

Adverbial hierarchy and verb movement in the early production of Italian children

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Abstract

This paper investigates the syntax of Italian adverbs and the placement of finite and non-finite predicates in children's early spontaneous speech, aiming at shedding light on the relationship between adverb syntax and verb movement in early language acquisition. We analyzed the syntax of 31 adverbs in the spontaneous speech of 17 monolingual Italian-speaking children, aged 1;04 to 3;04. We verified whether the placement of adverbs in children's early production obeys the adverbial hierarchy as proposed in Cinque (1999), and how high the predicate moves in the fine-grained array of clausal projections. Our findings reveal that children's use of adverbs adheres to the hierarchy of functional projections proposed in theoretical literature (Cinque 1999/2006) from an early stage. Furthermore, our results indicate that verb placement is established in a target-like manner from early on, consistent with prior acquisition research (Clahsen 1990, Guasti 1993), reaching a clausal-medial position compatible with that identified for adults (Schifano 2018). Overall, this work provides a fine-grained picture of the adverbial hierarchy and of the placement of finite and non-finite predicates in Italian children's early productions.

Keywords: adverbs, hierarchy, verb, movement, Italian.

1. Introduction

Since Pollock (1989), it is well known that Romance finite verbs move into the Tense domain (from here on referred to as TP). This conclusion holds for both adults' and preschool children's grammars (Belletti 1990, Guasti 1993, Cinque 1999, Caprin & Guasti 2009, Lorusso 2015). With the advent of the cartographic approach, most notably Rizzi (1977) and Cinque (1999), theoretical advances have been made in understanding the architecture of the functional projections constituting the clausal spine, which has yielded an extremely detailed empirical mapping of the verb placement in Romance. Following the principles outlined in Pollock (1989) and Cinque (1999), various studies have applied the transitivity property to the sequence of adverbs and used adverbs as a revealing tool to detect the position of the finite/non-finite predicate as well as of other constituents (Schifano 2018, Groothuis 2022, among others). The model of language consequently proposed has thus reached a high degree of observational and descriptive adequacy.

While this is true for adults' grammar, our understanding of the verb placement in child language has remained essentially limited, as no studies have exploited the cartographic array of functional projections. More generally, we lack for Romance child language the fine-grained picture of the verb movement microvariation reached for adult Romance languages (e.g., Schifano 2018, Groothuis 2022, Tescari-Neto 2022). Not only do we lack a detailed empirical mapping of the verb placement in child language, but we also do not have a good understanding of the syntax of adverbs in child language. This missing piece may contribute to both theory and acquisition in shedding light onto the architecture of functional hierarchies and, more generally, of clausal projections in early production. Our study embraces these challenges and fills some of these gaps, by investigating the syntax of adverbs and the verb placement in Italian child language, following the methodology of theoretical works.

This paper is structured as follows: first, we will summarize the literature background on adverbs and verb movement both in adults and child speech (Section 2). Second, we will present our study, based on the spontaneous speech analysis of 17 monolingual Italian-speaking children between 1;04 and 3;04 (Section 3). Based on the analysis of the relative orders between adverbs and other constituents in the clausal spine, Section 4 will show that our results are in line with previous theoretical works. Section 5 discusses the implication of our work and Section 6 concludes the paper.

2. Previous studies

In this section, we will first present our theoretical framework, focusing on the hierarchy of adverbs as proposed by Cinque (1999/2006). We will explore how this hierarchy can be instrumental in understanding verb movement in Italian, drawing on Schifano's (2018) analysis. Next, we will summarize current acquisition studies related to adverbs and verb movement.

2.1. Theoretical background on adverb placement and verb movement

Cinque's analysis of adverbs has significantly impacted the cartography of syntax for over the last two decades, positioning adverbs among the key elements that determine

[illegible]

Evidence supporting the hierarchy in (2) comes from the consistent sequencing of auxiliaries, verbal affixes, and functional particles across languages, which mirrors the ordering of adverbs. Since adverbs remain in their first-merged position in pragmatically unmarked sentences, unless involved in focalization or other A-bar movements (Cinque & Rizzi 2010), they have been used as a heuristic tool to reveal the position of other constituents. For instance, the height of verb movement can be established by testing the relative order between the verb and the adverb in its neutral, intonationally-flat position (Pollock 1989, Belletti 1990, Cinque 1999, among others). As a matter of fact, while adverbs maintain a fixed position and consistent properties cross-linguistically, languages exhibit variability in the movement of other constituents relative to adverbs, e.g., how high the finite predicate raises. By looking at event-related adverbs and negation, Pollock (1989) was able to detect how far from the VP the verb moves in English and French. Sentence pairs such as (3) and (4) were used as diagnostics.

- (3) V > Adv
 a. Jean embrasse souvent Marie.
 b. * John kisses often Mary.
- (4) Adv > V
 a. * Jean souvent embrasse Marie.
 b. John often kisses Mary.

The contrasts reported above are due to longer or shorter movement of the verb, which raises past the adverb in French but not in English. Further evidence from tensed clauses and infinitives led Pollock to conclude that the I(nflection)P(hrase) needed to be split into a higher T(ense)P(hrase) and a lower Agr(eement)P(hrase), in the middle of which a Neg(ation)P(hrase) may also intervene. Each of these projections hosts a head which can be the target of verb movement, depending on the type of sentence and the specific properties of the language. The movement of the verb consists of successive steps, and no movement to T is allowed if movement to lower heads has not occurred.

A further step was made by Cinque (1999) in proposing that the hierarchy in (1,2) is governed by a relation of transitivity (Cinque 1999, Cinque & Rizzi 2010, Cinque 2013, see also Pollock 1989). Cinque (1999: 6, 48) shows that transitivity can effectively predict the positioning of the order of adverb pairs. If an adverb α precedes an adverb β , and the adverb β precedes an adverb γ , then the adverb α also precedes the adverb γ . Likewise, transitivity can also be used to predict the position of constituents other than adverbs. For instance, let us consider two adverbs, α and β , which are ordered such that α precedes β . If a constituent XP cannot follow α , it cannot follow β either (5a). Similarly, if XP cannot precede β , it cannot precede α (5b). The reason for this lies in the syntax: the ordering of a constituent and an adverb is not computed as the linear ordering between the two of them, but as the result of movement within the hierarchical clause structure.

- (5) a. If $\alpha > \beta$,
 $*\alpha > XP \rightarrow *\beta > XP$

- b. If $\alpha > \beta$,
 $*XP > \beta \rightarrow *XP > \alpha$

By using these diagnostics, verb placement in various languages has been successfully investigated in various studies, thereby reaching a high descriptive adequacy of the cross-linguistic variation (Pollock 1989, Belletti 1990, Cinque 1999, 2006, Ledgeway & Lombardi 2005, Schifano 2018, Groothuis 2022, Tescari-Neto 2022, among others.). Verb placement is indeed a property which differentiates Romance languages (Ledgeway & Lombardi 2005, Schifano 2011/2018 among many others). Whereas Cinque (1999) mainly discussed the verb position in standard Italian, Schifano (2018) tested the placement of the verb across Romance varieties, by using a subset of adverbs included in Cinque's adverbial hierarchy as a tool to identify verb variation in the Northern (Milan, Lombardy), Central (Fabriano, Marche and Rome, Lazio) and Southern regional (Calabria) varieties of Italian. We limit the topic to Northern and Central regional Italian as they will be relevant for our study. Focusing on the placement of the indicative verb in declarative clauses, Schifano (2018) demonstrated that on a parallel with observation about standard Italian (Cinque 1999/2006), in Northern and Central regional Italian the verb raises to a position situated at the low boundaries of the HAS. Indeed, the predicate follows high adverbs but precedes those which lexicalize the bottom positions of the HAS, like *apposta* 'intentionally'.

- (6) Northern Regional Italian (Schifano 2018: 8-9)
- a. Gianni (***confonde**) forse **confonde** questa poesia con un' altra
 Gianni perhaps confuses this poem with an other
 'Perhaps G. confuses this poem with another.'
- b. Gianni **parla** apposta (***parla**) con un accento napoletano
 Gianni speaks intentionally with an accent Neapolitan
 'Gianni speaks with a Neapolitan accent on purpose.'

In addition, the verb precedes the presuppositional negator *mica*, which marks the uppermost boundary of the LAS (Schifano 2018: 9).

- (7) Gianni non **conosce** mica (***conosce**) quel ristorante
 Gianni not knows NEG.PRES that restaurant
 'Gianni does not know that restaurant.'

Hence, in Northern and Central regional Italian as well as in standard Italian the verb reaches a clause-medial position, sandwiched between Asp(frequentative) and Mod(volitional).

Finally, for non-finite verbal forms, Cinque (1999) applied the same diagnostics used for finite predicates and concluded that the active past participle in Italian raises to a position above *tutto* 'everything'.¹

¹ See also Tescari-Neto (2019/2022), who further widens the range of microvariation between Romance languages, individuating a precise cline for the different heights to which the active past participle must raise in Romance languages within the LAS.

(8) Italian (Cinque 1999: 45)

Da allora, non hanno di solito mica più sempre **rimesso**
 Since then, not have of usual not any longer always put
 completamente **rimesso** tutto (***rimesso**) bene in ordine.
 completely put everything put well in order
 ‘Since then, they haven’t usually not any longer always put everything well in order.’

Throughout this work, by adopting a cartographic approach (Cinque & Rizzi 2010), we assume that adverbs are licensed as specifiers of dedicated functional projections, which enter the derivation in a fixed order as in (2). As in Cinque (1999), we further assume that the hierarchy in (2) is governed by transitivity. Finally, we consider Cinque’s (1999) and Schifano’s (2018) conclusions on standard Italian as representative of the Italian adult-grammar. Therefore, the final landing site of the finite predicate is a clausal-medial position sandwiched between Asp(frequentative) and Mod(volitional), whereas the active past participle targets a position sandwiched between Asp(perfect) and Asp(pl-completive).

2.2. Acquisitional studies on adverb placement and verb movement

The observation that adverbs are hierarchically merged along the clausal spine in a fixed order as in (1,2) finds large support cross-linguistically, in adult languages, but the acquisition of the adverbial hierarchy has never been verified in monolingual child language (see Pirvulescu et al. 2022 for an analysis of the adverbial hierarchy and the role of language transfer in French L3 learners and Schlyter 2005 for a comparison between the acquisition of aspectual and temporal adverbs in bilingual Swedish/French children). Moreover, previous works on adverbs have mainly focused on the comprehension (Clark 1971, Harner 1975, Mandić 2011, Xu 2016, among others) or the production (Liang, Wu & Li 2019, Li et al. 2022, Surakka & Kirjavainen 2024) of specific adverbs, such as manner, aspectual and temporal. Some studies found a low frequency of adverb production in early speech (see Pačesová 1968 and Chejnová 2017 for Czech), especially when compared to other more concrete and imageable words such as nouns (Li & Fang 2011 for English). Other studies on English-acquiring children have highlighted the relevance of adverbs in the acquisition of novel adjectives (Syrett & Lidz 2010) and verb learning (Syrett, Arunachalam and Waxman, 2013). As for Italian, a few comprehensive studies investigated the first vocabulary development of Italian children (Caselli et al. 1995, Caselli & Casadio 1995, Caselli et al. 2016, D’Odorico et al. 2001 among others), without a specific focus on adverbs. Patrizi & Sanfelici (2024) focused on the timing of production of adverbs (considered as lexical elements) in Italian children, finding the positive member of antonymic pairs emerging before the negative one, in line with previous studies (Clark 1972, Barner & Snedeker 2008, Pagliarini et al. 2022) with an order of acquisition from the bottom to the top of the tree, possibly compatible with the *Growing Trees Approach* (Friedmann et al. 2021).

Conversely, a vast body of research has focused on verb placement and the acquisition of V-to-I inflection, providing evidence for the setting of verb movement before onset of multiword utterances in L1 acquisition. Considering verb distribution with respect to negation, French children consistently display finite verbs before the

negation and infinitival verbs after the negation before 2 years, showing knowledge of V-to-I raise (Pierce 1992, Déprez & Pierce 1993, among others). The same holds for German (e.g. Poeppel & Wexler 1993). Young English learners move auxiliaries (but not lexical verbs) before the negation (Harris & Wexler 1996). Stromswold (1990) and Guasti (2000) showed that English children use between 93% and 99% correct subject-auxiliary inversion in yes/no questions, proving further evidence that auxiliaries are raised in English from early on.

The V2 parameter is a well investigated diagnostic of verb movement in Germanic languages. Many studies showed that, from a very young age, while finite verbs are more often placed in V2/not final position, infinite verbs are more often found in not V2/final position (see Clahsen 1990, Poeppel & Wexler 1993 for German, Platzack 1990, Waldmann 2012 for Swedish, Plunkett & Strömquist 1993, Hamann & Plunkett 1998 for Danish, Westergaard, 2005 for Norwegian).

According to Costa & Loureiro (2006), in languages where verb movement is accompanied by a clear morphological correlate, such as Portuguese, the relevant trigger for setting V-to-I movement may be morphological rather than word order (see also Guasti, 2016 for an overview on Italian, Catalan and Spanish). Moreover, Santos (2006), and Costa & Santos (2010) found that Portuguese-speaking children use VP ellipsis,² which requires mastery of V-to-I movements, in verbal answers to yes/no questions. Costa & Friedmann (2009) investigate cross-linguistic differences in the early placement of VS and SV orders, proposing that only after subject movement to Spec, IP is acquired, can the verb move before the subject, and VS configurations with unergative and transitive verbs consequently appear.

As for Italian, Lorusso (2015) demonstrated that children distinguish between auxiliaries from the very early stages and this distinction is driven by the presence of an overt direct object. Guasti (1993/94) analyzed the spontaneous placement of clitics and the use of infinitives, demonstrating that Italian children as young as 1;10 distinguish between finite and infinitive verbs and exhibit knowledge of the verbal agreement system from the earliest stages of acquisition. This idea is further strengthened by Caprin & Guasti (2009) who found that Italian learners show a knowledge of tense and distinction between copula and auxiliaries by 30 months of age.

By contrast, research on non-finite predicates is quite scarce and mainly interested in the morphological inflectional domain. Among non-finite forms, past participles have been reported to be produced frequently (e.g. Antelmi 1997, Camaioni 1980). Unlike what has been found for other languages, Italian children rarely produce infinitives in the place of main verbs (Rizzi 1993), i.e., they fail to produce root infinitives (instead they produce finite verbs usually with present tense morphemes). Inflectional morphemes associated with the verb are gradually acquired, but this acquisition is almost error free (Caprin & Guasti 2009). A small percentage of bare past participles is found in Italian child language, which have been interpreted as forms of the *Passato Prossimo* lacking the overt expression of the auxiliary, since most of the children used them in contexts in which *Passato Prossimo* is generally used (Guasti 1993, Caprin & Guasti 2009). Conversely, gerunds are very infrequent (Caprin &

² An example of VP-ellipsis in verbal answers in European Portuguese (Costa & Santos 2010): A: Tu vais comprar o livro? (You go-2SG buy- INF the book; “Are you going to buy the book?”) B: Vou. (Go-1SG; “Yes.”).

Guasti 2009). Other studies have investigated the agreement between the active past participle and the object (Antinucci & Miller 1986, Tedeschi & Moscati 2009). Yet, no studies we are aware of have investigated the placement of active past participles in child language.

3. Our Work

No studies we are aware of have carefully investigated the syntax of adverbs nor the position of finite verbs with respect to the wide selection of hierarchically-ordered adverbs in L1 acquisition, as laid out in (1,2). To fill this gap, our work investigates the structure of the adverb hierarchy and, in turn, the position of (non-)finite predicates respective to the adverb hierarchy in Italian children's early speech.

3.1. Research questions

Two research questions were formulated:

- (Q1) Does the placement of adverbs in children's early production obey the adverbial hierarchy as proposed in Cinque (1999)?;
- (Q2) How high does the predicate move in the fine-grained array of clausal projections?

If children's early production is constrained by the same mechanisms as adults' grammar, multiple adverbs should be placed in the same order provided by UG, as proposed in theoretical studies (Cinque 1999). In addition, the finite predicate is expected to rise to a TP-medial position in line with previous acquisition studies (Guasti 1993). Orthogonally, following Schifano (2018), we will verify whether differences emerge in children's verb placement due to the diverse regional varieties they were plausibly exposed to.

3.2. Material and Methods

We analyzed the same material of Patrizi & Sanfelici (2024), which consisted in the spontaneous speech included in 155 files from 5 different corpora of 17 monolingual Italian-speaking children (10 females), ranging from 1;04-3;04 (years;months), extracted from CHILDES database (MacWhinney, 2000). Children's productions were investigated with respect to their wMLU,³ according to previous literature (Caprin & Guasti 2009; Sanfelici & Gallina 2022), to avoid the high variability in the linguistic development among children in the same age range (Table 1).

³ Since only the Tonelli corpus provides a morphosyntactic annotation, which allows for calculating MLU in morphemes, we computed the word MLU, in order to provide a uniform analysis across corpora. Moreover, research shows that utterance segmentation in words is less prone to subjectivity and allows for easier replications (Ezeizabarrena & Garcia Fernandez 2018).

Table 1. The corpora analyzed.

Corpus	Sample N	Age range	Total words	wMLU range	Regional Italian ⁴
Antelmi	1 (Camilla)	2;02-3;04	7376	2.6-4.6	Northern
Tonelli	3 (Elisa; Marco; Gregorio)	1;05-2;05	22214	1.1-4.9	Northern
Roma	1 (Francesco)	1;04-1;08	1379	1.2-1.6	Central
Calambrone	6 (Diana; Martina; Rosa; Guglielmo; Viola; Raffaello)	1;07-3;03	47137	1.2-5.5	Central
D'Odorico	6 (Claudia; Linda; Lorenzo; Federica; Veronica; Davide)	1;04-2;06	5509	1.1-2.3	Northern

Through the CLAN (*Computerized Language ANalysis*) program and related tools (MacWhinney, 2000), we initially searched for all Italian adverbs reported in Cinque's and Schifano's hierarchies. We found 31 adverbs in 1481 productions, which we included in our analysis (Table 2).

Table 2. Adverbs extracted from the corpus and considered for our analyses.

Adverb Projections	Lexical item (N of occurrences)	Total N of occurrences
Mood(speech act)	<i>allora</i> 'hence' (137); <i>poi</i> 'thus'(124); <i>ora</i> 'now/thus' (42)	303
Mood(irrealis)	<i>forse</i> 'maybe' (9)	9
T(present/past/future)	<i>poi</i> 'after/then/later' (233); <i>allora</i> 'then' (16); <i>ora</i> 'now' (313); <i>adesso</i> 'now' (81); <i>subito</i> 'immediately' (9); <i>presto</i> 'soon' (2); <i>ieri</i> 'yesterday' (6); <i>oggi</i> 'today' (20); <i>domani</i> 'tomorrow' (20); <i>prima</i> 'before' (27); <i>dopo</i> 'after/then/later' (100)	827
Asp(repetitive/frequentative)	<i>spesso</i> 'often' (1); <i>di nuovo</i> 'again' (5); <i>ancora</i> 'again' (42)	48
Neg(presuppositional)	<i>mica</i> 'at all' (5); <i>nemmeno</i> 'even' (1), <i>affatto</i> 'at all' (1)	7
T(anterior)	<i>già</i> 'already' (28)	28
Aspect(terminative)	<i>più</i> 'anymore' (42)	42
Aspect(continuative)	<i>ancora</i> 'still' (114)	114
Aspect(perfect)	<i>sempre</i> 'always' (35), <i>mai</i> 'never' (7)	42
Aspect(proximate)	<i>presto</i> 'soon' (1)	1
Aspect(prospective)	<i>quasi</i> 'almost' (1)	1
Voice	<i>bene</i> 'well/good' (54); <i>male</i> 'badly' (2); <i>veloce</i> 'quickly' (2); <i>di fretta</i> 'quickly' (1)	59

Productions were annotated for (i) adverb class, (ii) syntactic context (clause-type) in which adverbs occurred, and (iii) their position in the clause relative to other adverbs, finite verbs, subject and object DPs, and negation. To illustrate, the production in (9), which contains the adverb *allora* 'hence', received the annotation Speech Act, declarative CP, and the sequence Adv-SubjDP-V-ObjDP for parameters (i-iii).

⁴

The terms used in this column meet the definitions in Schifano (2018).

- (9) (Antelmi, Camilla, 3,01,00)
 allora io sono la maestra
 hence I am the teacher
 ‘Hence I am the teacher.’

For the purposes of our study, we excluded productions in which the adverb appeared in isolation, as in (10a), and with a DP or a PP exclusively, as in (10b). These, which amount to 351 occurrences, were indeed not relevant to address our two research questions as they contained neither another adverb (RQ1) nor a verb (RQ2).

- (10) a. (Tonelli, Marco, 1,10,12)
 (a)ncora.
 again
 ‘Again.’
 b. (Tonelli, Gregorio, 1,09,24b)
 mamma dopo.
 mum afterwards
 ‘Mum, afterwards.’

All the remaining 1130 sentences contained either two adverbs ($N=3$) or at least one adverb and a predicate. As for the predicate, 1092 occurrences contained a finite verb, whereas 35 productions exhibited the predicate in its non-finite, either participle or gerund, form. To address our first research question, we analyzed the total of 1130 productions. To address our second question, we limited our survey to declarative sentences with a finite/non-finite predicate, namely 952 productions, thereby following Cinque (1999/2006)’s and Schifano (2018)’s methodology (see Section 2.1). To our corpus of adverbs (Table 2), we also added the productions containing the high sentential negation *non* ‘not’, which was used as a further marker to detect verb movement as in Pollock (1989). 822 sentences including the negation *non* ‘not’ were extracted, 624 of which consisted of declarative sentences (we excluded interrogative and exclamative sentences from this analysis) and the remaining contained no finite verb.

4. Results

We analyzed the relative orders between adverbs and other constituents in the clausal spine. Much in the spirit of Pollock’s (1989) and Cinque’s (1999) works, we applied the transitivity property to the sequence of adverbs attested in children’s productions and used adverbs as a revealing tool to detect the position of the finite/non-finite predicate in the structure.

4.1. The relative order of adverbs

We first focused on the relative order between different adverbs in children’s productions. Thus, we considered all syntactic contexts in which two or more adverbs appeared in children’s speech, which also included productions of adverbs exclusively, i.e., contexts without a predicate. Our expectation was the following: if adverbs follow

the hierarchy in (2), we expect that for any adverb pair the two adverbs exhibit an order such that, if one is higher than the other, the former precedes the latter. For instance, given the adverb pair *ora–spesso*, *ora* ‘now’ was expected to precede *spesso* ‘often’, since the former is higher –being merged in T(present/past)–than the latter –Asp(frequentative). We illustrate the relative ordering with examples from (11) to (21).

Mood(speech act)>Mood(irrealis)

- (11) (Calambrone, Guglielmo, 2,09,06)
allora forse è (.) un maiale.
 thus maybe is a pig
 ‘Thus, maybe it’s a pig.’

Mood(speech act)>T(present/past/ future)

- (12) (Antelmi, Camilla, 2,06,19)
 ma **poi** la facciamo **dopo**?
 but then CL.3SG do.1PL later
 ‘But then, do we do it later?’

Mood(irrealis) > T(present/past/future)

- (13) (Tonelli, Marco, 1,09,15)
forse [/] (**f**)**orse** **essò@wp** [:**adesso**].
 maybe now
 ‘Maybe now.’

Mood(irrealis) > Asp(continuative)

- (14) (Tonelli, Elisa, 2,01,22)
 ma **forse** cucio **ancora**.
 but maybe sew.1SG still
 ‘But I may still sew.’

T(present/past/future)>Asp(continuative/repetitive/frequentative/terminative)

- (15) (Calambrone, Diana, 2,06,13)
 e **poi** quetto va **sempre** qui
 and later this goes always here
 ‘And then this goes always here.’
- (16) (Calambrone, Diana, 2,06,00)
ola [:**ora**] ha **ancora** [:**ancora**] fame.
 now has still hunger
 ‘Now she is still hungry.’

- (17) (Calambrone, Rosa, 2,10,14)
ora non va **pè** [:più].
 now not goes anymore
 ‘Now it does not function anymore.’

T(present/past/future) > Neg(presuppositional)

- (18) (Antelmi, Camilla, 2,09,04)
ora non si sente **mica**.
 now not CL.3SG hears at all
 ‘Now it cannot be heard at all.’

T(present/past/future) > T(anterior)

- (19) (Calambrone, Marco, 2,04,13)
ora loro xxx **già** a letto.
 now they V already in bed
 ‘Now they are(?) already in bed.’

T(present/past) > Voice

- (20) (Calambrone, Diana, 2,06,13)
 e **ola** [:ora] dorme **male**.
 and now sleeps badly
 ‘and now it sleeps badly.’

T(anterior) > Voice

- (21) (Tonelli, Marco, 1,09,01)
già [<] **bene**.
 already well
 ‘Already well.’

The results for each pair of functional heads are summarized in Table 3.

Table 3. Number of sentences produced by children for each adverb pair.

Adverb pair	Sentences	Children
Mood(speech act) > Mood(irrealis)	2	Camilla, Guglielmo
Mood(speech act) > T(present/past/future)	11	Camilla, Guglielmo, Diana, Elisa, Marco
Mood(speech act) > Asp(terminative)	2	Diana, Elisa
Mood(speech act) > Voice	7	Guglielmo
Mood(irrealis) > T(present/past/future)	1	Marco
Mood(irrealis) > Asp(continuative)	1	Elisa
T(present/past/future) > Asp(repetitive/frequentative/terminative/continuative)	7	Diana, Marco, Guglielmo, Elisa, Rosa
T(present/past/future) > Neg (presuppositional)	1	Camilla

T(present/past/future) > T(anterior)	3	Marco, Guglielmo
T(present/past/future) > Voice	7	Marco, Guglielmo, Diana, Camilla
T(anterior) > Voice	1	Marco

In all the occurrences, the relative order between the two adverbs of the adverb pairs is consistent with the hierarchy proposed in (2). When combining the orders of each adverb pair and applying the transitivity property to the word orders attested, our results show that children's adverbs follow a hierarchy similar to that in (2).

Due to the lack of relevant examples, the relative order between Asp(repetitive) and Asp(frequentative) could not be determined. Likewise, we could not derive the relative order between T(anterior) and Asp(continuative/terminative/perfect) and the order between Asp(continuative/terminative/perfect) and Voice. Yet, T(anterior) precedes Voice. Accordingly, we revise the hierarchy in (2), leaving the order between these functional projections unspecified: which is signaled by means of a /. Thus, the hierarchy of adverbs Italian children obey is reported in (22).

- (22) Mood(speech act) > Mood(irrealis) > T(present/past/future) >
 Asp(repetitive/frequentative) > Neg(presuppositional) > T(anterior)/
 Asp(terminative/continuative/perfect) > Asp(terminative/continuative/
 perfect)/ Voice

4.2 The relative order between adverbs and finite/non-finite predicates

We then focused on the relative order between adverbs and the finite/non-finite predicate in children's productions. Thus, we considered only those syntactic contexts in which at least a predicate (either finite or non-finite) and one adverb were produced in a sentence by children. Our expectation was the following: if children correctly place the verb as reported in previous studies, we expect higher adverbs to precede the verb and, *vice versa*, lower adverbs to follow the verb.

As for adverbs merged in Mood(speech act), children place the adverb before the predicate in 89,13% of the cases as in (23). In 10,87% of the occurrences, the adverb follows not only the verb but the entire sentence, thereby appearing in a sentence-final position (24).

- (23) (Tonelli, Marco, 2,01,11)
 eh, **poi** verrebbe così.
 eh then come.COND.3SG so
 'Eh, thus it would turn out like this.'

- (24) (Tonelli, Marco, 2,00,00)
 sono di [/] di nero **forse?**
 are of black then
 'Are black, then?'

We highlight that the post-verbal position of Mood(speech act) is not peculiar to any child and it is not the exclusive order in any child's production. The children who place the adverbs in post-verbal position are a subset of the children from different Italian regions, i.e., Diana, Raffaello, Rosa, Gregorio, Camilla, Elisa. All of them also

produce sentences with these adverbs in preverbal position. The latter order is indeed attested in the majority of the instances.

A similar conclusion applies to Mood(irrealis): in all three occurrences the Mood(irrealis) adverb is placed before the finite predicate as in (25) (see also (14)). We acknowledge that the three occurrences were produced by only one child, Elisa.

- (25) (Tonelli, Elisa, 1,10,18)
 lo fascia perché (.) **forse** lo mette qua.
 CL.3SG binds because maybe CL.3SG places here
 ‘She binds it because she may place it here.’

T(present/past/future) adverbs preceded the finite predicate in 89,9% of children’s occurrences (26). In the remaining 10,1% of instances, the adverb followed not only the verb but the entire clause, as in (27).

- (26) (Calambrone, Guglielmo, 2,09,06)
ora il cavallo &e &e esce e **poi** ritorna.
 now the horse goes_out and then comes_back
 ‘Now the horse goes out and then comes back.’

- (27) (Antelmi, Camilla, 3,04,09).
 l’ ho trovato **ora**.
 CL.3SG have found now
 ‘I have found it now.’

A subset of children from diverse Italian regions, i.e. Camilla, Marco, Elisa, Gregorio, Guglielmo, Rosa, Raffaello and Diana, produced utterances with these adverbs in sentence-final position. Notably, all of them also produce sentences with these adverbs in preverbal position, which happened in the majority of their occurrences.

Conversely, all lower adverbs exhibited the opposite order: they followed the predicate in most of the occurrences. Aspectual adverbs, i.e., Asp(repetitive), Asp(frequentative), Asp(terminative), Asp(perfect), Asp(proximative) and Asp(prospective), followed the finite predicate in 85% of the occurrences as in (28-34).

- (28) (Calambrone, Diana, 2,06,13)
 scegli-mi **ancora**.
 choose-me again
 ‘Choose me again!’
- (29) (Tonelli, Marco, 2,02,11)
 non mi ricordo **più**.
 not CL.1SG remember anymore
 ‘I do not remember it anymore.’

- (30) (Antelmi, Camilla, 2,11,17)
 e quando andiamo in macchina lo lasciamo **ancora** lì.
 and when go in car CL.3SG leave still there
 ‘And when we go by car, we leave it still there.’
- (31) (Antelmi, Camilla, 3,04,09)
 quelle che racconti te non finiscono **mai**?
 those that tell you not finish ever
 ‘Those that you tell, don’t they ever finish?’
- (32) (Calambrone, Guglielmo, 2,11,01)
 perché gli dà **sempre** le botte.
 because CL.DAT.2SG gives always the bumps
 ‘Because he always gives him bumps.’
- (33) (Antelmi, Camilla, 3,04,09)
 finiscono **presto**.
 end soon
 ‘(My stories) end soon.’
- (34) (Tonelli, Marco, 2,03,29)
 ci sono **quasi**.
 there am almost
 ‘I am almost there.’

While these adverbs mostly follow the finite predicates, they always precede the non-finite verb as in (35-36).

- (35) (Tonelli, Elisa 2,01,20)
 non l’ ho **ancora** co(m)prata.
 not CL.3SG have yet bought
 ‘I have not bought it yet.’
- (36) (D’Odorico, Davide, 2,00,02)
mai viste
 never seen
 ‘never seen them.’

In 15% of the relevant productions, they preceded the finite predicate as in (37-38).

- (37) (Calambrone, Rosa, 2,07,26)
sempre cacca petto!
 always falls this
 ‘This always falls.’

- (38) (Calambrone, Diana, 2,06,00)
 oh **ancola** [: ancora] fame ce l' ha!
 oh still hunger there CL.3SG has
 'Oh he is still hungry.'

As seen for other adverbs, only few children produced the preverbal order in very few instances, i.e., Rosa (N=6), Diana (N=3), Guglielmo (N=3) and Marco (N=1). Also in this case, no regional influence can be found, as these children were from the central and northern areas of Italy. All of them placed these aspectual adverbs post-verbally in the majority of their productions. The preverbal positioning of these adverbs may plausibly be due to pragmatic motivations.

The Neg(presuppositional) adverbs *mica* 'at all', *nemmeno* 'even', *affatto* 'at all' followed the finite predicate in all the occurrences as in (39). Interestingly, in sentences with a past-tensed predicate, Neg(presuppositional) adverbs are found between the auxiliary and the participle as in (40).

- (39) (Antelmi, Camilla, 2,09,04)
 io non mi no non lo prendo **mica** la scossa.
 I not CL.DAT.1SG no not CL.3SG take at_all the shock
 'I do not get a shock at all.'

- (40) (D'Odorico, Davide, 2,00,02)
 ho **mica** visto tappo.
 have at_all seen cap
 'I have not seen the cap at all.'

The same observations hold for T(anterior): in all occurrences the adverb *già* 'already' follows the finite predicate and, in sentences with predicates inflected for past tense, *già* is sandwiched between the auxiliary and the participle or the gerund as in (41-42).

- (41) (Calambrone, Diana, 2,05,01)
 sì (.) ecco-lo è **già** llivato [:arrivato]!
 yes here-CL.3SG is already arrived
 'Yes, here he is. He has already arrived.'

- (42) (Antelmi, Camilla, 3,04,09)
 loro stanno **già** dormendo.
 they stay already sleeping
 'They are already sleeping.'

Voice adverbs always follow the finite predicate as in (43) (see also (20)). These adverbs plausibly follow the participle. We say "plausibly" because this happens in two instances only, which unfortunately lack the finite predicate, as in (44), thereby rendering the interpretation of the productions less straightforward.

- (43) (Calambrone, Raffaello, 2;11,09)
 guarda eh non gira **bene**.
 look eh not turns well
 ‘Look, it does not turn well.’

- (44) (Tonelli, Marco, 2;00,27)
 timato [: sistemato] **bene** io.
 fixed well I
 ‘I (have) fixed it well.’

Finally, the finite predicate always preceded the higher sentential negation *non*, which in turn preceded the clitic complex when present, as in (45-46) (see also (29, 35)).

- (45) (Antelmi, Camilla 2;11,17)
non la vedo la sua mamma.
 not CL.3SG see the his mum
 ‘I do not see his mum.’

- (46) e **non** te li do più.
 and not CL.2SG.DAT CL.3PL give anymore
 ‘and I don’t give them to you anymore.’

On the basis of our results, we conclude that the finite predicate reaches a clause-medial position below Mood(irrealis) and above Asp(repetitive). Conversely, the past participle raises to a position lower than T(anterior) and Asp(perfect) and possibly higher than Voice. Children’s verb movement is essentially target-like from the very early productions as it conforms to the adults’ grammar outlined in Section 2.1.

5. Discussion

This paper investigated the syntax of adverbs and the verb placement in Italian child language, answering two research questions: (Q1) Does the placement of adverbs in children’s early production obey the adverbial hierarchy as proposed in Cinque (1999)?; (Q2) How high does the predicate move in the fine-grained array of clausal projections? The spontaneous productions of 17 Italian-acquiring children in an age range from 1;04 to 3;04 were analyzed.

As for (Q1), combining the orders of each adverb pair and applying the transitivity property to the word orders attested, we demonstrated that children’s adverbs essentially follow the hierarchy in (2). More precisely, due to the lack of relevant examples which did not allow us to determine the relative order between some functional projections, we concluded that Italian children obey a hierarchy similar to that of adults, which was proposed in (22), here repeated as (47).

- (47) Mood(speech act) > Mood(irrealis) > T(present/past/future) >
 Asp(repetitive/frequentative) > Neg(presuppositional) > T(anterior)/

Asp(terminative/continuative/perfect) > Asp(terminative/continuative/perfect)/ Voice

Our finding is consistent with the cartographic hypothesis according to which the functional sequences, i.e., the hierarchies of functional categories from distinct extended projections, are a construct of the initial stage of the language faculty, the UG, and thus, would not show cross-linguistic variation (Benincà and Munaro 2011; Cinque 1999; Cinque and Rizzi 2010; Rizzi and Cinque 2016). As a matter of fact, no variation in the adverbial hierarchy is observed in children's productions, as children's adverbial hierarchy essentially matches that of Italian adults reported in the theoretical literature.

As for (Q2), we demonstrated that the finite predicate in declarative clauses raises to a clause-medial position which is sandwiched between the upper bound Mood(irrealis) and the lower bound Asp(repetitive). The verb placement in children's productions is error-free and matches that of Italian adults (see Section 2.1). Our data did not allow us to detect a possible influence of the regional Italian varieties in children's verb placement, which was instead substantially consistent and similar across all children. Recall indeed that Schifano (2018) convincingly argued that the finite verb raises to a similar position in declarative sentences in Northern and Central regional Italian and Standard Italian. The very few instances of deviant word orders found in the corpus were produced by a subset of children, who also produced the expected word order in the majority of their sentences. Indeed, no child exhibited only the deviant word order. Moreover, the reported deviant word orders are also attested in the target adult grammar as instances of adverb extraposition or focalization. Children's productions are plausibly compatible with these interpretations. Interestingly, children displaced Mood(speech act) and T(present/past) adverbs not only after the finite predicate but to a sentence-final position, which suggests that these deviant word orders could be plausibly treated as instances of extraposition. *Vice versa*, aspectual adverbs were displaced to a sentence initial position (in a few instances a discourse particle preceded the displaced adverb). Although the transcript did not contain audio files –and thus we could not check the prosody of these utterances–, this positioning is compatible with a focalization of the adverb to the left periphery.

Our findings also demonstrated that the active past participle raises to a position lower than T(anterior) and Asp(perfect) and possibly higher than Voice. As for the finite predicate, the verb placement of the active past participle in children's productions essentially matches that of adults. Due to the lack of relevant data, we could not determine whether the active past participle can also move above Asp(pl-completive) as it does in the adult grammar.

6. Conclusions

This paper has taken a step toward filling a clear gap in the literature. While various studies have applied the transitivity property to the sequence of adverbs (Pollock, 1989; Cinque, 1999) and used adverbs as a heuristic tool to detect the position of the finite/non-finite predicate cross-linguistically (Schifano 2018; Groothuis 2022, a.o.), therefore reaching a high level of descriptive precision for adult grammar, comparable insights for child language have remained scarce. By analyzing Italian children's early

productions, we provided the first detailed mapping of verb movement and adverbial functional sequences in acquisition. From their early productions, children obey the adverbial hierarchy proposed in the theoretical literature and place the finite as well as the non-finite predicates in the target positions as adults do.

As a reviewer rightly noticed, our findings raise the more general question as to how children acquire this fine-grained system of functional hierarchies. Various hypotheses can be advanced. For instance, one answer in line with the cartographic hypothesis would be that the hierarchies of functional categories are part of the initial stage of the language faculty. Alternatively, functional hierarchies emerge from experience. An investigation of the input children are exposed to would be relevant in this respect. We leave this research for the future.

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