



5-1-2012

# Change in Prosody as an Alternative: Evidence from Acquisition

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## **Abstract**

This study contributes to the issue of syntax-prosody-semantics interaction in child speech. It focuses on the prosodic realization of contextually-defined direct objects in a language allowing object scrambling. The empirical data are collected from 3-4-year-old children acquiring Ukrainian. The children's speech samples were analyzed in order to find contrast between the prosody of sentences with various syntactic and semantic properties. The results show that child intonation is variable, but mostly predictable. The most evident contrast was detected for the structures with pronouns: when children failed to scramble pronouns, they still marked them prosodically by destressing. It can be concluded, then, that 3-4-year-old children are able to establish context relatedness for pronouns, and in order to mark their special status they can use one of two 'options' available in the grammar: syntactic movement or prosodic recontouring.

# Change in Prosody as an Alternative: Evidence from Acquisition

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## 1 Introduction

It has been proposed earlier that prosodic deaccenting/destressing of a constituent might have the same interpretational effect as syntactic movement (see e.g., Neeleman and Reinhart 1998 on Dutch scrambling).<sup>1</sup> In a recent study by Antonyuk-Yudina and Mykhaylyk (2009), this claim has been further corroborated with the experimental data collected from adult Ukrainian speakers. It is shown that there is a significant effect of semantic context and syntactic structure on the prosodic realization of a sentence in adult speech. In child language, however, the role of these factors has not been clearly defined. Some studies suggest that young children differ from adults in the use of intonation/pitch: i.e., a child's variations in prosodic contours are often due to different emotional and interactional contexts, and not to the semantics or information structure (Behrens and Gut 2005, Chen and Fikkert 2007). Other studies (e.g., Chen 2010 and 2011) show that 4–5-year-olds are able to use intonation to encode informational status of arguments.

This paper presents novel empirical data from child Ukrainian that contributes to this issue and provides a crucial piece of evidence for previous proposals. It has been shown that children acquiring scrambling apply syntactic movement optionally and with a higher range of variability than adults (Schaeffer 2000, Anderssen, Bentzen and Rodina 2009, Mykhaylyk and Ko 2010). This is also the case even for obligatory pronominal scrambling in Ukrainian (Mykhaylyk 2011). However, it is known that in adult Ukrainian, pronouns (and other context-dependent elements, such as definite or partitive NPs) might remain *in situ* only when the intonation of a sentence is modified. This research investigates whether children follow adult prosodic patterns in the same contexts. It is predicted that in cases where children fail to move a contextually-dependent noun or pronoun, they will compensate for this lack of movement by destressing the object and applying the falling pitch accent on the verb, as is shown for adults in Antonyuk-Yudina and Mykhaylyk 2009.

To verify this prediction, an experimental study was conducted with 12 3–4-year-old children acquiring Ukrainian. The results show that the children distinguish several types of prosodic contours and use them in appropriate contexts. These findings are comparable to Chen 2010: both studies show that children at the age of 4 are already sensitive to the context-prosody correlation. Although the prosodic patterns of 3–4-year-old Ukrainian children appear to be more variable than the adult patterns in similar semantic contexts, the children are mostly target-like in applying one of two available options to pronouns: syntactic movement to vP edge or change in vP prosody.

## 2 Syntax-Prosody Interaction

### 2.1 Language Facts

Prosodic and syntactic properties of Ukrainian interact in an interesting way. The basic syntactic structure of Ukrainian is SVO, and the unmarked prosodic contour has a falling pitch accent on the sentence-final direct object (as shown in (1) from Féry, Paslawska and Fanselow 2007):

- LH\* HL\*  
(1) [[*DIVčy*na]<sub>p</sub>] [*čytaje roMAN*]<sub>i</sub>  
girl is-reading novel  
'A/the girl is reading a novel.'

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\* I thank Richard K. Larson, Mary Huffman, Christina Bethin, Irina Sekerina, and the audiences of PLC 35 and ExLing 4 for helpful comments on various parts of this research.

<sup>1</sup> Many other studies could be mentioned with regard to the general issue of syntax-prosody-semantics interaction: i.e., Büring 2007, Frascarelli 2000, Ladd 1996, Lambrecht 1994, Selkirk 1984 and 1995, Steedman 2000, Truckenbrodt 1999, Zubizarreta 1998, inter alia.

However, pronouns (and other context-dependent elements, such as definite or partitive NPs) usually must appear in pre-verbal position ((2) and (3)).

- (2) *Divčyna joho pročytala.*  
 girl it read  
 ‘The girl has read it.’
- (3) *Divčyna roman pročytala.*  
 girl novel read  
 ‘The girl has read the novel.’

Pronouns, definite objects, and partitive objects are all typically used to refer to an entity that has been previously mentioned, so if these objects are not moved before the verb (creating an SOV word order, as in (2) and (3)), they should be destressed (as in (4) and (5)).

- (4) *Divčyna pročytala joho.*  
 girl read it  
 ‘The girl has read it.’
- (5) *Divčyna pročytala roman.*  
 girl read novel  
 ‘The girl has read the novel.’

By contrast, indefinite objects generally refer to discourse-new entities, so they are less likely to appear before the verb, and do not demand destressing when they are not moved, as was exemplified by an unmarked structure in (1).

These observations suggest that there is a certain correlation of prosodic, syntactic and semantic factors in Ukrainian scrambling. While the role of semantics/pragmatics/information structure in scrambling or word order in general has been emphasized in previous studies, the role of phonology in the process of object movement remains to be unspecified. This paper suggests how to integrate prosodic factors in the derivation of scrambled structures. Particularly, it proposes to consider prosodic change as an alternative to syntactic movement. The following section spells out theoretical preliminaries of this approach.

## 2.2 Theoretical Preliminaries and Predictions

The theoretic account of the language facts exemplified in (1)–(5) is based on Antonyuk-Yudina and Mykhaylyk 2009 and follows the main conventions of the Phase Theory (Chomsky 2001 and others). It is assumed that the SOV construction (as in (2) and (3)) is derived from the basic SVO structure via direct object movement to vP edge position. Scrambling or shift of objects to vP edge position have been hypothesized to involve two features: EPP (a syntactic feature responsible for the movement) and INT (associated with some aspect of interpretation). Based on the syntax of valuation by Pesetsky and Torrego (2001 and 2007), it has also been proposed that INT is a semantically interpretable feature on v, which has to be checked via assignment of values to the elements with deictic/contextual parameters within the vP phrase.

In line with this proposal, object scrambling occurs as a combination of two processes: INT-agreement and the movement itself. More specifically, the functional head v, bearing an EPP feature and INT (semantically interpretable feature), probes its c-command domain for its goal (another instance of INT); upon finding one, v agrees with it; and the INT-marked item moves to the vP edge. It is further hypothesized that the INT-agreement corresponds to the assignment of values to deictic/contextual parameters within a phase, and to some extent it is an independent and crucial step in the derivation. INT-agreement might be realized in a scrambled structure at the syntax-semantic interface if the EPP feature responsible for movement is present and scrambling occurs. If movement does not occur, but INT is valued as [definite/partitive], the structure must undergo some changes at the syntax-phonology interface. Under this view, prosodic recontouring is seen as an alternative expression of INT-agreement, which marks the whole scope of the agreement domain through prosody.

Given the observations above, scrambling and prosodic recontouring might be seen to consti-

tute alternative expressions of INT-agreement, exploiting word order rearrangement or phonological adjustment (respectively). These two options for expressing INT-agreement might be then unified in terms of the basic vP domain over which it extends (6a). Thus scrambling marks the left edge of the INT-agreement domain by movement (6b), while recontouring marks the whole scope of the same domain through prosody (6c):

- (6) a. [vP ... V ... [DP...INT] ]  
 b. [vP [DP...INT] [vP ... V ... [DP...INT] ] ] (scrambling – left edge)  
 c. [vP ...v INT ... V ... [DP...INT]] (prosodic recontouring – whole domain)

To test this theoretical hypothesis, it is imperative to explore what happens at a phonological level when there is no object scrambling in definite/partitive contexts. It can be predicted that in the absence of syntactic movement in such contexts, prosodic means of INT-agreement would be activated.

This prediction was confirmed by the experimental data from 8 adult Ukrainian speakers in Antonyuk-Yudina and Mykhaylyk 2009. The experimental task involved reading sentences which represented 8 conditions with different types of contexts (Definite, Indefinite, or Partitive), direct objects (NPs or Pronouns) and syntactic structures (SVO or SOV). The results showed clear contrasts between different types of structures: 1) indefinite objects in an SVO structure vs. definite and partitive objects in an SVO structure; and 2) indefinite objects in an SOV structure vs. indefinite objects in an SVO structure. Specifically, target SVO sentences with indefinite object NPs were produced with neutral prosody on which the verb had a rising pitch accent (L\*+H), and the strongest falling pitch accent was realized on the object. In contrast, the same SVO structures with definite or partitive object NPs had the strongest falling pitch accent realized on the verb (H+L\*), while the object was prosodically destressed. When the participants encountered infelicitous scrambled structures in indefinite contexts, they were forced to “repair” them by means of prosody. As a result, sentences in the Indefinite Scrambled Condition were realized with the most marked prosody: with a weakly pronounced verb, which was mostly destressed or had a falling pitch accent. The authors conclude that these findings imply that there is no true optionality in scrambling in the sense that object movement and prosodic recontouring are the two licit ways of expressing definite/partitive object semantics.

Although these results provide valuable experimental data pertaining to the issue, the reading task put some limitations on their interpretation. The speakers did not produce any utterances on their own, and thus we do not know much about the interaction of defined factors in the spontaneous production of syntactic structures. Investigation of child speech would allow us to keep a structured experimental setting, but collect close-to-natural speech data from naïve participants. Furthermore, since it has been shown earlier that young children use some non-target syntactic structures (see e.g., Mykhaylyk 2011), it is important to establish the cause of these “errors” and identify all linguistic means (including prosody) that can be used by children.

Based on the theoretical hypothesis presented above, it is predicted that children might exploit one of two options available in the grammar: syntactic movement or prosodic recontouring. Specifically, if children do not apply direct object scrambling, they will apply a distinct prosodic contour to the SVO sentences with the definite/partitive/pronominal objects as compared to the neutral contour associated with the indefinite object in the SVO sentence. In addition, an infelicitous structure with the indefinite object in a scrambled position should receive a highly marked prosodic realization. These predictions were tested with an experimental task described below.

### 3 Experiment

#### 3.1 Method

Twelve 3–4-year-old monolingual Ukrainian children participated in the experiment. The method was a picture description task, in which the pictures and questions were designed to elicit particular types of nouns/pronouns. The design was based on Mykhaylyk 2011, and the conditions

matched those presented in Antonyuk-Yudina and Mykhaylyk's (2009) study on adult Ukrainian. The goal was to identify the intonation preferred for two types of syntactic structures (i.e., SVO and SOV) in four contexts triggering use of Definite, Partitive, Indefinite or Pronominal direct object. For example, in the Definite/Pronominal Context, there was a car in one picture and Kangaroo with the same car and a set of tools in another picture, and the expected responses were either 'Kangaroo it/the car is fixing' or 'Kangaroo IS FIXING it/the car'.

The utterances representing the experimental conditions were excised from the long sound files if they matched two conditions: 1) the sentence consisted of 3 elements (subject, verb and object) or in some cases of 2 elements (verb and object); and 2) the recording was of sufficient quality with regard to the voice volume and background noise. There were 44 of such items. They were analyzed acoustically in Praat and labeled using ToBI labeling conventions (Pierrehumbert 1980, Silverman et al. 1992, Ladd 1996, Gussenhoven 2004) that were adapted to Ukrainian.

The key principles of the child data analysis were identical to the analysis of adult results: the common types of prosodic contours were identified, and the group results for the object stress and the verb pitch type were analyzed. The individual patterns and group results were then compared to the adult results, as presented in the next sub-section.

## 3.2 Results

### 3.2.1 Types of Prosodic Contours

The overall results show that the children distinguished several types of prosodic contours and used them in appropriate contexts. These types are described below.

The basic SVO structure with an indefinite object has an unmarked prosodic contour (as in Figure 1, cf. (1)). The sentence-final direct object is stressed (or "accented" in a different terminology), and the type of this pitch accent is defined as "falling": H\*+L.

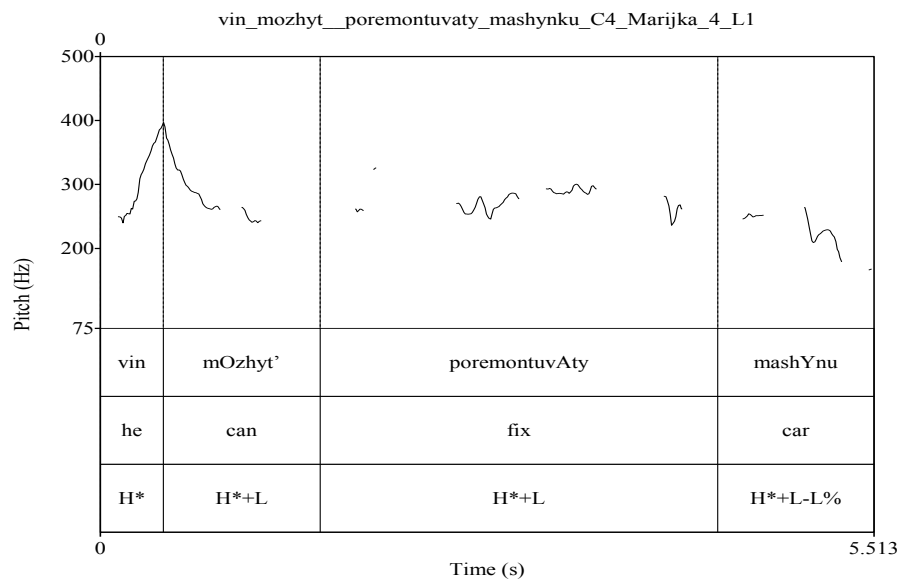


Figure 1: Indefinite object and SVO

The Pronominal SVO Condition, on the other hand, has a clearly contrasting prosodic contour: as shown in Figure 2, the strongest falling pitch accent is realized on the verb (H\*+L), while the sentence-final pronominal object is prosodically destressed/deaccented.

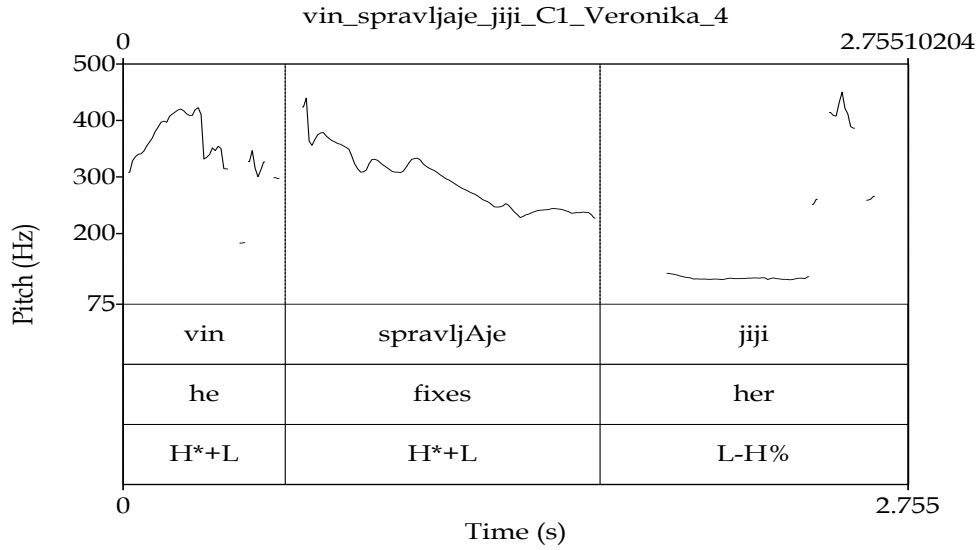


Figure 2: Pronominal object and SVO

In contrast, when the pronoun was scrambled (which is the most typical structure in adult Ukrainian), the prosodic contour was different, as shown in Figure 3. In this condition, the pronoun is not totally destressed and receives a rising accent, while the verb is realized with a falling accent.

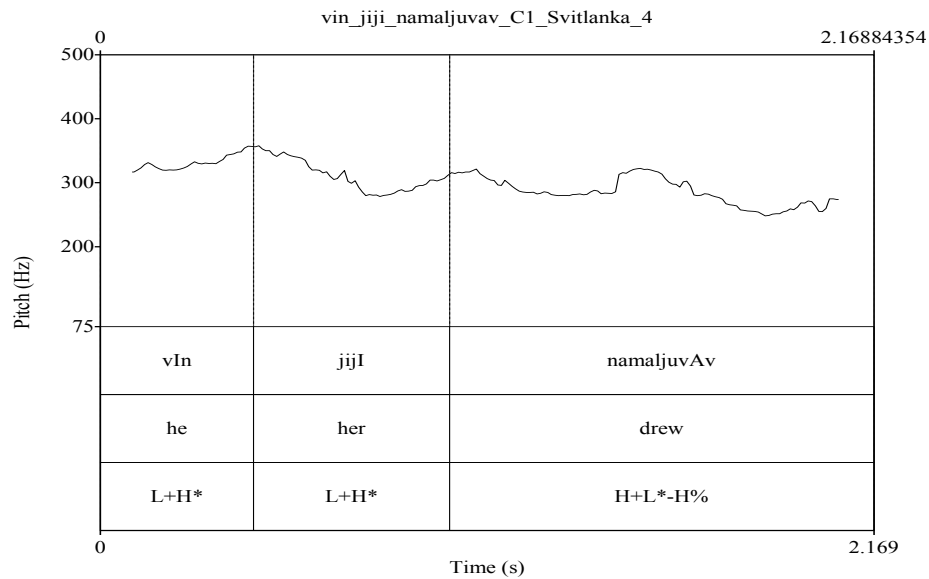


Figure 3. Pronominal object and SOV

A similar contrast was expected for other contextually-dependent direct objects. However, the children exhibited more variability with full NPs. When they dropped a subject and used a two-word structure with a definite object in a postverbal position, their prosody was mostly adult-like, with a falling pitch accent on the verb and a destressed object (as shown in Figure 4).

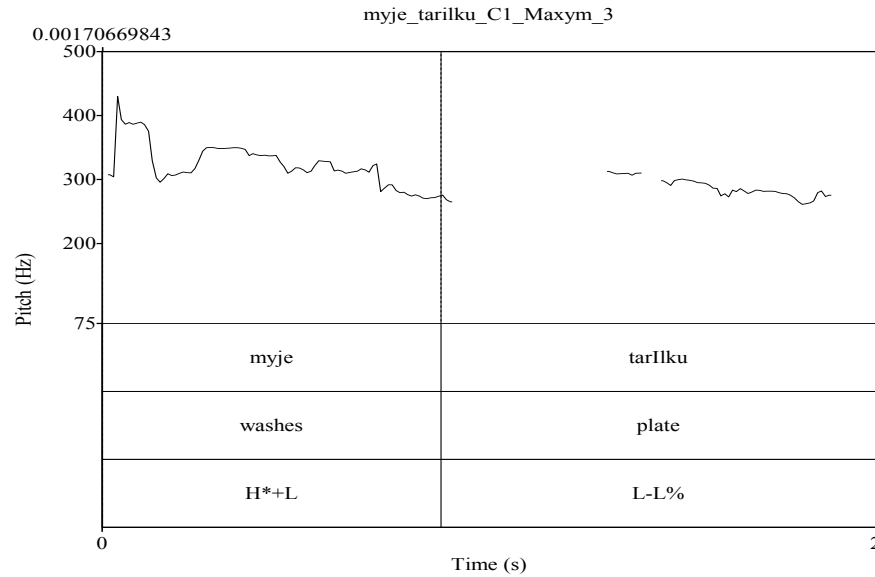


Figure 4: Definite object and SVO: Type 1

Full sentences, on the other hand, were often pronounced with a different prosody, exemplified in Figure 5: the object was stressed and received a falling pitch accent.

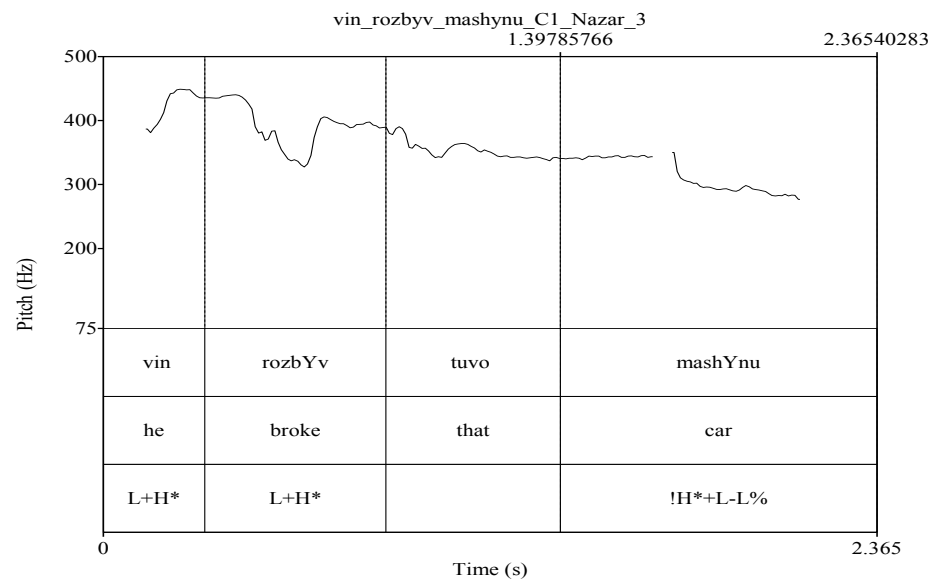


Figure 5: Definite object and SVO: Type 2

The type of prosodic structure presented in Figure 5 was more similar to the default prosody: rising pitch on the verb and falling pitch on the sentence-final object (cf. Figure 1). However, it is evident that the interpretation of the sentence in Figure 5 corresponds to the context: pronoun ‘that’ indicates that the direct object is definite. Moreover, the pitch on the object is a downstepped fall (!H\*L), which has also been identified as a ‘topic-marking’ accent in Chen 2010.<sup>2</sup>

It is possible that children have a wider repertoire of prosodic means than adults. For instance, children can mark different interpretations not only with the pitch type, but also with gradient

<sup>2</sup> As was noted by Chen, transcribing child data is not an easy task, and frequently, transcribers have difficulty in separating ‘H\*L’ from ‘!H\*L’ and ‘no accent’ in the production of some children.



phonetic parameters, such as word duration or pitch range. In particular, one of the participants constantly ‘stretched out’ words in a non-adult manner. It is likely that some children understood their task as describing the pictures, and thus, they produced descriptive declarative sentences with unnatural prosody. Such sentences (N=4) were excluded from the analysis of the group results, but they are worth mentioning as one type of the prosodic structures used by children.

Prosodic realizations of sentences in other conditions were highly variable, but the most marked prosody was received in sentences with an indefinite object in SOV structure: stressed object (with rising or falling pitch accent) and a destressed verb (Figure 6).

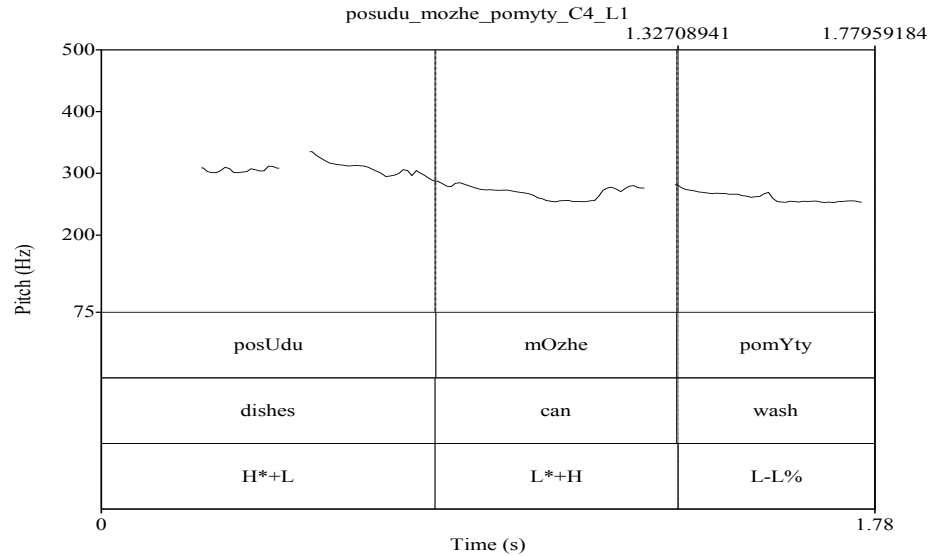


Figure 6: Indefinite object and SOV

Sentences with partitive objects were also produced with varying prosody. In some cases, this prosody resembled the types detected for definite objects, while in others the scrambled partitive object would receive a distinct pitch accent. Particularly, scrambled objects marked with words ‘one’ or ‘only one’ were pronounced with the falling pitch accent, which added a special emphasis to the object (as shown in Figure 7).

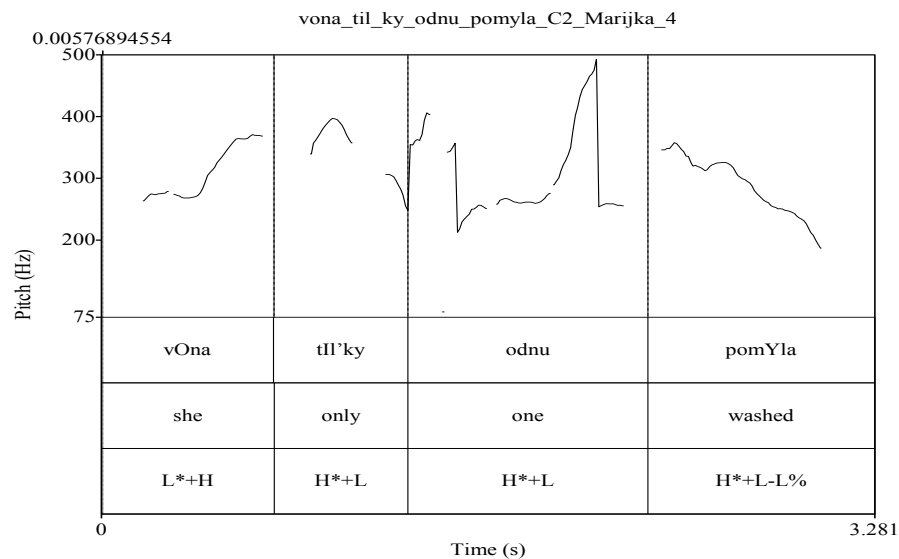


Figure 7: Partitive object and SOV

To summarize, the types of prosodic contours used by the children are similar to those used by the adults, particularly in the sentences with pronouns and indefinite objects. It seems that the most prominent difference between child and adult prosody concerns the range of possible contours: on one hand, children are biased to the default prosody in SVO structures, and on the other hand, their contours are more variable and “bouncy”, especially in partitive contexts.

### 3.2.2 Group Results

The group results are presented in terms of realization of the main relevant properties: stress assignment and the type of pitch accent. It should be mentioned, however, that only descriptive statistics could be performed with the available limited set of 44 utterances. Therefore, only mean percentages are presented below.

The total group results confirm that the children behave mostly adult-like in never stressing indefinite direct objects in the basic SVO structure (cf. Table 1 and Table 2). They also closely approximate adults by destressing pronouns at 75% (cf. 100% for adults in Table 2), but are less adult-like in the prosodic realization of sentences with other context-dependent direct objects.

	Pronominal object	Definite object	Partitive object	Indefinite object
Destressed object	75	50	75	<b>0</b>
Falling pitch on verb	100	56	50	50

Table 1: SVO structures with four types of direct objects: Children, %.

As shown in Table 1, the child prosody of sentences with definite and partitive objects differs considerably from the adult prosody in similar semantic contexts (Table 2).

	Pronominal object	Definite object	Partitive object	Indefinite object
Destressed object	100	87	75	<b>0</b>
Falling pitch on verb	100	100	88	25

Table 2: SVO structures with four types of direct objects: Adults (adapted from Antonyuk-Yudina and Mykhaylyk (2009)), %

While the child data exhibit a clear contrast between the stress placement on the direct object (definite and partitive objects are destressed more often (50% and 25%) than indefinite objects (0%)), there is no such contrast for the prosodic realization of the verb. The Definite and Partitive contexts do not trigger use of the falling pitch on the verb more often than Indefinite contexts (56%, 50% and 50%, respectively). It is important to mention, however, that none of the children’s prosodic contours could be considered ‘incorrect’, but some of them just differed from those normally used by adults.

To conclude thus far, the children’s prosody was as variable as their syntax. The results presented above just touch the surface of the issue of the prosody-scrambling correlation in child speech. It appeared, however, that children follow predicted prosodic patterns for pronouns, though they are less adult-like in the prosodic realization of structures in other contexts.

## 4 Discussion

Prosodic analysis of child data from the elicited production experiment allows us to examine a

complex language phenomenon from different perspectives and to provide an additional piece of evidence of child grammar knowledge. The main idea behind this research was that there is an interaction between two processes: syntactic movement and prosodic (re)contouring. Since both of these processes are related to contextually-defined properties of the direct object, it was predicted that different types of contexts would trigger different types of syntactic structures or prosodic realizations.

The most evident contrast was detected for the structures with pronouns: recall that in Mykhaylyk (2011), children often failed to scramble pronouns, but it appeared from this study that in those cases they still mark them prosodically by destressing. Thus, 3–4-year-old children are able to establish context relatedness for pronouns, and in order to mark their special status they can use one of two ‘options’ available in the grammar: syntactic movement or prosodic shift. In this regard children are very much like adults.

It was also predicted that a similar pattern should be found for other contextually-defined elements—full NP direct objects with definite or partitive semantics appearing in an SVO structure. Apparently, children had some difficulty with these elements or with the experimental task itself. Definite objects were destressed only about half of the time in the available data, while in other cases they received a falling pitch accent, as did indefinite direct objects in the same syntactic position. This might suggest that children do not relate context with the word order or prosody, but it is also possible that they interpreted the experimental task directly as a picture description whereas the goal was to elicit a dialog based on the pictures. Some of the structures had adult-like prosody, while others had a highly marked ‘descriptive’ prosody more appropriate for a ‘teacher-student’ conversation (see e.g., Yokoyama 2002 on the marked child prosody in Russian). It is important to mention that none of the analyzed prosodic contours was ‘incorrect’ or ‘infelicitous’ in any way, but some of them merely differed from those normally used by adults. On the other hand, when children dropped a subject and used a two-word structure with a definite object in a postverbal position, their prosody was mostly adult-like: with a falling pitch accent on the verb and a destressed object.

Furthermore, the prosodic analysis of ‘erroneous’ structures produced by children in the contexts with an indefinite object in a scrambled position shows that such structures are highly marked. They usually have a rising pitch accent on the object and a destressed verb both in child and adult data.

All these results taken together suggest that children are able to use prosody effectively, and that the child-adult differences might be due to different experimental tasks. Adult prosody was evaluated in a reading task which was controlled for context, object semantics, and phonetic properties. Child prosody was evaluated with the material collected from the elicited production task which was only partly controlled for the aforementioned factors. In addition, the sound files with child speech were not always of sufficient quality. Many utterances had to be excluded from the acoustic analysis for various reasons (as it is often the case in experimental work with young children), which made the set of child data limited. Therefore, a more rigorously set experiment needs to be designed and administered to both children and adults in order to investigate possible causes of children’s bias to the default prosody.

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