

# INTONATIONAL REALISATION OF TOPIC AND FOCUS BY DUTCH-ACQUIRING 4- TO 5-YEAR-OLDS

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## ABSTRACT

This study examined how Dutch-acquiring 4- to 5-year-olds use different pitch accent types and deaccentuation to mark topic and focus at the sentence level and how they differ from adults. The topic and focus were non-contrastive and realised as full noun phrases. It was found that children realise topic and focus similarly frequently with H\*L, whereas adults use H\*L noticeably more frequently in focus than in topic in sentence-initial position and nearly only in focus in sentence-final position. Further, children frequently realise the topic with an accent, whereas adults mostly deaccent the sentence-final topic and use H\*L and H\* to realise the sentence-initial topic because of rhythmic motivation. These results show that 4- and 5-year-olds have not acquired H\*L as the typical focus accent and deaccentuation as the typical topic intonation yet. Possibly, frequent use of H\*L in sentence-initial topic in adult Dutch has made it difficult to extract the functions of H\*L and deaccentuation from the input.

**Keywords:** topic-focus, intonation, pitch accent type, language acquisition, Dutch.

## 1. INTRODUCTION

### 1.1. Topic-Focus and intonation in adult language

In everyday conversation, the most common activity is probably the conveyance of information about a discourse entity [12]. The entity about which information is provided is commonly known as the topic; the information that is provided about the entity is the focus. At the sentence level, both the topic and the focus can be encoded in a single sentence. The topic is typically a referent, realised as a full noun phrase (NP) or a pronoun. The topic-focus partition of a sentence is determined by the context, for example, a WH-question. (See Table 1 for examples).

The focus is new in relation to the topic as it is the information that is to be added to the hearer's knowledge world. The topic is given in relation to the focus as it is outside the scope of what is predicated in the focus and serves as an anchor to the previous discourse. Further, the topic is typically identifiable to the hearer (i.e. referentially given) [5]. Both the focus and the topic can be either non-contrastive or contrastive. In this study we have concerned ourselves with topic and focus that are non-contrastive and realised as full NPs.

Languages use different devices (e.g. word order, focus particles, morphology, and intonation) to express the topic-focus distinction. In West Germanic languages, this is mainly expressed in the intonation structure. Specifically, the focus is typically realised with the 'newness' accent

H\*L [e.g. 7]. There is, however, less agreement on how the topic is intonationally realised. Given that the topic is characterised by givenness, [12] suggested that the topic should be deaccented. However, [8] observed that in American English, intonational-phrase final topics are frequently realised with LH\* and H\*. For German, [4] found that the topic is realised with LH\* and L\*H, followed by either a high plateau or a fall, equivalent to L\*HL, H\*L, H\* and L\*H in the ToDI notation used in this study [6]. [18] claimed that Dutch uses both H\*L and L\*H to realise topic.

### 1.2. Topic-Focus and intonation in child language

Studies on language development have shown that the commonality of the topic-focus structure is already established in early child language. [15] observed in a case-study of one English-acquiring child that prior to the two-word stage the child frequently produced constructions consisting of two one-word utterances, in which one designates a topic and the other provides information about the topic, e.g. *Finger. Touch* (The child reached out to touch the microphone used in the recording session with her finger tip). [3] found that in the two-word stage, Italian-acquiring children frequently produce noun + noun utterances, e.g. *Federica acqua* 'Federica water' (The child was pretending to drink), and noun + adjective/adverb utterances at the 200-word level. In these utterances, the first word serves as the topic and the second word the focus.

However, there has been relatively little discussion on the use of intonation to express the topic-focus distinction in child language. Bloom [1] reported that children do not use intonation to express the topic-focus distinction in the one-word stage. Wieman [19] found that children tend to accent the focus and deaccent the topic in the two-word stage. The few studies on the use of intonation to mark information structure in the grammatical multi-word speech stage are concerned with contrast, which was also focal [9,13,14]. For example, Hornby and Hass [9] asked English-acquiring 3- to 4-year-olds to describe pairs of pictures that differed by one feature (e.g. actor, action or object) and found that children used emphatic accentuation ('contrastive stress' in their term) to realise the contrast in the description of the second picture (e.g. *A boy is riding a bike vs. a GIRL is riding a bike*) in 60% of the cases (see also [13]). Via an imitation task in which children repeated the answer to a question (e.g. *Eva wants to bake cookies. What does Peter bake?*) in comic strips, Müller et al. [14] found that like adults, 4- to 5-year-old German-acquiring children uttered words carrying the contrast with a higher mean pitch (337 Hz) than words carrying no contrast (320 Hz) with the same syntactic function and in the same position in the sentence.

As focus was confounded with contrast in prior work], no clear predictions can be derived on the use of accentuation to express non-contrastive focus (see [2] for a different view).

Further, prior studies tell us little about the types of pitch accent that children are able to use to mark information structure. This is an important issue given the fact that intonational realisation of focus is not only about accent placement but also the choice of accent type. It is also closely related to another important issue, i.e. the development of inventory of pitch accent types.

Moreover, the position of the contrastive/focal element in the sentence appears to influence the intonational marking. [9] found a significant decrease in the use of contrastive stress in sentence-final contrast. They suggested that this might be caused by children's sensitivity to the role of word order. Sentence final position is a typical position for contrastive elements; sentence-final contrast is thus less likely to be marked intonationally. However, [14] found a bigger increase in mean pitch height in sentence-final contrast than in sentence-initial contrast, suggesting a stronger intonational realisation of contrast in sentence-final position, contra [9]. There is thus an obvious need to reexamine the effect of sentence position in focus marking in a context where there are no confounding factors.

In addition, as mentioned above, nothing is known about how children use accent types to realise topic in different sentence positions.

In an effort to fill the lacunas in our knowledge on the intonational realisation of topic and focus in child language, we investigated how Dutch-acquiring 4- to 5-year-olds use pitch accent types and deaccentuation to realise full NP non-contrastive topic and focus in different sentence positions and how they differ from adults.

## 2. METHOD

### 2.1. The picture-matching game

A picture-matching game was developed to elicit topic-focus structures. Prior to the game, the experimenter showed the child two boxes full of pictures. The child was told that a picture from one box went together with a picture from the other box and that the experimenter needed his/her help to sort the pictures out. The procedure of the game is as follows. First, the experimenter took a picture (e.g. a bicycle) from one box. She then drew the child's attention to the picture and established what the picture was by saying *kijk! Een fiets!* 'Look! A bicycle!' with either H\*L or L\*H on the verb and H\*L on the noun. If the word was identified as a potentially difficult word for 4- to 5-year-olds in the pilots, the experimenter went on to talk a bit about the picture. This was done to make sure that the entity on the picture was referentially given to the child before the utterance of the question. Second, the experimenter asked a question about the picture (e.g. *Wie beschermt de fiets?* 'Who protects the bicycle?'), again in prescribed intonation contours. The WH-word was said with H\*L; the noun was said with either deaccentuation or H\*L with a reduced local pitch range. Third, the child then turned to a robot for help by clicking on a picture of the robot displayed on his/her computer screen. The child received the answer from the robot via headphones such that the experimenter could not hear it. The robot's answer

was generated by splicing together the words (with a 200 ms pause in between) recorded in a wordlist reading, as in [14]. The original intonation was then erased and the pitch level was set at 200 Hz to obtain a flat intonation. Fourth, the child told back the full-sentence answer to the experimenter in his/her own intonation (e.g. *De vos beschermt de fiets.* 'The fox protects the bicycle.'). Finally, the experimenter looked for the matching picture and handed both pictures over to the child.

### 2.2. Experimental design

Thirty-six question-answer pairs served as the experimental stimuli. The answers were SVO sentences. Subjects and objects were realised as full NPs. Two variables were controlled for in the answer sentences: PRAGMATIC CONDITION (topic, focus), SENTENCE POSITION (initial, final), as shown in Table 1. Half of the question-answer pairs represented the initial focus-final topic condition and the other half represented the final focus-initial topic condition. Each sentence-initial NP and each sentence-final NP occurred in both groups of answer sentences but in different combinations so that each answer sentence was heard only once.

Table 1: Experiment conditions in answer sentences.

	sentence-initial	sentence-final
<b>focus</b>	(Who protects the forest?) <b>The fox</b> protects <u>the forest</u> .	(What does the toad eat?) The <u>toad</u> eats <b>a berry</b> .
<b>topic</b>	(What does the toad eat?) The <u>toad</u> eats <b>a berry</b> .	(Who protects the forest?) <b>The fox</b> protects <u>the forest</u> .

### 2.3. Participants

Monolingual Dutch children (age range: 4;5 – 5;7, mean age 5;1, N = 27) from two primary schools in the neighboring towns of Nijmegen participated in the experiment. Thirty-four students from Radboud University Nijmegen were tested as the controls and were paid a small fee. All participants reported to have normal hearing and speaking.

### 2.4. Procedure

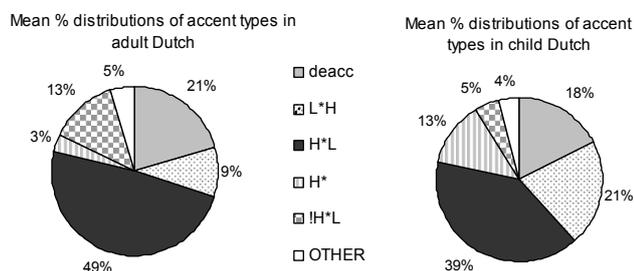
Children were tested individually in a quiet room at their school during school time; adults were tested individually in an experiment room at the Max Planck Institute for Psycholinguistics. The experiments were conducted by means of a portable experiment setup equipped with the NESU experiment software. Each experiment began with four practice trials, which the experimenter and the participant did together. In the practice trials, no headphone set was used and the answer could be heard by both the participant and the experimenter. The practical trials were included to allow the participant to become familiar with the game, feel comfortable with the experimenter, and get used to giving the full-sentence answer without using pronouns. Adults were told prior to the experiment that the game was originally developed for children and therefore very simple. Each experiment was recorded on a DAT tape at 48 kHz (16 bits precision).

### 2.5. Intonational annotation

The data from 7 children were excluded from analysis either because of poor sound quality or because the child turned out to have received speech therapy for minor speech deficits. The recordings of the other participants were segmented and annotated for segments, placement of

word stress and speaking styles using Praat. Intonation was annotated for 20 children and ten adults following the ToDI notation. As ToDI was developed to transcribe the intonation of adult Dutch, the pitch accent types classified in ToDI may not be fully established in child Dutch yet. We thus gave a phonetic description of the pattern using ToDI-like labels when it was not clear which pitch accent type in the adult model the child intended to produce. Figure 1 displays the percentage distributions of accent types (including deaccentuation) averaged over conditions in adults' and children's data separately. Clearly, children and adults largely employ a similar set of pitch accent types, although child-specific accent types were also present, i.e. H\*L^HL and L\*HLH.

**Figure 1:** % distributions of accent types in adult and child Dutch averaged over conditions. OTHER: H\*LH, L\*, L\*HL, H\*L^HL, and L\*HLH. The last two occurred only in child Dutch.



### 3. RESULTS AND DISCUSSION

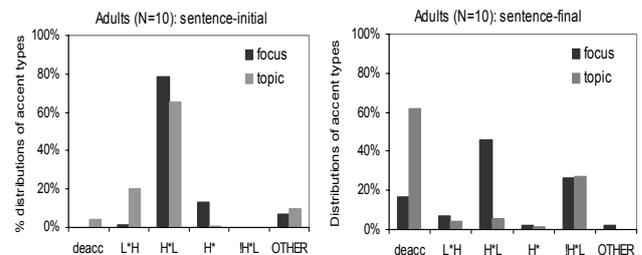
The data of percentage distributions of accent types from adults were analysed separately from children's data but in the same way. The data from each group were divided into six sets. All but the OTHER data set were subjected to statistical analysis. We conducted five repeated measures ANOVAs on adults' data and another five on children's data with two independent variables at a significance level of 0.05: PRAGMATIC CONDITION (2 levels: topic, focus), and SENTENCE POSITION (2 levels: initial, final). The dependent variables were the percentage distributions of deaccentuation, H\*, H\*L, L\*H and !H\*L. If the two-way interaction was found to be significant in the distribution of an accent type in addition to main effects, we consider the effect of the interaction only. We first present results from adults' data to establish the model that children are supposed to acquire over time.

#### 3.1. Realisation of topic and focus in adult Dutch

The interaction of SENTENCE POSITION  $\times$  PRAGMATIC CONDITION was found to be significant in the distributions of deaccentuation ( $F(1, 9) = 36.6, p < .001$ ) and H\*L ( $F(1, 9) = 63.1, p < .001$ ). As shown in Figure 2, in sentence-initial position, deaccentuation occurred only occasionally in the topic condition and did not occur in the focus condition at all. H\*L occurred frequently in the topic condition (65.4%) and even more frequently in the focus condition (78.3%). In sentence-final position, deaccentuation occurred observably more frequently in the topic condition (62%) than in the focus condition (16.8%). In fact, deaccentuation was the most frequent intonation pattern in the topic condition. H\*L was used substantially more often in the focus condition (45.8%) than in the topic

condition (5.6%). In the distributions of H\* and !H\*L, only a main effect of SENTENCE POSITION was found. H\* occurred mostly in sentence-initial position ( $F(1, 9) = 22.01, p < .001$ ) and !H\*L in sentence-final position ( $F(1, 9) = 39.45, p < .001$ ). The analysis on the percentage distributions of L\*H revealed no effect. This can be attributed to the very low frequency of L\*H in adults' data (9%).

**Figure 2:** Mean % distributions of accent types in adult Dutch



Taken together, the findings show that in adult Dutch the focus is typically realised with H\*L, independent of sentence position, in line with the literature on focus. The intonation of topic differs depending on sentence position, however. In sentence-initial position, topic, like focus, is mostly realised with H\*L. In sentence-final position, topic is typically deaccented.

#### 3.2. Default intonation of topic in adult Dutch

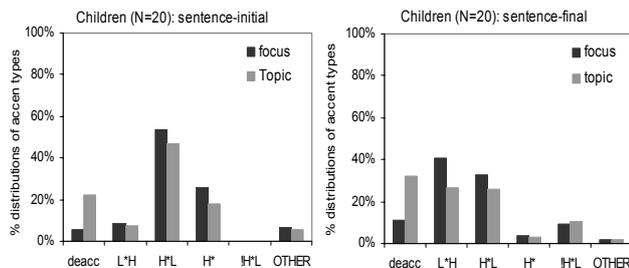
Given the fact that the topic is mostly accented in sentence-initial position but deaccented in sentence-final position, it is debatable what is the default 'topic intonation', i.e. what is the 'topic intonation' that children are supposed to acquire. We propose that deaccentuation is the default intonation of the topic, following [12], for two reasons. First, there is a large body of evidence in psycholinguistics literature that deaccentuation facilitates the processing of relationally given information [e.g. 16, 17]. Second, focus has a higher information value than topic because it is the information to be added to the hearer's knowledge world. It is essential that the focus is realised with accentuation. Deaccenting topic by default thus facilitates focus marking. The defence of this proposal requires an account for why sentence-initial topic gets mostly accented. It has been suggested for English that accenting the pre-focal constitute in the same intonational phrase is rhythmically desirable [11, 17]. In a subsequent perception experiment, we asked native speakers of Dutch to judge the melodic pleasantness of the answer sentences in a number of question-answer dialogues. Results showed that this is also true for Dutch. Listeners judged answer sentences with sentence-final focus to be melodically more pleasant when both topic and focus were spoken with H\*L than when only focus was spoken with H\*L ( $t(15) = 3.88, p < .01$ ).

#### 3.3. Realisation of topic and focus in child Dutch

A main effect of SENTENCE POSITION was found in the distributions of H\*L ( $F(1, 19) = 11.19, p < .01$ ), H\* ( $F(1, 19) = 18.98, p < .001$ ), and !H\*L ( $F(1, 19) = 13.82, p < .005$ ). As shown in Figure 3, H\*L and H\* occurred more frequently in sentence-initial position than in sentence-final position; !H\*L occurred only in sentence-final position. A main effect of PRAGMATIC CONDITION was found in the

distribution of deaccentuation ( $F(1, 19) = 17.04, p < .001$ ). It occurred more frequently in the topic condition (20.5%) than in the focus condition (13%). The interaction of **SENTENCE POSITION**  $\times$  **PRAGMATIC CONDITION** was found to be significant in the distribution of L\*H ( $F(1, 19) = 6.81, p < .05$ ). L\*H occurred more frequently in sentence-final position than in sentence-initial position, like !H\*L; in sentence-final position, it occurred more frequently in the focus condition than in the topic condition.

**Figure 3:** Mean % distributions of accent types in child Dutch.



Thus, topic and focus are realised differently in terms of the distributions of deaccentuation and L\*H. Topic is more often realised with deaccentuation than focus; focus is more often realised with L\*H than topic at sentence-final position. Further, both topic and focus are more frequently realised with H\*L and H\* in sentence-initial position than in sentence-final position, but more frequently realised with L\*H and !H\*L in sentence-final position than in sentence-initial position. As L\*H and !H\*L are more likely to occur in intonational phrase final position for phonological reasons, these differences are not related to the pragmatic properties of topic and focus.

Compared to adults, in sentence-initial position, children exhibit a noticeably weaker preference for H\*L over H\*, though they accent both topic and focus frequently, like adults. In sentence final position, again they accent both topic and focus frequently, unlike adults, who mostly accent the focus (using H\*L most frequently) and deaccent the topic. Note that deaccentuation is used similarly frequently as L\*H and H\*L in sentence-final topic in child Dutch. This indicates that children treat deaccentuation as an equally suitable intonation pattern like L\*H and H\*L to realise sentence-final topic.

#### 4. CONCLUSIONS

We have examined how Dutch 4- to 5-year olds and adults realise non-contrastive and full NP topic and focus intonationally. Three major findings have emerged from our data. First, 4- to 5-year-old Dutch-acquiring children and adult speakers of Dutch employ a similar set of pitch accent types to mark the topic-focus distinction, though child-specific accent types are present. Second, like adults, children deaccent the topic more frequently than the focus independent of sentence position. That is, children accent the focus more frequently than the topic. This indicates children's sensitivity to the accentuation-focus association and the deaccentuation-topic association, which prior work either failed to show convincingly or did not look at. The absence of a main effect of sentence position shows that children do not consider sentence-final position as the typical position for focus and hence deaccent sentence-final focus more frequently as suggested in [9]. Nor do

they use deaccentuation less frequently in sentence-final focus as may be derived from [14]. Our results imply that children under 6 are not sensitive to the role of word order in expressing the topic-focus distinction, in line with [10]. Third, 4- to 5-year-olds have not acquired H\*L as the typical focus pitch accent and deaccentuation as the default intonation of topic. They realise topic and focus similarly frequently with H\*L, whereas adults use H\*L noticeably more frequently in focus than in topic in sentence-initial position and nearly only in focus in sentence-final position. children also frequently realise the topic with an accent, whereas adults mostly deaccent the sentence-final topic and use H\*L and H\* to realise the sentence-initial topic because of rhythmic motivation. Possibly, the frequent use of H\*L in sentence-initial topic in adult Dutch has complicated the task to extract the functions of H\*L and deaccentuation in marking focus and topic from the input.

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#### 5. REFERENCES

- [1] Bloom, L. 1973. *One word at a time*. The Hague: Mouton.
- [2] Cutler, A., Swinney, D.A. 1987. Prosody and the development of comprehension. *J. of Child Lang* 14, 145-167.
- [3] D'Odorico, L., Carubbi, S. 2003. Prosodic characteristics of early multi-word utterances in Italian children. *First Language* 23 (1), 97-116.
- [4] Braun, B. 2006. Phonetics and phonology of thematic contrast in German. *Language and Speech* 49(4), 451-493.
- [5] Gundel, J., Fretheim, T. (in press). Topic and focus. In Horn, L., Ward, G. (ed), *The handbook of contemporary pragmatic theory*. Oxford: Blackwell.
- [6] Gussenhoven, C. 2005. Transcription of Dutch Intonation. In Jun, S.(ed), *Prosodic typology and transcription: A unified approach*. Oxford: Oxford University Press, 118-145.
- [7] Gussenhoven, C. 2006. Types of focus in English. In Lee, C., Gordon, M., Büring, D. (eds), *Topic and Focus: Cross-linguistic perspectives on meaning and intonation*. Dordrecht: Kluwer, 83-100.
- [8] Hedberg, N., Sosa, J.M. 2006. The prosody of topic and focus in spontaneous English dialogue. In Lee, C., Gordon, M., Büring, D. (eds), *Topic and Focus: Cross-linguistic perspectives on meaning and intonation*. Dordrecht: Kluwer, 101-120.
- [9] Hornby, P.A., Hass, W.A. 1970. Use of contrastive stress by prechoold children. *J. of Speech and Hearing Research* 13, 359-399.
- [10] Hornby, P.A., Hass, W.A., Feldman, C.F. 1970. A developmental analysis of the 'psychological' subject and predicate of the sentence. *Language and Speech* 13 (3), 182-193.
- [11] Horne, M. 1991. Why do speakers accent 'given' information? *Proc. Eurospeech 1991*, 1279-1282.
- [12] Lambrecht, K. 1994. *Information structure and sentence form: Topics, focus, and the representations of discourse referents*. Cambridge: Cambridge University Press.
- [13] MacWhinney, B., Bates, E. 1978. Sentential devices for conveying givenness and newness: A cross-cultural developmental study. *J. of verbal learning and verbal behavior* 17, 539-558.
- [14] Müller, A., Höhle, B., Schmitz, M., Weissenborn, J. 2005. *Focus-to-stress alignment in 4 to 5-year-old German-learning children*. Proc. GALA 2005.
- [15] Scollon, R. 1979. A real early stage: an unzipped condensation of a dissertation on child language. In Ochs, E., Schieffelin, E. (eds), *Developmental pragmatics*. New York: Academic Press.
- [16] Terken, J., Nootboom, S.G. 1987. Opposite effects of accentuation and deaccentuation on verification latencies for given and new information. *Language and cognitive processes* 2, 145-163.
- [17] Terken, J., Hirschberg, J. 1994. Deaccentuation of words representing 'given' information: effects of persistence of grammatical function and surface position. *Language and Speech* 37(2), 125-145.
- [18] Vallduvi, E., Engdahl, E. 1996. The linguistic realisation of information packaging. *Linguistics* 34, 459-519.
- [19] Wiemann, L.A. 1976. Stress patterns in early child language. *J Child Language* 3, 283-286.