

John Benjamins Publishing Company



This is a contribution from *The Acquisition of Reference*.

Edited by Ludovica Serratrice and Shanley E.M. Allen.

© 2015. John Benjamins Publishing Company

This electronic file may not be altered in any way.

The author(s) of this article is/are permitted to use this PDF file to generate printed copies to be used by way of offprints, for their personal use only.

Permission is granted by the publishers to post this file on a closed server which is accessible to members (students and staff) only of the author's/s' institute, it is not permitted to post this PDF on the open internet.

For any other use of this material prior written permission should be obtained from the publishers or through the Copyright Clearance Center (for USA: www.copyright.com).

Please contact rights@benjamins.nl or consult our website: www.benjamins.com

Tables of Contents, abstracts and guidelines are available at www.benjamins.com

CHAPTER 4

Children's use of intonation in reference and the role of input

Aoju Chen

Utrecht University / Max Planck Institute for Psycholinguistics

Studies of children's use of intonation in reference are few in number but are diverse in terms of theoretical frameworks and intonational parameters. In the current review, I present a re-analysis of the referents in each study, using a three-dimension approach (i.e., referential givenness-newness, relational givenness-newness, contrast), discuss the use of intonation at two levels (phonetic, phonological), and compare findings from different studies within a single framework. The patterns stemming from these studies may be limited in generalisability but can serve as initial hypotheses for future work. Furthermore, to shed light on the role of input in the acquisition of intonational encoding of referents, I examine caregivers' use of intonation in reference in infant direct speech. In addition, I discuss how future research can advance our knowledge of these issues.

Keywords: reference, intonation, referential givenness-newness, relational givenness-newness, contrast, pitch, accentuation, accent type, input, infant-directed speech, read speech, spontaneous speech

1. Introduction

How children master the art of referring is a long-standing topic of interest for linguists and psycholinguists. Filmmakers also make creative reference to this acquisitional process. In a scene of the well-known Dutch children's film *Tow-Truck Pluck* (Dutch: *Pluk van de Petteflet*), a clerk from the town hall walks into a garden and bumps into Pluck, a boy of the age of six or seven, who is setting up his tent in the garden. Surprised as he is, the clerk asks, *Wat zijn wij hier aan het doen?* 'What are we doing here?'. Pluck turns to him, with a face full of confusion and says, *Wij?* 'We?', with a questioning tone, instead of answering the clerk's question. This humorous scene seems to be based on the assumption that Pluck did not know that

the pronoun ‘we’ can function like the pronoun ‘you’ and be used to refer to the addressee only. When making references, the speaker adjusts his choice of lexical expression, intonation, and, to a lesser degree, syntactic construction to contextual factors. This chapter is primarily concerned with children’s use of intonation in reference in different information structural contexts and the role of input in infant-directed speech (hereafter IDS).

I start with a brief description of the theoretical distinctions that I consider relevant to the discussion of reference in child language. Then I discuss the interface between intonation and reference in adult speech. Following this, I present a meta-analytic review of children’s use of intonation in reference. Then I discuss how caregivers use intonation in reference in IDS, and the role of IDS in the acquisition of appropriate intonation in reference. In the final section, I conclude the review with a summary of the highlights stemming from earlier work and suggest directions for future research.

2. Relevant theoretical distinctions

According to Chafe (1987) and Lambrecht (1994), changes in the information state (also referred to as information status, activation state) of referents are the driving force for changes in how a referent is lexically and intonationally encoded. On the assumption that different types of mental effort or ‘cost’ are involved in the processing of referents, Chafe (1987, p. 22) distinguishes three information states: active (or given), semi-active (or accessible), and inactive (or new). If a referent is already in the addressee’s focus of consciousness at the time of the utterance, it is given. If a referent is in the addressee’s long term memory but is not active in any way, it is new. If a referent is in the addressee’s peripheral consciousness and is not directly focused on, it is accessible. A referent can become accessible either by having been active at an earlier point in the discourse or by being inferable from an already active or accessible referent. Lambrecht (1994, p. 100) refers to these two kinds of accessibility as ‘textually accessible’ and ‘inferentially accessible’ respectively. In addition, he proposes a third kind of accessibility, ‘situationally accessible’, whereby a referent is accessible due to its presence in the text-external world (e.g., the referent of ‘waitress’ is accessible if mentioned in a restaurant). The three information states of referents can be seen as scales on a referential givenness-newness continuum, following Gundel and Fretheim (2004). “Referential givenness-newness involves a relation between a linguistic expression and a corresponding non-linguistic entity in the speaker/hearer’s mind, the discourse, or some real or possible world” (Gundel & Fretheim, 2004, p. 176).

Notably, while a referent's information state changes as the discourse unfolds, typically over a number of sentences, it can assume different information structural roles within a sentence along a different dimension of givenness-newness, namely, relational givenness-newness. Relational givenness-newness "involves a partition of the semantic/conceptual representation of a sentence into two complementary parts, X and Y, where X is what the sentence is about ... and Y is what is predicated about X ... X is given in relation to Y ... Y is new in relation to X" (Gundel & Fretheim, 2004, p. 176). X is typically referred to as topic or background, Y as focus or comment (Vallduví & Engdahl, 1996). Although the two dimensions of givenness-newness often converge in a sentence, they are logically independent. That is, a referent can be the topic of a sentence or (part of) the focus. A topical referent is generally active or accessible, but can also be inactive upon its mention, as 'gardening' in (1). A focal referent is generally inactive, but can also be active or accessible, as 'she' in (2) (Gundel & Fretheim's (3)). In experimental studies of topic and focus, question-answer pairs are often used to determine what is topic and what is focus (Roberts, 2012). For example, a who-question (e.g., *who baked the cake?*) renders the subject-referent focal but the object-referent topical in an SVO response (e.g., *Grandma baked the cake*). A what-question has the opposite effect (e.g., *What did grandma bake?*). A what-happens question puts the whole sentence in focus.

- (1) As for gardening, it is the pastime of many villagers here.
- (2) A: Who called?
B: Pat said she called.

Another concept that is relevant to the discussion of the acquisition of reference is contrast. This is, however, not a standard view. In the theoretical literature on information structure, contrast is exclusively discussed in connection with relational givenness-newness. Topic can be contrastive or not; the same goes for focus. In this chapter, I will take up the view that contrast is "not only a relevant feature for the parametrisation of topicality and focusing, but (also) ... represents an autonomous concept of information structuring" (Molnár, 2002, p. 147). A new referent can be contrastive or not; the same holds for a given or accessible referent. One of the most decisive criteria for whether a referent is contrastive is the availability of a limited number of candidates (Chafe, 1976; Halliday, 1967; Rooth, 1992, as cited in Molnár, 2002). I adopt a strong version of this criterion in my review of studies of children's use of intonation in reference. That is, I consider a referent contrastive only if a limited number of alternative candidates are explicitly mentioned in the immediately preceding context. For example, the referent 'fruits' is contrastive in (3) but not in (4).

- (3) In this supermarket, vegetables are expensive but fruits are cheap.
- (4) In this supermarket, fruits are cheap.

In studies of children's use of intonation for information structural purposes, researchers are often imprecise about the exact information structural aspects under investigation. Consequently, it is not always obvious how comparable the results from different studies are. Furthermore, different uses of terms (intentionally or unintentionally) sometimes unnecessarily amplify differences or similarities between these studies. In my review of these studies, I will present a re-analysis of the information structural features of the referents using a three-dimension approach and compare the findings from different studies within a single framework. That is, each referent of interest will be re-defined along three dimensions – referential givenness-newness, relational givenness-newness, and contrast – following the criteria described above. Because of the small number of these studies, I can be explicit about what materials were elicited and how they were elicited in each study, and about the original definition of the information structural conditions examined.¹ In so doing, the readers are provided with the necessary detail to make their own judgements on my reanalysis of the materials and my interpretation of the findings, or to develop their own interpretation of the findings.

3. Adults' use of intonation in reference

To form an idea of how successfully children can use intonation in reference, it is important to know how adults do it. Studies of intonation and reference in the speech of adults are mostly concerned with speakers' use of intonation in nominal expressions, typically nouns and proper nouns, to encode referents with different information states. The general pattern that has emerged from these studies is that referents with a lower degree of activation tend to be encoded with more intonational prominence than referents with a higher degree of activation. Intonational prominence can be achieved at both the phonological and phonetic level. At the phonological level, this includes discrete changes in accent placement (i.e., whether a noun is accented or not) and in accent type (i.e., the shape of the pitch accent, such as a rise vs. a fall). At the phonetic level, or in the realisation of the phonological categories, this includes variation in pitch span (i.e., the difference between

1. There has been some work on children's use of intonation to process contrast in offline and online language comprehension (see Ito, 2014, for a review). Readers who are interested in the link between production and comprehension in children's use of intonation for information structural purposes are referred to Chen (2010) and Chen (2014) for a detailed discussion.

the highest and lowest pitch, also referred to as pitch range by some authors), the difference in alignment of pitch peak (i.e., the locus of the highest pitch), and the difference in duration. The exact intonational means used to achieve different degrees of prominence can differ across languages (e.g., Flemming, 2008) and between different speech modalities, such as read speech vs. spontaneous speech. Because studies of children's use of intonation in reference to be reviewed in next section are concerned with children acquiring a West Germanic language, I will only discuss adults' use of intonation in reference in West Germanic languages in this section.

In read speech, accent placement is a key cue for distinguishing new referents from given referents. That is, new referents are almost always accented, whereas given referents are generally not accented (or deaccented) (e.g., Baumann, 2006; de Ruiter, 2010; Hawkins & Warren, 1994). Accessible referents can be accented or deaccented, depending on the nature of the referents. For example, Baumann and Grice (2006) found that, in German, an accessible referent was preferably unaccented if it (e.g., *rose*) had a part-whole relation with an already active referent (e.g., *flower*), but was preferably accented if it (e.g., *flower*) had a whole-part relation with an already active referent (e.g., *rose*). Importantly, accent type matters in distinguishing new referents and accented accessible referents. For example, Baumann (2006) analysed the intonation of sentence-final referents in short newspaper texts read by one male speaker of German. He found that H+L* (a falling pitch pattern with the highest pitch aligned with the unstressed syllable of the word) was used in more than half of the accessible referents, whereas H* (a simple rising pattern) was rarely used.² Baumann and Hadelich (2003) found, in an off-line perception experiment, that H* and H+L* were both judged to be appropriate in marking new referents, with H* being more favoured. Further, in another off-line perception experiment, Baumann and Grice (2006) found that H+L* was considered more appropriate for accessible referents than H* and deaccentuation in German. In short, in German, accessible referents appear to be frequently accented with H+L* and rarely with H* when being accented; new referents are pronounced with both H* and H+L*, with a preference for H*.

In spontaneous speech, the role of accent placement is relatively moderate and the form-function mappings between accent types and information states

2. The label H+L* stands for 'high plus low star' or 'H plus L star'. H or 'high' refers to a high pitch level, L or 'low' a low pitch level. These kinds of labels are common in descriptions of intonation within the framework of Autosegmental-Metrical Theory (Ladd, 1996). The two pitch levels are considered as two distinct tones, a high tone and a low tone. If a word is accented, the pitch pattern can be transcribed using these two tones. The 'star' sign indicates which tone is associated with the lexically stressed syllable of the accented word.

are different from those reported for read speech. For instance, Bard and Aylett (1999) analysed accent placement in dialogues produced by native speakers of Glasgow English in a route communication task and found that deaccentuation rarely occurred in within-dialogue and across-dialogue second mentions of referents. De Ruiter (2010) examined the intonation of new, given and accessible referents in spontaneously produced narratives elicited in a picture-story telling task, compared to read-out stories based on the same picture-stories in German. She found systematic differences in the distribution of deaccentuation and accent types between the read-out stories and the spontaneous narratives. Specifically, deaccentuation was used to encode given referents in only 33% of the cases in the spontaneous narratives, compared to 93% of the cases in the read-out stories. Accessible referents and new referents were frequently marked with the L^*+H accent (a rising-pattern with a salient low plateau preceding the rise, also known as a rise with a late peak) in the spontaneous narratives, instead of the H^* and $H+L^*$ accents in the read-out stories. Notably, when the phonological cues do not suffice to distinguish one information state from another, phonetic cues to prominence are used instead. For example, Watson, Arnold, and Tanenhaus (2006) analysed the referents in utterances produced by native speakers of American English in an interactive task that had the goal of putting objects in the right location on a computer display. They observed that, although speakers accented referents regardless of their information states, referents with a low degree of activation tended to be encoded with a higher pitch, a longer duration and a higher intensity than referents with a high degree of activation.

Additionally, contrast can license extra intonational prominence in read speech in some languages. For example, Braun (2006) found that although sentence-initial contrastive and non-contrastive topical referents were equally frequently realised with L^*+H and $L+H^*$ (a rising pattern without a salient low plateau preceding the rise, also known as a rise with an early peak) in German read speech, the contrastive topical referents were realised with a higher pitch, a later peak or a larger pitch span than the non-contrastive topical referents. Baumann, Becker, Grice, and Mücke (2007) reported that in comparison to non-contrastive focal referents, contrastive focal referents were fairly systematically realised with a higher and later pitch peak, a wider pitch span, and a longer duration in the accented syllable in German read speech. The effect of contrast seems to be weaker in Dutch. For instance, Hanssen, Peters, and Gussenhoven (2008) found that contrastive focal referents were accented and produced with a somewhat higher pitch peak than non-contrastive focus referents only when the focus was confined to one word in Dutch read speech.

4. Children's use of intonation in reference

In order to use intonation in referential expressions like adults, children need to have a fairly accurate understanding of the information states of referents in the first place. Developmental studies of pointing and eye gaze have shown that children know what is new in a context both from their own perspective and from the perspective of the interlocutor by 24 months (e.g., Liszkowski, Carpenter, Striano, & Tomasello, 2006; Moore & D'Entremont, 2001; Tomasello & Haberl, 2003; see Ng, Demir, & So, this volume). It is, however, less clear whether children develop sensitivity to the information states falling between newness and givenness, such as the accessible state, by this age. Furthermore, children need to get right the general mappings between different information states and degrees of intonational prominence. In addition, they need to realise intonational prominence appropriately at both the phonological and phonetic level.

Hornby and Hass's (1970) study is the earliest published work on children's use of intonation in distinguishing referents. In this study, English-speaking 3- and 4-year-olds (mean age: 4 years) were asked to describe pairs of pictures that differed by one feature (agent – sentence subject, action – sentence predicate, or patient – sentence object), as in (5). The difference between within-pair pictures thus made the new referent or action in the second picture contrastive to its syntactic counterpart in the first picture. The children were prompted with the question *What's happening in this picture?* each time before they described a picture. The use of such a question rendered the whole sentence relationally new, and perhaps the contrastivity between different actions and between different referents less strong than otherwise. But a substantial degree of contrast was certainly present given that the children described a pair of pictures each time. The referents of interest in the descriptions of the second pictures were thus referentially new, relationally new, and contrastive. Their counterparts in the descriptions of the first pictures were then referentially new, relationally new, and non-contrastive. The referents differed thus only in whether they were contrastive, as shown in (5). In this example and the following examples, the original analysis of a referent is given in sub-script next to the relevant word; the re-analysis of the referent along the three dimensions (referentially givenness-newness, relationally givenness-newness, contrast) is provided in brackets, following the relevant sentence.

- (5) Picture 1-Question 1: What's happening in this picture?
 Picture 1: A [girl]_{new} rides a bike. (referentially new, relationally new, non-contrastive)
 Picture 2-Question 2: What's happening in this picture?
 Picture 2: A [boy]_{new+contrastive} rides a bike. (referentially new, relationally new, contrastive)

On the basis of just one linguistics student's perceptual judgments on the presence of 'contrastive stress' in each sentence produced by the children, Hornby and Hass observed that although the children hardly used 'contrastive stress' in their description of the first picture in each pair, they frequently used 'contrastive stress' to produce the contrastive referent or action in the second picture. Interestingly, the children used 'contrastive stress' even more frequently in subject-referents than in object-referents. The authors did not define what they meant by 'contrastive stress'. But considering that each sentence must have a sentence-level accent and because the authors stated that 'contrastive stress' hardly occurred in the descriptions of the first pictures, I interpret their 'contrastive stress' to mean accentuation with a pitch span larger than that of the accent used in the descriptions of the first pictures. Hornby and Hass's results may therefore suggest that English-speaking 3- and 4-year-olds can distinguish referents that differ only in contrastiveness by using a larger pitch span in the contrastive referents. Using similar data-elicitation and evaluation methods, MacWhinney and Bates (1978) found that the use of 'contrastive stress' to distinguish referents only differing in contrastiveness in English-speaking children was well established around the age of 3 years, but still increased between 3 and 6 years.

Children's ability to encode contrastive referents with more intonational prominence than non-contrastive referents is confirmed by acoustic analysis in recent research. Wonnacott and Watson (2008) examined English-speaking children's use of pitch span, duration, and intensity in referents (i.e., agents) who performed a hitting action on other referents (i.e., recipients) and differed in the dimensions of referential givenness-newness and contrast. Notably, the authors defined the differences between agents as a matter of different degrees of 'accessibility'. Wonnacott and Watson's use of the term 'accessibility' is thus clearly different from that of Chafe (1987) and Lambrecht (1994). In their study, English-speaking children aged between 3;5 and 4;9 were asked to describe pairs of short video scenes using SVO sentences in three conditions. The video scenes in each pair depicted the same hitting action but the agent or the recipient could be different in the second scene, creating a contrast between agents or recipients. In one condition (Wonnacott and Watson's 'given-nonshift' condition), the agent performed the hitting action on two different recipients in the two scenes; the agent in the second scene was thus referentially given and non-contrastive, as in (6a). In the second condition ('given-shift'), the agent in the second scene was the recipient in the first scene; the recipient in the second scene was an animal not present in the first scene, as in (6b).³ The agent in the second scene was therefore

3. 'Shift' refers to a change in grammatical role of a referent from the first scene to the second scene (e.g., being an agent in the first scene but a recipient in the second scene).

referentially given but contrastive. In the third condition, the two scenes had different agents and recipients; the agent was therefore referentially new and contrastive, as in (6c) ('new'). However, in practice, the agent in the second scene was not referentially new in its strict sense but referentially accessible, because all the five hand puppets appeared in the experiment several times and it would take only a few trials for the children to see all of them once. Finally, because the children were prompted with the question *What happened?* after the first scene and the question *And then what happened?* after the second scene every time, the referents and actions in their descriptions were all relationally new. The agents thus differed in the dimension of contrast between conditions (6a) and (6b), and in the dimension of referential givenness-newness between conditions (6b) and (6c).

- (6) a. Question 1: What happened?
 Sentence 1: The lion hit the giraffe.
 Question 2: And then what happened?
 Sentence 2: The [lion]_{given-nonshift} hit the elephant. (referentially given, relationally new, non-contrastive)
- b. Question 1: What happened?
 Sentence 1: The giraffe hit the lion.
 Question 2: And then what happened?
 Sentence 2: The [lion]_{given-shift} hit the elephant. (referentially given, relationally new, contrastive)
- c. Question 1: What happened?
 Sentence 1: The elephant hit the giraffe.
 Question 2: And then what happened?
 Sentence 2: The [lion]_{new} hit the elephant. (referentially accessible, relationally new, contrastive)

It was found that the agent referents were nearly always accented in all three of the conditions. Phonetic analysis showed that the referents were similarly realised in conditions (6b) and (6c), but the referents in these two conditions were produced with a higher maximum pitch and a higher intensity than the referents in condition (6a). This pattern mirrored findings from English-speaking adults by Watson, Arnold, and Tanenhaus (2005, as cited in Wonnacott & Watson, 2008). But in contrast to the adults, the children did not show differences in durational measures between conditions. Wonnacott and Watson's results thus suggest that English-speaking 4-year-olds can vary pitch and intensity in a gradient fashion to distinguish referents that differ in both referential givenness-newness and contrastiveness or only in contrastiveness but not referents that differ only in referential givenness-newness.

Similar findings have been reported for German-speaking children. Müller, Höhle, Schmitz, and Weissenborn (2006) examined the use of pitch in German-speaking 4- to 5-year-olds, compared to adults. SVO and OVS sentences were elicited via a repetition task. In this task, the participants watched a number of three-picture comic strips together with a hand puppet. Each comic strip was accompanied by a narrative consisting of a three-sentence story, a wh-question, and an answer to the wh-question, as illustrated in (7) (example in Müller et al.'s Figure 1) and (8), made up on the basis of (7). Unlike the other sentences in the narrative, the answer sentence lacked sentence-level prosody (i.e., intonation and rhythmical properties). The participants were requested by the hand puppet to repeat the answer in each story. Müller et al. analysed the object-referents as focal and the subject-referents as unfocal in answers responding to what-questions; the opposite held for the referents in answers responding to who-questions. Analysis of automatically extracted mean pitch heights in the subject- and object-referents revealed that the focal referents were produced with a higher mean pitch than the non-focal referents by both the children and adults. This difference was more pronounced in sentence-final position than in sentence-initial position, regardless of word order.

- (7) Tomorrow is the birthday of Peter and Eva's mother. Therefore they want to surprise their mother. (Peter and Eva standing next to each other in picture 1)
 Eva wants to bake cookies. (Eva with cookies in picture 2)
 What does Peter bake? (Peter baking in picture 3)
 [Peter]_{non-focal} bakes [a cake]_{focal}. ('cake': referentially new/accessible, relationally new, contrastive)
- (8) A cake and some cookies need to be baked for a party.
 Eva wants to bake cookies.
 Who bakes a cake?
 [Peter]_{focal} bakes [a cake]_{non-focal}. ('cake': referentially given, relationally given, weakly contrastive)

Considering that in each comic strip, the event described after the wh-question differed from the event described before the wh-question in both the subject- and object-referents, the answer to the wh-question would seem to have a double-contrast construction. The what-questions on either the subject-referents or the object-referents might have made the contrast stronger in the focal referents than in the non-focal referents. Further, as each referent appeared twice (albeit in different comic strips), the focal referents were referentially new at the first appearance but referentially accessible at the second appearance. The focal referents were therefore referentially new on half of the trials and referentially accessible on the other half of the trials. The non-focal referents were always referentially

given, because they were mentioned in the narratives. The focal referents can thus be re-analysed as relationally new, referentially new or accessible, and contrastive, and the non-focal referents as relationally given, referentially given, and perhaps weakly contrastive. The referents in the focus condition and their counterparts in the unfocused condition thus differed in all the three dimensions. Müller et al.'s results thus suggest that German-speaking 4- to 5-year-olds can vary mean pitch to distinguish non-given referents from given referents if the former are contrastive and the latter are at most weakly contrastive. As Müller et al. did not provide information on accent placement in the referents, it is not possible to tell whether the difference in mean pitch was of a phonetic nature or driven by a phonological difference (e.g., frequent accenting in the referentially and relationally non-given referents vs. frequent deaccenting in the referentially and relationally given referents).

The question arises as to how children use intonation in non-contrastive referents differing in the givenness-newness dimensions. Work based on corpora of spontaneous production of young children has yielded different results. Wieman (1976) observed in 2-year-old English-speaking children's two-word utterances that accent placement in the two-word stage was in the first place governed by the semantic relation between the two words. For example, in Noun/Verb–Locative utterances (e.g., *play museum*), the accent was almost always assigned to the locative (e.g., *museum*). However, the default pattern broke down if the non-default accent-bearing word referred to a referent that was relationally new. For example, a child accented *firetruck* instead of *street* in *firetruck street* when answering his mother's question *What is in the street?*. This observation would seem to suggest that 2-year-olds could use accent placement to distinguish non-contrastive and relationally new referents from non-contrastive and relationally given referents. However, Wieman's observation was based on only seven sentences in her corpus, and its generalisability is therefore limited (Wells & Local, 1993). Behrens and Gut (2005) showed in their longitudinal study of a German-speaking boy that the boy frequently accented both words in his two-word utterances regardless of information structure, the syntactic organisation of the utterance, and the semantic relation between the words. Chen and Fikkert (2007a) found a similar pattern in the production of three Dutch-speaking 2-year-olds after the vocabulary size of 160 unique recorded words was reached. However, Chen (2009) noted that children of this young age have an immature pitch-control system and they might experience difficulty with keeping pitch low over the length of a whole word. Consequently, they might use a downstepped accent when they should deaccent a word. Reanalysing the intonation in Noun-Verb utterances (e.g., *appel eten* 'apple eat') reported by Chen and Fikkert (2007a), Chen (2011b) found that Dutch-speaking 2-year-olds appeared to use non-downstepped accents to

realise relationally new referents and actions but downstepped accents and de-voicing to realise relationally given referents and actions. The same pattern was found in Dutch-speaking 3-year-olds' Adjective-Noun utterances (e.g., *lieve beer* 'sweet bear') in which the noun was relationally and referentially given and non-contrastive and the adjective conveyed new information (Chen & Fikkert, 2007b). Together, these studies suggest that 2- and 3-year-olds may use broadly different types of accents (i.e., downstepped vs. non-downstepped) as an alternative to accent placement to separate relationally new referents from relationally given referents in two-word utterances.

Turning to older children, Chen (2009, 2011a) elicited SVO sentences with either the subject-referent or the object-referent being focal or relationally new from Dutch-speaking 4- to 8-year-olds and adult controls by means of a picture-matching game. In this game, the experimenter told the participant that she had two sets of pictures, and one picture from one set went together with a picture from the other set. The pictures were however mixed up; the participant's help was needed to sort out the pictures. The experimenter showed the participant one picture each time, described the picture, and asked a wh-question about it, as shown in (9). The participant then received an answer from a virtual robot (displayed on a computer screen) via a headphone set. The robot's sentences were constructed such that they contained no sentence-level intonation and rhythmic properties, similar to the target utterances in Müller et al. (2006). The participant was instructed to use the robot's words to answer the experimenter's question but should speak normally, instead of sounding like the robot. Each referent appeared twice in the experiment, once in the focused condition and once in the unfocused condition. Referentially, the subject- and object-referents were thus given in the unfocused condition (as in (9)) but new or accessible in the focused condition (as in (10)), similar to the referents in Muller et al.'s study (2006). The subject-referents were non-contrastive throughout the experiment.

- (9) Experimenter: Look! A beet. It seems that someone is eating the beet. Who is eating the beet?

Participant: [The cleaning lady]_{focal} is eating [the beet]_{non-focal}. ('cleaning lady': referentially new/accessible, relationally new, non-contrastive; 'beet': referentially given, relationally given, non-contrastive)

- (10) Experimenter: Look! A cleaning lady. It seems that she is picking up something. What is the cleaning lady picking up?

Participant: [The cleaning lady]_{non-focal} is picking up [a vase]_{focal}. ('cleaning lady': referentially given, relationally given, non-contrastive; 'vase': referentially new/accessible, relationally new, non-contrastive)

Chen (2011a) analysed the distribution of accentuation and choice of accent type in the subject- and object-referents. It was found that the children were adult-like in accent placement in both the subject- and object-referents, and in choice of accent type in the subject-referents at the age of 4 or 5 years, but they were not adult-like in choice of accent type in the object-referents until the age of 8 years. Like the adults, the children accented the subject-referents in nearly all cases, similar to what Wonnacott and Watson (2008) found, and they most frequently used H*L (a falling pattern with the highest pitch aligned with the stressed syllable of the word). Further, the children accented the object-referents more frequently when they were referentially new/accessible and relationally new than when they were referentially given and relationally given, similar to the adults. However, unlike the adults, the children did not exhibit a preference for H*L when accenting the referentially new/accessible and relationally new object-referents. Instead, they used H*L, L*H and downstepped H*L (a falling pattern with a lowered pitch peak compared to the high tone in the preceding accent) similarly frequently. Chen (2009) analysed the intonation in the subject-referents accented with H*L in both the children's and adults' data. In the adults' data, the subject-referents were realised with a larger pitch span, triggered by a lower pitch minimum after the peak, an earlier peak alignment, and a longer word duration when they were referentially new/accessible, relationally new and non-contrastive than when they were referentially given, relationally given and non-contrastive. The 4- to 5-year-olds used neither pitch-related cues nor duration to distinguish these two types of referents. The 7- to 8-year-olds used only the pitch-related cues for this purpose.

Dutch-speaking 4- to 5-year-olds therefore appear to be different from their English- and German-speaking peers in that they cannot vary intonational prominence phonetically to distinguish referential and relational givenness from newness in subject-referents. Notably, the subject referents differed in the dimension of contrast in addition to givenness and newness in Wonnacott and Watson (2008) and Müller et al. (2006), but only in givenness and newness in Chen (2009, 2011a). The absence of contrastivity in the 'new' referents may explain the apparent difference between Dutch-speaking children and other children.

The studies reviewed so far are concerned with children's use of intonation in distinguishing referents that differ in more than one dimension. De Ruiter (2010) examined German-speaking 5-year-olds' and adults' use of accent placement and accent type in distinguishing referents that only differed in the dimension of referential newness-givenness – i.e., referentially new, given and accessible referents that were relationally new and non-contrastive. As mentioned earlier, a picture-story-telling task was used to elicit different kinds of referents in natural narrations. Two sets of picture-stories were designed. In one set, the target referent changed from 'new' to 'given' after being introduced into the story by

appearing again in the immediately following picture. In the other set of stories, the target referents changed from 'new' to 'accessible' by reappearing in the fourth or fifth of the pictures after two other referents were introduced. The target referents were animate, non-agentive, phrase-final and played a secondary role in the stories. Each participant was supposed to tell the stories in a clear manner to an adult interlocutor, who sat opposite to him or her and could not see the pictures. The adult interlocutor was instructed to give back-channel feedback throughout the experiment but to ask a 'what-happens' question prior to the picture containing the target referent in the intended conditions, e.g., *And what happens then?* or *Oh, and what comes now?* The use of such questions made all target referents relationally new. Analysis of the intonation in the target referents revealed that the children were remarkably similar to the adults in their use of accent placement and accent type to mark referential givenness-newness already at the age of 5 years. Like the adults, the children deaccented most frequently in the 'given' condition, followed by the 'accessible' condition, and least frequently in the 'new' condition. This result suggested that the children were sensitive to recency of mention and could use intonation accordingly. Further, both the adults and children used accentuation rather frequently in the 'given' condition. However, the alleged 'newness' accent (i.e., H*) as found in read speech was not more favoured in the 'new' condition than in the other two conditions. The accent L*+H was the only accent type that occurred significantly more frequently in the 'new' and 'accessible' conditions than in the 'given' condition in both the adults and children. The only difference between the adults and the children was in the use of L+H*. The children used this accent most frequently for new referents, whereas the adults used it most frequently for accessible referents. De Ruiter suggested that this could be related to the adults' intention to remind the listener of a previously introduced referent by means of a perceptually more salient accent. Subsequent acoustic analysis showed that the excursion from the lowest pitch in the unstressed syllable preceding the stressed syllable to the highest pitch in the stressed syllable was much larger in L+H* than in H*, suggesting that L+H* might sound more prominent than H*.

The near adult-like use of accent type in German 5-year-olds in encoding referents in natural narrations (de Ruiter, 2010) stands in contrast to the non-adult-like use of accent type (in sentence-final referents) in Dutch 4- to 5-year-olds (Chen, 2011a). This difference suggests that children learn to track the changes in newness and givenness in one dimension and encode the changes phonologically in their own speech earlier than changes in multiple dimensions in dialogues.

Referential expressions have different sizes, varying from single-noun NPs to more complicated NPs, such as NPs containing an adjectival modifier. All the studies reviewed above were concerned with single-noun NPs. Wells, Peppé, and

Goulandris (2004) examined how English-speaking children used intonation to express contrast in adjective+noun phrases, in which the contrast was either in the adjective or the noun. Using a lotto game, they elicited SVO sentences containing adjective+noun NPs (e.g., I want a white bike) from children in four age groups (5 years, 8 years, 10 years and 13 years). In the game, the child first received a picture. Then the experimenter offered the child one picture a time by saying, for example, *How about a green bicycle?* (Example (11)). The picture offered by the experimenter differed from the child's picture either in object class (e.g., boat vs. bus) or in colour (e.g., green bike vs. white bike). The child's task was to ask the experimenter to give an identical copy of his picture. Each child seemed to have been offered only two pictures in total, covering both kinds of contrasts between the child's pictures and the experimenter's pictures. The experimenter did not use intonation to highlight either the colour or the vehicle in her questions.

- (11) a. Experimenter: How about a green bike?
 Child: I want a [white]_{contrast} bike.
 b. Experimenter: How about a black boat?
 Child: I want a black [bus]_{contrast}.

Wells et al. (2004) found that the children accented the contrastive adjective with a falling accent in over 90% of the cases and the contrastive noun in 50%–63% of the cases in all age groups. The children were thus less consistent in accent placement when the contrast was in the noun regardless of age. According to the authors, the fall on the noun in this case was “not accompanied by a step up in pitch, or increased loudness or duration” and hence did not sound emphatic enough (p. 776). Further, the 5-year-olds placed the accent by mistake on the noun in the colour-contrast condition slightly more often than the other children (6.5% vs. 0.3%–2%). The studies of English-speaking children's expression of contrast involving single-noun NPs, showed that children know to accent the noun and realise the accent with a larger pitch span at the age of 4 or 5 years (Hornby & Hass, 1970; MacWhinney & Bates, 1978; Wonnacott & Watson, 2008). Wells et al.'s results thus suggest that syntactic complexity of the noun phrase can interfere with the use of intonation and lead to non-adult-like use of intonation. This raises the question of how generalisable the results based on SVO sentences in the above-reviewed studies are to more complex sentences.

To sum up, this review shows that children appear to vary intonation to differentiate relationally new referents from relationally given referents at the age of two, albeit in a child-specific way. At the age of 4 or 5 years, children can use intonation at the phonetic level to distinguish non-given referents from given referents only if the non-given referents are contrastive. That is, children's phonetic use of intonation seems to be driven by the presence of contrast at the age of 4

or 5. This is remarkable given that contrast licenses extra intonational prominence only to a limited extent in adult speech. It is not until the age of 7 or 8 that children can distinguish new and non-contrastive referents from given and non-contrastive referents phonetically, though still not in a completely adult-like way. Possibly, contrast and newness together are perceived to be more salient than newness alone by younger children, and thus trigger the use of more prominence in production. Furthermore, at the phonological level, children can use accent placement to distinguish non-contrastive referents differing in the givenness-newness dimensions. Their choice of accent type is adult-like by the age of 5 years only if the referents differ in one dimension of newness-givenness and appear in monologues. Finally, children may undergo a U-shaped development if their ability in using intonation in reference in syntactically simple sentences does not get ‘transferred’ to syntactically more complex sentences.

5. Intonation in reference in infant-directed speech

As has become clear from the preceding section, children undergo a complicated developmental process in order to appropriately use intonation in reference in spontaneous speech. The question of how children learn to do what they do with intonation is, however, hardly addressed in previous studies. It has been suggested that 4- to 5-year-olds’ use of increased intonational prominence in new information is a universal ‘physiological reflex’ (Bolinger, 1983; Cutler & Swinney, 1987). According to Bolinger (1983), speakers increase pitch and thus intonational prominence as a result of excitement when telling something new or important. The above-reviewed studies have shown that 4- to 5-year-olds use intonation in different ways in different contexts and different languages for the purpose of reference. This suggests that their use of intonation cannot possibly be simply a ‘physiological reflex’ which predicts similar uses of intonation in children across languages. However, this reflex may be a plausible starting point in the early verbal stage. Assuming that children initially raise their pitch in new or contrastive referents but lower their pitch in given referents, they need feedback from their surroundings to figure out whether they should continue doing so but fine-tune their production or whether they should change their strategy. In West Germanic languages, if input from caregivers provides positive feedback, then it has a facilitating role in children’s acquiring the use of intonation in reference. If input from caregivers does not provide clear and consistent feedback, it can pose an acquisitional challenge to children. Thus, knowing how caregivers use intonation in reference can give us an insight into the nature of the task of learning to use intonation in reference. In this section, I will discuss how mothers use intonation

in reference in IDS, the most typical form of input. Research on the intonation of IDS has paid limited attention to how caregivers use intonation to express the two dimensions of newness-givenness. Three published studies will be reviewed here: Fernald and Mazzie (1991), Fisher and Tokura (1995), and Bortfeld and Morgan (2010), all on IDS in American English.

In Fernald and Mazzie (1991), mothers with 14-month-old infants were asked to tell a story about a baby getting dressed to their child in one session and to an adult in another session. In the story, a baby was introduced in the first picture, and then got a piece of clothing put on in each of the subsequent pictures. The new clothing item was printed in different bright colours, whereas the clothing items put on earlier were printed in grey in each picture. The mothers used the highest pitch for the target referent at its first mention in a sentence significantly more frequently in IDS than in speech to the adult (hereafter ADS). They also used the highest pitch for the target referent at its second mention relatively frequently in IDS. Examples of the speech produced by a mother describing the pictures to her infant are given in (12), in which the words in bold were spoken with the highest pitch in the respective utterances. Fernald and Mazzie's results thus suggest that mothers frequently use an accent with a high pitch peak for a new referent and even for the second mention of the same referent in IDS. This indicates that mothers may not be consistent in accenting newness and deaccenting givenness in IDS, contrary to what Fernald and Mazzie concluded themselves (1991, p. 217) and how their results have been interpreted in the literature (e.g., Cristia, 2013).

- (12) That's a **boy**. He put on his **pants**. They're **blue** pants huh. Then he put on his yellow **socks**. Uh-huh. And then he put on his orange and blue striped **shirt**. Yeah. That's a **shirt**. So he's got a shirt and shorts and **socks** on.

As Fernald and Mazzie (1991) did not set out to examine the intonation of first mentions and second mentions of referents and they had a small number of second mentions, Fisher and Tokura (1995) took up the issue of first and second mentions in their study with mothers of 14-month-old infants. In their experiment, the mothers watched a puppet show twice and were instructed to describe the events as they occurred to their 14-month-old infants in one session and to an adult experimenter in another session. Each puppet show featured an action that the recurring figure, a pig, did to another animal. The other animal was the target referent, and was mentioned typically in sentence-final position because of its role as the recipient of each action. The mothers spoke in general at a lower speaking rate, used shorter utterances and were higher-pitched in IDS than in ADS. But they realised the target referents with a longer duration, a larger pitch span, and higher amplitude in first mentions than in second mentions in both speech modes. Further, the target words coincided with pitch peaks more frequently in

first mentions than in second mentions in both speech modes. Fisher and Tokura's results thus emphasise the similarities in how intonational cues are used to encode first and second mentions of referents in IDS and ADS. It is not clear whether the decrease in word duration, pitch span and amplitude in second mentions was due to frequent use of deaccentuation, or was a reflection of how accents were realised.

Since mothers tend to repeat words in IDS, Bortfeld and Morgan (2010) went one step further than Fisher and Tokura (1995) by asking the question of how mothers use intonation in reference beyond the first two mentions. Mothers with infants aged between 9 and 10 months were asked to watch a puppet show in which a turtle puppet performed different actions on different animals (target referents), similar to the puppet shows in Fisher and Tokura's study. The scene in each show was repeated until the mothers stopped talking for at least 2 seconds to elicit multiple mentions of the target referents. The mothers were cued as to which nouns and verbs should be used. Bortfeld and Morgan found that the mothers mentioned the target referents about four times on average. First mentions of the target referent were produced with a longer duration, a higher pitch, and a wider pitch span than second mentions, similar to what was found in Fisher and Tokura's study (1995). Third mentions were not produced with a decrease but an increase in duration and pitch, compared to second mentions. Fourth mentions were produced with a decrease in pitch and duration, compared to third mentions. Fifth mentions were produced with an increase in pitch and duration, relative to fourth mentions. The mothers thus alternated between producing the nouns with more or less intonational prominence, regardless of the position of the word within an utterance and utterance length. Bortfeld and Morgan (2010) speculated that this sing-song pattern may be used by mothers to keep infants interested.

Taken together, if we focus on the intonation in the first and second mentions of a referent, mothers seem to produce the referent with less prominence when it becomes more activated though not necessarily in a very consistent manner. When we go beyond the first two mentions, the more activation-less prominence pattern appears to break down. These results suggest that the input in IDS is complex. Consequently young children need to figure out that mothers' use of intonation is driven by both changes in the activation state of the referent and other communicative intents.

6. Conclusions and future research

This chapter has reviewed production studies of the use of intonation in reference by children in spontaneous speech and by adults, in particular, mothers, in IDS in West Germanic languages. The studies concerning children show that three

factors jointly shape the developmental path to adult-like use of intonation. First, whether a referent is contrastive matters to how early children can use intonation phonetically in reference. Second, whether referents differ in one dimension and appear in the child's own speech or differ in multiple dimensions and occur in dialogues may influence how able children are to use intonation phonologically. Finally, increased syntactic complexity of the linguistic expressions denoting referents may trigger inappropriate use of intonation. The studies concerning IDS show that mothers' use of intonation in IDS appears to be different from adults' use of intonation in both read speech and spontaneous speech. The input from mothers is thus not as straightforward as has been suggested in the literature (e.g., Cristia, 2013; Fernald & Mazzie, 1991). Young children face the task of figuring out that mothers vary pitch and other intonational parameters in referents for various communicative purposes. Chen's (2011b) finding that Dutch 2-year-olds use broadly different accent types (downstepped vs. non-downstepped accents) to realise new and given referents suggests that (some) children have succeeded in deciphering the information in their mothers' intonation by the age of 2 years.

Our current knowledge of children's and caregivers' use of intonation in reference is, however, extremely sketchy. A number of directions can be pursued in future research to advance our knowledge in this field. First, efforts are needed to conduct comparative studies of the same issues with children acquiring English, German and Dutch in order to establish cross-linguistic similarities and differences between children within the same language family. Second, it is necessary to extend this line of research to children acquiring languages other than West Germanic languages in the light of relevant typological differences between languages from different language families. Such research will shed important light on how the linguistic system of a language shapes the acquisition process. Third, given the differences between read speech and spontaneous speech, children's use of intonation in reference in reading aloud remains to be investigated. Fourth, the acquisition of appropriate intonation in reference may be related to the acquisition of other linguistic devices for marking referential givenness-newness and contrast. A delay in one area may imply faster progress or a similar delay in another area. It is therefore important to put research on intonation and reference in the context of how children refer in general. Fifth, intonation should be analysed at both the phonetic and phonological level, because children do not necessarily acquire the use of intonation at the two levels at the same speed. Finally, regarding caregivers' use of intonation in reference, given that mothers adjust the way they address their children according to children's cognitive development (e.g., Kitamura & Burnham, 2003), it remains to be seen whether IDS addressed to 9- to 14-month-olds is similar to IDS addressed to 24-month-olds and to child-directed speech addressed to older children in this respect. Changes in mothers'

speech imply changes in the role of input at different ages. Future research is needed to find out how mothers and other caregivers use intonation in IDS and speech addressed to older children to encode referential givenness-newness, relational givenness-newness, and contrast across languages, compared to adults in ADS.

Acknowledgements

The article was written with the support of a VIDI grant (276-89-001) from the NWO (Netherlands Organisation for Scientific Research). The author wishes to thank Shanley Allen and two anonymous reviewers for their valuable comments.

References

- Bard, E. G., & Aylett, M. (1999). The dissociation of deaccenting, givenness, and syntactic role in spontaneous speech. In J. J. Ohala, Y. Hasegawa, M. Ohala, D. Granville, & A. C. Bailey (Eds.), *Proceedings of the 14th International Congress of Phonetic Sciences* (pp. 1753–1756). San Francisco, CA: University of California.
- Baumann, S. (2006). *The intonation of givenness: Evidence from German*. Tübingen: Niemeyer. DOI: 10.1515/9783110921205
- Baumann, S., Becker, J., Grice, M., & Mücke, D. (2007). Tonal and articulatory marking of focus in German. In J. Trouvain & W. J. Barry (Eds.), *Proceedings of the 16th International Congress of Phonetic Sciences* (pp. 1029–1032). Dudweiler: Pirrot.
- Baumann, S., & Grice, M. (2006). The intonation of accessibility. *Journal of Pragmatics*, 38(10), 1636–1657. DOI: 10.1016/j.pragma.2005.03.017
- Baumann, S., & Hadelich, K. (2003). Accent type and givenness: An experiment with auditory and visual priming. In M. Solé, D. Recasens, & J. Romero (Eds.), *Proceedings of the 15th International Congress of Phonetic Sciences* (pp. 1811–1814). Rundle Mall, SA, Australia: Causal Productions.
- Behrens, H., & Gut, U. (2005). The relationship between syntactic and prosodic organisation in early multiword speech. *Journal of Child Language*, 32(1), 1–34. DOI: 10.1017/S0305000904006592
- Bolinger, D. L. (1983). Intonation and gesture. *American Speech*, 58(2), 156–174. DOI: 10.2307/455326
- Bortfeld, H., & Morgan, J. (2010). Is early word-form processing stress-full? How natural variability supports recognition. *Cognitive Psychology*, 60(4), 241–266. DOI: 10.1016/j.cogpsych.2010.01.002
- Braun, B. (2006). Phonetics and phonology of thematic contrast in German. *Language and Speech*, 49(4), 451–493. DOI: 10.1177/00238309060490040201
- Chafe, W. L. (1976). Givenness, contrastiveness, definiteness, subjects, topics, and point of view. In C. N. Li (Ed.), *Subject and topic* (pp. 25–55). New York, NY: Academic Press.
- Chafe, W. L. (1987). Cognitive constraints on information flow. In R. S. Tomlin (Ed.), *Coherence and grounding in discourse* (pp. 21–51). Amsterdam: John Benjamins. DOI: 10.1075/tsl.11.03cha

- Chen, A. (2009). The phonetics of sentence-initial topic and focus in adult and child Dutch. In M. Vigário, S. Frota, & M. J. Freitas (Eds.), *Phonetics and phonology: Interactions and interrelations* (pp. 91–106). Amsterdam: John Benjamins. DOI: 10.1075/cilt.306.05che
- Chen, A. (2010). Is there really an asymmetry in the acquisition of the focus-to-accentuation mapping. *Lingua*, 120(8), 1926–1939. DOI: 10.1016/j.lingua.2010.02.012
- Chen, A. (2011a). Tuning information structure: Intonational realisation of topic and focus in child Dutch. *Journal of Child Language*, 38, 1055–1083. DOI: 10.1017/S0305000910000541
- Chen, A. (2011b). The developmental path to phonological encoding of focus in Dutch. In S. Frota, G. Elordieta, & P. Prieto (Eds.), *Prosodic categories: Production, perception and comprehension* (pp. 93–109). Dordrecht: Springer. DOI: 10.1007/978-94-007-0137-3_5
- Chen, A. (2014). Production-comprehension (a)symmetry: Individual differences in the acquisition of prosody focus-marking. In N. Campbell, D. Gibbon, & D. Hirst (Eds.), *Proceedings of the 7th Speech Prosody Conference*. <<http://www.speechprosody2014.org/>>
- Chen, A., & Fikkert P. (2007a). Intonation of early two-word utterances in Dutch. In J. Trouvain, & J. B. William (Eds.), *Proceedings of the 16th International Congress of Phonetic Sciences*. Dudweiler: Pirrot GmbH.
- Chen, A., & Fikkert, P. (2007b). *Dutch 3-year-olds' use of intonation in marking topic and focus*. Poster presented at *Generative Approaches to Language Acquisition (GALA)*, Barcelona, Spain.
- Cristia, A. (2013). Input to language: The phonetics and perception of infant-directed speech. *Language and Linguistics Compass*, 7(3), 157–170. DOI: 10.1111/lnc3.12015
- Cutler, A., & Swinney, D. A. (1987). Prosody and the development of comprehension. *Journal of Child Language*, 14(1), 145–167. DOI: 10.1017/S0305000900012782
- de Ruiter, L. (2010). *Studies on intonation and information structure in child and adult German* (Doctoral dissertation). Max Planck Institute for Psycholinguistics, Nijmegen, Netherlands.
- Fernald, A., & Mazzei, C. (1991). Prosody and focus in speech to infants and adults. *Developmental Psychology*, 27(2), 209–221. DOI: 10.1037/0012-1649.27.2.209
- Fisher, C., & Tokura, H. (1995). The given-new contract in speech to infants. *Journal of Memory and Language*, 34(3), 287–310. DOI: 10.1006/jmla.1995.1013
- Flemming, E. (2008). *The role of pitch range in focus marking*. Slides from a talk given at the *Workshop on Information Structure and Prosody*, Studiecentrum Soeterbeek, Ravenstein, Netherlands. <<http://web.mit.edu/flemming/www/paper/FlemmingSoeterbeek.pdf>>
- Gundel, J. K., & Fretheim, T. (2004). Topic and focus. In L. R. Horn & G. Ward (Eds.), *The handbook of pragmatics* (pp. 175–196). Oxford: Blackwell.
- Halliday, M. A. K. (1967). Notes on transitivity and theme in English II. *Journal of Linguistics*, 3(2), 199–244. DOI: 10.1017/S0022226700016613
- Hanssen, J., Peters, J., & Gussenhoven, C. (2008). Prosodic effects of focus in Dutch declaratives. In P. A. Barbosa, S. Madureira, & C. Reis (Eds.), *Proceedings of the 4th Speech Prosody Conference* (pp. 609–612). Campinas: Editora RG/CNPq.
- Hawkins, S., & Warren, P. (1994). Phonetic influences on the intelligibility of conversational speech. *Journal of Phonetics*, 22(4), 493–511.
- Hornby, P. A., & Hass, W. A. (1970). Use of contrastive stress by preschool children. *Journal of Speech and Hearing Research*, 13(2), 359–399.
- Ito, K. (2014). Children's pragmatic use of prosodic prominence. In D. Matthews (Ed.), *Pragmatic development in first language acquisition* (pp. 199–217). Amsterdam: John Benjamins. DOI: 10.1075/tilar.10.12ito

- Kitamura, C., & Burnham, D. (2003). Pitch and communicative intent in mothers' speech: Adjustments for age and sex in the first year. *Infancy*, 4(1), 85–110.
DOI: 10.1207/S15327078IN0401_5
- Ladd, D. R. (1996). *Intonational phonology*. Cambridge: Cambridge University Press.
- Lambrecht, K. (1994). *Information structure and sentence form: Topic, focus and the mental representations of discourse referents*. Cambridge: Cambridge University Press.
DOI: 10.1017/CBO9780511620607
- Liszkowski, U., Carpenter, M., Striano, T., & Tomasello, M. (2006). 12- and 18-month-olds point to provide information for others. *Journal of Cognition and Development*, 7(2), 173–187. DOI: 10.1207/s15327647jcd0702_2
- MacWhinney, B., & Bates, E. (1978). Sentential devices for conveying givenness and newness: A cross-cultural developmental study. *Journal of Verbal Learning and Verbal Behavior*, 17(5), 539–558. DOI: 10.1016/S0022-5371(78)90326-2
- Molnár, V. (2002). Contrast from a contrastive perspective. In I. Kruijff-Korbyová & M. Steedman (Eds.), *Information structure in a cross-linguistic perspective* (pp. 147–161). Amsterdam: Editions Rodopi.
- Moore, C., & D'Entremont, B. (2001). Developmental changes in pointing as a function of attentional focus. *Journal of Cognition and Development*, 2(2), 109–129.
DOI: 10.1207/S15327647JCD0202_1
- Müller, A., Höhle, B., Schmitz, M., & Weissenborn, J. (2006). Focus-to-stress alignment in 4- to 5-year-old German-learning children. In A. Belletti, E. Bennati, C. Chesi, E. Di Domenico, & I. Ferrari (Eds.), *Proceedings of Generative Approaches to Language Acquisition 2005* (pp. 379–392). Newcastle upon Tyne: Cambridge Scholars.
- Roberts, C. (2012). Information structure in discourse: Towards an integrated formal theory of pragmatics. *Semantics and Pragmatics*, 5(6), 1–69.
- Rooth, M. E. (1992). A theory of focus interpretation. *Natural Language Semantics*, 1, 75–116.
DOI: 10.1007/BF02342617
- Tomasello, M., & Haberl, K. (2003). Understanding attention: 12- and 18-month-olds know what's new for other persons. *Developmental Psychology*, 39(5), 906–912.
DOI: 10.1037/0012-1649.39.5.906
- Vallduví, E., & Engdahl, E. (1996). The linguistic realisation of information packaging. *Linguistics*, 34(3), 459–519. DOI: 10.1515/ling.1996.34.3.459
- Watson, D., Arnold, J. E., & Tanenhaus, M. K. (2005). *Not just given and new: The effects of discourse and task based constraints on acoustic prominence*. Poster presented at the 2005 CUNY Human Sentence Processing Conference, Tucson, AZ.
- Watson, D., Arnold, J. E., & Tanenhaus, M. K. (2006). Acoustic prominence and reference accessibility in language production. *Proceedings of the Third Speech Prosody Conference*. <<http://sprosig.isle.illinois.edu/sp2006/>>
- Wells, B., & Local, J. (1993). The sense of an ending: A case of prosodic delay. *Clinical Linguistics and Phonetics*, 7(1), 59–73. DOI: 10.3109/02699209308985544
- Wells, B., Peppé, S., & Goulondris, N. (2004). Intonation development from five to thirteen. *Journal of Child Language*, 31(4), 749–778. DOI: 10.1017/S030500090400652X
- Wieman, L. A. (1976). Stress patterns in early child language. *Journal of Child Language*, 3, 283–286. DOI: 10.1017/S0305000900001501
- Wonnacott, E., & Watson, D. (2008). Acoustic emphasis in four year olds. *Cognition*, 107(3), 1093–1101. DOI: 10.1016/j.cognition.2007.10.005