

The Development of Pluperfect: Evidence from Greek

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1. Introduction

Previous work on the development of Past Perfect/Pluperfect (Fayol 1982, Labelle 1994, Hamamn et al. 2001, Jakubowicz 2003) reports that Pluperfect is acquired late relatively to other past tenses, i.e. after the age of 5;6. Pluperfect has been described as an absolute-relative-tense that locates a time-point in the past, along with either an event that occurred prior to this reference point (*Past-in-the-Past meaning*) (1) or an event that was completed at this reference point (*Perfect-in-the-Past meaning*) (2) (Reichenbach 1947, Comrie 1985, Kamp and Reyle 1993, Ogihara 1996, Iatridou et al. 2001, Portner 2011).

In the Past-in-the-Past reading (1), Pluperfect locates an event prior to the reference time. Under the Perfect-in-the-Past reading, Pluperfect denotes a past state resulting from an earlier event (2).

- (1) John had left the day before/when Mary washed the dishes [PAST-IN-THE-PAST]
(2) I saw John yesterday; he had been sick for two weeks. [PERFECT-IN-THE-PAST]

The distinction between these two readings is not always a straightforward one. In many contexts, the pluperfect gives rise to an uncertainty between a result-state interpretation and a purely temporal ordering of events, especially when there is no specific reference point (e.g. 'I had been sick'). According to the Extended Now (XN) theory (Iatridou et al. 2001), the perfect establishes a time interval, called the perfect time span, which relates to the clause's reference time and its boundaries are defined/specified by the temporal adverbials (left boundary; LB) and the right boundary (RB) is set by tense. Under this view, the Pluperfect introduces a perfect time span whose right boundary precedes the utterance time and left boundary coincides with reference time.

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In Greek (as in English and many other languages) the Pluperfect is formed by the auxiliary verb ‘have’ and the perfective stem of the main verb; it can optionally combine with the aspectual adverbial *iði* (already) (3):

- (3) O Janis içe (iði) fiyi (iði) [otan i Mary irthe spiti]. [PAST-IN-THE-PAST]
 John have._{3SG.AUX.PST} (already) leave._{NPST.PFV} (already) when Mary
 come._{3SG.PST.PFV} home.
 ‘John had already left when Mary came home’

Iði (already) can optionally appear in combination to Pluperfect in Greek and it is analysed as a scalar adverbial¹ (Krifka 2000, Zimmermann 2018), which compares the prejacent with a set of focus alternatives which are ordered along a contextually or intrinsically determined scale. In (3), ‘John had left’ is presented as an event that occurred prior to ‘Mary coming home’ and the presence of *iði* (already) makes more explicitly that ‘John’s leaving’ occurred earlier relative to the salient set of alternatives.

The distinction between the *Perfect-in-the-past* and *Past-in-the-past* readings raises a number of questions regarding children’s production and comprehension of the Pluperfect. Up-to-date, it is still unidentified when children start produce Pluperfect forms across languages and of what type/interpretation. Moreover, it is unknown what children’s perception of the two readings is, i.e. how they perceive the perfect time spam introduced by the Pluperfect in instances like (2) versus (3).

The current study aims at shedding light on these issues by examining the Pluperfect emergence in a novel naturalistic corpus (*DireSpont Speech* corpus; Oikonomou et al. under review) and children’s understanding of the Past-in-the-Past meaning in two experiments (with and without the presence of *iði* (already)) testing the temporal order of two events, as in (3).

2. Previous studies on the acquisition of Pluperfect

The development of Pluperfect has received limited attention. A study by Fayol (1982) examines children’s comprehension and production of the pluperfect between the ages of 4;0 to 10;0. The study suggests that children at the age of 4;0-5;0 use the pluperfect for storytelling or in order to denote temporal distance. Two experimental tasks with children aged 6-10 were used to further investigate this development, namely a reversed narrative retelling task and a story-based picture-sequencing task. The findings demonstrate that the ability to use and interpret Pluperfect tense emerges at approximately between 9-10 years of age.

Another study by Hamann, Lindner and Penner (2001) investigated whether children’s difficulties with reference time are related to deficits in the CP domain. They carried out a picture-selection comprehension experiment testing the interpretation of temporal adverbs, causal relations, and Past Perfect constructions without overt temporal cues on Swiss German and Bavarian children with Specific Language Impairment (SLI). In the pilot phase, 20 Swiss German

¹ Other researchers (Ippolito 2007) proposed the analysis of *already* as an additive particle.

children aged 5;0-7;0 were tested. After standardization, the main study included 5 Swiss German children and 12 Bavarian children aged 5;0-7;0. Their findings showed that while typically developing children performed relatively well on Pluperfect (73% accuracy), children with SLI had considerable difficulty interpreting pluperfect constructions (35% accuracy).

Jakubowicz (2003) investigated the acquisition of *passé composé* and Pluperfect in French-speaking children with and without SLI. The study used a sentence-completion task with 18 items in each tense. Participants included 12 children with SLI, aged 5;5-9;0, 12 typically developing children aged 3;3-3;7, 12 typically developing children aged 4;2-4;6, and 12 adults. The results showed that the 3-year-olds produced 76.8% *passé composé* and 39.9% Pluperfect, while the 4-year-olds produced 94.4% *passé composé* and 69.4% Pluperfect. Children with SLI produced 38.4% *passé composé* and only 0.5% Pluperfect. Also, 3-year-olds who failed to produce the Pluperfect did not overuse *passé composé*; 4-year-olds who produced few correct Pluperfect forms showed awareness of the distinction, using *passé composé* more in the relevant task than in the Pluperfect one.

3. The acquisition of temporal adjunct clauses

Many studies have shown that the surface chronological order of clauses (i.e. iconicity) plays a crucial role in children's accuracy with temporal adjunct clauses (Clark 1971, Coker 1978, Feagans 1980, Natsopoulos and Abadzi 1986, Blything and Cain 2016, de Ruiter et al. 2018 i.a.). However, other studies (Amidon 1976, Pyykkönen and Järviö 2012, Tsakali and Vamvouka, 2021, i.a.) have found no or a partial effect with the surface temporal order of events.

Clark (1971) tested English-speaking children aged 3-5 on their understanding of *before* and *after* using an act-out task. Results showed higher accuracy for sentences in which the clause order reflected the actual sequence of events, especially among younger children.

Blything and Cain (2016) investigated children's comprehension of temporal adjunct clauses with *before* and *after*. They carried out a comprehension experiment with 108 children aged 3;0 to 7;0 in a touch-screen study in which the participants had to touch the event that agent did last. The experiment evaluated both accuracy and response times and according to their findings, children's performance was influenced by the order of clauses: consistently higher accuracy was observed when the clauses follow the chronological sequence of events than the reverse order. The youngest children (3- to 4-year-olds) performed above chance on chronological *before* and *after* sentences, but struggled with reverse-order; older children (6-7-year-olds) exhibited higher accuracy on reverse conditions at a rate of 66%. Response times also showed faster reactions on correct responses for sentences that allowed incremental processing.

Karlsson et al. (2019) investigated 9-12-year-olds on Dutch in two experiments with 74 and 50 participants respectively. They asked the participants what happened first in experiment 1 and what happened last in experiment 2 on temporal adjunct clauses in a reading task with *before* and *after* in a sentence initial or sentence-medial position. Their results did not indicate greater difficulty

in understanding or processing non-chronological sentence structures and they claim that clause salience and recency effects play a crucial role in children's comprehension on sequence of events, which extends throughout adolescence.

Makrodimitris and Schulz (2025) investigate the comprehension of the temporal connectives *prin* (before) and *afu* (after) in 60 monolingual Greek-speaking children aged 6;0-12;0. Comprehension was evaluated via a picture-sequence selection task and the connective type and iconicity was manipulated in such a way that yielded four conditions (before/after $\times$ iconic/non-iconic; six items per condition). Their results show that while there was no significant difference ($p=0.650$) between iconic-*before* (91.4%) and non-iconic-*before* (93.1%) there was a significant difference ($p<0.001$) between iconic-*after* (94.2%) and non-iconic-*after* (73.9%), as well as between non-iconic-*before* and non-iconic-*after* ($p<0.001$). These findings were interpreted as evidence for an interaction between iconicity and clause order: When a non-iconic connective appears in sentence-medial position, children are required to restructure their initial representation of the events. The authors claim that children's difficulties stem from 'event-semantic kindergarten-path' effects, i.e. a processing account according to which the connective which triggers the reanalysis of the event-semantic representation appears late and children tend to avoid reconstruction and preserve their initial, incorrect discourse representation.

4. Our study: The developmental questions

We study the emerge of the Pluperfect in a novel spontaneous speech corpus (DireSpont Speech, Oikonomou et al. under review) and the comprehension of the Pluperfect in a sequence of event temporal relation. The main questions are:

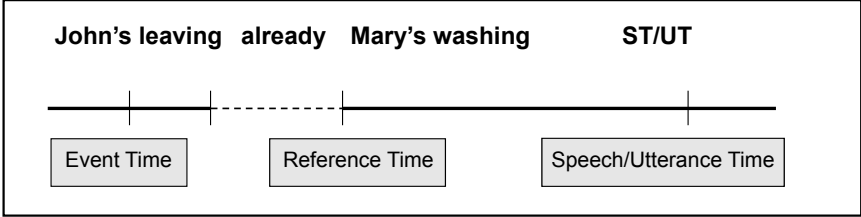
- (i) When does the Pluperfect form emerge in child Greek and which meaning do children produce first?
- (ii) What is children's understanding of Pluperfect in sequence of events, i.e. in a Past-in-the-Past interpretation?
- (iii) Does the scalar aspectual marker *already* affect children's interpretation of event order?

Based on the previous studies, children are expected to interpret sentences with chronological surface order more accurately than the ones depicting the reverse chronological order, as the linear order of clause (8c) mirrors the actual temporal sequence, while the clauses with reverse order of events (8a) require a reordering of the events.

Crucially, we expect the presence of the scalar aspectual marker *iði* (already) to facilitate children's interpretation of event order. Our intuition is that it provides an explicit scalar-temporal cue, which functions as an additional temporal interval between the Event Time and the Reference Time (see schema in (4)), allowing children to establish a stronger distinction between the two events. Previous studies on spontaneous speech data regarding the acquisition of the adverbial aspectual *already*, have shown that it emerges early, i.e. around 2;0-3;0 (Weist and

Buczowska 1987 for Polish; Chejnová 2017 for Czech; Patrizi and Sanfelici 2024 for Italian), while an experimental study (Wagner 2001) reports that the presence of this adverbial, as a salient linguistic form, facilitates children’s performance.

- (4) O Janis içe iði fiyi [otan i Mary epline ta pjata]. [PAST-IN-THE-PAST]
John have._{3SG.AUX.PST} already leave._{.NPST.PFV} when Mary wash._{3SG.PST.PFV} the
dishes.
‘John had already left when Mary washed the dishes’



5. The emergence of Pluperfect in DireSpont speech corpus

The investigation is based on the DireSpont Speech corpus (Oikonomou et al. under review). The corpus consists of spontaneous speech data from 15 monolingual Greek speaking children (8 males and 7 females), aged 2;7-6;11 and 18 Greek-speaking adults (14 females and 4 males). The data examined in the current study come from 117 recording sessions. In some sessions more than one child participated, thus the number of annotated files is 170. The corpus consists of 62.062 utterances in total, of which 37.673 were produced by children. Each annotated session lasts approximately 30 minutes. Transcription and annotation were carried out using ELAN software (Version 6.9, 2024) and were reviewed by three independent annotators. Recordings took place in naturalistic contexts, either in the children’s homes or in kindergarten settings, and include spontaneous speech produced during play and everyday interactions with adults and peers.

We divided child’s production of the Pluperfect into four (approximately) one-year age groups. Table 1 summarizes the emergence of the Pluperfect tokens across age groups.

Table 1: The emergence of the pluperfect per age groups in DireSpeech

Age Groups	N of verbal utterances	Pluperfect-tokens	X-marked	Interpretation
2;7-3;12 (n=3)	3.531 /5.241	3	0	PerfPast
4;0-4;9 (n=2)	3.161 /4.959	34	2/34	PerfPast
5;0-5;11 (n=8)	5.090 /8.164	118	58/118	PerfPast
6;0-6;11 (n=2)	1.051 /1.616	17	10/17	PerfPast

In Table 1, the numbers in bold represent the verbal child production which could in principle form a Pluperfect tense. Thus, from the total number of the verbal utterances (Table 2), we have excluded the instances of copula verbs, the possessive *exo* (have) and the imperatives which in Greek cannot be expressed in Pluperfect.

Table 2: The production of verbal utterances per age group in DireSpeech

Age Groups	N of verbal utterances	Copula verbs	Auxiliary verbs	Imperatives
2;7-3;12	5.241 /10.783	758	201	751
4;0-4;9	4.959 /8.835	759	281	758
5;0-5;11	8.164 /15.272	1.467	543	1064
6;0-6;11	1.616 /2.783	235	85	245

Table 1 shows that the youngest age group (2;7-3;12) produces only 3 Pluperfect tokens, which increases to 34 in the age group 4;0-4;9 (example 5). At this stage, we also observe the first productions of X-marked Pluperfect (example 6) (i.e. future particle + Pluperfect), which expresses counterfactuality. A marked increase is observed at the age-group 5;0-5;11 years old, with 118 Pluperfect tokens occurring in 5.090 utterances and 58/118 instances expressing X-marked constructions. In the oldest child group (6;0-6;11), 17 Pluperfect tokens were found in 1.051 utterances with 10/17 being X-marked forms. Overall, the child data reveal a strong and consistent preference for the Perfect-in-the-Past interpretation. Although it is not always clear whether an example like (5) denotes a Perfect-in-the-Past or a Past-in-the Past meaning, we consider that children's utterances express the former as in all instances the Pluperfect can be replaced by the Aorist, i.e. the simple past tense. Thus (5) can equally be felicitous with Pluperfect (e.g. "I had seen a child who..") and with Aorist ("I saw a child who...") (see Partee 1984, Ogihara 1996).

In the adult production, 54 pluperfect tokens were identified in a total of 26.590 utterances. From those, 46 tokens would be interpreted as Perfect-in-the-Past and 8 tokens could be interpreted as Past-in-the-Past (7). Nevertheless, our findings show that children use Pluperfect more than the direct input in the corpus.

- (5) *eγo iça ði ena peðiko ena peðaci pu forai forema.* [CHD004FCV; age 4;6.24]
 I have._{1SG.AUX.PST} see._{NPST.PFV} a kid's show one child RELwear._{3SG.PRS} dress
 'I had seen a kid's show, a little child who is wearing a dress.'
- (6) *tora aftos ða içe arostisi ce sa pirame jato.* [CHD009FNB, age: 5;4.8]
 Now he FUT have._{3SG.AUX.PST} sick NPST.PFV and FUT call._{1PL.PST.PFV} the doctor
 'Now he would have gotten sick and we would have called the doctor.'
- (7) *ekina pu iça kani otan irðe i [name].* [MOT001FMD, 36;9]
 Those REL have._{1SG.AUX.PST} do.NPST.PFV when come._{3SG.PST.PFV} the [name]
 'The things I had done when [name] came.'

Children's use of the Pluperfect increases with age, showing a strong and consistent preference for the Perfect-in-the-Past interpretation. In adult speech,

both Perfect-in-the-Past and Past-in-the-Past readings occur. For this purpose, we conducted the following experiments to investigate children's understanding of the Past-in-the-Past interpretation of the Pluperfect.

6. The comprehension of Pluperfect in temporal clauses- Experiment I

6.1. Task and procedure

A comprehension picture-ordering matching task was developed according to which participants were presented with two pictures depicting two distinct and causally independent events performed by distinct agents. Participants were instructed that they will listen to an utterance by Peppa and they then had to drag (or show if they preferred) the picture which depicted what happened first to box 1 and what happened afterwards to box 2 (Fig.1-2).

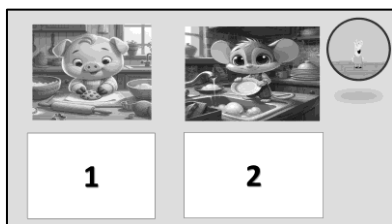


Figure 1: Example of Condition 1&3

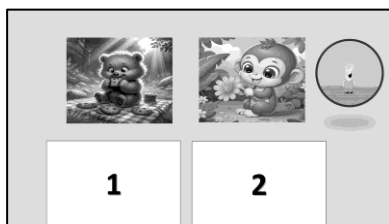


Figure 2: Example of Condition 2&4

All Peppa's utterances were recorded and they contained a main sentence and a temporal adjunct clause introduced by *otan* (when). Pluperfect tense was always on the verb of the main clause (8a-d). The experimenter's lead-in question was: *ti eginē prota ke ti eginē meta?* (What happened first and what happened afterwards?). Prior to the main experiment, there was a warm-up/familiarization session on how to play the game (3 items) and participants were asked to listen carefully and help Peppa understand what happened first and what happened afterwards.

The experiment included 16 critical items (4 items/conditions) and 8 fillers. All items were pseudorandomized. The duration of the study was 10-15 minutes and after completion, children were rewarded with stickers for their participation.

6.2. Conditions and Items of Experiment I

Experiment I included four conditions (four items/condition) and eight filler items. The conditions (8a-d) contained a main sentence and a temporal adjunct clause introduced by *otan* (when)². Pluperfect tense always appears on the verb of

² The choice of testing the Pluperfect with the *when-adjunct* is motivated by the observation that 'when' is semantically vacuous (von Stechow and Grønn 2013), enabling us to study the Pluperfect independently of any contribution from the connective. Moreover, *when* is typically reported as the first to be acquired (Bloom et al. 1980, Silva 1991, Winskel 2003, Papakonstantinou 2015, Kupersmitt and Nicoladis 2021).

the main clause carrying the Nuclear Pitch Accent (NPA) of the sentence across items to ensure that the prosodic pattern does not affect how the pluperfect is interpreted. We controlled for the order of clauses, (main clause first- adjunct clause first) which gives rise to different chronological sequence of events (surface - reverse), and the visual presentation of events in the corresponding pictures (surface picture order - reverse picture order). When the adjunct clause was first, we had the reverse chronological order (8a-b), while when the main clause was first, we had the surface chronological order (8c-d).

CONDITION 1: Adjunct_RS: Adjunct clause first, Reverse chronological order and Surface picture order. [4 items]

- (8) a. Otan to pondikaci epline to pçato, to yurunaci **içe (iði) plasi** to biskoto
when the mouse wash._{3SG.PST.PFV} the plate, the pig have._{3SG.AUX.PST} (already)
make._{NPST.PFV} the biscuit
'When the little mouse washed the dish, the little pig **had (already) made** the cookie'.

CONDITION 2: Adjunct_RR: Adjunct clause first, Reverse chronological order and Reverse picture order [4 items]

- b. Otan to arkuðaci dagose to biskoto, to maimuðaci **içe (iði) kopsi** to luluði.
when the bear bite._{3SG.PST.PFV} the biscuit, the monkey have._{3SG.AUX.PST} (already)
cut._{NPST.PFV} the flower
'When the little bear bit the cookie, the little monkey **had (already) picked** the flower'.

CONDITION 3: MainCP_SS: MainClause first, Surface chronological order and Surface picture order [4 items]

- c. To yurunaci **içe (iði) plasi** to biskoto, otan to pondikaci epline to pçato
the pig have._{3SG.AUX.PST} (already) make._{NPST.PFV} the cookie, when the little
mouse wash._{3SG.PST.PFV} the plate
'The little pig **had (already) made** the cookie, when the little mouse washed the dish'.

CONDITION 4: MainCP_RS: MainClause first, Surface chronological order and Reverse picture order [4 items]

- d. To maimuðaci **içe (iði) kopsi** to luluði, otan to arkuðaci dagose to biskoto
the monkey have._{3SG.AUX.PST} (already) cut._{NPST.PFV} the flower, when the bear
bite._{3SG.PST.PFV} the biscuit
'The little monkey had picked the flower, when the little bear bit the cookie'.

Additionally, we used 8 fillers which were designed similarly to the critical items (Fig.3 & 4) and they aimed at controlling children's understanding of the event ordering with the adverbs *prota-meta* (first-then/afterwards) (9a-d).

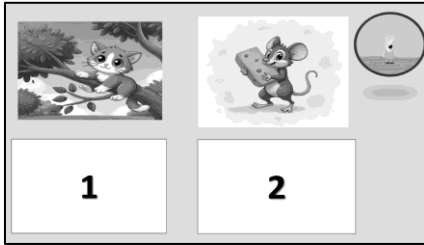


Figure 3: Example of fillers with first-afterwards (Condition 5 & 6)



Figure 4: Example of fillers with afterwards (Condition 7 & 8)

Filler-type a: First-afterwards, Surface chronological order and reverse picture order [2 items]

- (9) a. *Prota to pontikaci eklepse to tiri ke meta i gatoula anevise sto ðendro*
First_{ADV} the little mouse steal_{3SG.PST.PFV} the cheese and then_{ADV} the kitty
climb_{3SG.PST.PFV} the tree
 ‘First the little mouse stole the cheese and then the kitty climbed up the tree’.

Filler-type b: First-afterwards, Surface chronological order and surface picture order [2 items]

- b. *Prota o Yianacis kratise to baloni ke meta i Merula anikse to kuti*
Prota_{ADV} little John hold_{3SG.PST.PFV} the ballon and then_{ADV} Mary
open_{3SG.PST.PFV} the box
 ‘First little John held the balloon and then little Mary opened the box’.

Filler-type c: Afterwards, Surface chronological order and reverse picture order [2 items]

- c. *to ayoraci skepase tin karekla ke meta to koritsaci eðese tin korðela*
The boy cover_{3SG.PST.PFV} the chair and then_{ADV} the little girl tie_{3SG.PST.PFV}
the ribbon
 ‘The little boy covered the chair and then the little girl tied the ribbon’.

Filler-type d: Afterwards, Surface chronological order and surface picture order [2 items]

- d. *to arkuðaci epcase tin bala ke meta to layuðaci ðagose to karoto*
the bear catch_{3SG.PST.PFV} the ball and then_{ADV} the rabbit bite_{3SG.PST.PFV} the
carrot
 ‘The little bear caught the ball and then the little rabbit bit the carrot’.

6.3. Participants

Sixty-six typically developing Greek monolingual children, aged 6 to 9 years, participated in the study. They were divided into four age groups. Group A included 15 children aged 6-7 years (mean age: 6;7, 8 males and 7 females). In Group B, 21 children aged 7-8 years (mean age: 7;6, 8 males and 13 females) completed the study. Group C consisted of 16 children aged 8-9 years (mean age: 8;6, 4 males and 12 females) and Group D included 14 children aged 9-10 years

(mean age: 9;3, 6 males and 8 females). A control group of 15 Greek monolingual adults (mean age: 28 years, 9 males and 6 females) was also tested.

6.4. Results of Experiment I

Figure 5 shows participant's accuracy across. Adults perform at ceiling on all conditions. Children's performance on the Main CP conditions (i.e. Conditions 3 & 4, expressing the surface chronological order of events) was near ceiling already at the age of six (95% and 85%), which increased with age. However, accuracy on the Adjunct conditions (i.e. Conditions 1 & 2, expressing the reverse chronological order) was considerably lower. Six-year-olds perform correctly at a rate of 30% for Adjunct_RS and 20% for Adjunct_RR, which is comparable to the 7-year-olds' performance (30.3% and 32.6% respectively).

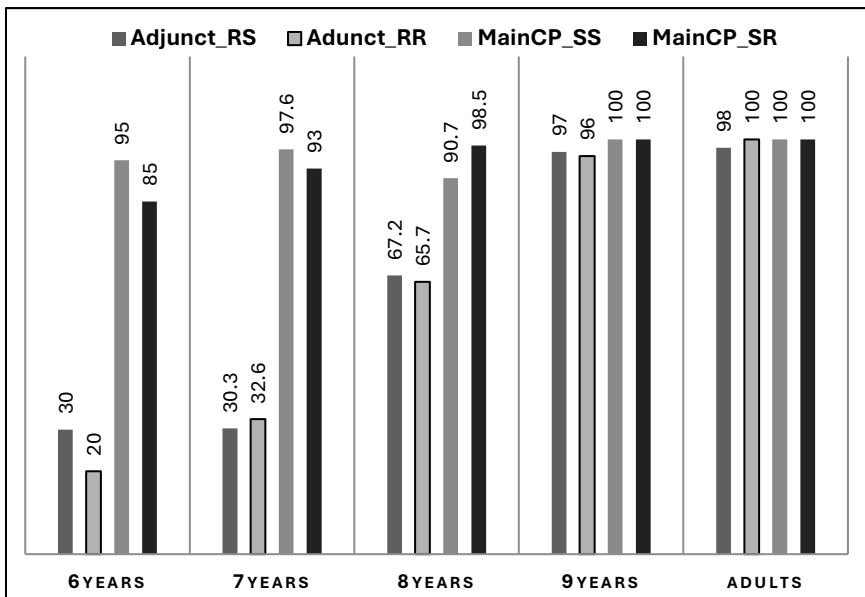


Figure 5: Children's accuracy on Experiment I

The accuracy rate increases significantly at the age of 8, when comprehension of Adjunct conditions elevates to 67.2% and 65% for Adjunct_RS and Adjunct_RR. However, the performance of 8-year-olds is still not adult-like, unlike 9-year-olds who perform at or near ceiling on all conditions. Interestingly, the performance of 8-year-olds show a split pattern with most of the participants being accurate on all items and some exhibiting a profile similar to 7-year-olds.

Overall, surface chronological order was consistently easier across age groups, while children's performance on reverse order show an age effect with 8 being a developmental milestone. Importantly, all children performed adult-like (98%-100%) in the fillers.

7. The Pluperfect with the overt aspectual marker *already*-Experiment II
7.1. Procedure and Conditions

Experiment II was designed to inspect whether the scalar aspectual marker *īdi* (already) affects children’s interpretation of event order. Specifically, the study examines if the presence of *īdi* facilitates children’s comprehension of the Pluperfect meaning (see the discussion regarding schema in (4)).

The procedure, conditions, and items of Experiment II were identical to Experiment I; the only difference was the presence of *īdi* (already) (8a-d).

The participants of Experiment II were 65 typically developing Greek monolingual children, aged 6-9. They were again divided into four age groups: Group A included 16 children 6-7 years old (mean age: 6;5, 9 male and 7 female). Group B included 22 children aged 7-8 years (mean age: 7;5, 14 male and 8 female). Group C consisted of 15 children aged 8-9 years (mean age: 8;4, 4 male and 11 female) and Group D included 12 children aged 9-10 years (mean age: 9;7, 6 male and 6 female). A control group of 12 Greek monolingual adults (mean age: 26 years, 4 male and 8 female) was also tested.

7.2. Results of Experiment II

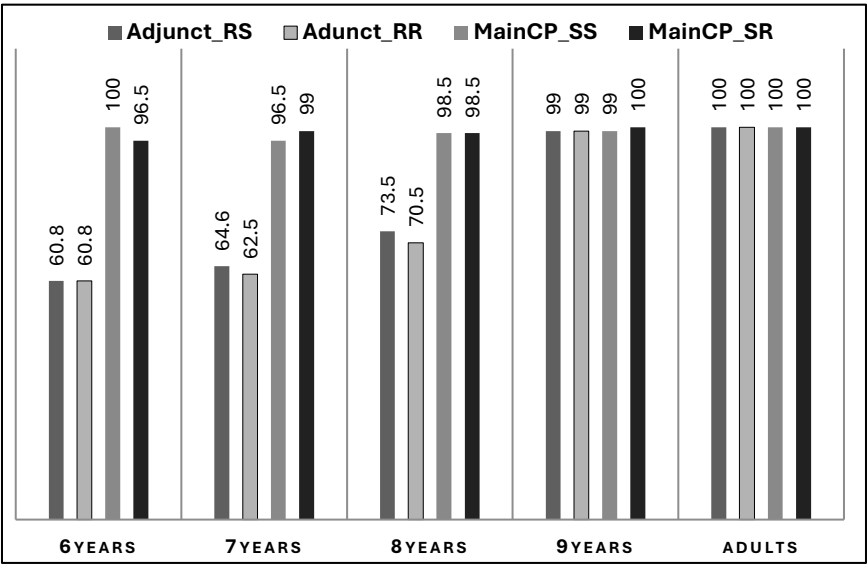


Figure 6: Children’s accuracy on Experiment II with Pluperfect + already

Figure 6 summarizes the results of Experiment II. Six- and seven-year-old children showed a significant improved accuracy in the Adjunct_RS and Adjunct_RR (reverse chronological order) conditions. Six-year-olds achieved 60.8% accuracy in these conditions in Experiment II in contrast to 30% and 20% in Adjunct_RS and Adjunct_RR in Experiment I. Similarly to what we observed

in Experiment I, the developmental milestone seems to occur at the age of 8 and children do not perform adult-like before the age of 9. All children perform at ceiling on all fillers.

8. Overall conclusions & Discussion

The present study sheds light on the production and the comprehension of the Pluperfect through spontaneous speech and experimental data in child Greek. Spontaneous production data suggest that the first occurrences of the Pluperfect emerge, strictly speaking, at around the age of 3 but it becomes productive after the age of 5. Child production of the Pluperfect shows that children make almost no use of the Past-in-the-Past meaning; all instances in our corpus show that children assign the Perfect-in-the Past meaning. Based on the production data, it is not clear how children interpret Pluperfect. That is, it is possible that in such instances children's temporal representation of the event is to locate it somewhere in the past (similarly to the Aorist interpretation). Thus, they may not yet fully understand that the Perfect-in-the-Past interpretation highlights the "result state" of the Pluperfect event and that the Past-in-the-Past introduces a new temporal point, locating the event prior to another past event (Ogihara 1996).

The findings from the comprehension experiment testing the Past-in-the-Past meaning demonstrate an adult-like understanding of the Pluperfect as long as the surface chronological order of events is preserved. Thus, although children make no use of the Past-in-the-Past meaning in spontaneous speech productions, they exhibit adult-like comprehension in the MainCP-conditions. However, this does not provide sufficient evidence as to whether children understand that the Past-in-the-Past meaning introduces a new reference time. Such concerns are enhanced by children's poor performance on the reverse chronological order in Experiment I (see also Clark 1971, Coker 1978, Feagans 1980, Natsopoulos and Abadzi 1986, Blything and Cain 2016, de Ruiter et al. 2018 a.o.). The presence of the adverbial *already* in Experiment II advances accuracy significantly for 6-, 7- and 8-year-olds on the reverse-chronological-order conditions (cf. Wagner 2001). The findings from Experiment II in comparison to Experiment I, indicates that the problems posed by the reverse-chronological-order-conditions can be mitigated by linguistic means, i.e. the overt adverb, and cannot be attributed to processing effects (Pyykkönen and Järviö 2012, Makrodimitris and Schulz 2025). We propose that children interpret *already* as the introducer of a salient temporal interval between the Event Time and the Reference Time. Consequently, *already* may ease the mapping between language and temporal interpretation by explicitly marking the separation between Event Time and Reference Time.

Overall, our findings show that children's mastery of the Pluperfect starts after the age of 8 and it is fully adult-like by the age of 9. This finding is well-matched with Karlsson et al.'s study (2019), who report no effect of chronological and reverse temporal order in children aged 9;0-12;0.

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