



The Transition from One-word to Multi-word Utterances. A Case-study of an Italian Child

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ABSTRACT:

Previous work has suggested that infants start producing multi-word utterances while they still produce single-word utterances, and they make generalizations about the order of constituents from early stages. This article describes the transition from one-word to multi-word utterances in an Italian child recorded every two weeks for 45 minutes from the age of 1;05 to the age of 2;05, and it examines specifically whether the child's productions respect a head-complement generalization (in Italian, the generalization that heads precede complements). The analysis was conducted on files available in the Childes database. The study shows that one-word utterances are indeed not abandoned when the child learns to combine words, and the first two-word productions reflect adult utterances, whether or not these comply with the general ordering of heads and complements. These results are compatible with approaches that see first multi-word utterances as being syntactic, but they also show that the level of generalization is not fully compatible with predictions from experimental work on head-directionality (which predicts a wider generalization than the one observed in this child).

KEY WORDS

syntax, infants, acquisition, head-complement, merge

1 INTRODUCTION

1.1 THEORETICAL BACKGROUND

Every grammatical sentence consists of a sensible combination of at least two words, an operation described with the term “merge” (Adger, 2003; Zaccarella & Friederici, 2015; Fukui, 2017). The ability to combine words to form new units has been a pillar in linguistics within the so-called generative approach, where it is conceived as the main property of human syntax and a skill that differentiates our cognition from that of other animals (Chomsky, 2014). In different theoretical environments this ability is seen as less crucial and as emerging from domain-general cognition (Bybee & McClelland, 2005): for example, researchers in the usage-based tradition agree that there is a role of combinatorial skills in language, but they undermine considerably their importance, and point to the fact that most of the sentences we produce are not created *ex-novo*, but rather they are repetitions of what we have already said or heard (Ibbotson, 2013).

The main aim of this article is to describe the emergence of simple syntax (combination of at least two units) in the spontaneous productions of an Italian child. The two theoretical approaches just mentioned offer different interpretations of early



child productions, as a consequence of their different approach to the role of combination in language. Researchers in usage-based grammar suggest that the first multi-word utterances are not created using combinatorial skills, but rather by storing sequences of words as if they were units (Tomasello, 2009; Diessel, 2013). According to this view, when children start producing small sequences of words, such as “article + noun”, or “copula + adjective”, they are not combining these elements but simply treating them as units. Researchers in the generative tradition suggest instead that the first small sequences are basic syntactic constructions, where the child is combining two elements to form a new unit (Guasti, 2017). Disentangling these two proposals is beyond the scope of this article. However, this introduction is necessary because the notion of syntactic development I use here is bound to the generative tradition. In this article, I look at the emergence of sequences such as the ones just described (combinations of two words), which I interpret as being syntactic. It should be stressed, however, that this is a personal choice and usage-based approaches would not interpret these sequences as being necessarily syntactic. In addition, while the article is grounded in the generative tradition in that it treats small sequences as syntactic, the analysis of the results on head-complement order does take into account the tenets of usage-based theory, and it shows that usage-based theories of language acquisition may offer relevant insights into the description of the current data.

The article is organized as follows: first I present an introduction to previous studies dealing with the transition from one-word to multi-word utterances and with the development of head-complement generalizations. Then I present two research questions (stemming from these two topics), followed by two analyses that address them. Finally, I discuss the obtained results in relation to the literature presented in the introduction.

1. 2 EARLY SYNTACTIC DEVELOPMENT. FROM ONE-WORD TO MULTI-WORD UTTERANCES

In everyday life, attending to child verbal productions, one can observe that children do not combine words like adults. However, despite these early stages, child productions gradually transform into adult productions, suggesting that the unconscious skills of infant and adult speakers are linked. The question of how children’s productions transform into adults’ productions has been the subject of an intense debate for several decades (Deuchar, 2013). One proposal argues that children use simplified rules and their competence partly overlaps with that of adults. According to this view, children leave some positions empty at the level of realization, while keeping similar underlying structures, and this leads to speech that differs from adult speech. According to a different view, children’s rules (or generalizations) are different than those found in adult grammars. These asymmetries are observed particularly in intermediate stages of development (so called U-shaped development, Siegler, 2004). In English preschoolers, for example, it is common to hear expressions such as “I goed” or “it broke”, a symptom of the fact that children are applying a rule which in the adult grammar does not apply to irregular verbs such as “to go” or “to break” (Marcus, 1996; Taatgen & Anderson, 2002). Before producing such sentences,



children experience various developmental phases in which they communicate with different systems, such as screams, cries, pointing and visual coordination (Lock & Zukow-Goldring, 2010). The first proto-syntactic productions arrive around the first birthday and are made up of single items described with the term “holophrases”. Holophrases are interesting elements in a child’s speech: They are phrases made up of only one unit, which however already express a relatively complex concept (Bloom, 2013). A child saying “ball” to their parents might mean “let’s play ball”, while a child saying “dog” might mean “there is a dog”. There are good reasons to think that single-word production does not mean the absence of syntactic combination (Guasti, 2017). For example, several studies show that even when children produce verbs in isolation, they make use of mini-paradigms, which essentially allow them to inflect verbs in the present tense in the first, second and third person singular, in languages that have these inflections (Bittner et al., 2011). It is reasonable to assume that children have some knowledge of the fact that the verb may be divided into a root and a bound morpheme, and that therefore their syntactic representation of verbs reflects this competence. A sentence like the Italian “accendo luci” ‘I turn on lights’ is likely to have an underlying structure as in Figure 1, when uttered by a child. As one can see, the inflectional element (T = tense), in this case assuming the value “present”, is displayed, since the verb is inflected for tense. It should also be noted that the structure contains the underlying subject of the sentence, since the appropriate verbal inflection suggests that the child is correctly assuming who the subject is.

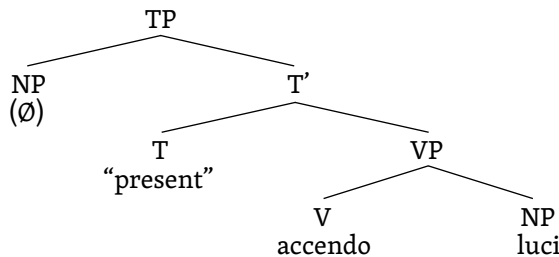


FIGURE 1: Syntactic tree for “accendo luci”.

Similarly to work on verbs produced in isolation, work on omissions leads to conclusions suggesting that when children produce sentences that miss some elements, these elements may be present at a more abstract level (Rizzi, 2002; Carter & Gerken, 2004; Guasti et al., 2004; Wexler et al., 2004). These observations lead to the first prediction of this study: single-word utterances and multi-word utterances overlap, since single-word utterances do not necessarily indicate a lack of syntax. This claim is compatible with both generative and usage-based accounts. Diessel (2013) notices that even when the child produces new combinations of words, these tend to be combinations of holophrases with other elements, and there is no specific trade-off between the two stages. Similar conclusions are reached by Guasti (2017) in her review of the generative literature.

1.3 HEAD DIRECTION AND BEYOND. PREVIOUS STUDIES ON TWO-WORD UTTERANCES

According to generative analyses, one generalization both children and adults make is that of head directionality: When two units combine, one of the two takes the head role and gives its properties to the whole phrase. A verb merging with its complement, for instance, will create a verb phrase; a preposition merging with a noun phrase will give rise to a prepositional phrase (Chomsky, 2014). According to this view, languages display a regular organization of their constituents: certain languages prefer a head-initial order, while other languages prefer a head-final order. English, French and Italian, for example, display a head-initial order: verbs appear before their complements, prepositions appear before their nouns, and copulas appear before their adjectives. Japanese and Turkish, on the other hand, show the opposite pattern.

Research on child development has suggested that children make generalizations about head directionality from very early stages during development. Using the high-amplitude sucking procedure, Christophe et al. (1997) showed that 2–3-month-old infants are able to discriminate languages based uniquely on the prosodic contour created by head–complement order. In this study, infants from a monolingual French background were presented with two kinds of semi-artificial stimuli paired on all phonetic properties except the phonetic contour associated with head–complement directionality. By measuring their interest (sucking rhythm) when the phonetic contour was changed from one kind to the other, the authors showed that infants were sensitive to a change in head–complement directionality.

Gervain et al. (2008) investigated these preferences comparing Italian and Japanese infants presented with artificial stimuli. This study is based on an important property of function words, which is that of being more frequent than content words. If infants are making a generalization about word-order directionality, they should have a preference based on frequency distributions: In two-unit sequences, Italian children should prefer frequent items before infrequent items, while Japanese children should show the opposite pattern. Gervain et al. (2008) tested this idea on 8-month-olds in an artificial grammar learning experiment. By measuring looking times, the authors showed that at this stage children from the two linguistic environments behave differently, with Italians displaying longer looking times for initial-frequent sequences, and Japanese showing the opposite pattern. These findings suggest that infants do indeed operate with generalizations about head–complement directionality in early stages.

While these findings are interesting, some researchers have criticised the interpretation that the authors of these studies have given to them, particularly the proposal that these results imply generalisations in the child's mind. One problem with these ideas is that the generalizations proposed are too wide and do not mirror the actual linguistic environment. As Tomasello (2001) and Dryer (1992) notice, head directionality generalization is not necessarily observed in languages. First, the theory of head directionality was developed on a small number of languages, and its applicability to all human languages is debatable, with some languages displaying considerable flexibility in the order of heads and complements. Second, even within the languages analyzed, the generalization makes predictions of word order that are simply not observed. For





example, in English adjectives occur before nouns, even if nouns are described as heads of a phrase that contains a noun and an adjective. Similarly, articles occur before nouns in English and all Romance languages, again against the intuition that nouns are heads in an article–noun sequence (even though some have proposed that articles, and not nouns, are heads in those sequences (Hudson, 2004)). Tomasello (2001) claims that early productions are less abstract than what generalizations would suggest, and he proposes that a large component of early productions must be stored sequences of words.

Several studies described the occurrence of specific head–complement structures in a number of children, a bundle of data that can help evaluate this idea: Seminal work from Braine and Bowerman (1976) showed that most of children’s productions respect the order of heads and complements as required by their language, and early productions mostly boil down to variations on a simple structure where one element is kept, and the other is changed (i.e., *more-water* vs *more-juice* vs *more-chicken*). This pioneering work was conducted on 6 American children and a number of case studies on other languages (Hebrew, Samoan, Finnish and Swedish) and still remains one of the most thorough analyses of this kind. As the authors stress, their findings do not hint at wide generalizations in the child’s mind, but they do hint at the presence of some simplified rules. In another well-known study, Poeppel and Wexler (1993) show that 2-year-old German children produce verbs and objects in the order required by the specific sentence they are uttering. In German the order of verbs and objects varies according to the properties of the verb, and infants appear to be sensitive to these properties, suggesting, according to the authors, an internal representation of syntactic rules. Sugisaki (2005) showed that Japanese children produce objects and verbs consistently in the right order at age 2, suggesting again that children master the correct ordering of these elements from a very early stage. In a study of a German child, Behrens and Gut (2005) showed that the earliest two-word productions are an interesting mix of structures: The child is either producing ungrammatical repetitions of two nouns, grammatical sequences of determiners and nouns, or sequences of verbs and nouns in both possible orders (the authors do not report the prevalence of each order). Finally, a large corpus study on French (Le Normand et al., 2013, p. 655) investigated “whether or not increases in language complexity (as measured by MLU) could be predicted on the basis of lexical, pragmatic, and grammatical diversity (word types)”. This study showed that the mean length of utterances (MLU) is best predicted by grammatical diversity, and not by lexical diversity, a finding that is in line with the generative approach (Guasti, 2017) and not in line with the usage-based approach (Diessel et al., 2013). These findings, taken together, do not seem to point in one specific direction, since they are not all compatible with one another. Interestingly, none of these studies specifically addressed the order of head–complement structures when these differ within the same language (for example, “adjective + noun” vs “verb + complement” in English). The current study partly fills this gap, since it includes both structures that are canonical head–complement sequences in Italian (for instance “verb + complement”), and structures that require the opposite order in adult grammar (for instance “object clitic + verb”).

The studies mentioned in this section bring us to the second prediction of the current article, which, based on the less unified literature on this topic, is more open

than the first prediction. If children rely on a wide head-complement generalization during the transition from one-word to multi-word utterances (as predicted by Gervain et al., 2008), we will observe a significant number of occurrences where the child inverts heads and complements in comparison to adults, for example in the context of “object clitic + verb” sequences. If, instead, productions are less bound to generalizations (as predicted by Tomasello, 2001), we will observe children producing two-word utterances in the same order as their parents, whether or not these respect the generalization of head-complement directionality.



2 RESEARCH QUESTIONS

This article aims at contributing new data to two open research questions:

1. Do children abandon one-word utterances once they start producing syntactic sequences?
2. Do children rely on a head-complement generalization once they start combining words?

3 METHOD

The analysis reported in this article was carried out on files extracted from the Childes international database (MacWhinney, 2014).¹ To choose which files to use among those available in the database, I have implemented a systematic procedure. I needed early productions, and I needed files from a child who had been followed consistently for a long time, in order to see changes from the lack of syntax to a certain level of syntactic complexity. I then made the first reduction by selecting the folders in which the oldest file did not indicate an age greater than about a year and a half. I then used a mathematical tool, the mean length of utterance (MLU), to select a child for the analysis. MLU is a function that counts the number of words and divides it by the number of expressions that the subject chosen for analysis has pronounced and thus gives an estimate of the length of the uttered sentences (Rice et al., 2010). By calculating MLU on the first and last file of the subjects who had passed the first screening, I selected the (only) subject that initially had a MLU value close to 1 and reached a value close to 3. The child thus selected was Marco (MAR) and the data were those collected by Tonelli (2004). These are recordings of child-mother interaction lasting 45 minutes each, conducted at home during play-time. In these sessions, the child produced an average of 355 outputs per recording (standard deviation: 80,54). Outputs include utterances, but also gibberish sounds,

¹ The term Childes is an acronym that stands for Child Language Data Exchange System. The database was created in 1984 by Brian MacWhinney and Catherine Snow and it contains spontaneous productions of children from many different linguistic backgrounds (MacWhinney, 2004).



word plays, and attempts at producing words that were, however, distant from any meaningful output.

As part of the main analysis of this study, I first proceeded with a count of the utterances produced by the child throughout his development. The first insights were obtained using an automatic procedure on the dataset, aimed at obtaining a count of strings of 2, 3, 4 and 5 words produced by the child in each datafile. These were obtained with a Grep command. The command used is the following:

```
grep -i -c -n -B3 -A3 -E 'MAR: [[: space:]] * [ @ a-zA-Z ] [ @ a-zA-Z ] * ([[: space:]] | [.,;:?!']) [ @ a-zA-Z ] [ @ a-zA-Z ] * ([[: space:]] | [.,;:?!']) * $ '
```

This command counts the number of expressions that contain two words, and translated into natural language reads: “count the number of expressions starting with MAR, followed by a space, followed by one or more uppercase or lowercase letters, followed again by a space or a punctuation symbol, followed again by one or more uppercase or lowercase letters, ending with a space or a punctuation mark”. Similar strings were used to get the count of 3, 4 and 5 words. Importantly, this command does not count word plays, off-target productions and sequences that are not a word in Italian, since these were tagged with specific symbols in the file.

This command entails a specific sense of the term “word”. The precise definition of the term “word” is a subject of debate and it appears that researchers have used it equivocally (Haspelmath, 2017). Here we use the term to refer to mono- or plurimorphemic items that are conventionally written in isolation. In this sense, both *corro* ‘I run’ and *burro* ‘butter’ are words, even if *corro* contains two morphemes, and *burro* only one.² This specification is important because it underlines an intrinsic limit of this count as a measure of (morpho)syntactic complexity, since such count does not differentiate between monomorphemic and plurimorphemic words. This approach has consequences on the count of MLU. MLU is conventionally calculated on morphemes (mean number of morphemes per utterance) in the English data of Childes. This is possible because English is a mostly analytic language (Josiah & Udoudom, 2012) and has a limited number of bound inflectional morphemes. In the Italian data, MLU is instead calculated on words, using the notion of “word” outlined above. Despite this difference, it should be stressed that previous work indicates that there is an almost perfect correlation between morpheme-MLU and word-MLU in the English Childes data, suggesting that the use of word-MLU in languages other than English does not compromise the validity and reliability of this measure and its comparison to previous analyses of English and other languages (Parker & Brorson, 2005). A second manual analysis was additionally performed to better understand the content of the strings counted with the automatic analysis (more detail is presented in the results section).

2 In *corro* ‘I run’, *corr-* is the stem and *-o* is a bound inflectional morpheme indicating first person singular, present tense. In *burro* ‘butter’, there is only one morpheme that cannot be decomposed.

4 RESULTS

Counts of utterances can offer an important insight into linguistic processing, and measures of how counts change over time (so called trend analyses) are a simple yet powerful system to investigate child language development (Altman, 1991; Parker & Brorson, 2005). Results obtained with the automatic Grep count are summarized in Table 1. A report of utterances divided by record is preferred in the table to an average across records, because the average would fail to capture the developmental component of the data.

Record	1 word	2 words	3 words	4 words	5 words	Age
1	47	2	0	0	0	01;05,04
2	55	13	0	0	0	01;05,18
3	94	14	1	0	0	01;06,02
4	79	12	4	1	0	01;06,22
5	104	27	2	0	1	01;07,06
6	104	33	1	0	1	01;07,19
7	134	40	7	0	0	01;08,03
8	88	37	7	2	0	01;08,17
9	122	26	7	1	0	01;09,01
10	89	29	5	0	0	01;09,15
11	90	32	11	0	0	01;09,29
12	80	36	6	5	1	01;10,12
13	107	34	10	3	0	01;11,15
14	103	32	10	3	0	02;00,00
15	111	57	24	4	3	02;00,14
16	84	35	14	3	0	02;00,27
17	109	44	16	5	4	02;01,11
18	56	16	18	6	4	02;01,27
19	82	44	21	8	5	02;02,11
20	57	32	22	8	4	02;03,02
21	44	29	15	5	3	02;03,02
22	56	37	20	9	3	02;03,15
23	67	40	23	8	7	02;03,29
24	75	36	22	18	5	02;04,13
25	100	54	22	8	3	02;04,25
26	98	54	32	11	7	02;05,10
27	53	46	14	10	6	02;05,24

TABLE 1: Counts of utterances.

The data obtained with the Grep count were analyzed using correlations. To understand whether these counts were significantly changing over the child's development, correlations were run between age and scores in the different kinds of utterances (see



Altman, 1991 for a justification of this method in the analysis of trends over time). Results can be found in Table 2.

	r	t	p
1W	-0,237	-1,217	0,235
2W	0,686	4,710	< 0,001*
3W	0,893	9,900	< 0,001*
4W	0,868	8,744	< 0,001*
5W	0,833	7,539	< 0,001*

TABLE 2: Correlation coefficients with age across different utterance lengths.

A small negative coefficient was obtained for the 1-word utterances, and large and very large coefficients were obtained for all multi-word utterances (see Hemphill, 2003, for guidelines on how to interpret the magnitude of correlation coefficients). A Bonferroni adjusted alpha of 0,01 was used as threshold for significance (0,05/5). All correlations reached significance except for the one between age and the count of one-word utterances. This result suggests that all multi-word utterances increased in number (based on the positive sign of the coefficient) over the time period recorded, while one-word utterances did not decrease significantly (the negative coefficient indicates that they decreased in absolute terms).

The results are shown visually in Figure 2: For each specified length, I present the trending line to make the development easier to read. From this graph, one can see that the number of expressions made up of one word tends to decrease over time overall, even though the trend is not significant, while the number of expressions made up of two, three, four and five words tends to increase, with significant trends. This finding is not surprising and could indicate the child's gradual abandonment of holophrases in favor of syntactic constructions, but the decrease in the use of one-word utterances appears to be slow and it certainly does not happen automatically with the first multi-word productions.

The automatic count of words is a useful measure, and it offers an excellent estimate of the competence and the productivity of the child. However, it has the intrinsic limit of not analyzing structures for what they contain, but only for how long they are (Vasilyeva et al., 2008). A second analysis was then performed looking for specific structures that the child may be developing at this age. The chosen structures, with Italian examples and English translations, are provided below:

- Determiner + Noun (i.e., *la casa* 'the house')
- Negation + Verb (i.e., *non voglio* 'I don't want')
- Wh- questions (i.e., *cosa è?* 'what is that?')
- Subject + Verb (i.e., *io mangio* 'I eat')
- Verb + Adverb (i.e., *voglio ancora* 'I want more')
- Copula + Adjective (i.e., *è piccolo* 'it is small')
- Auxiliary + Verb (i.e., *hanno fatto* 'they did')
- Verb + Complement (i.e., *voglio la palla* 'I want the ball')

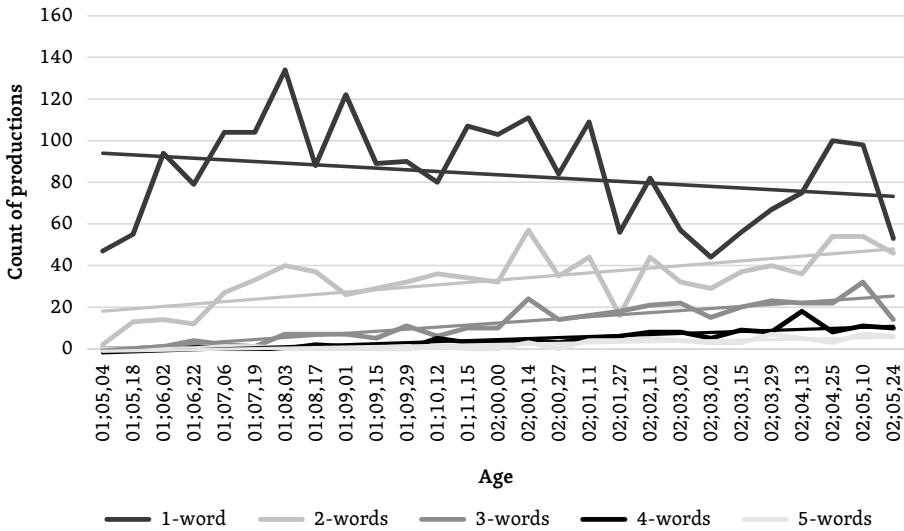


FIGURE 2: Count of productions of various lengths over time.

- Preposition + Noun phrase (i.e., *per la scuola* ‘for school’)
- Object clitic + Verb (i.e., *li spingo* ‘I push them’)

This manual analysis allows us to address the second research question, related to the order of heads and complements. I chose ten types of merge connected to head-complement order and verified their occurrence. Each column of the following Table 3 shows one of these types. The last column shows the sum of the irregular occurrences relating to the file in question (each row corresponds to a file). The files are sorted in chronological order. The legitimate inversion phrases are those concerning specific situations where the order complement-head is expected, such as contrastive focus (i.e., *with a ball I play, not dice*). One common example of this kind is the “determiner + noun” sequence, even though, as previously mentioned, some analyses have claimed that articles may be heads instead of nouns (Hudson, 2004). Wh- questions similarly do not respect the head-complement generalization, and they are usually described as the consequence of complement movement to the beginning of the sentence (Grewendorf, 2012; Kayne et al., 2014). Finally, “object clitic + verb” structures are particularly interesting because they form a minimal pair with “verb + complement” structures, and they offer an interesting example of a structure where the complement precedes the head. As mentioned in the introduction, the “object clitic + verb” phrases are those where the clitic pronoun appears correctly before the verb in Italian (i.e., *li spingo* ‘I push them’), thus producing a complement before its head.

Counts were conducted manually, analyzing through the data files. Inter-rater reliability was calculated on 8% of the dataset, which was re-analyzed by a different linguist with no involvement in this study. Reliability (percentual agreement of two raters) was at 84%, indicating that the measures obtained can be trusted (values



above 75% are considered acceptable in psychology and the social sciences (Everitt & Skrondal, 2010)). Importantly, sequences that appeared multiple times in a file were counted only once, thus focusing on the creative component of the child's speech under the assumption that constant repetitions of an item are not creative, while first attempts at a sequence are creative, together with modifications of a previously heard or repeated sequence (Vygotsky, 2004; Cekaite, 2018).

Record	DN	Neg V	Wh	Subj V	V Adv	Cop Adj	Aux V	V compl	P NP	clitic V	Licit inv.	Illicit inv.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	4	0	0	0	0	0	0	0	0	0	0	0
5	9	0	0	0	0	0	0	0	0	0	0	0
6	8	0	0	0	0	3	0	3	0	0	0	2
7	30	1	0	0	0	3	0	4	0	0	0	1
8	7	1	0	0	0	1	0	1	4	0	0	0
9	9	0	0	1	0	0	1	1	2	0	0	0
10	9	0	0	0	0	0	0	3	6	0	1	2
11	7	1	0	0	4	0	0	2	1	1	0	1
12	13	9	1	0	2	0	1	5	4	0	2	1
13	10	4	2	2	2	3	0	3	2	0	3	0
14	10	7	17	1	6	1	3	12	5	0	5	0
15	15	5	10	2	0	0	3	7	6	3	1	0
16	16	1	27	2	2	2	1	9	7	1	1	0
17	39	5	17	11	4	1	4	21	13	5	1	1
18	32	3	19	15	5	1	0	26	15	3	2	0
19	24	4	12	7	11	5	7	16	7	7	2	2
20	32	11	17	11	13	7	6	29	20	6	5	1
21	41	3	16	9	10	0	6	23	25	5	3	1
22	48	8	20	6	6	5	9	28	22	3	1	0
23	69	13	13	14	11	20	3	36	27	5	1	0
24	54	11	16	12	10	12	5	30	14	6	4	0
25	44	4	11	8	11	5	3	20	18	7	2	0
26	46	15	17	12	11	9	12	29	24	3	8	0
27	46	11	24	10	14	1	13	25	26	9	5	0

TABLE 3: Counts of head-complement productions and related structures.

In the last section of the analysis, I explored in more detail the trend in the growth of the various structures. Similarly to what I did for the Grep count, I proceeded with an analysis of the trends across the various structures analyzed. The analysis shows that all structures significantly increase in number over time, with large correlation coefficients for all variables except “copula + adjective” (showing a medium coefficient).



The results are summarized in Table 4 below. Following Bonferroni correction, the threshold for significance is set at 0,005 (0,05/10).

	r	t	p
D N	0,872	8,889	< 0,001 *
Neg V	0,792	6,481	< 0,001 *
Wh	0,817	7,073	< 0,001 *
Subj V	0,831	7,480	< 0,001 *
V Adv	0,883	9,397	< 0,001 *
Cop Adj	0,567	3,441	0,002 *
Aux V	0,788	6,402	< 0,001 *
V compl	0,900	10,318	< 0,001 *
P NP	0,895	10,048	< 0,001 *
clitic V	0,752	5,702	< 0,001 *

TABLE 4: Correlation coefficients with age across different kinds of merge.

The productions of the child are, concerning the order of constituents, almost always correct. The percentage of incorrect expressions is in fact just 1%, and even this 1% may be described as a consequence of other phenomena, such as the omission of the verb or contrastive focus. The number of illicit productions is very low and all occurrences are reported in Table 5. As a final step, I compared the occurrence of licit and illicit inversions, to understand whether the use of non-canonical order was more common in licit or illicit productions. The two conditions were compared with a paired sample t-test, which showed that the number of licit violations is significantly higher than the number of illicit violations, $t(26) = 2,69, p = 0,01$.³

Original	Translation
file6: <i>occhi tre, rotta punta</i>	'eyes three', 'broken top'
file7: <i>tondo giro</i>	'around turning'
file10: <i>elefanti tanti, cavalli uno</i>	'elephants many', 'horses one'
file11: <i>funghi due</i>	'mushrooms two'
file12: <i>altro una</i>	'other one'
file17: <i>mangia tutto il papà il budino</i>	'eats all dad pudding'
file19: <i>tutto metto per terra, scontro ho fatto io</i>	'all put on the ground', 'clash made I'
file20: <i>grande ha preso un pianoforte ha preso</i>	'big took a piano took'
file21: <i>libretto leggiamo</i>	'small book we read'

TABLE 5: Cases of illicit order of heads and complements.

3 Licit and illicit labels are given according to the adult grammar. So, for instance, a clitic-verb sequence is licit when the complement precedes the head, because this is what adults do (even if this violates the head-complement generalization).



5 DISCUSSION

This study investigates the transition from one-word to multi-word utterances in an Italian child recorded between the age of 1;05 and 2;05. The study provides two main findings:

1. The increase in the production of multi-word utterances does not correspond to a significant decrease in the production of one-word utterances.
2. The first two-word utterances are productions of various elements in the adult order, whether these comply with the head-complement generalization or not.

The two findings will be discussed separately.

The first analysis was conducted with the Grep command, which provides an automatic count of the number of utterances of a specified length in a given file. The results of this analysis show that when the child begins to use syntax (a stage here represented by utterances of at least two words), he does not instantly abandon one-word utterances. The number of expressions made up of a single word tends to an almost constant decrease in absolute terms, but the statistical analysis shows that this decrease is not significant, while all other structures do increase significantly over time. This finding is in line with other studies that suggest that the production of multi-word utterances overlaps with the production of holophrases (Diessel, 2013), even though it does not necessarily indicate that the first multi-word productions include those that were initially holophrases. Additionally, this analysis has a limited relevance because it is not possible to establish whether the single-word utterances produced by the child contain more than one merge, since an automatic count does not capture the underlying structure of the utterance produced, and inflections and/or omissions in specific positions might instead indicate a more complex underlying structure than what is found in the output (Carter & Gerken, 2004; Guasti, 2017). To overcome these limitations and get a clearer understanding of the first syntactic productions, a second analysis was carried out.

The second analysis was conducted manually and investigated the development of specific pairings (or merge) of linguistic units. The analysis of these structures gives us an idea of the trend in the child's grammatical development. The structures that were chosen for analysis are "determiner + noun", "negation + verb", wh- questions, "subject + verb", "verb + adverb", "copula + adjective", "auxiliary + verb", "verb + complement", "preposition + noun-phrase", "object clitic + verb". Previous work suggests that infants may be making a generalization about the order of heads and complements during pre-verbal development (Christophe et al., 1997; Gervain et al., 2008). This generalization leads to a specific prediction, which is that children will consistently produce heads and complements in the canonical order for their language until they understand when this generalization does not apply. If that is the case, children are expected to produce a number of structures that are not grammatical in their language, since the specific combination of head and complement is not totally regular in most languages. In Italian, for example, heads tend to appear before complements, but this is not true in "object clitic + verb" constructions (Wexler et al.,

2004), or *wh*- questions (Kayne et al., 2014). In *wh*- questions, the *wh*- operator (what / where / who / when) is uttered at the beginning of the sentence, even if the meaning it carries belongs to the complement position of the verb. In clitics, the complement appears before the verb (when the verb has a finite tense), even though it takes, semantically at least, the role of the complement.

The current study shows that children do not always make an overregularization of the order of heads and complements. The child analyzed in the current article produced two-word utterances that were in the adult grammatical order in 99% of cases, and there was no indication that instances where the order of head and complement is non-canonical were in any way less accurate than the others. This finding is in line with previous works on early child productions that describe them as mirroring the adult speech in its core properties and order (Tomasello, 2001; Diessel, 2013). Interestingly, all these structures, whether they were canonical or not, showed a significant increase over time, meaning that we do not observe any stall in any of these structures: they all gradually become more common over the years of development. As mentioned in the introduction, this study falls into the generative tradition to the extent that these structures are seen as being syntactic (Poeppel & Wexler, 1993; Sugisaki, 2005). However, these results go against a strong generative view of wide generalization in the child's mind, and they are rather in favor of an account where stored exemplars and simple combinatorial procedures are deployed at the same time. This interpretation is in line with the classic work of Braine and Bowerman (1976), and also with some contemporary approaches to usage-based grammar (Diessel, 2013), where children's learning is described as an attempt at small sequential manipulations of stored exemplars.

The most important contribution that this article brings to the literature is the evidence that the generalizations proposed for heads and complements in previous work may be too wide and do not reflect all of the data. One word of caution is certainly needed: this is a case-study, and by its very definition it should not be used to make broad claims about the population. Nonetheless, these findings suggest that while heads and complements are indeed produced in their canonical order if we look at basic structures (such as “verb + complement”, or “copula + adjective”), children may not necessarily operate with a generalization in terms of abstract notions of heads and complements to produce these basic structures. Licit instances of complement-head orders (such as “object clitic + verb”) are equally well mastered by the child analyzed in this study, even if they violate the generalization about head-complement order that can be made in Italian. There are two possible explanations for this finding:

1. The child has performed a generalization (in line with experimental work such as Gervain et al., 2008), but he has additionally understood when this generalization does not apply. Similar claims are often made when discussing later stages of language development in relation to more complex structures, for example when children go from overgeneralizations of past tense to the adult use of regular vs irregular past tense (Marcus, 1996; Taatgen & Anderson, 2002). This kind of interpretation of the data presented in this article has the advantage of fitting well with previous experimental work on infants (such as Christophe et al., 1997 and





- Gervain et al., 2008), but it also has the weakness of not explaining how and when children learn when not to use the head-complement generalization;
2. The child has not performed a generalization at all, and he is learning each structure separately. This analysis is in line with usage-based approaches, such as Tomasello (2001), which do not assume broad generalizations in the child's mind, particularly in the initial stages of learning. This interpretation has the advantage of better explaining the current data, but at the same time it does struggle to capture the earlier stages described in the aforementioned experimental work (Christophe et al., 1997; Gervain et al. 2008).

Further research on different samples and different languages may gradually push in one direction or the other. For instance, a promising approach could consist in investigating what happens in languages that have a less clear-cut ordering of heads and complements (Dryer, 1992). However, unfortunately, the data available in *Chil-des* mostly comes from the same small group of languages that was used to develop the head-complement theory in the first place, and additional longitudinal data collection would be necessary to properly address the research question in these terms.

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