’s understanding of progressives and imperfectives, since children have been reported to have difficulty with perspective-shifting (e.g., Birch & Bloom, 2003, 2004; Krauss & Glucksberg, 1969; Perner, Stummer, Sprung, & Doherty, 2002; Piaget & Inhelder, 1956), and therefore they may provide evidence for the importance of perspective shifting in the semantics of imperfectives. According to another approach to the Imperfective Paradox, which we refer to as the event-based approach, the crucial puzzle involves the meaning-to-form mapping and how an appropriate event label can be identified or ‘accessed’ when a speaker encounters only part of the event. Under this approach, children’s mastery of progressives and imperfectives may depend on their ability to successfully identify events in the world as sub-parts of larger events.

In Section 2 we contrast the two leading approaches to the Imperfective Paradox and highlight their different predictions about where children might encounter difficulties in appropriately interpreting imperfective statements. In Section 3 we describe four experiments specifically designed to test Russian children’s understanding of the completion entailments of imperfective predicates. Although a number of studies of the production and comprehension of aspect in various languages have suggested that children have some understanding of aspectual contrasts at an early age (e.g., Delidaki & Varlokosta, 2003; van der Feest & van Hout, 2002; Vinnitskaya & Waxler, 2001; Wagner, 2001; Weist, Wysocka, & Lyytinen, 1991), previous studies have not specifically probed children’s mastery of completion entailments. Russian is well suited to investigating children’s understanding of aspectual entailments, since imperfective and perfective morphology is highly salient in the language and there is ample evidence that children master the morphological properties of (im)perfectives.
at an early age (Bar-Shalom, 2002; Bar-Shalom & Snyder, 2002; Gvozdev, 1961). Results from our initial experiments (Experiments 1 and 2) suggest that Russian-speaking children incorrectly ascribe completion entailments to imperfectives. However, subsequent experiments (Experiments 3 and 4) indicate that the children’s problem lies not with their understanding of completion entailments, which turns out to be adultlike, but rather with their ability to find a suitable temporal interval against which to evaluate imperfective statements. In Section 4 we provide a revised account of the Imperfective Paradox that is motivated by our developmental results and which draws upon key insights of the two competing accounts of the semantics of aspect.

2. Imperfective in semantic theories and development

In Section 2.1 we present the Imperfective Paradox in more detail and discuss how semantic theories of the imperfective deal with the challenges that it presents. In Section 2.2 we outline the predictions that these theories make about the prerequisites to mastery of the imperfective category in children and we summarize the most relevant previous findings on children’s understanding of imperfectives and progressives. We conclude that previous studies have not tested the situations that constitute the core of the Imperfective Paradox, i.e., situations in which an imperfective predicate refers to a past, permanently incomplete event.

2.1. Theories of the imperfective

As explained in Section 1, the Imperfective Paradox arises from the fact that imperfective predicates can refer to incomplete events. It encompasses two closely related questions regarding the mapping between a linguistic form (an imperfective predicate) and a meaning (an incomplete event). The completion entailment problem requires that a theory of the imperfective explain how the imperfective form of a telic predicate can be used to label an event that failed to reach its endpoint. The event-projection problem requires that a theory of the imperfective explain how an incomplete event can be identified as an event of the type described by a telic predicate. The two main classes of approaches to the semantics of the imperfective differ with respect to which of the two questions above is taken to be more fundamental. ‘Perspective-based’ approaches focus on the form-to-meaning mapping and aim to pro-

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1 In our discussion of semantic theories of the imperfective we focus on situations in which the imperfective is used to describe a part of a full event, either because the event is in progress or because the event failed to reach its endpoint, and we leave aside the habitual, generic or iterative readings of the imperfective (see Binnick, 1991; Comrie, 1976; Isaenko, 1968; Timberlake, 1985 for discussion of these readings). These additional uses of the imperfective are likely also related to the fact that imperfective predicates lack completion entailments, but do not lead to the Imperfective Paradox. For ease of exposition in this paper we treat the English progressive and the Russian imperfective as freely interchangeable. However, it is clear that there are important differences between imperfectives and progressives, although they lie beyond the scope of this study (cf., Klein, 1995; Filip, 1997, 2000; Zucchi, 1999).
vide an account of why imperfective predicates lack completion entailments. Conversely, ‘event-based’ approaches focus on the meaning-to-form mapping and aim to explain the mechanism that makes it possible to label an incomplete event with a telic predicate.

The perspective-based approach is well represented in the syntactic and typological literature and treats tense and aspect as spatio-temporal predicates (Borik, 2002; Comrie, 1976; Demirdache & Uribe-Etxebarria, 1997, 2000, 2005; Kamp & Reyle, 1993; Klein, 1994, 1995; Reichenbach, 1947; Smith, 1991). This approach derives the lack of completion entailments with the imperfective by capitalizing on the intuition that the imperfective takes an ‘insider viewpoint’ on an event. The idea is formalized by positing that the imperfective selectively focuses on a narrow temporal interval or ‘perspective’ that falls inside the event and excludes its endpoints from view. As a consequence, the imperfective makes no assertion about whether the event was completed. In sentences with overt temporal modifiers the perspective coincides with the interval defined by the temporal modifier in the sentence; in the absence of an explicit temporal modifier the perspective is set to some other contextually salient interval.2 Applying this analysis to (2a), the interval defined by the when-clause provides an insider perspective on the house-building event and consequently (2a) is understood as referring to a situation in which a house-building event was ongoing throughout the phone conversation. Since the sentence makes no assertion about what happened beyond the interval defined by the while-clause, there is no entailment that the house-building event led to a complete house. Hence, the notion that the imperfective conveys an ‘insider perspective’ accounts for the suspension of completion entailments. However, the notion of an insider perspective on an event leaves the event-projection problem unanswered: it remains unclear under this approach how a subpart of a telic event qualifies as an instance of that event. For this reason, perspective-based approaches have often been considered to not provide a full solution to the Imperfective Paradox.

In contrast, the event-projection problem is taken as the core of the Imperfective Paradox in event-based approaches to the imperfective, which are well represented in the formal semantic and philosophical literature (e.g., Bach, 1986; Dowty, 1979; Parsons, 1990; Landman, 1992). The primary aim of these approaches is to capture the meaning-to-form mapping that links incomplete events to imperfective predicates, and the solution to this mapping problem is taken to yield a solution to the form-to-meaning mapping problem (the completion entailment problem) as a direct consequence. The idea is that if one knows how and why an incomplete event can be labeled using a telic predicate, then this automatically explains why the imperfective lacks completion entailments. Consequently, the traditional notion of ‘perspective’ has typically played no role in event-based accounts of the Imperfective Paradox.

The most well-known example of the event-based approach is the intensional theory of the progressive (e.g., Bennett & Partee, 1972; Dowty, 1979; Landman, 1992). In

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2 The reader is referred to Demirdache and Uribe-Etxebarria (1997, 2000, 2005) for a detailed explanation of the relation between the aspectual perspective and a discourse-salient interval, e.g., the interval selected by a temporal modifier.
this account every telic predicate, whether perfective or imperfective, must be associated with a complete event at some level. However, in the case of the imperfective the complete event need not reach completion in the actual world. Instead, the semantics of the progressive can be satisfied if only a (sufficiently long) subpart of the complete event occurs in the actual world and the remainder of the event can be found by projecting a normal continuation of that event into a non-actual world. In Dowty’s terms, for example, the progressive/imperfective morpheme serves as an operator that relates an incomplete event in the actual world to a complete version of that event in an inertia world, a possible world that coincides with the real world until a point that immediately precedes the event interruption, and develops in a normal and expected fashion thereafter, as the real world would have developed if the event had not been interrupted. In order to project an inertia world, the speaker may draw upon his knowledge of the agent’s intentions or upon his own hypothesis of what the natural outcome of the event should be or should have been. In (3), for example, the bare uninflected predicate cross the street is taken to always denote a successful street-crossing event, and the progressive form of the predicate is licensed because the speaker recognizes that John would have successfully reached the opposite side of the street if it were not for the unfortunate arrival of the truck. Note, therefore, that under this account the progressive or imperfective of a telic predicate may refer to an event in the past that never reached completion (i.e., a counterfactual event) uniquely by virtue of an inertia world where the event did reach completion.

(3) John was crossing the street when he was hit by a truck.

There is an extensional variant of the event-based approach, most clearly represented by Parsons (1990), that captures the meaning-to-form mapping in a more direct fashion. Whereas the intensional theory posits that the denotation of a telic predicate is always a complete event, the extensional account takes the denotation of a bare predicate to include both complete and incomplete events, such that a bare verb such as cross “is true of all crossings independently of whether they culminate” (Parsons, 1990, p. 170). Hence, a permanently incomplete event of street-crossing, as in (3), can be directly classified as an instance of street-crossing, without any need to consider how it might have continued. The Imperfective Paradox is thus circumvented, but only at a price: the theory appears to require a listing of all possible incomplete events in the denotation of a predicate. For example, the denotation of the predicate was driving to Boston must include the event described in (1b) in which Mary only made it as far as New York City.

Summarizing the different approaches to the Imperfective Paradox, event-based approaches share the primary goal of answering the event-projection problem, i.e., how an incomplete event can be labeled with an imperfective predicate. Since the solution to this problem makes direct reference to incomplete events, this also explains why imperfective predicates lack completion entailments. In so doing, the event-based approaches effectively eliminate any role for temporal modifiers and temporal perspectives in accounting for the missing completion entailments. This places them in sharp contrast with the perspective-based approach, which derives the
lack of completion entailments from the special perspective introduced by an imper-
fective predicate, yet leaves the event-projection problem unanswered. The fact that
event-based approaches offer an answer to the event-projection problem would
appear to confer on them a decisive advantage over the perspective-based approach,
unless this came at the price of failing to capture speakers’ intuitions about the spe-
cial ‘insider’ perspective conveyed by the imperfective.

2.2. Development of imperfectives and progressives in children

We next discuss the emergence of the imperfective in language development, with
a specific emphasis on the issue of completion entailments. This discussion lays the
groundwork for a series of experiments that investigate whether young children can
tackle the Imperfective Paradox and also provide developmental evidence for evalu-
ating semantic theories of the imperfective.

We start with predictions that different theories could make about where children
might encounter difficulty in interpreting imperfectives. Perspective-based
approaches stress the importance of appropriately locating a temporal perspective on
an event in accounting for the absence of completion entailments with the imperfec-
tive. Under these approaches we may suppose that children’s success in using the
imperfective with an incomplete event should depend on their ability to choose an
appropriate perspective from which to evaluate the event. For example, we may
assume that cases like (2a) in which the perspective on the event is provided by an
explicit temporal modifier—the while-clause—should be easier for the child to inter-
pret appropriately, since the child does not need to choose the perspective for himself.
Under event-based approaches, on the other hand, children’s ability to relate imper-
fectives to incomplete events should not be affected by the presence or absence of a
temporal modifier phrase that provides an explicit insider perspective on the event.
This is because such theories derive the lack of completion entailments from their
solution to the event-projection problem and do not rely upon the notion of a tempo-
ral perspective. Instead, event-based approaches might predict that children should
encounter difficulty if they cannot successfully recognize that an unfinished or partial
event is an instance of the relevant complete event-type. Under intensional
approaches, difficulty may arise if children have difficulty in computing plausible
continuations of events. This difficulty is especially likely in situations where the com-
pletion of the event is counterfactual. Under extensional approaches, difficulty may
arise if the child fails to recognize an incomplete event as belonging to the denotation
of the corresponding predicate.

In what follows we test these predictions by investigating Russian children’s com-
prehension of past perfective and imperfective predicates, focusing on their ability to
relate imperfective aspect to permanently incomplete past events. There are two main
advantages of choosing Russian for this study. First, Russian has a highly salient
aspectual paradigm. The vast majority of past tense verbs carry unambiguous perfec-
tive or imperfective aspect marking, using prefixation, suffixation or a stem change,
and this marking is morphologically independent of the past tense suffix -l. Both past
aspectual forms are synthetic, as in the imperfective form stroil ‘was building’ and
the perfective form *postrostil*P ‘built’. 3 As in other languages, past perfective forms entail the completion of the event described by the predicate, whereas the completion entailment is absent with imperfective forms. The second advantage of using Russian is that previous naturalistic production studies with Russian-speaking children have shown that at least the surface forms of the two aspectual categories are mastered at a young age, in some reports as early as age 2 years (Bar-Shalom, 2002; Bar-Shalom & Snyder, 2002; Gvozdev, 1961). These studies also suggest that even the youngest Russian-speaking children successfully use present imperfective predicates to describe ongoing events that develop in the here-and-now. This implies that young children have at least some ability to relate imperfective predicates to events that have not yet reached completion.

In the one previous experimental study of Russian children’s understanding of imperfectives Vinnitskaya and Wexler (2001) presented a sentence-to-picture matching experiment that investigated the comprehension of aspect by 3- to 6-year-old children. In each trial the child heard either a perfective (4a) or an imperfective (4b) sentence and had to match it to one of three pictures. One picture depicted the result state of a completed event (e.g., a smiling girl sitting next to a closed book); another showed the same event in progress (e.g., a girl reading a book); the remaining picture depicted an unrelated action.

(4) a. Devochka prochitalaP knigu.  
   girl read.Past.Perf book  
   *The girl read the book (completely).*

b. Devochka chitalaI knigu.  
   girl read.Past.Imp book  
   *The girl was reading the book.*

Children of all ages showed a strong preference to select the picture showing a completed action on perfective trials and the in-progress picture on imperfective trials, replicating a finding from an earlier similar study with English and Polish children by Weist et al. (1991). These results provide good evidence that children can associate imperfective predicates with events that are in progress. However, the picture-matching task makes it difficult to specifically test children’s understanding of the completion entailments of the imperfective, which requires testing children’s ability to associate the imperfective with counterfactual events, i.e., past events that are permanently incomplete. It is very difficult to unambiguously depict such an event in a static picture, since the event in the picture could be mistaken for a non-counterfactual event that is ongoing and that will reach completion at some later time.

Thus, in order to know whether children are willing to associate an imperfective predicate with an event that failed to reach completion one needs to use experimental designs that can provide events that are unambiguously past and permanently incomplete. Such a design was described in Wagner (2001) and used in a study by van der Feest and van Hout (2002) on the comprehension of tense and aspectual distinctions by Dutch-speaking adults and 3- to 4-year-old children. The participant watched an act-out story in which a puppet took a walk along a road with three landmarks and had an opportunity to perform the same action (e.g., doing a puzzle) at

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3 In what follows the superscript ‘I’ marks imperfective aspect and ‘P’ marks perfective aspect.
each of the locations. The puppet always performed the action halfway at the first location and completely at the second location. While the puppet was still engaged in the event at the final location the experimenter asked a question about one of the events using predicates from various tense-aspect categories, i.e. simple present, simple past or present perfect. Among those categories the Dutch simple past is of most interest to us, since traditionally it has been claimed to lack completion entailments. However, contrary to the traditional view, in this experiment the adult control participants accepted simple past queries with past complete events but not with past incomplete events, suggesting that at least in the scenarios provided in this study the simple past did have a strong completion entailment. (The Dutch adults’ judgments are further discussed in Section 3.3 below.) Hence, due to the adult speakers’ rejection of the simple past with incomplete events, the study is somewhat less relevant to the question of what children know about categories that exhibit the Imperfective Paradox. Nevertheless, the study is important in another respect, as it showed that 3- to 4-year-old children had no problem accepting the simple present with present ongoing events that develop in front of the child in the here-and-now. This observation, also made by Delidaki and Varlokosta (2003) for Greek-speaking children, will become important when we consider the results of our own studies in Section 3.1.4.

Summarizing, previous results indicate that young children have some knowledge of the semantic properties of imperfectives or progressives, but these findings do not provide a clear indication of what children understand about the completion entailments of these categories. Our series of four experiments on the comprehension of aspect in 3- to 6-year-old Russian-speaking children was specifically designed to fill this gap. In order to establish whether the children are aware of the lack of completion entailments in the imperfective, we tested them in situations where the imperfective refers to a past incomplete event, as van der Feest and van Hout (2002) had done in their study. In so doing, we also tested the developmental predictions of the perspective-based and event-based theories of the imperfective. Our experiments differed from one another in two main respects. First, we manipulated the presence or absence of an explicit temporal modifier phrase, which under the perspective-based approach might be expected to provide an important guide to children in selecting an appropriate perspective on an event. Experiments 1 and 2 tested mono-clausal sentences without an overt temporal modifier such as (2b). In contrast, Experiments 3 and 4 used sentences that included an overt temporal modifier clause such as (2a) that explicitly signaled an insider perspective on the event described by the imperfective. The second point of variation across experiments concerned the counterfactuality of the event described by the imperfective, i.e., whether the event ultimately reached completion. From the perspective of intensional theories of the imperfective, the status of the event as counterfactual or otherwise may be an important factor in children’s performance, since it determines whether or not children must project beyond the actual world in order to find a complete version of the event in question. In Experiments 1, 2 and 4 the imperfective referred to a counterfactual event, whereas in Experiment 3 the event was non-counterfactual.

In Section 3 we present the four experiments with Russian-speaking children. Anticipating our main findings, the results from Experiments 1 and 2 suggest that
Russian-speaking children incorrectly ascribe completion entailments to imperfectives. However, Experiments 3 and 4 indicate that the children’s problem rather concerns their inability to find a suitable temporal interval against which to evaluate imperfective statements. The relevance of these results for the theories of the imperfective will be discussed in Section 4.

3. Experiments with Russian-speaking children

3.1. Experiment 1: Creation predicates

3.1.1. Experiment 1: Rationale
The aim of Experiment 1 was to test Russian-speaking children’s knowledge of completion entailments with imperfective and perfective predicates in sentences such as (5) and (6). Most critically we wanted to know whether children are aware of the lack of completion entailments with the imperfective in (6). We explored this question by investigating children’s ability to associate a simple imperfective sentence with a past event that failed to reach completion.

(5) Gde obezijanka sobrala\(^\text{p}\) gnomika? perfective
where monkey assemble.Past.Perf smurf

Where did the monkey build a smurf?

(6) Gde obezijanka sobiral\(^\text{l}\) gnomika? imperfective
where monkey assemble.Past.Imp smurf

Where was the monkey building a smurf?

If a child has an adultlike understanding of the completion entailments of perfective and imperfective aspects, he should accept the perfective (5) only with a complete smurf-building event, but should accept the imperfective (6) both with complete and incomplete events.

3.1.2. Experiment 1: Design and methods
Twenty-five children aged 3–6 years (mean age 4;10, range 2;10–6;9) from Moscow participated in the experiment. All children were raised in monolingual Russian-speaking households. Written consent was obtained from a parent or guardian for all participants. Each child was tested individually in a quiet room. Following a warm-up story, each child saw a total of four experimental stories interspersed with filler stories, presented in one or two sessions of 15–25 min each. Stories were acted out by one experimenter, who also tape-recorded children’s responses.

Experiment 1 was a modified Truth-Value Judgment task (Crain & McKee, 1985; Crain & Thornton, 1998; Gordon, 1996) in which stories that contained complete and incomplete creation events were acted out in front of the child, which made it possible to have events that were clearly in the past and permanently incomplete. Creation predicates were chosen since they made it possible to act out clearly distinct
complete and incomplete versions of the same event (see Appendix 1 for a full list of the predicates used and a sample story). The tested predicate was never used by the experimenter in telling the story in Experiment 1 or in any subsequent experiments. The completion of a creation event is defined by the status of the direct object, which fully comes into existence only as the event reaches its culmination. For example, in a smurf-building event a complete smurf is an automatic product of the completed event, whereas a half-built smurf (or any other amount of smurf) indicates that the event took place, but failed to reach completion.

Each story followed the same pattern, adapted from Wagner (2001). In the story, a toy animal went down a road with three landmarks: a flowerbed, a castle and a tree. A given action, that could be performed to completion at each location, was performed completely at one location only, incompletely at one other location, and not at all at a third location. For example, in the smurf-building story the main character is a monkey who encounters pieces of a smurf at each of the three locations (Fig. 1a). He builds a smurf completely at the flowerbed (‘the complete location’); at the castle he starts building a smurf, but is interrupted and therefore leaves the smurf half-finished (‘the incomplete location’); finally, at the tree he notices the smurf pieces but ultimately does not do anything with them (‘the null location’). At the incomplete location, the reason why the main event did not reach completion was always an interruption: the agent was distracted from the main event and could not finish it because of an intervening event, e.g., a bug stinging the monkey. The order of main event types (complete, incomplete, null) was randomized across stories and across children. The interrupting event took place twice per story, always at the incomplete location, and at either the complete or the null location, with an equal probability across trials. This made it possible to control for the child’s ability to hold multiple occurrences of the same event in memory (see below). Furthermore, the two occurrences of the interrupting event made it possible to avoid a one-to-one correspon-

4 Interruptions were chosen over scenarios in which the agent simply failed to complete the event, as this reduced the number of possible ways of describing the event and made the use of imperfectives more natural for adult Russian speakers. We thank Sergey Avrutin for useful discussion on this issue.
dence between interruptions and incomplete main events. The scene at the end of the
story (Fig. 1b) provided the child with visual cues to what had happened in the story:
the child could determine where the smurf-building event had happened (in)completely
by finding a landmark with an (in)complete smurf in the final scene.

After each story the experimenter asked the child a series of questions. This always
included both perfective (5) and imperfective (6) where-questions about the main
event, separated by a control question (7) about the interrupting event. The order of
the perfective and imperfective questions was randomized.

\[(7)\] Gde obezjyanku ukusil\(^\text{9}\) zhuk? control
   Where was the monkey stung by a bug?

In order to provide an adultlike answer to the imperfective question in (6) or to the
control question (7) a child needed to mention exactly two locations: the complete and
the incomplete location for (6) and the locations of the two interruptions for (7).\(^5\)
Therefore, in order to maximize the chance that children would name multiple loca-
tions in their answers, all where-questions were accompanied by a follow-up question
that asked whether the event happened anywhere else. These questions always pre-
served the verb morphology used in the where-question, e.g., the imperfective (6) was
followed by A gde-nibud’ esh’e obezjyanka sobirala’gnomika? ‘Was the monkey build-
ing a smurf anywhere else?’. To be considered adultlike on either imperfective ques-
tions or controls, a child had to cumulatively name exactly two appropriate locations
in response to the where-question and the following anywhere-else question. We con-
sidered the child’s representation of the perfective to be adultlike only if he named the
complete location in response to (5) and responded negatively to the following any-
where-else question. Children received no feedback on their replies.

In order to gain a better understanding of the child’s rationale for accepting or
rejecting each type of sentence with a complete or an incomplete event, at the end of
each trial we asked the child to judge additional statements about the story uttered
by a puppet who had watched the story with the child. The puppet made statements
about the events and locations in the story using perfective and imperfective verbs,
such as (8).

\[(8)\] Okolo zamka obezjanka sobirala\(^1\) gnomika.
   near castle monkey assemble.Past.Imp smurf
   At the castle the monkey was building a smurf.

The explanations that the child gave when correcting the puppet were useful for
clarifying the child’s reasoning and for reinforcing the results based on answers to the
where-questions. The truth-value judgment task results also enable a more straight-

\(^5\) This was the main reason for including a third, null location in the design. This location made a
response that included two locations to be non-trivial and felicitous.
forward comparison of the results from Experiment 1 with subsequent experiments (especially Experiments 3 and 4 which did not use *where*-questions).

### 3.1.3. Experiment 1: Results

In light of the fact that multiple questions were asked after each story, we performed two types of analysis: a conventional analysis that was based exclusively on responses to the first query in each trial and an additional analysis that combined the answers to different queries of the trial. There was no effect of the order of the perfective and imperfective questions (5)–(6), nor were there any reliable differences between the results derived from the first query alone and the results derived from answers to all questions. Therefore, in what follows we report results that are based on the answers to all questions asked on each trial.

A control group of 10 Russian-speaking adults who were tested on the same stories as the children showed the predicted results. They always chose only the complete location in response to perfective queries, and chose both the complete and incomplete locations in response to imperfective queries. Since a fair assessment of children’s understanding of the imperfective required the ability to name two locations as an answer, we only included in the analyses those trials in which the child successfully answered the control question by mentioning both locations where the interrupting event occurred. In this experiment children showed 100% success on the controls, and consequently no trials were excluded from the analysis. The overall results based on all queries from each story are summarized in Table 1 and show a clear contrast in the performance on perfective and imperfective queries (95% vs. 39% correct, Fisher Exact test, two-tailed, \( p < .001 \)). Importantly, an overwhelming majority of incorrect responses to imperfective queries were due to the same error, namely the child’s failure to associate the imperfective with an incomplete event. This error was observed both as a failure to name the incomplete location in response to the imperfective question (6) and the following *anywhere-else* question, and as rejection of the puppet’s imperfective statement about the incomplete location in the truth-value judgment phase of the trial.\(^6\)

Next we classified the results shown in Table 1 on a trial-by-trial basis, according to the response pattern to the perfective and imperfective queries within each trial (Table 2). Notably, all trials from all children fell into the three categories shown in

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\(^6\) In a small number of imperfective trials (2/94) children answered by saying that the event in question happened ‘halfway’. Although this answer is somewhat felicitous when presented in the English simple past tense or the Russian perfective, it strikes adult Russian speakers as distinctly odd when presented in the imperfective, since it suggests a completion requirement that the imperfective lacks.

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**Table 1**

<table>
<thead>
<tr>
<th>Query</th>
<th>% correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfective</td>
<td>95% (89/94)</td>
</tr>
<tr>
<td>Imperfective</td>
<td>39% (37/94)</td>
</tr>
</tbody>
</table>
Table 2, two of which accounted for most of the data. In 32% of trials children gave completely adultlike responses on all parts of the trial. In another 61% of trials children failed to associate the imperfective with an incomplete event, but were adultlike in all other respects, i.e., they correctly accepted both aspects with the complete event and rejected the perfective with the incomplete event. Only 7% (7/94) of trials did not fit either of these patterns. In 5 of those trials the child incorrectly accepted the perfective with an incomplete event; in 2 trials the child’s replies to the where-questions contradicted his truth-value judgments.

Table 2 shows that there were roughly twice as many trials on which the imperfective was incorrectly rejected with incomplete events than there were trials on which the children gave adultlike responses to all queries. The analysis of within-subject performance suggests, however, that such a distribution was not due to inconsistent within-subject performance. Rather, there were 8 children who gave an adultlike answer to all queries in all or all but one of their four trials. These children accounted for 80% (24/30) of the total number of target-like trials (adultlike group). Meanwhile, there were 15 children who consistently rejected the imperfective with an incomplete event in all or all but one of their trials. These children accounted for 88% (50/57) of the rejections of the imperfective (non-adultlike group). The remaining 2/25 children could not be classified in either group: one child gave mutually incompatible responses to the where-questions and the truth-value judgment statements in 3 of his 4 trials; the other was the only child who gave equal numbers of adultlike and non-adultlike responses to imperfective queries. The bimodal distribution of responses to imperfective questions across children was confirmed by the significance of a Shapiro–Wilk test ($W = .706, p < .001$) suggesting divergence from a normal distribution. The average age of the Non-adultlike group was numerically lower than that of the Adultlike group (4;8 vs. 5;2), although this difference was statistically non-significant (Mann–Whitney test, 1-tailed, $U = 40.5, p = .10$), due to the presence of a single age-outlier in each of the two groups. When the oldest and youngest child was excluded from each group, the age difference between the groups became marginally significant (Mann–Whitney test, 1-tailed, $U = 40.5, p < .06$).

### 3.1.4. Experiment 1: Discussion

In Experiment 1 Russian-speaking children demonstrated adultlike comprehension of perfective predicates by accepting them only with completed events. However, many children had problems with imperfectives, as witnessed by their failure to associate the imperfective with incomplete events. Children’s problem with the imperfective cannot be attributed to a failure to hold multiple locations in memory in light of their excellent performance on control questions that required naming two locations where the interrupting event took place.
A possible reason for children’s error in Experiment 1 may have been the use of creation verbs. Creation events are special in the respect that the object of a creation predicate does not come into existence until the event is completed. This property of creation verbs is valuable for designing scenarios that clearly contrast complete and incomplete events, but it may also have incurred a cost. Children’s unwillingness to accept the imperfective with incomplete events in Experiment 1 could be due to the lack of the object in the scene, i.e. the child might reject ‘He was building a smurf’ if there was no (complete) smurf in the scene. This approach to children’s failure is particularly plausible from the perspective of the extensional theory of the progressive (Parsons, 1990), in which creation verbs call for a special notion of ‘extended object’ that makes it possible to include incomplete objects in the set of denotations for a nominal. In the smurf-building story, for example, this approach might predict that children were unable to accept The monkey was building a smurf at the incomplete location, because they failed to extend the set of the possible referents of the NP a smurf to unfinished instances of smurfs, such as their bodies. The notion that the children’s difficulties are specifically related to creation verbs can be straightforwardly tested in a modification of Experiment 1 that uses a different class of verbs. Experiment 2 pursues this idea by using change-of-state predicates.

3.2. Experiment 2: Change-of-state predicates

3.2.1. Experiment 2: Rationale

The aim of Experiment 2 was to test Russian children’s ability to associate imperfective predicates with incomplete events using change-of-state verbs in settings that closely matched Experiment 1. If the sole reason for the rejection of the imperfective with incomplete events in Experiment 1 was the absence of the direct object of the creation event, we expect children to show improved performance on the imperfective in sentences such as (9) that involve change-of-state predicates, e.g., color in a flower, whose direct object exists regardless of the event completion.

Where did the cat color in / was the cat coloring in a flower?

3.2.2. Experiment 2: Design and methods

A new group of 41 Russian-speaking children aged between 2;6 and 6;7 (mean age 4;8) participated in Experiment 2. A full list of the change-of-state predicates used in this study is given in Appendix 1. The experimental design and the analysis procedure were identical to those in Experiment 1.

3.2.3. Experiment 2: Results

A control group of 10 adults always accepted perfective statements only with complete events and imperfective queries with both complete and incomplete events. Children correctly answered the control question about the location of the two inter-
rupting events in 96% (153/160) of trials. All subsequent analyses were based upon these trials. Children’s responses to perfective and imperfective queries are summarized in Table 3 and are very similar to the results of Experiment 1. Children showed clearly adultlike performance on perfective predicates and significantly worse performance on imperfective predicates (93% vs. 54% correct, Fisher Exact test, two-tailed, \( p < .001 \)). As in Experiment 1, most of the incorrect answers to imperfective queries were due to a failure to associate imperfective predicates with incomplete events. As in Experiment 1, there was no effect of the order in which the queries were presented after each trial.

Children’s responses to the where-questions and the corresponding truth-value judgments within each trial were highly consistent: all trials could be classified in the same few types as in Experiment 1 (Table 4). In 40% of trials children gave completely adultlike responses to both the perfective and the imperfective queries. In 48% of trials children failed to associate the imperfective with an incomplete event, but were adultlike in all other respects. Only 12% (18/153) of the trials did not conform to these two patterns. In 10 of those trials the child incorrectly accepted the perfective with an incomplete event, and in the remaining 8 trials the child’s replies to the where-questions were inconsistent with his truth-value judgments on the same trial.

Individual children were also consistent in their responses across trials, as in Experiment 1. The two most frequent response patterns showed a bimodal distribution across subjects, as supported by the results of a Shapiro–Wilk test of normality (\( W = .801, p < .001 \)). 16 children gave an adultlike answer to all queries in all or all but one of their four trials. These children accounted for 89% (50/56) of the total number of adultlike trials (adultlike group). 20 children consistently rejected the imperfective with an incomplete event in all or all but one of their trials. They accounted for 89% (63/71) of the instances where children failed to associate imperfectives with incomplete events (non-adultlike group). Only 5 of the 41 children could not be classified in either group: two children were at chance in their judgments of imperfectives; another two children accepted the perfective with an incomplete event in 2 of their 4 trials; the fifth child gave conflicting responses to the where-questions and truth-value judgment queries in 2 of 4 trials. The mean age of the children in the Non-adultlike

<table>
<thead>
<tr>
<th>Query</th>
<th>% correct</th>
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<tbody>
<tr>
<td>Perfective</td>
<td>93% (143/153)</td>
</tr>
<tr>
<td>Imperfective</td>
<td>54% (82/153)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trial type</th>
<th>% of trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adultlike imperfective responses; adultlike perfective responses</td>
<td>40% (61/153)</td>
</tr>
<tr>
<td>Rejected imperfective with incomplete events; adultlike perfective responses</td>
<td>48% (74/153)</td>
</tr>
<tr>
<td>Other</td>
<td>12% (18/153)</td>
</tr>
</tbody>
</table>
group was 13 months younger than the Adultlike group (4;2 vs. 5;3), a difference that was significant in a one-tailed Mann-Whitney test ($U = 65.0, p < .01$).

3.2.4. Experiment 2: Discussion

The results with change-of-state predicates in Experiment 2 were very similar to those with creation predicates in Experiment 1. Children showed a high level of accuracy in associating perfective predicates only with complete events. However, a substantial proportion of children, mostly younger ones, consistently failed to accept imperfectives with incomplete events. The findings about change-on-state predicates exclude the possibility that children’s failure with the imperfective is due to an idiosyncratic property of creation verbs, such as the lack of the direct object in the scene when the event is not completed.

Taken together, the results of Experiments 1 and 2 indicate that younger Russian-speaking children are not fully adultlike in their understanding of the imperfective. This confirms our suggestion that Vinnitskaya and Wexler’s picture-matching task may have overestimated Russian children’s mastery of the completion entailments in the imperfective. Children’s failure to associate imperfectives with past incomplete events has gone unnoticed in previous studies because they tested whether children could associate imperfectives with ongoing events which might still reach completion.

Next we relate the findings from Experiments 1 and 2 and from previous literature with the theories of the imperfective outlined in Section 2.1. If we accept the conclusion from previous studies that children readily associate imperfectives with present ongoing events (Delidaki & Varlokosta, 2003; van der Feest & van Hout, 2002), we are left with a contrast between children’s judgments of present ongoing events and their judgments of past incomplete events. In both instances children witness the same subpart of the event, but it is only with past incomplete events that children have difficulty accepting the imperfective. This calls for an account of the imperfective that treats a past incomplete event differently from an event in the present that is not-yet complete.

The contrast in children’s judgments of past incomplete and present ongoing events presents a challenge for the extensional theory of the progressive/imperfective (Parsons, 1990), which claims that imperfectives refer only to events in the actual world, and therefore assumes that the denotation of imperfective predicates includes partial events. This account implies that a partial event should be compatible with an imperfective predicate, irrespective of whether it occurs in the past or present.

On the other hand, both the perspective-based approach and the intensional version of the event-based approach to the imperfective have the tools needed to capture the contrast between children’s judgments of present ongoing events and past incomplete events. Recall that the perspective-based approach claims that imperfectives involve an ‘insider’ perspective on an event, and that this perspective makes the semantics of the imperfective blind to the outcome of the event. Therefore, under the perspective-based approach the contrast in children’s judgments may reflect the relative difficulty of adopting the perspective needed to evaluate an
imperfective statement. For present ongoing events the child’s own ‘here-and-now’ perspective is sufficient to provide an insider perspective on the event. For past incomplete events, on the other hand, a shift in perspective is required in order to obtain a suitable perspective. This perspective shift may be the source of children’s difficulty with past tense imperfectives. Meanwhile, under the intensional approach to the imperfective it is claimed that imperfectives always refer to complete events, but that the complete events may lie outside the actual world, in speakers’ projections of how an event could have continued. This approach also lends itself to an account of children’s contrasting judgments. Past incomplete events are counterfactual, and therefore in order to associate an imperfective predicate with a past incomplete event a child must find a complete version of the incomplete event by considering an outcome that contradicts what happened in the actual world. Present ongoing events also require the child to project beyond what already happened in the actual world, but do not require the child to entertain continuations that are counterfactual. It is possible that children may experience greater difficulty in making counterfactual projections of partial events. In Experiments 3 and 4 we test the predictions of these two approaches, in order to determine whether the children’s difficulty with the imperfective is rooted in counterfactuality or in perspective shifting.

Before proceeding, we also consider some additional potential sources of children’s difficulty in associating imperfectives with incomplete events. First, it is possible that children who showed non-adultlike performance simply failed to draw any semantic distinction between perfective and imperfective forms and took both forms to have the semantics of perfective aspect. Although there is nothing in the results of Experiments 1 or 2 that can exclude this possibility, this issue is directly addressed in Experiment 3. Second, we should consider the possibility that the children who failed to associate past incomplete events with imperfectives might have done so because they were unable to understand or remember the agent’s unfulfilled intention, a factor that is particularly important for licensing the imperfective under intensional approaches. In these approaches the imperfective is licensed by considering plausible counterfactual continuations of the event, and the agent’s intention plays a critical role in determining what could have been a normal, expected continuation of the real world should the event have continued in an uninterrupted fashion. That children may have difficulty understanding the agent’s unrealized intention is plausible, given that many of the children in our sample are at an age where they may still experience difficulties in tasks that require reasoning about beliefs that differ from their own (Birch & Bloom, 2004; Piaget, 1930; Wimmer & Perner, 1983). However, the explanations that children gave in response to the truth-value judgment queries in Experiments 1 and 2 suggested that their errors were not due to misunderstanding of the agent’s intentions. In fact, their answers to the questions indicated no difficulty in recalling the plot of the story, and some children used the agent’s unfulfilled intentions to justify their non-adultlike answers to imperfective queries (e.g., ‘Tiger wanted to turn it (the picture) over, but it started raining.’). This suggests that they remembered perfectly the original intention of the agent. Thus, we contend that the children’s errors in Experiments 1
and 2 are unlikely to be the result of a general failure to understand and remember others as intentional agents.\footnote{It should be noted that children who understand the beliefs and desires of others may nevertheless be subject to what has been called the ‘curse of knowledge’, a tendency to be biased by one’s own knowledge of the outcome, such that an ‘outcome-naive’ viewpoint can no longer be adopted (Birch & Bloom, 2003, 2004). Although we have shown evidence that children had a general awareness of the agent’s unfulfilled intention in the incomplete events, this does not prove that the children were able to use the agent’s counterfactual intention for the specific task of licensing the imperfective with incomplete events.}

Experiments 3 and 4 were designed to provide a more precise assessment of the nature of children’s semantics for the imperfective and to establish the reason for the problem uncovered in Experiments 1 and 2. The new pair of experiments focus on the role of counterfactuality and perspective shifting, two factors that are critical for representing the semantics of the imperfective in different theories.

### 3.3. Experiment 3: Non-counterfactual event with explicit temporal modifier

#### 3.3.1. Experiment 3: Rationale

In Experiments 1 and 2 children failed to associate simple imperfective sentences with past events that were permanently incomplete. In Experiment 3 we tested whether children are able to associate the imperfective with a subpart of an event, i.e., a portion of a larger past event that reached completion in the actual world. Similarly to Experiments 1 and 2, the focus of Experiment 3 was to explore children’s understanding of the imperfective with incomplete events. However, Experiment 3 differed from its predecessors in two respects: the event that the imperfective referred to was non-counterfactual, and there was an overt temporal modifier clause that explicitly signaled an insider perspective on the event.

#### 3.3.2. Experiment 3: Design and methods

Experiment 3 was a truth-value judgment task in which children judged imperfective sentences such as (10) and their perfective counterparts (11). These sentences contained a \textit{while}-clause that provided an explicit temporal interval for evaluation of the main clause predicate. All sentences were tested against the situation diagrammed in Fig. 2.

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![Fig. 2. Schematic view of the scenario tested in Experiment 3. The main table-cleaning event reaches completion outside the interval specified by the temporal modifier. A full rectangular bar denotes a complete event; an arrow denotes an event in progress.](image)
The diagram in Fig. 2 schematizes a situation in which a boy starts watering some flowers and shortly thereafter a girl starts cleaning a table. After a while, the boy finishes watering the flowers and starts riding his bike. While he is riding the bike, the girl successfully finishes cleaning the table. In order to evaluate the truth of (10) or (11) against this situation, the speaker must determine whether the proposition expressed by the main clause holds at the interval delimited by the temporal modifier, i.e., the while-interval marked by vertical lines in the diagram. For an adult speaker of Russian (10) is true because the truth conditions of the imperfective main clause are satisfied during the evaluation interval: informally, there was a table-cleaning event that was ongoing during the interval delimited by the flower-watering event. On the other hand, (11) is false, since the truth conditions of the perfective predicate 'the girl cleaned (all of) the table' are not satisfied during the interval specified by the temporal modifier: the table was not cleaned completely while the boy was watering the flowers. Importantly, it is precisely because speakers evaluate the main clause perfective predicate at the interval defined by the while-clause that (11) is false; the proposition expressed by the main clause is true at a larger interval that includes the entire table-cleaning event.

Experiment 3 incorporates two crucial modifications to the scenarios tested in Experiments 1 and 2. First, the imperfective describes a subpart of a past event that is delimited by the while-clause and subsequently develops into a complete event. This event is therefore non-counterfactual. According to the intensional approach to the imperfective, the non-counterfactuality of the event may help the child in licensing the imperfective, since it makes it possible to find a full version of the event in the actual world, and does not require the child to consider counterfactual continuations of the event. In this respect, the imperfective in (10) may be regarded as a past tense parallel to a present tense imperfective predicate used with a present ongoing event, since both cases involve incomplete yet non-counterfactual events. Second, the while-clause explicitly highlights an interval that provides an ‘insider’ perspective on the event. This modification may lead children to give more adult-like judgments if their problems in Experiments 1 and 2 were due to difficulty in adopting an appropriate perspective on the event. We introduced both of these changes into Experiment 3 in order to find out whether it is possible to elicit adult-like judgments on imperfectives from the younger Russian children who failed in Experiments 1 and 2. It was understood that if these changes proved to be successful, it would be necessary to conduct additional studies in order to determine the specific source of the children’s difficulty.
Participants in Experiment 3 were 34 children aged 3–6 years (mean age 4;7; range 3;2–6;9) from the Moscow metropolitan area. Since we were interested in comparing performance in Experiment 3 with Experiments 1 and 2, all of the children in this study were pre-tested on either Experiment 1 or Experiment 2 (one week or less prior to Experiment 3). Experiment 3 used a truth-value judgment task that was conducted in one or two individual sessions of 15–25 min each, for a total of four experimental stories per child. Each session started with a warm-up story, and a filler story followed every two experimental stories. The child and a puppet watched stories acted out with small props following the schema in Fig. 2. A detailed sample story and a full list of experimental materials is given in Appendix 2. After each story the child judged three statements made by the puppet. Two of the statements were sentences such as (10) and (11) that probed the child’s understanding of perfective and imperfective aspect. The order of these statements was counter-balanced and they were always separated by a control query that was not directly related to the experimental hypothesis and served as a measure of whether the child had paid attention to the story.

3.3.3. Experiment 3: Results

Four children who incorrectly answered the control question on 2 or more of their 4 trials were excluded from the analyses. For the remaining 30 children, only trials in which a child correctly responded to the control query were included in the further analyses (114/120). Table 5 summarizes the responses to the first query in each trial. As Table 5 shows, the results of Experiment 3 stand in clear contrast to the overall results of Experiments 1 and 2 from Tables 1 and 3. In Experiment 3 children correctly rejected the perfective statement (11) in 89% of trials and correctly accepted the imperfective statement (10) in 91% of trials, thereby demonstrating that they did not treat perfective and imperfective forms as equivalent and successfully distinguished the two aspectual forms. The difference in the proportion of ‘no’ responses across conditions was highly reliable (Fisher Exact test, two-tailed, \( p < .001 \)).

The conclusion drawn based on Table 5 is reinforced by the fact that in all cases where children rejected the perfective sentence they appropriately explained their rejection. Furthermore, if we look at the children’s responses to both experimental questions in each trial, we find that in 80% (91/114) of cases the child correctly switched his response from ‘yes’ to the imperfective statement to ‘no’ to the perfective statement (or vice versa) within the same trial, thereby providing further reinforcement of the conclusions drawn from responses to the first query in each trial.

Table 5

<table>
<thead>
<tr>
<th>Query</th>
<th>% correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfective</td>
<td>91% (53/58)</td>
</tr>
<tr>
<td>Imperfective</td>
<td>89% (50/56)</td>
</tr>
</tbody>
</table>

The results are based on the first query in each trial. The correct response was ‘No’ for the perfective queries and ‘Yes’ for the imperfective queries.
Since all participants in Experiment 3 also took part in either Experiment 1 or Experiment 2, it was possible to conduct a within-subjects analysis comparing responses to simple imperfective statements from Experiments 1 or 2 with responses to the bi-clausal structures in Experiment 3. Fig. 3 groups the participants in Experiment 3 according to their performance in Experiments 1 or 2. Most importantly, the group of 12 children who were classified as non-adultlike based on their responses in Experiments 1 or 2, where they successfully matched imperfectives to incomplete events in only 11% of trials, improved to 78% accuracy on the imperfectives in Experiment 3. The difference in performance was significant on a Wilcoxon signed ranks test ($Z = -3.1$, $p < .01$). Also, the two subgroups of children who were classified as adultlike or as non-adultlike in Experiments 1 and 2 showed no difference in their accuracy in Experiment 3 (Fisher Exact test, 2-tailed, $p = .43$).

To summarize, in Experiment 3 children correctly rejected the perfective with incomplete events, repeating their success from Experiments 1 and 2. Importantly, in Experiment 3 most children also showed a high success rate in associating imperfective predicates with incomplete events regardless of whether they had previously succeeded or failed in Experiments 1 and 2.

### 3.3.4. Experiment 3: Discussion

Experiment 3 tested children on imperfective statements that referred to a subpart of a past event that reached completion. All children, including those who fell into the non-adultlike group in Experiments 1 and 2, correctly accepted imperfective statements and rejected perfective statements in this study.

The results of Experiment 3 are important in several respects. First, the overwhelming rejection of perfective sentences like (11) in the situation schematized in Fig. 2 shows that children used the correct temporal interval for evaluation of the main clause, i.e., they used the interval defined by the while-clause. If the children had not evaluated the main clause using this interval, they would have incorrectly accepted (11) as true, since the event ultimately reaches completion and thus could be described using a perfective predicate. Children’s acceptance of imperfective sentences like (10) therefore indicates that they are able to associate imperfectives with
incomplete events, since in the scenario in Fig. 2 the main event was not completed during the interval described by the while-clause. Second, the results of Experiments 1 and 2 were consistent with the possibility that children in the non-adultlike group simply mistook the semantics of the imperfective for that of the perfective. The results of Experiment 3 make this explanation unlikely. Since children gave opposite truth-value judgments in an identical situation for sentences like (10) and (11) that differed only in aspectual verb morphology, they necessarily draw a clear semantic distinction between perfective and imperfective predicates.8

Summarizing, even those children who rejected the imperfective with a counterfactual past incomplete event in Experiments 1 and 2 accepted the imperfective with a non-counterfactual past incomplete event in Experiment 3. Children’s acceptance of past imperfectives in this study, together with their acceptance of present imperfectives with present ongoing events, indicates that they are aware that the imperfective can describe parts of full events.

As explained in Section 3.3.2 the children’s success in Experiment 3 may reflect either of the two modifications introduced by the experiment. It may have been due to the addition of an explicit temporal modifier that directed the child’s attention to an appropriate insider perspective on the event. This outcome would support the critical role of a temporal modifier in calculating the semantics of the imperfective and, consequently, would provide support for perspective-based approaches to the imperfective. Alternatively, the children’s success in Experiment 3 may have been due to the non-counterfactuality of the incomplete event that the imperfective predicate referred to, which would favor the position advanced by event-based approaches. This is because in these approaches it is the (non-)counterfactuality of the incomplete event that determines whether the critical step in the calculation of the semantics of the imperfective—relating that event to its complete version—needs to be performed outside of the actual world. Experiment 4 was designed to tease apart these two alternatives. Experiment 4 modified Experiment 3 in such a way that the explicit temporal modifier was still provided, but the critical event was now counterfactual.

3.4. Experiment 4: Counterfactual event with explicit temporal modifier

3.4.1. Experiment 4: Rationale

The goal of Experiment 4 was to distinguish whether the reason for the child’s success in Experiment 3 was due to the fact that an insider perspective was explicitly provided by a temporal modifier or to the fact that the event that the imperfective referred to was non-counterfactual. Experiment 4 was similar to Experiment 3 in that a temporal modifier provided an insider perspective on the critical event, but differed

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8 The results of Vinnitskaya and Wexler (2001) also suggest that Russian-speaking children semantically distinguish perfectives and imperfectives, since children in their study consistently matched imperfectives to pictures depicting ‘ongoing’ scenes and matched perfectives to pictures depicting completed scenes. However, as noted above, this contrast does not reflect the full range of interpretations available for adults, and it is not clear that the ‘ongoing’ pictures were interpreted as depicting past events, leading to a possibility that the distinction that children made was temporal rather than aspectual in nature.
from Experiment 3 in that the event that the imperfective referred to was counterfactual. If the temporal perspective is the crucial factor for the child, then children should also succeed in Experiment 4. On the other hand, if the non-counterfactuality of the event is the key, then many children should fail in Experiment 4.

3.4.2. Experiment 4: Design and methods

Experiment 4 tested the same structures (10) and (11) as Experiment 3, but made one important modification to the situation that these sentences were judged against. As in Experiment 3, the table-cleaning event carried out by the girl overlapped with the boy’s watering of the flowers, and later on with his biking. The difference is that eventually the girl failed to clean the table completely (because she ran out of cleaning solution). This change in the outcome of the table-cleaning event does not affect the truth-value of (10) and (11) for Russian-speaking adults: the imperfective (10) is true and the perfective (11) is false in both situations in Figs. 3 and 4. This should not be surprising, since the truth-value of the sentence is obtained by evaluating the main clause at the interval defined by the while-clause, during which the two situations are identical. However, in Experiment 3 the main predicate in (10) referred to a non-counterfactual event (a subpart of a completed past event), whereas in Experiment 4 it picked out a counterfactual event (a subpart of a permanently incomplete past event).

Twenty-one children aged 3–6 years (mean age 4;10; range 3;3–6;9) from the Moscow metropolitan area participated in Experiment 4. As in Experiment 3, all of them had previously participated in Experiment 1 or Experiment 2 at most one week earlier. A full list of the sentences tested in Experiment 4 is given in Appendix 2. The test procedure was identical to the one used in Experiment 3.

3.4.3. Experiment 4: Results

The same exclusion criteria as in Experiment 3 were applied, which resulted in exclusion of one child. The results based on 78 trials from the remaining 20 children are presented in Table 6 and are very similar to those found in Experiment 3. Children correctly rejected perfective sentences like (11) in 90% of all cases and correctly accepted imperfective sentences like (10) in 84% of trials. The same conclusion is reached whether we consider only the children’s judgments of the first experimental sentence in each trial, as shown in Table 6, or whether we consider the children’s responses to both the perfective and the imperfective queries within the same trial. In
79% of cases (62/78 trials) the child correctly rejected the perfective sentence and accepted the imperfective sentence within the same trial.

Using the same procedure as in Experiment 3 we grouped the results from Experiment 4 according to each child’s performance in Experiment 1 or Experiment 2 (Fig. 5). A group of 8 children who were classified as non-adultlike based on their responses in Experiments 1 or 2, where they showed only 13% accuracy in matching imperfectives to incomplete events, improved to 81% accuracy in judging the imperfectives in Experiment 4. The difference in performance was significant on a Wilcoxon signed ranks test (Z = −2.4, p < .05). Also, the groups of children who were classified as adultlike or as non-adultlike in Experiments 1 and 2 showed no difference in their accuracy in Experiment 4 (Fisher Exact test, 2-tailed, p = .29).

To summarize, in Experiment 4 children once again correctly rejected the perfective with incomplete events, thus replicating their success in Experiments 1–3. Importantly, they also correctly associated imperfective predicates with subparts of past counterfactual events. Children’s performance on the imperfective in Experiment 4 is rather similar to their performance in Experiment 3: children who had succeeded or failed in Experiments 1 and 2 were equally successful in accepting the imperfective with incomplete counterfactual events in Experiment 4.

### 3.4.4. Experiment 4: Discussion

In Experiment 4 children correctly accepted the imperfective with a past incomplete counterfactual event if the temporal modifier provided a narrow perspective on that event. Thus, they repeated and extended their success from Experiment 3, in which they accepted the imperfective with past incomplete non-counterfactual
events. Summarizing the results from all four experiments, Russian-speaking children inappropriately rejected the imperfective with past incomplete events in Experiments 1 and 2, but correctly accepted it in Experiments 3 and 4 (see the column on Russian children Appendix 3 for a summary). The contrast in performance between the two pairs of experiments cannot be due to differences among children, since the same children who failed to associate imperfectives with past incomplete events in Experiments 1 and 2 showed a dramatic improvement in Experiments 3 and 4 in which an insider perspective on the event was explicitly provided.

We considered two possible alternatives for the children's errors with imperfectives in Experiments 1 and 2. First, the error could be due to the counterfactual status of the critical event in those experiments. We can now discard this alternative in light of the results of Experiment 4, in which children accepted the imperfective with a past incomplete counterfactual event. In other words, Russian children as young as 3 years of age are equal to the challenges posed by the Imperfective Paradox. Specifically, they understand that imperfectives lack completion entailments, and also appear to be able to solve the event-projection problem. This implies that a non-adultlike understanding of completion entailments is unlikely as the cause of the children's errors in Experiments 1 and 2. This leaves us with just one account that can capture the dramatic improvement in children's performance between the first and the second pair of experiments. We conclude that children's failures in Experiments 1 and 2 were due to the lack of an explicit temporal modifier that provided an appropriate perspective for evaluation of an imperfective predicate.

4. General discussion

4.1. Children's knowledge of completion entailments

The Imperfective Paradox may be understood as a cover term for two related problems in the relationship between predicates of language and events in the world. First, an account of the Imperfective Paradox must address the completion entailment problem, i.e., why imperfective predicates lack completion entailments. Second, an account of the Imperfective Paradox must also address the event-projection problem, i.e., how an incomplete event can be successfully identified as being a part of a specific larger type of event. As explained in Section 2 there are two broad classes of accounts of why imperfective and progressive predicates lack completion entailments. The perspective-based tradition emphasizes the notion that imperfectives are always associated with a particular temporal perspective, and that suspension of completion entailments occurs when an imperfective is associated with an ‘insider’ perspective on an event that renders the ultimate outcome of the event invisible. This approach has the advantage that it captures the widespread intuition that imperfectives introduce a specific perspective on an event, but it has the limitation that it offers no solution to the event-projection problem. In contrast, theories in the event-based tradition emphasize the event-projection problem and argue that the solution to that problem derives the lack of completion entailments without additional
assumptions and without the need to appeal to a notion of temporal perspective. The aim of the current study was to investigate the development of the imperfective category in Russian children and to use this evidence to evaluate the two accounts of the Imperfective Paradox. We tested the extent to which young children recognize that imperfectives lack completion entailments, and whether they are able to map from incomplete events to telic predicates.

The findings from our initial studies (Experiments 1 and 2) showed a strikingly non-adultlike result, in which many of the younger Russian-speaking children refused to associate incomplete events with simple imperfective statements. Although these findings might be taken as evidence that many Russian children do not know that imperfectives lack completion entailments, subsequent experiments revealed this to be incorrect, and demonstrated that the children understand the two core properties of imperfectives. Experiments 3 and 4 showed that the same children who failed in Experiments 1 and 2 successfully associated imperfective predicates with partial or incomplete events, even when they knew that the event never reached completion. This suggests that all of the children were aware of the fact that imperfectives lack completion entailments, in contrast to perfectives, which the children consistently associated only with complete events. Also, the children’s success on Experiment 4 suggests that they do not have difficulty with the event-projection problem. These findings go beyond previous studies on the development of aspect, which have shown that children can associate imperfectives with ongoing events, but have not demonstrated that children can reliably associate imperfectives with events that explicitly fail to reach completion. Taken together, the results of our experiments show that young Russian children know a good deal about the semantics of perfectives and imperfectives, but also show that many children are subject to the limitation that they can suspend the completion entailments of imperfectives only when aided by an explicit temporal modifier, as in Experiments 3 and 4. If so, Russian-speaking children seem to have a more complex system than Russian adults, who can freely associate imperfectives with incomplete events. In the remainder of this section we argue that the higher complexity of the Russian children’s system is only apparent. We consider why Russian-speaking children differ from adults and discuss the implications of our findings for theories of the Imperfective Paradox.

4.2. Semantics of the Imperfective

The children’s judgments of the completion entailments of imperfectives changed dramatically according to the presence or absence of a temporal modifier phrase that provided an explicit insider perspective: the same children who rejected the imperfective with incomplete events in monoclausal sentences in Experiments 1 and 2, accepted it in biclausal sentences with a temporal embedded clause in Experiments 3 and 4. These findings are clearly at odds with the predictions of the event-based

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9 Although we have focused here on the effect of explicit temporal modifier phrases, it is possible that other forms of strong contextual support may aid children to select a suitable temporal perspective.
approach that predict similar performance in Experiments 1, 2, and 4, in which the critical event always remained incomplete and counterfactual, and hence should have been licensed in the same way in all cases. Conversely, the fact that an explicit temporal modifier makes it easier for Russian-speaking children to suspend completion entailments for imperfectives provides support to the perspective-based approach, which emphasizes the role of temporal modifiers and temporal perspectives in the evaluation of imperfective statements.

However, the perspective-based approach leaves the event-projection problem unresolved. In order to provide a full account of the Imperfective Paradox and account for our developmental findings, it seems necessary to combine the strengths of both the perspective-based and event-based traditions. In the approach described below we merge the key insight about the completion entailment problem in perspective-based approaches with the solution to the event-projection problem provided by event-based approaches. Briefly, we adopt the basic insight of the intensional approach to the event-projection problem, namely that imperfectives are always associated with a complete event, but that the complete event need only partially coincide with what transpires in the actual world. However, we argue that the role of the temporal perspective is to provide a constraint on the degree of overlap between the full event and what happens in the actual world: the end of the perspective interval defines the earliest point at which the non-actual continuation of the event may diverge from the event in the real world. We next outline one of several possible formal implementations of this approach to the semantics of the imperfective.

Recall that in standard intensional approaches to the imperfective (e.g., Dowty, 1979; Landman, 1992) an event may be described with an imperfective predicate only if a complete version of the event is found either in the actual world or in an intended or expected continuation of what happened in the actual world (Dowty’s inertia world). An inertia world diverges from the actual world from the moment that immediately precedes the moment of event failure and develops from there on in a normal and expected way. We suggest instead that a temporal perspective interval plays a role in the evaluation of imperfective statements, as in perspective-based approaches, and that the specific role of the perspective interval is that it provides a constraint on the degree of overlap between the real-world extent of the event and its non-actual continuation. Specifically, the real-world extent of the event must continue throughout the perspective interval, and the transition point from the actual world to a non-actual continuation must follow the perspective interval. This additional constraint has the critical consequence that the event-projection problem can only be solved if the imperfective is evaluated using a temporal perspective on the event that excludes the event failure, otherwise no qualifying inertia world would contain a complete version of the event. This constraint has the same impact as the claim in perspective-
based approaches that the imperfective takes an insider perspective on an event, and thus enables us to capture our findings from Russian children, without sacrificing an account that captures both components of the Imperfective Paradox.

Next we discuss how this modified account explains why Russian children’s understanding of imperfectives is non-adultlike and how they might progress to the adult state. Anticipating our conclusion, we claim that Russian children know the key ingredients of the solution to the Imperfective Paradox: they understand that the imperfective may refer to an incomplete event in the actual world (i.e., lack of completion entailments) and that in order to license the imperfective an incomplete event from the actual world must be associated with a complete version of the event in a non-actual world (i.e., event-projection problem). We suggest that the reason for the children’s failure in Experiments 1 and 2 is due to the fact that they attempted to solve the Imperfective Paradox using an inappropriate perspective interval.

Specifically, we suggest that if an overt temporal modifier is present, Russian children evaluate the imperfective using the exact interval defined by that modifier. In Experiments 3 and 4 the interval defined by the while-clause does not include the event failure point, either because the event never fails (Experiment 3) or because the event failure point occurs after that interval (Experiment 4). Using this insider temporal perspective, Russian children were able to successfully solve the event-projection problem and associate the imperfective with a partial event in both experiments. On the other hand, the test sentences in Experiments 1 and 2 lacked an overt temporal modifier. We suggest that in the absence of an explicit temporal modifier or other strongly biasing context, Russian children instead evaluate imperfectives using a default perspective interval that spans the entire event, and possibly continues to the present. Such a wide perspective includes the event failure and would therefore prevent children from projecting a hypothetical continuation of the event to completion that diverges from the actual world only after the perspective interval. We suggest that this is the reason why Russian children failed to license the imperfective with incomplete events in Experiments 1 and 2.11 Our approach also straightforwardly explains why other studies have found that children do accept present imperfectives with present in-progress events (Section 2.2). In those cases the child’s default perspective on the event continues to the present moment and therefore does not contain an event failure, making it possible to project a completion of the event beyond the perspective interval. In Section 3.3 we suggest that this asymmetry between present and past imperfectives is also attested in adult grammatical systems.

We suggest that Russian adults differ from Russian children in their judgments of simple imperfective statements like those in Experiments 1 and 2 because they are able to evaluate imperfectives using a perspective interval that is narrower than the default interval. In Experiments 1 and 2 their more liberal choice of perspective enables Russian adults to select an interval that is narrower than the default past per-

11 A straightforward prediction of this theory to be tested in the future is that children should fail to accept the imperfective statement (10) in a situation similar to that in Experiment 4 with the difference that the temporal modifier referred to a wider interval that included the main event failure, i.e., if the flower-watering event spanned all of the (incomplete) table-cleaning event, including its failure.
spective and excludes the event failure, thus making it possible to license the imperfective. The Russian adults’ acceptance of the imperfective in Experiments 3 and 4 is unsurprising, given that the explicit temporal modifier provided a suitable perspective for licensing incomplete events as imperfectives.

To conclude, we suggest that the temporal perspective plays a central role in the mapping from incomplete events to imperfective predicates, since it defines the earliest point of divergence from the actual world into a non-actual world where the event continues to completion. We claim that Russian children are aware of the solution to the Imperfective Paradox, but that they fail to choose an adultlike perspective for evaluating the imperfective unless an appropriate perspective is explicitly provided by a temporal modifier.

4.3. Why Russian-speaking children may select a non-adultlike perspective

In Section 3.1 we proposed that the difference between Russian-speaking children and adults does not reflect a difference in the general representation of the imperfective or in the basic mechanism used to solve the Imperfective Paradox, but rather is restricted to how children and adults select a temporal perspective upon an event. Obviously, this begs the question of why Russian children differ from Russian adults in their choice of perspective on past events, and how the children progress to the adult state. Below we lay out a couple of possibilities, each of which is compatible with our current results.

One possibility is that the difference between Russian children and adults has a source in cognitive development. Russian children may be unable to license simple imperfective statements with past incomplete events because a cognitive limitation prevents them from evaluating the statement using an appropriate past perspective, unless this perspective is explicitly provided in the discourse. There is substantial evidence that young children have difficulty in shifting perspectives, and in particular that they have difficulty in simultaneously maintaining mutually incompatible perspectives (e.g., Perner et al., 2002). Although studies in this area have primarily focused on perspective shifts involving different spatial viewpoints (Piaget & Inhelder, 1956; Krauss & Glucksberg, 1969) or the beliefs of different agents (Piaget, 1930), it is plausible that children’s difficulty may extend to shifts in temporal perspectives. Under this approach, the trigger that would lead Russian children to begin to give adultlike judgments in Experiments 1 and 2 would come not from language but from an independently motivated cognitive change. This change might be expected to coincide with changes in performance on false belief tasks (Wimmer & Perner, 1983; Wellman, Cross, & Watson, 2001) or “synonyms” tasks (Doherty & Perner, 1998). Note that this suggestion is compatible with our observation that Russian children who gave non-adultlike judgments on imperfectives were nevertheless able to clearly explain the unfulfilled agent’s intentions. There are related findings in the literature on false belief tasks that suggest that children may be able to provide explanations of agents’ inappropriate actions before they are able to use false beliefs to provide correct predictions of agents’ inappropriate actions (Bartsch & Wellman, 1989; Robinson & Mitchell, 1995; but cf. Perner, Lang, & Kloo, 2002). However, it is also
important to recognize that it cannot be the case that younger Russian-speaking children are subject to a general restriction on perspective shifting, since they have no problems in adopting a past perspective in situations where such perspective is explicitly provided by a temporal modifier, as in Experiments 3 and 4.

Alternatively, the Russian children’s errors on the imperfective may be due to an incorrect initial hypothesis about how Russian uses temporal perspectives in the licensing of imperfectives. Specifically, the children may wrongly assume that the temporal interval used in solving the event-projection problem must be anaphoric to an explicit or default discourse-established perspective. Interestingly, we find evidence that adult languages may conform to the pattern that we have observed in Russian children. The Russian children’s judgments of the imperfective parallel Dutch adults’ judgments of the Dutch simple past. We tested Dutch adults in an informal Truth-Value Judgment task using sentences like (12)–(13), together with schematic presentations of the scenarios that we had used to test Russian-speaking children in Experiments 1–4.12

(12) a. Maria maakte de tafel schoon.
    Maria make.simple-past the table clean
    Maria cleaned the table.

    b. De vader zaagde de tak af.
    the father saw.simple-past the branch off
    The father sawed off the branch.

(13) a. Terwijl Hans de bloemen aan het water geven was, maakte Maria de tafel schoon.
    while Hans the flowers on the water giving was, do.simple-past Maria the table clean.
    While Hans was watering the flowers, Maria was cleaning the table.

    b. Terwijl de dochter de bloemen oppakte, zaagde de vader de tak af.
    while the daughter the flowers was-picking saw.simple-past the father the branch off
    While the daughter was picking up flowers, the father was sawing off the branch.

Dutch adults associated simple sentences like (12) with complete events, and were reluctant to associate them with past incomplete events. Although the Dutch simple past is traditionally considered to be aspectually neutral and thus compatible with past incomplete events, our findings replicated an earlier report by van der Feest and van Hout (2002) whose adult controls rejected imperfectives with past incomplete situations in 90% of trials (Section 2.2). On the other hand, Dutch adults accepted simple past sentences like (13) as descriptions of the situations in Figs. 2 and 4. For ease of reference, Appendix 3 shows a summary of the judgments obtained for imperfective and simple past sentences from Russian and Dutch adults speakers in our studies. The adult Dutch simple past may treat perspective intervals in the same way that we have proposed for Russian children. This agrees with the proposal that the Dutch

12 In what follows we translate Dutch simple past forms as English simple past in contexts where the form carries a completion entailment and as past progressive where it does not.
simple past is anaphoric to discourse, even in situations that do not involve incomplete events (Boogart, 1999).

This comparison raises the possibility that the Russian children’s non-adultlike judgments were not due to a developmental resource-limitation. Rather, it is possible that the Russian children might pass through a Dutch-like stage on their way to developing the mature adult Russian semantics for the imperfective. This may be seen as a consequence of a more general conservative learning strategy. Such learning strategies are represented in both formal accounts of language learning (‘Subset Principle’: Baker, 1979; Berwick, 1985; Pinker, 1984; Wexler & Manzini, 1987) and in functionalist approaches (e.g., Tomasello, 2003), and propose that the child gradually progresses from more restrictive to less restrictive grammatical hypotheses on the basis of positive input. In the case of imperfectives and temporal perspectives, the child Russian system is more restrictive than the adult Russian system, since it allows the imperfective to be used in a narrower range of situations. In addition to the Subset Principle, our finding of similarity between the Russian children’s system and the system of Dutch adults’ is compatible with a stronger hypothesis on language acquisition, the Continuity Hypothesis, according to which child and adult languages can differ only in ways that adult languages can differ from each other (Crain, 1991; Pinker, 1984). Importantly, regardless of whether the similarity between Russian children and the Dutch adults is principled or coincidental, our account predicts that Russian children should be able to progress to the Russian adult grammar on the basis of positive input alone, by hearing adults use simple imperfective statements as descriptions of past incomplete events and consequently relaxing their setting of the perspective used to evaluate the imperfective.

5. Conclusion

In this article we investigated Russian children’s understanding of the completion entailments of imperfective predicates, and used the experimental findings to argue for a modified account of the Imperfective Paradox that draws upon insights from two different research traditions. In our experiments younger Russian-speaking children were able to associate the imperfective with an incomplete event, but only if a suitable ‘insider’ perspective was explicitly provided by the linguistic context. The children’s judgments thus differed from the judgments of Russian adults, who always accepted the imperfective with incomplete events, regardless of whether an insider perspective was provided by a temporal modifier. We argued that the difference between the adult Russian imperfective on the one hand, and the child Russian imperfective and the Dutch simple past on the other hand is due to a difference in how adults and children select the temporal perspective that is used to evaluate imperfective statements. If this is the case, then the Russian children’s superficially more complex judgments on the imperfective, where it sometimes has and other times lacks completion entailments, in fact reflect a simpler underlying representation. The children’s non-adultlike selection of temporal perspectives might reflect either a domain-general computational limitation or a language-specific misanalysis of the
target language. Under either alternative, our account of ensures the possibility of a smooth transition from the childlike representation of the Russian imperfective to the adultlike representation. We argued that previous event-based accounts of the Imperfective Paradox were not tenable in light of the sensitivity of Russian children, as well as Dutch adults, to the presence of temporal modifiers. In order to capture these findings, we offered an account that draws together insights from both event-based and perspective-based traditions. We agree with the intensional event-based approaches that in order for an imperfective predicate to be licensed a partial event in the actual world must be related to some representation of a complete version of the same event. However, we add to this the condition that all imperfectives must be evaluated with respect to a specific temporal perspective on an event, explicitly or implicitly provided by the discourse. Specifically, the point of divergence between the actual world and the hypothetical continuation of the event must lie beyond the limits of the temporal perspective interval. This constraint effectively recreates the key insight of perspective-based approaches to the imperfective, namely that the imperfective provides an ‘insider’ perspective on an event.

In conclusion, we would like to reinforce the point that developmental dissociations may provide a useful tool for investigating long-standing questions about adult language. Based on our analysis of Russian child language, we argued that a notion of perspective is needed in the semantics of child Russian imperfectives, and by extension also in their adult Russian counterparts, contrary to theories that eschew the notion of perspective, e.g., Landman (1992). In light of the semantic parallels between adult Dutch simple pasts and child Russian imperfectives, one might reasonably ask whether our argument could have been constructed using just the evidence from adult Dutch, without recourse to developmental evidence. We contend that it could not. One might suppose that the semantic notions that are required for the Dutch simple past are of little relevance for the Russian imperfective. In contrast, it is more difficult to argue that our two groups of adultlike and non-adultlike Russian children are interpreting the imperfective using radically different semantic primitives, and thus if perspectives are needed to capture the performance of the non-adultlike Russian children it is likely that they are also relevant for the adultlike children and for adult Russian. In this way, comparison of child and adult language may provide evidence that goes beyond what can be learned from comparisons of different adult languages.

Acknowledgements

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Appendix 1. A sample story and lists of predicates tested in Experiment 1 and 2

Sample story (translated from Russian) based on the predicate sobiral/:
sobral gnomika ‘was assembling / assembled a smurf’

Setting: a road with three landmarks: a flower-bed, a castle and a tree. There are pieces of a smurf at each location. A monkey starts her journey down the road.

The monkey arrives at the flower-bed. “These are nice flowers. Oh, look, there are the pieces of a smurf down here! Perhaps a witch put a spell on him and he fell apart into pieces. Let me try to revive this guy. Ok, so the body goes on top of the legs, what’s next…?”. Suddenly, a bug bites the monkey. “Ouch, that hurts! I don’t want to stay here any longer. I’m going to leave all of it like this and continue down the road.”

The monkey continues down the road until she reaches the castle: “Oh, look, what a beautiful castle! And there are pieces of a smurf next to it. Let me try to revive this one too! OK, the body goes on top of the legs, what’s next…?” At this moment, another bug bites the monkey. “Oh no, a bug bit me again! Why am I so unlucky today? But this time I’m going to finish this thing anyway!” The monkey assembles the smurf completely and continues along the road.

Then the monkey reaches the tree: “What a great tree, it’s so nice to sit in its shade. And there are some smurf pieces again. But I guess I have to go home now – my mom is waiting for me for dinner.” The monkey goes home.

Appendix 2. Sample story and list of sentences tested in Experiments 3 and 4

Sample story designed to test the predicate ‘clean the table’, as illustrated in Figs. 2 and 4.

A girl and a boy return home from a summer vacation. They have a few things to do about the house, including watering the flowers in the garden, arranging their toys and cleaning a table.

Boy: Let me start with the flowers. It has not been raining for a long time so I’ll have to water them really thoroughly, otherwise they will die. He goes to the garden, finds a watering-can and starts to water the flowers.

Girl: OK, I think I will surprise my brother. I will take care of everything in this room – that is the toys and the table. What should I do first? I guess I’ll start with the

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List of creation predicates tested in Experiment 1

<table>
<thead>
<tr>
<th>Russian predicate</th>
<th>English equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>sobiral / sobral gnomika</td>
<td>‘was assembling / assembled a smurf’</td>
</tr>
<tr>
<td>stroil / postroil dom</td>
<td>‘was building / built a house’</td>
</tr>
<tr>
<td>sostavlyal / sostavil kartinku</td>
<td>‘was making / made a puzzle’</td>
</tr>
<tr>
<td>lepi / slep medvedya</td>
<td>‘was molding / molded a bear’</td>
</tr>
</tbody>
</table>

List of change-of-state predicates tested in Experiment 2.

<table>
<thead>
<tr>
<th>Russian predicate</th>
<th>English equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>napolnyal / napolnil stakanchik (molokom)</td>
<td>‘was filling/filled a glass (with milk)’</td>
</tr>
<tr>
<td>zakrashival / zakrasil cvetochek</td>
<td>‘was coloring / colored in a flower’</td>
</tr>
<tr>
<td>perevorachival / perevernul kartinku</td>
<td>‘was turning / turned over a picture’</td>
</tr>
<tr>
<td>razvorachival / razvernul podarok</td>
<td>‘was unwrapping / unwrapped a gift’</td>
</tr>
</tbody>
</table>
toys. Oops, but we left the toy box in the park. Too bad, so I can’t do anything with them. OK, so let me wipe the table instead. Look it’s dirty all over the place! I am going to make the table shine, so that there is not a single dirty spot left! Let me start from this corner. The girl starts to wipe the table with a cloth. I am doing really well. When my brother comes back from the garden he will be surprised to see how shiny the table is.

A dog runs into the room and starts barking.

Dog: Woof-woof, please, give me some water. I am very thirsty.

Girl: Doggy, I don't have time. Can’t you see that I am busy with this table.

Dog: Please, give me some water! I usually drink from a pool in the garden, but it has not rained in such a long time, all of the pools have dried up!

Girl: Doggy, you always need something at the wrong time. OK, I'll get some water for you.

The girl leaves the room and returns with a jar full of water.

Girl: Here you are, Doggy. And now I'll have to get back to work.

The girl resumes cleaning the table. After a while, the boy finishes watering the flowers in the garden and returns to the house.

Boy: Look at this table: half of it is still dirty but the other half is so shiny!

Girl: I am sorry, I thought I would have time to make it all clean before you come back, but the dog interrupted me.

Boy: Don’t worry! I am going off to ride my bike now.

The boy starts to ride his bike, and the girl resumes cleaning the table. Some time later ....

Experiment 3 ending (successful completion): OR Experiment 4 ending (unsuccessful completion):13

The girl finishes cleaning the table.

Girl: Look how shiny the table is!

Boy (as he rides his bike past her): Yes, indeed!

The girl runs out of cleaning solution; part of the table is left dirty.

Girl: Oh, well, what can I do now? Still it’s better than it was before. I will have to leave it as is and call my grandma to let her know that we came home safely.

Puppet: That was a story about a girl and a boy, and about how they did some things about the house. I know one thing that happened:

Imperfective statement: While the boy was watering flowers, the girl was cleaning the table. OR

Perfective statement: While the boy was watering flowers, the girl cleaned the table.

List of sentences tested in Experiments 3 and 4

Note: although some of the predicates could potentially be understood either as activities or as accomplishments (Vendler, 1967), they were disambiguated towards the accomplishment reading by overtly declaring the agent’s goal to attain the event completion (see Wagner & Carey (2003) for evidence that children can use the goal of the event for purposes of event individuation by 3 years of age). For example, in the table-cleaning story the girl’s aim was ‘to make the table shine, so that there is not a single dirty spot left!’.

13 This ending is presented here for illustrative purposes only, in order to show how the scheme of the stories used in Experiment 4 was the same as for those in Experiment 3, except for the outcome. In reality, the predicate 'clean the table' illustrated in this example was used in Experiment 3.
Appendix 3. Summary of Russian and Dutch speakers’ judgments of the Russian imperfective and Dutch simple past

<table>
<thead>
<tr>
<th>Sentence &amp; Situation</th>
<th>Russian</th>
<th>Dutch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Children</td>
<td>Adults</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adults</td>
</tr>
<tr>
<td>Russian: Maria stroila domik.</td>
<td></td>
<td></td>
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<tr>
<td>Dutch: Maria bouwde een huis.</td>
<td></td>
<td></td>
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<tr>
<td><em>Maria build</em> (Rus-IMP/Dutch-simple.past) a house.</td>
<td></td>
<td></td>
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<tr>
<td>Past incomplete</td>
<td></td>
<td></td>
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<tr>
<td><img src="image" alt="Build a house" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>now</td>
<td></td>
<td></td>
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<tr>
<td>Past complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Build a house" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>now</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russian: Poka mal’chik polival cvety, devochka vytiralal/vyterla⁷ stol.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dutch: Terwijl Hans de bloemen aan het water geven was, maakte Maria de tafel schoon.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>While Hans was watering the flowers, Maria clean</em> (Rus-IMP/Dutch-simple.past) the table.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Boy water flowers" /> <img src="image" alt="Boy taking" /> <img src="image" alt="Girl clean the table" /> <img src="image" alt="Boy bluing" /> <img src="image" alt="Girl clean the table" /></td>
<td></td>
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</tr>
<tr>
<td><img src="image" alt="Boy water flowers" /> <img src="image" alt="Girl clean the table" /></td>
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<tr>
<td><img src="image" alt="Boy water flowers" /> <img src="image" alt="Girl clean the table" /></td>
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</tbody>
</table>
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