CHAPTER 6

The role of cognitive accessibility in children’s referential choice

Shanley E. M. Allen, Mary E. Hughes and Barbora Skarabela
University of Kaiserslautern / Boston University / University of Edinburgh

This chapter reviews the literature on preschool children’s sensitivity to cognitive accessibility in selecting linguistic forms to realize referents in speech. Both spontaneous speech and experimental production studies are reviewed, encompassing thirteen languages for monolingual children and five different language pairs for bilingual children. Across languages, children show sensitivity to referent accessibility from as early as 1;6, with sensitivity to discourse factors such as explicit contrast and prior mention emerging first and becoming adult-like by about 3;0. Sensitivity to perceptual factors such as perceptual availability and joint attention emerges slightly later and develops into the school years. Both caregiver speech and language structure play a role in how children’s sensitivity emerges. This sensitivity to accessibility points to children’s understanding of discourse structure and early stages of theory of mind.

Keywords: accessibility, referential choice, pronouns, cross-linguistic acquisition, bilingual acquisition, cognitive status, theory of mind, gesture, newness, perceptual availability, joint attention, discourse-pragmatics, argument realization

1. Introduction

An essential task facing children from the outset of language development is choosing how to realize referents in their speech. Children must select a particular linguistic form – such as a lexical noun phrase, demonstrative, pronoun, or null form (omission) – to express a referent. In English, for example, one can describe the person giving a kiss with any of the following utterances: ‘Elizabeth kissed me’, ‘The girl kissed me’, ‘That one kissed me’, or ‘She kissed me’. In null argument languages such as Italian and Japanese, the subject and sometimes the object can also be omitted.
One main influence on children’s referential choice is their understanding of information flow in discourse. Children choose whether and in what form to realize referents in their speech depending on their determination of how cognitively accessible the referent is to the listener. Cognitive accessibility is defined as “the ease with which the mental representation of some potential referent can be activated in or retrieved from memory” (Bock & Warren, 1985, p. 50), and is mediated by several factors first elucidated in studies on adult discourse (e.g., Ariel, 1990; Arnold, 2010; Chafe, 1987; Gundel, Hedberg, & Zacharski, 1993). These factors include, for example, whether the referent is newly introduced into discourse or has recently been mentioned, whether the speaker and interlocutor are jointly attending to the referent or not, and how many if any potential competitor referents are in the immediate discourse context. The more accessible a referent is on the basis of these and similar factors, the more likely the child is to use a reduced form such as a pronoun or omission. Conversely, the more inaccessible a referent is, the more likely the child is to use a fuller form such as a demonstrative or a noun phrase. For languages with determiners, definite determiners tend to be used for noun phrases realizing accessible referents while indefinite determiners tend to be used with noun phrases realizing inaccessible referents (once children start producing determiners). Thus children, like adults, “direct their addressees’ retrieval of the intended referents by signalling to them how accessible those mental entities are” through use of particular forms in speech to express those referents (Ariel, 1994, p. 99). This process of referential choice reflects sophisticated coordination of linguistic knowledge (which linguistic forms are permitted in a given language), discourse knowledge (how accessible referents are in the discourse and physical context), and social knowledge (what the interlocutor is attending to at the time of speaking). As Gundel et al. (1993) and others point out, the overall strategy of matching level of information in the linguistic form with referent accessibility corresponds to Grice’s (1975) Maxim of Quantity, which states that the speaker should be as informative as required but no more informative than needed.

In this chapter, we review the literature on the influence of cognitive accessibility on preschool children’s referential choice. The first half of the chapter covers the types of studies typically conducted, the factors of accessibility typically investigated, and the trajectory of the development of sensitivity to these factors. The second half of the chapter highlights other aspects of the linguistic situation that influence the relationship between cognitive accessibility and referential choice, including gesture, language structure, and caregiver input. It also discusses proposed explanations for sensitivity to accessibility including theory of mind and understanding of discourse structure.
Throughout the chapter, we focus on findings from spontaneous speech and elicited production data in contexts of interaction with others, allowing us to highlight accessibility factors that are relevant in natural child discourse and ways in which a variety of factors work together in influencing referential choice. The effect of accessibility on referential choice in narratives and on comprehension of reference is reviewed elsewhere (e.g., Hickmann, 2003; Hickmann et al., this volume; Salazar Orvig & Morgenstern, this volume; Sekerina, this volume). We also focus exclusively on the effect of accessibility on referential choice. However, accessibility is also reflected in other (plurifunctional) linguistic devices such as intonation (e.g., Chen, this volume), word order (e.g., Bentzen, this volume), and discourse particles in languages that mark related information structure distinctions such as topic-comment (e.g., Hendriks, 2000).

2. Studies on children’s sensitivity to accessibility in referential choice

Over the past couple of decades, a growing number of studies have investigated when and how children develop sensitivity to accessibility in referential choice. This line of research began with a seminal study by Greenfield and Smith (1976), which found that children’s utterances at the one-word stage tend to express the one word that encodes what is new or changing in the situation, and omit presupposed information that can be taken for granted from the discourse context shared between the speaker and interlocutor. Greenfield and Smith (1976) named this the Informativeness Principle.

Clancy (1993) was the first to extend this approach to naturalistic corpora at a slightly later stage of development, in a study of two Korean-speaking children aged 1;8-2;3 and their caregivers. She made Greenfield and Smith’s (1976) notion of ‘informativeness’ more precise by breaking it down into four component factors: query, contrastiveness, lack of prior mention, and absence (see (6) for definitions). She found that both children and their caregivers realized ‘informative’ referents (i.e., referents that were inaccessible for one or more of the four factors) more often with lexical noun phrases than with either pronouns or null forms, consistent with Greenfield and Smith’s findings; she later confirmed this result separately for each of the four factors individually (Clancy, 1997). Allen (2000) extended this line of research in a study of naturalistic speech from four Inuktitut-speaking children aged 2;0 to 3;6, further specifying ‘informativeness’ to include four additional factors, and using logistic regression to provide a more sophisticated analysis of the results.
Since then, numerous spontaneous speech and experimental studies have confirmed that children are sensitive to accessibility in referential choice in a variety of languages. These include at least nine languages where subject (and sometimes object) omission is permitted, as listed in (1) and (2), as well as at least four languages where subject omission is largely prohibited, as listed in (3) and (4).

(1) Spontaneous speech studies in languages with argument omission
   a. Hindi (Narasimhan, Budwig, & Murty, 2005)
   b. Inuktitut (Allen, 2000, 2006, 2008; Allen & Schröder, 2003; Skarabela, 2007a, b)
   c. Italian (Schmitz, 2007; Serratrice, 2005; Serratrice, Sorace, & Paoli, 2004)
   d. Japanese (Guerriero, Oshima-Takane, & Kuriyama, 2006; Mishina-Mori, 2007)
   f. Mandarin (Huang, 2011, 2012a; So, Demir, & Goldin-Meadow, 2010; So & Lim, 2012; So, Lim, & Tan, 2014)
   g. Spanish (Paradis & Navarro, 2003)

(2) Experimental studies in languages with argument omission
   a. Catalan (Prat-Sala & Hahn, 2007)
   c. Turkish (Bahtiyar & Küntay, 2009; Demir, So, Özyürek, & Goldin-Meadow, 2012; Gürcanlı, Nakipoglu, & Özyürek, 2007; Küntay & Özyürek, 2006)

(3) Spontaneous speech studies in languages without argument omission
   a. Dutch (Rozendaal & Baker, 2008)
   c. French (De Cat, 2004; Rozendaal & Baker, 2008; Salazar Orvig, Marcos, Morgenstern, Hassan, Leber-Marin, & Parès, 2010a, b)
   d. German (Schmitz, 2007)

(4) Experimental studies in languages without argument omission
   a. Dutch (Deutsch & Pechmann, 1982; Pechmann & Deutsch, 1982)
   c. German (Salomo, Graf, Lieven, & Tomasello, 2011; Salomo, Lieven, & Tomasello, 2010; Wittek & Tomasello, 2005)
At least eight studies have also investigated the effect of accessibility on referential choice in bilingual children who speak one language in which subjects are required and another in which subjects may be omitted, as listed in (5).

(5) Spontaneous speech studies with bilingual children
   b. Italian-English (Serratrice et al., 2004)
   c. Japanese-English (Mishina-Mori, 2007)
   d. Italian-German (Schmitz, 2007)
   e. Mandarin-English (So et al., 2014)
   f. Hebrew-English (Hacohen & Schaeffer, 2007)
   g. Turkish-English (Haznedar, 2010)

This chapter will focus primarily on patterns found in monolingual data, with less reference to cross-linguistic comparison and bilingual data. Cross-linguistic data are reviewed in Hickmann et al. (this volume), while bilingual data are reviewed in Serratrice and Hervé (this volume).

2.1 Accessibility factors

A total of ten different accessibility factors have been investigated in the literature on children’s production of referential choice to date, although they are labelled and defined somewhat differently across studies (see Allen, Skarabela, & Hughes, 2008 for detailed information about each factor). All of these factors have been found to have a significant effect on referential choice in one or more studies. The factors are listed in (6), with a definition for the accessible/inaccessible value. We have listed here the most recent or common label for each of the factors, which is the label we use in the remainder of this chapter; alternative labels are listed in parentheses.

(6) a. ANIMACY
   The referent is {animate / inanimate}

   b. CONTEXTUAL DISAMBIGUATION (CONTRAST, DIFFERENTIATION IN CONTEXT)
   The referent {has no / has at least one} potential competitor referent in
   the physical context

   c. DISCOURSE DISAMBIGUATION (CONTRAST, DIFFERENTIATION IN DISCOURSE)
   The referent {has no / has at least one} potential competitor referent in
   the preceding discourse

   d. EXPLICIT CONTRAST (CONTRAST)
   The referent {is not / is} explicitly contrasted with a competitor
e. **Joint Attention**
   The speaker and listener {are / are not} focused on the same target referent and {are / are not} aware of each other's focus of attention

f. **Perceptual Availability (Absence, Physical Presence, Mutual Knowledge)**
   The referent {is / is not} present in or perceptually available in the physical context
   Note: Some studies include a middle category for referents that comprise shared knowledge (e.g., grandma, grandpa), world knowledge (e.g., the sun), part-whole knowledge (e.g., wheels of a car), etc. For some studies this middle category is considered inaccessible (e.g., Allen, 2000), while for others it is considered accessible (e.g., Rozendaal & Baker, 2010).

g. **Person**
   The referent is {first or second / third} person

h. **Prior Mention (Newness)**
   The referent {is / is not} mentioned in the immediately preceding discourse (usually defined as the past 1, 5, or 20 utterances)

i. **Query**
   The referent {is not / is} the subject of or the response to a question

j. **Shared Knowledge (Perceptual Availability)**
   The speaker and interlocutor {have / do not have} shared knowledge of the referent through witnessing a previous action involving the referent

Many of the same factors are investigated in studies of children's referential choice in narratives and comprehension. These studies, however, also often consider additional factors that are less relevant in spontaneous speech production. For narratives, this includes the difference between introduction and re-introduction of referents, as well as topic continuity (the number of times a referent is mentioned in the narrative after its first introduction) (see Hickmann et al., this volume). For comprehension, this includes grammatical role (whether a referent is expressed as subject or object) and order of mention (whether a referent is expressed first or second in the utterance) (e.g., Song & Fisher, 2005; see Sekerina, this volume).

### 2.2 Spontaneous speech studies

Three different approaches are taken in spontaneous speech studies investigating children's sensitivity to accessibility in their referential choice. One approach is analyzing the effect of a subset of accessibility factors individually (e.g., Allen, 2000; Clancy, 1997; Haznedar, 2010; Huang, 2011; Hughes & Allen, 2013; Paradis & Navarro, 2003; Serratrice et al., 2004; Skarabela, 2007a). Each study examines
the effect of between four and eight factors, looking at whether children produce more informative forms (lexical noun, demonstrative) for referents that are inaccessible for each factor, and less informative forms (pronoun, null) for referents that are accessible for each factor. Patterns in the results are typically substantiated by chi-square or logistic regression analyses confirming that children are sensitive (or not) to each factor individually in their referential choices.

A second approach is to group several individual accessibility factors together into one indicator for analysis. The logic is that all the factors play a part in determining if something is accessible or not, and children are attending to the overall accessibility of a referent rather than to accessibility for each individual factor. This general accessibility is referred to with a variety of terms including ‘pragmatic prominence’ (Clancy, 1993; Narasimhan et al., 2005), ‘informativeness’ (Allen, 2000; Hacohen & Schaeffer, 2007), ‘common ground’ (Clark, 2001), and ‘activation state’ (Serratrice, 2005). Gundel and her colleagues (Gundel, 2009; Gundel & Johnson, 2013; Gundel, Ntelitheos, & Kowalsky, 2007) look at ‘activation state’ in a more nuanced way by dividing it into six levels – in focus, activated, familiar, uniquely identifiable, referential, and type identifiable – where the definition of each level implicitly takes several factors into consideration. Two studies address grouping of factors in a slightly different way by focusing on the incremental effect of accessibility factors; they determined whether children used a higher proportion of informative forms for referents that were inaccessible for more factors (e.g., inaccessible for four factors vs. for two factors; Allen, 2008; Hughes & Allen, 2015).

A third approach is to focus on a single factor, or sometimes two factors, seeking to assess the influence of just that factor on referential choice. Most of these studies focus on prior mention (e.g., Allen & Schröder, 2003; Clancy, 2003; De Cat, 2004; Guerriero et al., 2006; Huang, 2012a; Mishina-Mori, 2007; So et al., 2010), which is assumed to be one of the strongest factors influencing referential choice. One study focuses solely on joint attention (Skarabela, 2007b), while at least three studies analyze both prior mention and perceptual availability (Cho, 2004; Rozendaal & Baker, 2010; Salazar Orvig et al., 2010a, b).

In addition to quantitatively assessing children’s sensitivity to accessibility in referential choice, several spontaneous speech studies also explore the sources of, and patterns within, this sensitivity through qualitative analysis of transcripts. For instance, Clancy (2003) illustrates the correlations between prior mention, form, and grammatical role by examining the patterns of eight high frequency verbs in child-caregiver discourse. Salazar Orvig et al. (2010a, b) illustrate through numerous examples how children’s utterances are sensitive to their interlocutor’s immediately preceding utterances while not simply repeating them, and Gundel and Johnson (2013) discuss many excerpts of interactions, showing how children are sensitive to each level of the activation state hierarchy.
2.3 Experimental studies

Experimental studies manipulate one or two accessibility factors while holding all of the others constant, in order to see the effect on referential choice of the chosen factor(s). Two main methods are used. In the first, children play a game or see a video or picture and then are asked to recount what happened in response to a question that is either general (e.g., *What happened?*) or specific (e.g., *What did the clown do?*). This method has been used to test if children are sensitive to prior mention (Campbell et al., 2000; Kayama, 2003; Matthews et al., 2006; Pratasala & Hahn, 2007; Serratrice, 2008; Theakston, 2012; Wittek & Tomasello, 2005), perceptual availability (Demir et al., 2012; Salomo et al., 2011; Serratrice, 2008; Wittek & Tomasello, 2005), shared knowledge (Campbell et al., 2000; Gürcanli et al., 2007; Matthews et al., 2006; Salomo et al., 2011), and contextual/discourse disambiguation (Demir et al., 2012; Graf et al., 2015; Salomo et al., 2010; Serratrice, 2008, 2013; Theakston, 2012; Wittek & Tomasello, 2005).

The second common method is a referential communication task, used to explore whether children are able to adjust their referential choice in response to perceptual availability and contextual disambiguation (Bahtiyar & Küntay, 2009; Davies & Katsos, 2010; Deutsch & Pechmann, 1982; Hurewitz et al., 2000; Matthews, Lieven, & Tomasello, 2007; Matthew, Butcher, Lieven, & Tomasello 2012; Nadig & Sedivy, 2002; O’Neill, 1996; O’Neill & Topolovec, 2001; Pechmann & Deutsch, 1982). Children typically have a number of objects in front of them, often including two that are similar (e.g., a big cup and a small cup of the same color), and often including one or more referents that the child can see but the interlocutor cannot. The children must then identify a particular referent so that the interlocutor can select it from the array of referents available to the interlocutor.

3. Developmental patterns

Children as young as 1;6 show at least some sensitivity to cognitive accessibility in their referential choice in the relatively undemanding context of naturalistic speech with peers and caregivers in familiar environments, where children’s utterances are often co-constructed with or scaffolded by their interlocutors (Schmitz, 2007, for German and Italian at 1;6; Serratrice, 2005, for Italian at 1;7; Clancy, 1993, 1997, for Korean at 1;8). Children use substantially more lexical forms for inaccessible referents and substantially more null forms for accessible referents, whether the analysis is for individual accessibility factors or accessibility factors lumped together (e.g., ‘pragmatic prominence’, ‘activation state’). However, the extent of their sensitivity to accessibility develops over time. Sensitivity to some
accessibility factors emerges or becomes robust earlier than sensitivity to other factors, and the level of communication demands in the situation also plays a role.

Several studies propose that children become sensitive to discourse-related factors earlier than to perceptually-based factors (Campbell et al., 2000; Matthews et al., 2006; Rozendaal & Baker, 2010), and we organize the following sections along these lines as well. Discourse-related factors are ones for which there is “evidence in the discourse context that the listener has the referent in her focus of attention (e.g., an immediate prior mention)”, while perceptually-based factors are ones for which there is “evidence in the physical situation that the listener has the referent in her focus of attention (e.g., she is or was looking at it)” (Campbell et al., 2000, p. 1339).

3.1 Earlier sensitivity to discourse-based factors

Children show earliest sensitivity to three factors related to linguistic aspects of the discourse: explicit contrast, prior mention, and person. The factor explicit contrast, where an overt linguistic form is obligatory to express the contrasted referent, seems to have the earliest influence in referential choice. For example, Clancy (1993) found that the least advanced child in her Korean spontaneous speech study (H, aged 1;10–2;3) selected forms to express referents based on explicit contrast but largely ignored other factors. In an experimental study with German-speaking children, Wittek and Tomasello (2005) found sensitivity only to explicit contrast at the youngest age tested (2;0) in that children consistently realized the target referent with a noun when an alternative incorrect referent was contrasted with it in the previous utterance. In addition to coming in early, explicit contrast is also a very strong factor: at least two experimental studies found that 2- to 3-year-old children used overt forms (typically lexical nouns) to realize over 90% of the referents that were explicitly contrasted with another referent in the preceding discourse (Graf et al., 2015, for English; Salomo et al., 2010, for German).

Prior mention – whether a referent is mentioned (given) or not mentioned (new) in preceding discourse – is also attended to very early, but slightly later than explicit contrast. In the study just mentioned, Wittek and Tomasello (2005) found that German-speaking children were not sensitive to prior mention in their referential choice at 2;0, but were at 2;6. Children’s sensitivity to prior mention also increases over time (Campbell et al., 2000; Guerriero et al., 2006; Matthews et al., 2006; Prat-Sala & Hahn, 2007; Rozendaal & Baker, 2010; Salazar Orvig et al., 2010a; Salomo et al., 2011; Serratrice, 2008). In spontaneous speech data, for example, Rozendaal and Baker (2010) found that English-speaking children aged 2;0–2;6 produced significantly more pronouns (55%) than nouns (37%)
for given referents, but the magnitude of this difference increased significantly by 2;9–3;3 (80% pronouns vs. 17% nouns). However, spontaneous speech studies differ concerning whether adult-like patterns of referential choice take longer to develop for new referents (Guerriero et al., 2006; Salazar Orvig et al., 2010a) or for given referents (Rozendaal & Baker, 2010). Developmental trends are also found in experimental studies albeit at slightly older ages, perhaps because of the higher cognitive demands of experiments as opposed to naturalistic speech in familiar contexts. For example, Matthews et al. (2006) found that English-speaking 3- and 4-year-olds, but not 2-year-olds, used significantly more pronouns for given referents than for new referents, and Serratrice (2008) and Salomo et al. (2011) found that older children (English-speaking 5-year-olds and German-speaking 4-year-olds respectively) were significantly more likely than 3-year-olds to use a noun to express a new referent, and less likely to use a null form.

Finally, person (first/second vs. third person) is also an early and strong accessibility factor (Allen, 2000; Hughes & Allen, 2013; Serratrice, 2005). For example, Serratrice (2005) found that Italian-speaking children were sensitive to the effect of person in spontaneous speech from the earliest stage tested (Mean Length of Utterance (MLU) 1.5–2.0): they produced overt subjects for 23% of third person referents vs. 12% of first and second person referents. They showed a significant increase in their sensitivity by MLU 2.0–3.0 (40% of third person referents vs. 25% of first and second person referents), and remained stable at that level.

3.2 Later sensitivity to perceptually-based factors

Children’s sensitivity to accessibility factors based on perceptual information emerges somewhat later in development, including factors such as perceptual availability (referent is / is not perceptually available in the interaction) and disambiguation (the referent does not have / has a potential competitor referent) (Matthews et al., 2006). For example, at least three studies that examined both perceptual availability and prior mention in the same children found sensitivity to perceptual availability significantly later (after 3;0) than to prior mention (by 2;0–2;6; Campbell et al., 2000; Matthews et al., 2006; Rozendaal & Baker, 2010). This may be because discourse cues are more salient than perceptual cues in the interactional context (Matthews et al., 2006), or because the cues in the input about which forms map with which values for which accessibility factors are more frequent and consistent for discourse-based factors than for perceptually-based factors (Rozendaal & Baker, 2010).
The general pattern for perceptual availability is that some sensitivity is evident in spontaneous speech at early ages, but this increases significantly over time. For example, Salazar Orvig et al. (2010a) found that French-speaking children were already sensitive to perceptual availability from the youngest stage tested (MLU 1.3–1.9), in that 75% of their pronouns realized present referents and only 25% realized absent referents. However, the magnitude of their sensitivity increased substantially by MLU 2.5, when 93% of pronouns realized present referents and only 7% realized absent referents. Experimental studies have typically found that children are not sensitive to perceptual availability at 2;0 (e.g., Matthews et al., 2006), but older children are significantly more likely to use nouns for non-available referents, and pronouns for available referents (Gürcanli et al., 2007, for Turkish; Salomo et al., 2011, for German; Serratrice, 2008, for English). These studies also find significant development from age 3 through at least age 6.

A similar pattern is found for disambiguation. In a spontaneous speech study, Serratrice (2005) found that Italian-speaking children were already sensitive to disambiguation at the earliest stage tested (MLU 1.5), in that they used more overt forms (nouns and pronouns) for referents with a potential competitor in the discourse or physical context, and more null forms for referents with no potential competitor. This performance did not change significantly across the four stages tested (up to MLU 3+). However, experimental studies that explicitly manipulate contextual disambiguation typically find later emergence of sensitivity and more evidence of development. For example, Serratrice (2008) found that English-speaking 3-year-olds showed a numerical but not significant sensitivity to contextual disambiguation, 5-year-olds were significantly better, and 6-year-olds performed like adults in mainly providing nouns in conditions of disambiguation between two referents. Referential communication tasks also show gradual development. In general, children as young as 2 years of age tend to provide more explicit reference – full nouns instead of pronouns (e.g., the cup vs. it), or modified instead of bare nouns (e.g., the big cup vs. the cup) – to appropriately realize the referent such that it is distinguished from its competitors. This sensitivity increases significantly with age until at least age 9 (Bahtiyar & Küntay, 2009; Deutsch & Pechmann, 1982; Matthews et al., 2007; Nadig & Sedivy, 2002; O’Neill & Topolovec, 2001), and children also become better at differentiating referents by attending to corrective feedback (e.g., Which sheep do you need?) (Deutsch & Pechmann, 1982; Matthews et al., 2007, 2012; see review in Ateş-Şen & Küntay, this volume).
3.3 Effects of communication demands

The level of communication demands in the discourse situation is another important influence on children’s sensitivity to accessibility. In general, the more demanding the situation, the more difficult it is for children to attend appropriately to the implications of accessibility for referential choice. One piece of evidence is already illustrated in the previous sections: sensitivity to accessibility factors appears to emerge earlier and develop faster when tested in spontaneous speech where communication demands are relatively low because of the familiarity of the situation. However, sensitivity typically emerges somewhat later when tested in experiments where communication demands are higher due to features such as novelty of the situation, less supporting context, and often more aspects in the situation to be integrated.

Two experimental studies are particularly revealing regarding the effect of communication demands. Küntay and Özyürek (2006) investigated Turkish-speaking children’s use of the demonstratives *bu* (proximal reference), *o* (distal reference), and *şu* (attention directing) during a joint Lego-building task where children had to identify Lego pieces for their interlocutor to give them. Children showed adult-like performance in differentiating the proximal vs. distal demonstrative by age 4. However, even by age 6, they were not appropriately using the demonstrative *şu* to call the interlocutor’s attention to an object that the interlocutor was not currently attending to. Küntay and Özyürek hypothesize that *şu* is later to develop because it not only requires being aware of the interlocutor’s attention, but also requires explicitly redirecting that attention.

In another study, Theakston (2012) tested English-speaking 5-year-olds’ and adults’ sensitivity to PRIOR MENTION and DISAMBIGUATION in competition with each other, in various sentence contexts that provided a high cognitive load. While children and adults both showed sensitivity to PRIOR MENTION through producing more lexical nouns for new than for given referents, this was more marked in adults (99% vs 68%) than in children (42% vs 34%). When two referents had to be disambiguated, only adults used complex NPs as necessary, while children used more pronouns and often did so for inaccessible referents. Although children showed some sensitivity to both PRIOR MENTION and DISAMBIGUATION, their performance was considerably worse than that of similar-aged children in studies with lower cognitive load described in Section 3.2. Serratrice (2008) found that English-speaking children aged 3 to 6 years had similar difficulties in balancing the effect of competing accessibility factors in her studies.
3.4 Early non-adult-like utterances

What do children’s utterances look like before they master adult-like sensitivity to accessibility factors? One common pattern is that children over-use omitted and pronominal forms for new or otherwise inaccessible referents (Clancy, 1993; Demir et al., 2012; Guerriero et al., 2006; Matthews et al., 2006; Skarabela, Allen, & Scott-Phillips, 2013). For example, Guerriero et al. (2006) found that English-speaking children used equal numbers of non-lexical (mostly omissions) and lexical forms for new referents at age 1;9, rather than using significantly more lexical forms like their caregivers. Similarly, Clancy (1993) noted that the least linguistically advanced child in her Korean data (H, aged 1;10–2;3) used more omissions and fewer lexical forms to realize pragmatically prominent (i.e., inaccessible) referents than did her more advanced peer or their two caregivers. Three possible reasons for this pattern are commonly discussed in the literature. First, since children spend much more time talking about given than new referents in their typical daily interactions, they may need more experience in learning how to realize forms in the less frequent context of new referents (Guerriero et al., 2006). Second, children may be balancing the accessibility information from prior mention with accessibility information from other factors (e.g., joint attention, perceptual availability) in their referential choice, and coming out with different patterns than their caregivers because of according different weights to the different factors (see further discussion in Section 4.2). Third, children may be conveying information about the referent not only through speech but also through gesture, and may not yet realize that gesture does not always fully compensate for speech (see further discussion in Section 5.1).

A second common pattern is that children overuse lexical forms for given or otherwise accessible referents (Hughes & Allen, 2013, 2015; Rozendaal & Baker, 2010; Salazar Orvig et al., 2010a). For example, Salazar Orvig et al. (2010a) found that French-speaking children realized about 60% of both new and given referents as nouns through MLU 2.5, and only clearly differentiated nouns for new referents (85%) rather than for given referents (36%) in an adult-like way by MLU 3+. This pattern most likely occurs for three reasons. First, overuse of nouns for given referents is a common feature of child-directed speech in many languages (e.g., Hughes & Allen, 2013; Snow & Ferguson, 1977). Caregivers tend to repeat already-introduced nouns in subsequent utterances, at least partly for the pedagogical effect of drawing attention to vocabulary and word-referent mapping (e.g., Look at this sock. Isn’t it a nice sock? This sock is so soft. Do you want to touch the sock?). Second, as Rozendaal and Baker (2010) point out, the cues for pronouns are less consistent in the input than the cues for nouns. While nouns are used predominantly for new or otherwise inaccessible referents, pronouns are
used for both given referents and referents that are new but part of mutual knowledge through being jointly attended to or perceptually available in the physical context. Third, as Hughes and Allen (2015) note, the form for pronouns is more complicated than for nouns. Pronouns in English and French differ according to speaker perspective (*I*, *you*), gender (*he*, *she*), animacy (*he*, *it*), number (*it*, *they*) and distance (*this*, *that*). They require much more knowledge of grammar than simply producing a lexical noun, given that nouns differ only for number (*book*, *books*) in both languages and for gender in French (*le livre*, *la table*). For all of these reasons, it might take children longer to work out the conditions under which pronouns are used, and they overuse nouns in the meantime.

4. Interplay between accessibility factors

Although many studies investigate the effect of accessibility factors in isolation from each other, children almost certainly attend to the various factors in interaction and in combination with each other. In this section, we consider two ways in which children show their sensitivity to the interplay between factors. On a more global level, we show that children do not attend simply to accessibility per se, but rather are sensitive to more subtle incremental effects of accessibility. On a more micro level, we see different ways in which children attend to two accessibility factors that converge or compete with one another in their effects on referential choice.

4.1 Sensitivity to incremental effect of accessibility factors

Several studies show that children are sensitive to the general accessibility of a referent, regardless of which particular factors are involved (Allen, 2000; Clancy, 1993; Narasimhan et al., 2005; Serratrice, 2005). For example, Allen (2000) found for Inuktitut-speaking children aged 2;0–3;6 that the odds of a referent being overt (i.e., lexical noun, demonstrative) were almost four times as large if any one factor (or more) was inaccessible than if all factors were accessible. However, two recent studies reveal that children are also sensitive to the incremental effect of accessibility, differentiating, for example, between a referent that is inaccessible for only one factor and one that is inaccessible for three factors.

In the first of these studies, Allen (2008) investigated the interplay of four factors: perceptual availability, prior mention, explicit contrast, and contextual disambiguation. For each referent, she calculated the number out of the four factors for which each referent was inaccessible. She found that Inuktitut-speaking children aged 2;0–3;6 used overt forms (demonstrative or lexical noun) for 18% of referents that were fully accessible, 29% of referents that were
inaccessible for only one of the four factors (i.e., accessible for the other three), 57% of referents that were inaccessible for two of the four factors, and 86% of referents that were inaccessible for three factors. (No referents were inaccessible for all four factors.)

In the second study, Hughes and Allen (2014) conducted a similar analysis for English-speaking children aged 2;0 and 3;0, using six accessibility factors: perceptual availability, animacy, prior mention, contextual disambiguation, linguistic disambiguation, and joint attention. They found that both the children and their caregivers strongly preferred null and pronominal forms over lexical forms for referents that had zero, one, or two inaccessible factors, but used an increasing number of lexical forms as the referents became more inaccessible. For example, Eleanor at 3;0 used lexical forms for 10% of fully accessible referents, 12% of referents that were inaccessible for only one factor, 15% for two factors, 25% for three factors, 58% for four factors, and 100% for five and six factors.

The results of these two studies reveal that very young children are not only sensitive to accessibility factors individually or as a group. They are also sensitive to the very subtle incremental effect of accessibility, simultaneously taking into account a variety of discourse, contextual, and social cues.

4.2 Sensitivity to two factors converging or competing

Two accessibility factors may also compete in their influences on referential choice. For example, a referent that has been introduced in the previous utterance would typically be realized by a pronoun or null form, but a noun phrase may be more appropriate if that referent is also being explicitly contrasted with other referents. Several recent studies have explored when and how children learn to integrate the effects of two competing factors on referential choice across different contexts.

Studies using spontaneous speech data have typically compared the contribution of one discourse factor and one perceptual factor in contexts that naturally occurred in the child’s interactions (Rozendaal & Baker, 2010; Salazar-Orvig et al., 2010a; Skarabela & Allen, 2010; Skarabela et al., 2013). Skarabela et al. (2013), for example, focused on prior mention and joint attention in children aged 2;0–3;6 acquiring Inuktitut. When just prior mention was considered, 65% of new referents were realized by null forms rather than the expected demonstratives and nouns. Further analysis revealed, however, that 63% of these null forms occurred precisely when the children were involved in joint attention with their interlocutors. Joint attention thus changed the accessibility status of new referents from inaccessible to accessible, and ‘licensed’ the use of null forms. In another study, Salazar Orvig et al. (2010a) investigated the relative contribution of prior
Mention and perceptual availability in 2-year-old French-speaking children. Looking just at perceptual availability, they found that pronouns were frequently used (rather than the expected nouns) to realize referents that were not physically present in the discourse. When they took prior mention into account, however, they found that 97% of the absent referents realized by pronouns were mentioned in the preceding discourse and thus were accessible.

Experimental studies also typically contrast one discourse factor with one perceptual factor, often finding more or earlier sensitivity to the discourse factor than to the perceptual factor (Graf et al., 2015; Serratrice, 2008). For example, Serratrice (2008) compared the role of prior mention (answering What's that person doing? vs. What's happening there?) and perceptual availability (interlocutor sees picture vs. not) in picture descriptions of English-speaking children aged 3, 5, and 6 as well as adults. Adults used predominantly nouns in the three conditions where one or both factors were inaccessible, and used omissions and pronouns only when both factors were accessible, showing that they attended equally to both factors. The 3-year-olds attended only to prior mention in their referential choice. The 5- and 6-year-olds also took perceptual availability into account to some degree, but could not yet integrate the two factors at the same level as adults. Interestingly, this reliance on discourse over perceptual context is also found in studies of children’s sentence processing (e.g., Trueswell, Sekerina, Hill, & Logrip, 1999).

Other experimental studies find that children attend more to perceptual than discourse factors (Salomo et al., 2011; Serratrice, 2013). For example, Salomo et al. (2011) contrasted the role of prior mention and perceptual availability in a video-description task with 3- and 4-year-old German-speaking children. Children recounted a short video clip (e.g., a monkey pushing a lion) when the interlocutor had either heard the relevant noun (e.g., lion) in the previous discourse or not, crossed with whether the interlocutor could see the video or not. The children in both age groups showed sensitivity to perceptual availability, producing more nouns when the video was not available to the interlocutor, and more omitted forms when it was available. However, no effect of prior mention was found. These findings agree to some extent with the findings of Skarabela et al. (2013) that contextual information may override discourse information when they are in conflict. However, it is odd that the children in Salomo et al’s study showed no sensitivity to prior mention. As Salomo et al. themselves discuss, this may be because the referent in question was specified two utterances previously instead of in the immediately preceding utterance.

Finally, some experimental studies have examined the complementary contribution of two perceptual factors (Demir et al., 2012; Serratrice, 2008). For example, Demir et al. (2012) explored the interaction of perceptual availability
and contextual disambiguation in a study with Turkish- and English-speaking children aged 3 to 4 years. The children described short narratives with two animate characters of the same gender (i.e., inaccessible for contextual disambiguation), with or without the support of pictures. The expectation was that the children would use nouns for contrastive referents, regardless of whether the characters were visually available to the interlocutor. However, they found that visual access to the referents modulated the effect of inaccessibility from contextual disambiguation. Although both groups of children used full nouns in about 80% of cases to realize referents that were not perceptually available, they used far fewer full nouns (57% in English, 30% in Turkish) when the referents were perceptually available. Thus, perceptual availability seems to be a stronger cue than contextual disambiguation (as also found in Serratrice, 2008).

Taken together, these results show that children are sensitive to even subtle aspects of information flow. In instances where it appears that children do not align with the adult model when understood simplistically as a result of a single discourse-pragmatic feature (e.g., when a new referent is realized by a null form), the studies cited here instead find evidence that children do indeed follow the adult model if the interaction between different accessibility factors is taken into account.

5. Additional influences on children’s referential choice with relation to accessibility

Until this point in the chapter, we have focused narrowly on the relationship between accessibility factors and referential choice, without taking other aspects of the communication situation into account. In typical communication, however, numerous other aspects play a role in how children can demonstrate their understanding of the relationship between accessibility and referential choice. We highlight five such features in this section: gesture, sentence structure, language-specific issues, caregiver speech, and the relation to grammatical knowledge.

5.1 Gesture as compensation for reduced forms

Words are not the only elements used to communicate in conversation. Gestures such as deictic pointing also play an important part in conveying information, sometimes as a complement to speech and sometimes instead of speech. Numerous studies confirm that children are sensitive to the referent-identifying function of pointing and use it communicatively, often in place of explicit referential forms. In a series of referential communication tasks, for example, Deutsch and
Pechmann (1982) found that Dutch-speaking children aged 2 through 9 years relied on pointing to distinguish one referent from other similar referents for their interlocutor, especially when they did not have the vocabulary to convey the relevant differences linguistically, or when the task was too cognitively demanding (e.g., many competitor referents). In a simpler version of this task, O’Neill (1996) found that English-speaking children aged 2;3 and 2;7 typically used pointing rather than speech to identify which of two possible locations a toy was hidden in.

Children also often use gesture as a device to ‘license’ a more reduced form in speech than would otherwise be expected. Guerreiro et al. (2006) found that English-speaking children aged 1;9–3;0 and their mothers virtually always used pointing or eye gaze to indicate the referent when they expressed a new referent with a null or pronominal form that otherwise would not be adequate to discriminate the referent. Japanese-speaking children and caregivers did this also, but only in about 60% of instances. Similarly, Salazar Orvig et al. (2010a) note that French-speaking children’s ‘incorrect’ use of pronouns to introduce new referents and to reintroduce referents are accompanied in 50% of instances by an ostensive gesture (e.g., showing the object to the interlocutor). Further, So and her colleagues (So et al., 2010, 2014; So & Lim, 2012) found that Mandarin- and English-speaking 3- and 4-year-olds used more gestures (pointing, hold-up, and iconic gestures) when inaccessible referents were underspecified in speech (i.e., pronouns or null forms) than when they were realized by nouns. In addition, they were able to use the gestures accompanying their caregivers’ speech to identify newly introduced referents.

Demir et al. (2012) found cross-linguistic differences in children’s use of gesture to compensate for reduced forms in speech. In their study, Turkish- and English-speaking 3- and 4-year-olds described short video clips involving two characters matched for gender and/or animacy. In the condition where the referents were perceptually available to both child and interlocutor (i.e., both could see stills from the clip), English-speaking children typically used noun phrases to identify referents while Turkish-speaking children preferred to use pronouns or null forms clarified by pointing or iconic gestures. Demir et al. hypothesize that speakers of null-subject languages (e.g., Turkish) may be more attentive to the perceptual context than speakers of non-null-subject languages (e.g., English), because they cannot depend on language in the speech of others to give them information about the referent (due to the prevalence of null forms). Thus, they may be more likely to use this in their own utterances as well, regularly expressing referents using a reduced form plus a gesture to the referent in the perceptual context.

In sum, numerous studies suggest that children are sensitive to the referential function of gesture (especially pointing), and to the ways in which gesture can be used to bolster or compensate for reduced forms in speech when communicating.
about inaccessible referents. The literature on gesture as a form of reference is reviewed in more detail in Ng et al. (this volume).

5.2 Alignment with Preferred Argument Structure

Children’s use of accessibility in referential choice must fit with the sentence structures in which the referents are expressed. Like adults, children follow the pattern of information flow in sentences known as Preferred Argument Structure (PAS; Du Bois, 1987). New referents, preferentially realized as lexical NPs, are typically the subject (S) of an intransitive verb or the object (O) of a transitive verb. Given referents, usually realized as pronouns or null forms, are typically the subject (A) of a transitive verb. This PAS pattern has been shown for preschool children learning Korean (Clancy, 1993, 2003), Inuktitut (Allen & Schröder, 2003), Hindi (Narasimhan et al., 2005), and Mandarin (Huang, 2012a). Clancy (2003) explored how PAS emerges naturally from the ‘here and now’ nature of child-caregiver conversation, focusing on attention management and the participant structure of typical events as encoded in frequently used verbs.

Experimental studies also provide support for a PAS pattern. Graf et al. (2015) found that English-speaking children omitted S more than O in elicited sentences, even when both referents were provided in the preceding utterance and thus given. Although on the surface this would seem to be evidence against PAS, Graf et al. argue that it rather supports PAS: children are so attuned to the typical PAS structure that they use it in their utterances even when the conditions do not strictly hold in an artificial experimental situation. Theakston (2012) showed that, when English-speaking 5-year-olds find themselves in an experimental situation where accessibility cues conflict with PAS (e.g., inaccessible information in A role and accessible information in O role), they tend to follow PAS by providing a fuller form for the object than would be necessary based on accessibility factors alone, and providing a less full form for the subject than would be necessary. Theakston suggested that PAS may provide children with a strong and long-lasting cue that outweighs accessibility when the two conflict.

5.3 Effect of language structure and language-specific patterns

Although children are sensitive to the relationship between accessibility and referential choice in similar ways regardless of which language they are learning, language structure and language-specific patterns also play an important role in at least three ways. First, the ability of children to show that they understand how accessibility influences referential choice is affected by the range and complexity
of linguistic forms in their language, completely unrelated to how the forms realize accessibility. Each language has its own repertoire of linguistic forms to express referents. However, some linguistic forms take longer to acquire than others, and this can lead to cross-linguistic differences. For example, fully accessible referents are typically realized by either null forms (e.g., Italian, Spanish) or pronouns (e.g., English, French) depending on the language. However, pronouns are harder to learn because they encode more specific information about the referent(s) than null forms, including person, gender, number, case, and pronunciation. To express new referents, full noun phrases are the most common option. However, languages differ in the sentential structure preferred to express the noun phrases. While many languages rely on noun phrases presented in standard SVO constructions (e.g., English), French often uses both presentational constructions and dislocated noun phrases, both of which are structurally more difficult to master. Children typically demonstrate earlier target-like use of the structural options that are easier to learn, with nouns and null arguments where these are allowed. Pronouns are consistently developmentally challenging (De Cat, 2004; Hughes & Allen, 2013; Salazar Orvig et al., 2010a).

Second, even when the same form is used across languages for the same level of accessibility, that form may be harder to learn in one language than another. This can be illustrated by the use of different types of determiners to signal accessibility, as found in many studies (e.g., MacWhinney & Bates, 1978; Maratsos, 1974; Rozendaal & Baker, 2008). For example, Dutch, French, and English all prefer to introduce new referents using noun phrases with indefinite determiners (een, un/une, a), and to refer to given referents using noun phrases with definite determiners (de/het, le/la, the). However, Rozendaal and Baker (2008) show that there is a substantial difference in the timing of determiner development across these three languages which they attribute to the frequency of determiner use in the input: French-speaking children acquire determiners by 2;9, English-speaking children by 3;3, and Dutch-speaking children sometime after that. This difference in time of acquisition affects when children learning these languages are able to use the target-like form to express the correct level of accessibility (Rozendaal & Baker, 2008). Before the target-like determiner forms are acquired, children often use bare nouns for both new and given referents.

Third, the mapping between accessibility and form sometimes differs across languages, which can lead to cross-linguistic differences in acquisition since children are sensitive to these language-specific mappings. For example, Dutch-speaking caregivers predominantly use indefinite noun phrases to label new referents, while French-speaking caregivers use indefinite and definite noun phrases about equally (Rozendaal & Baker, 2008). Not surprisingly, Dutch-speaking children rarely use definite noun phrases for labeling new referents while French-
speaking children use those forms more frequently (Rozendaal & Baker, 2008). Cross-linguistic differences can also lead to cross-linguistic influence in bilinguals who are learning two languages with different mappings. For example, pronouns are used for the most accessible referents in English and German, but are rather used for contrast and topic shift in Italian (null forms are used for the most accessible referents). Although monolingual Italian-, German-, and English-speaking children typically show language-appropriate sensitivity to accessibility in their use of pronouns from early on, Italian-English and Italian-German bilingual children tend to overuse pronouns to realize accessible referents in Italian until later stages of development (Serratrice et al., 2004; Schmitz, 2007; Serratrice & Hervé, this volume).

5.4 Influence of caregiver speech

Caregiver speech is crucial for children learning the language-specific mappings between accessibility and referential choice. At the most basic level, caregiver input provides a model for children to learn these mappings (Guerriero et al., 2006; Huang, 2012b; Hughes & Allen, 2013; Narasimhan et al., 2005). The most detailed evidence of this comes from Huang’s (2012b) longitudinal analysis of caregiver speech for mothers of two Mandarin-speaking children at ages 2;2, 2;7, 2;10, and 3;1. The caregivers are consistent across the four ages in their use of predominantly null and pronominal forms for accessible referents, and of lexical forms for inaccessible referents. Thus, children have an available model in the input from early on (although the children themselves use significantly more null forms for accessible referents at these ages than their caregivers do).

Beyond that, three particular sources of influence have been highlighted in the literature. First, caregivers often provide feedback in the form of clarification requests indicating to the child that their choice of referential form may not be sufficiently informative, and thus implicitly giving them feedback on the use of a more discourse-appropriate form in similar situations in the future. Several spontaneous speech studies provide examples and analyses of how this occurs in naturalistic communication (Gundel & Johnson, 2013; Salazar Orvig et al., 2010a; Skarabela, 2007a, b). A number of training studies also investigate this experimentally, manipulating different types of caregiver feedback to determine how children use it in making their referential expressions appropriately informative (Deutsch & Pechmann, 1982; Matthews et al., 2007, 2012; Theakston, 2012). This literature is reviewed in detail by Ateş-Şen and Küntay (this volume).

Second, since caregiver speech models appropriate referential choice for children, children may be slower at learning mappings that are less available or
consistent in the input. For example, Rozendaal and Baker (2010) explain English-speaking children’s persistent use of definite rather than indefinite noun phrases for absent referents by the fact that caregivers rarely mention absent referents so children have little experience of how to refer to them. Similarly, children's late mastery of pronouns for given referents may be explained by the fact that the form-function association for pronouns in caregiver speech is weaker than for other forms: pronouns are used both for given referents and for new referents that are physically present, whereas indefinite noun phrases are used more consistently only for new referents (Rozendaal & Baker, 2010).

Third, caregiver speech does not always model the mappings found in adult-to-adult speech, so children may follow the caregiver model until they have wider exposure to other speakers. For example, Hughes and Allen (2013, 2015) explained English-speaking children’s use of nouns for given referents as a function of the models in caregiver speech: using names instead of pronouns to refer to speech-act participants (e.g., Mommy instead of I; Johnny instead of you), and using nouns for subsequent mentions of third person referents to make vocabulary salient, confirm children’s communicative intentions, and the like (e.g., CHI: Butterfly has gone. MOT: Where has the butterfly gone?; Hughes & Allen, 2015, p. 56). Guerriero et al. (2006) and Mishina-Mori (2007) showed that Japanese-speaking 1- to 3-year-olds’ overuse of null and pronominal forms for new referents mirrored patterns in their mothers’ speech; explicit forms are rarely used to express new referents in conversation with familiar interlocutors in Japanese adult-directed or child-directed speech because familiar interlocutors are expected to be able to discern meaning from context and shared background information (Clancy, 1986). Similarly, Paradis and Navarro (2003) explained the overuse of pronouns for fully accessible referents in Spanish by their Spanish-English bilingual child by the fact that the child’s bilingual parents also used significantly more pronouns for accessible referents than monolingual Spanish-speaking parents. This raises the possibility that bilingual children’s non-native-like patterns may well be determined by their caregiver input rather than being directly, or solely, due to cross-linguistic influence.

### 5.5 Relation to grammatical knowledge

Four decades of research on the ‘pro-drop’, ‘null subject’, and ‘root infinitive’ hypotheses have revealed that children’s grammatical knowledge influences early use of omitted subjects in languages that do not permit subject omission (see review in Hyams, 2011; Serratrice & Allen, this volume). However, this grammatical knowledge also interacts with accessibility in determining referential choice.
(Allen, 2006; Hughes & Allen, 2015; Serratrice, 2005). To illustrate this, Hughes and Allen (2015) compare the effect of grammatical and accessibility factors within spontaneous speech data from English-speaking 2- and 3-year-olds. Although a higher proportion of omitted subjects are found in non-finite than finite clauses (grammatical factors) and a higher proportion of omitted subjects are found for accessible than inaccessible referents (accessibility factors), neither set of factors provides a full explanation for the pattern of omissions. For example, more omissions are used for accessible than inaccessible referents within both non-finite and finite clauses. Thus, each explanation accounts for part of the pattern but there is also substantial interplay between them.

6. **Explanations for sensitivity to accessibility**

It is clear from the discussion to this point that children are sensitive to the accessibility of referents in the discourse from a very early age. However, opinions are divided as to the source of this sensitivity.

Most of the literature attributes children’s use of accessibility in referential choice to their understanding of their interlocutor’s knowledge of the discourse situation. Gundel et al. (1993) refer to this as cognitive status – “the speaker’s assumed representation of the referent in the hearer’s memory and the extent to which the referent is active in memory” (Rozendaal & Baker, 2010, p. 1866). Gundel and her colleagues (Gundel, 2009; Gundel & Johnson, 2013; Gundel et al., 2007) see this ability as an early stage of theory of mind – an early implicit and non-propositional stage where children are able to assess cognitive status, different from the later conscious and propositional stage where they are able to evaluate epistemic status (e.g., knowledge, belief). Indeed, several researchers refer to theory of mind in accounting for children’s referential choice (Hughes & Allen, 2013; Rozendaal & Baker, 2010; Salazar Orvig et al., 2010a; Skarabela, 2007a, b).

However, other researchers propose that it is the speaker’s sensitivity to alignment in the discourse (Pickering & Garrod, 2004) that drives referential choice. For example, Matthews et al. (2006) suggest that children at 2;0 simply follow the discourse model of their interlocutor – using a noun phrase for the first mention of a referent, and a pronoun for the second and subsequent mentions. As Matthews et al. point out, this would explain children’s sensitivity to discourse cues before perceptual cues. Children can use discourse cues simply by aligning with their interlocutor’s discourse model, but they must be sensitive to accessibility to adjust their speech to take into account perceptual availability for an interlocutor. Salazar Orvig et al. (2010a), however, dispute this view. Both quantitative and qualitative analysis of their French spontaneous speech data reveals that children do not rely
on discourse alignment alone, but also “display a referential continuity that draws on the shared understanding of the ongoing activity” and cannot be explained simply by discourse alignment (p. 1860).

An alternative proposal is that children are influenced by the accessibility of referents to themselves rather than to their interlocutor (Demir et al., 2012; Serratrice, 2013), as in the speaker-internal-constraints approach developed by Arnold and Griffin (2007) to explain patterns in adult interactions. The idea is that speakers choose a higher information form for referents for which there is competition in the speaker’s own discourse model during the planning of the utterance – for example, between two referents that share relevant features (e.g., gender, animacy). Demir et al. (2012) found in their video-clip description task that English-speaking but not Turkish-speaking children used more nouns (i.e., high information forms) to realize referents that had the same gender and animacy, presumably since these features must be marked in English pronouns (he vs. she, he/she vs. it) but not in Turkish pronouns (the same form o is used for all third person singular referents – i.e., ‘he’, ‘she’, and ‘it’). Serratrice (2013) finds similar results for English-speaking children in a picture-description task for the role of animacy. In both these studies, the visual information is fully available to both the child and the interlocutor, so a linguistic distinction of referents is not necessary.

7. Conclusion and future directions

Three decades of studies covering fourteen different languages have revealed that children are sensitive to the influence of accessibility on referential choice from their earliest utterances. They use more explicit linguistic forms to realize less accessible referents, and less explicit forms to realize more accessible referents, despite the differences in grammatical and discourse structure across the languages they are learning. Children show sensitivity to accessibility from as young as 1;6 in naturalistic speech in familiar contexts, and from 2;0 in experimental studies when only one factor is varied in a fairly obvious way. However, they take longer to demonstrate their sensitivity in conditions of higher processing load: experimental studies where more factors are involved, where the competition between factors is more acute, or where manipulations are more subtle. They are sensitive earliest to discourse-related factors such as explicit contrast and prior mention, and take longer to develop sensitivity to perceptually-related factors such as perceptual availability. And they are sensitive not only to individual factors in isolation but also to the interplay between factors and to their incremental effect. Both caregiver speech and language structure play a role in how children’s
sensitivity emerges. Overall, it appears that a sensitivity to cognitive accessibility and its effect on referential form is universal across children.

However, there are still many open questions. First, the idea that children become sensitive to discourse-based cues earlier than to perceptually-based cues is intriguing and has considerable support, but still requires further examination to determine whether this is the relevant distinction. Second, more direct cross-language comparisons of the pattern and trajectory of children’s ability to use accessibility in referential choice would help us gain clearer insight into the effect of language structure on the relationship between accessibility and referential choice. In particular, we should focus on studies comparing acquisition across languages using methodology similar to that in Rozendaal and Baker (2008), as well as on studies of potential cross-linguistic influence in bilingual children in a wider range of language pairs and structures than investigated so far. Third, we know relatively little about how children integrate multi-modal expressions of reference; our understanding would benefit from additional detailed investigation into the use of gesture to (co-)express referents, as well as the use of touch, eye gaze, and other non-linguistic ways of indicating referents. Fourth, relatively little research has explored the similarities and differences between spontaneous production, narrative, and comprehension with respect to how children use accessibility for referential choice differentially. These domains of research have largely proceeded independent of each other, but more coordinated studies could provide clues to the links between production and comprehension in language processing. Finally, further research teasing apart the various explanations of the underpinnings of children’s referential choice will undoubtedly prove insightful in understanding whether children’s early sensitivity to accessibility in their referential choice is best explained by early theory of mind in the form of understanding of others’ cognitive status, by following a discourse model within ongoing conversation, or by the child’s own discourse model.

Acknowledgements

We gratefully acknowledge funding for our own research on accessibility in referential choice provided by the Kativik School Board, the Max Planck Institute for Psycholinguistics, and the National Science Foundation (BCS-0346841). We are also grateful for helpful comments on previous versions of this chapter provided by two anonymous reviewers and the Kaiserslautern Scientific Writing Group.
References


All rights reserved


All rights reserved
