Character reference in young children’s narratives:
A crosslinguistic comparison of English, Greek, and Turkish

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Abstract

This study compared the acquisition of referential expressions in preschoolers’ narratives in three typologically different languages, English, Greek, and Turkish. On the one hand, English and Greek have obligatory article systems that mark the definite/indefinite distinction, while Turkish marks it through word order along with case. On the other hand, the Greek determiner system is morphologically rich, while the English system is morphologically impoverished. A total of 157 3-, 4-, and 5-year-olds were tested (about 50 children per language) using two sets of picture sequences, one with a single main character and the other with two main characters. The results indicated that in introducing characters, Greek children displayed a higher level of performance than English children, who in turn did better than Turkish children. In reintroducing characters, Greek and Turkish children’s performance was higher than that of English children. In maintaining characters, children of all three language groups did comparably well. The results also differed in relation to the story types used. These findings indicate that the process of acquiring appropriate referential forms for introducing, reintroducing, and maintaining characters is influenced not only by the referential discourse functions under consideration, but also by language structure and story type.

Keywords: Referentiality in children’s narratives; Information structure; Greek–Turkish–English comparison; Variability in elicitation material

1. Introduction

One of the primary tasks that children need to master in constructing narratives is how to refer to characters in a clear and unambiguous way so that they can convey to the listener whom they are talking about. This is the case because stories deal with the “vicissitudes of human intention” (Bruner, 1986), and thus necessarily portray characters who act on the world as well as reporting on events experienced by characters—whether people, animals, or other fanciful animate elements. For the listener to know what the narrator is talking about as the narrative unfolds, these characters need to be suitably introduced as new participants in the story, reintroduced as participants recently referred to, and/or maintained as familiar, presupposed characters with established identities. At the same time, the narrator needs to be able to keep characters distinct from each other.

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The discourse functions of character introduction, reintroduction, and maintenance require the use of specific linguistic forms that signal whether the information is new, given, or presupposed (Givón, 1989). The correspondence between morphosyntactic forms relevant to reference and the cognitive status of new or old information was formulated by Gundel et al. (1993) in terms of the “givenness hierarchy,” which represents the speaker’s assumptions regarding how familiar the listener is with the intended referent. This hierarchy presents a continuum where new information, assumed to be least familiar, is encoded with indefinite constructions; given information, assumed to be uniquely identifiable, is encoded with forms high in specificity such as definite nouns; and the most presupposed information, assumed to be most familiar, is encoded with less specified forms such as pronouns, either overt or null. Thus, in acquiring character reference skills children are faced with a combination of linguistic and cognitive tasks that involve learning about cohesive devices used not only between utterances but also across the text (Hickmann, 2003).

While the discourse-pragmatic function of marking given and new referents is universal, different languages offer a range of linguistic devices and systems of reference for achieving these functions. For example, some languages use local cues (the definite/indefinite article system) to mark referentiality, while others use global cues affecting the entire clause (e.g., word order; Hickmann et al., 1996). These differences pose different problems for children to solve during the process of acquisition. While there has been considerable research investigating the acquisition of character referentiality, most studies have addressed this question by examining specific languages such as English, French, Finnish, Japanese, Warlpiri, or Turkish. Fewer studies have compared languages to each other. The current study contributes to this scant literature by comparing children’s developing acquisition of character reference in three different languages, English, Greek, and Turkish, which differ in important ways in how each language marks referentiality. In addition, this study explores the cognitive demands that pictorial stimuli used to elicit narratives present by varying systematically the number of main characters included in them. Finally, this study addresses the acquisition of the form/function referential relations during the preschool years (3, 4, and 5), an age range that is younger than the typically studied age groups that extend from about 5–6 to 10 years of age. The rest of this section reviews the relevant literature and further explicates our research questions.

1.1. The development of character referentiality and cross-linguistic comparisons

There is a rich literature on children’s referential abilities, and while studies differ widely in the languages and tasks used, one can discern some general patterns. Naturalistic and experimental studies have demonstrated a relatively protracted development in mastering appropriate introduction of referents through indefinite forms. Young children show a preference for definite forms (Maratsos, 1974), and it is not until 9 or 10 years of age that children are able to introduce characters in their narratives using indefinite forms at the same high rate as adults who completed the same tasks (Hickmann et al., 1996; Kail and Hickmann, 1992; Warden, 1981). Prior to that age, children show a gradual protracted development in using indefinite forms that first appear to be moderately frequent (close to 50%) starting around 7 years of age (Hickmann et al., 1996). However, Küntay (2002) indicated no further development in Turkish from 7 years on; indefinite nominals were used at about the same frequency by 7- and 10-year-olds (47%, respectively) and by adults (40%). Wigglesworth (1990) indicated a more protracted development in English-speaking children; even 8-year-olds did not use indefinite forms with any frequency to introduce characters, and this was particularly true for one of the pictorial booklets used to elicit the narratives. Thus, while indefinite forms begin to be used with some frequency around 7 years of age to mark the introduction of a new character, other (unexplored) factors may affect how frequently they are used and whether we see a further gradual development with age or not.

In terms of character reintroductions, children began to use the appropriate definite nominal forms as opposed to less informative pronominals (overt or null) starting around 4 years, and these increased gradually until 10 years of age (Orsolini et al., 1996). Hickmann and Hendriks (1999) found similar results with English-, French-, and German-speaking 4–10-year-olds, who used definite nominals for reintroduction at rates that increased steadily with age, and used pronominals for maintenance at a high rate at all ages. Their study indicated that preschool children had an easier time with maintenance, while reintroduction was further refined during the early school years. This order of acquisition was further supported by Vion and Colas (1999) with French-speaking children and by Wong and Johnston (2004) with Chinese children. However, the precise ages seem to vary across studies.

While this continuum of given and new information—marked by these three referential functions and their appropriate forms—is universal, Hickmann et al. (1996) argued that different languages use two different devices to mark this distinction. That is, while both referential marking systems are present in all languages, they differ concerning which of these systems is obligatory. Some languages use local markings on the noun phrase (e.g., definite vs. indefinite article or numerals and classifiers) while others use global cues affecting the entire clause (e.g., word order, including case marking, or dislocation). Many Indo-European languages such as English, French, German, and Greek use articles to mark the given/new distinction of referents. In contrast, some other languages that fall outside the Indo-European language tree, such as Chinese, Turkish, and Finnish, use word order, with or without case marking, as a global device to mark this distinction.
Specifically, Hickmann and colleagues compared the acquisition of referential forms for character introductions (Hickmann et al., 1996) as well as character reintroductions and maintenance (Hickmann and Hendriks, 1999) by 4/5-, 7-, and 10-year-old English-, French-, German-, and Chinese-speaking children. They found that Chinese children, when compared to children using Indo-European languages, were delayed in their use of the appropriate forms for marking introductions and reintroductions, but not for maintaining characters. In addition, for character introductions, they used local markers (different types of determiners) earlier than word order, the obligatory structure in their language to indicate new information. Hickmann and colleagues concluded that children develop their referential abilities earlier when their language uses local markers, but that this acquisition is more protracted when children have to master global markers.

While there are a few other comparative studies, no other study, to the best of our knowledge, compares the acquisition of referential functions based on the contrast between local and global referential devices. Thus, the results by Hickmann and colleagues have not been replicated with other languages that share this contrast. Our study attempts to do just that. We employed a more focused cross-linguistic comparison than that used by Hickmann and colleagues. Chinese, a language that mainly lacks morphology and relies primarily on word order to encode information status, is extremely different in its referential system from all three Indo-European languages they used, which have varying degrees of morphological richness (English, French, and German). For this reason, the present study contrasted three typologically different languages—English, Greek, and Turkish—that, while different, also have some important overlaps. On the one hand, English and Greek have an obligatory article system that marks the definite/indefinite contrast for the noun phrase, while Turkish marks this distinction through word order in combination with case marking and the (local) determiner bir (‘one’). On the other hand, Greek and Turkish are morphologically rich, while English is morphologically impoverished.

Next we turn to explain the referential system of these languages in somewhat greater detail.

1.1.1. Cross-linguistic comparison for English, Greek, and Turkish referential systems

1.1.1.1. The English referential system. English has a grammaticalized article system for the definite (the)—indefinite (a/an) distinction. But neither the articles nor the demonstratives (this/that) are differentiated grammatically with respect to gender, so there is no requirement for gender agreement between the article and the noun. A three-way gender distinction in the nominative system is only present in the third person singular, and the possessive determiners in the third person singular express the same distinction (his/heritis). Only the demonstrative determiners are marked for plural (thesel/those books), while the definite and possessive determiners are not. Indefinite plural as well as mass nouns are expressed by bare nouns. Word order in English is strict and is the principal mechanism for expressing grammatical relations. English is a non-pro-drop language that does not allow for argument ellipsis except in complex clauses.

1.1.1.2. The Greek referential system. There is an obligatory article system in Greek, and the article shows agreement with the noun phrase in gender (masculine, feminine, or neuter), case (nominative, genitive, accusative, or vocative), and number (singular or plural). The definite article (o, i, to) is used more frequently in Greek than in English because Greek employs definite determiners with all nouns, including proper names, obligatorily. The indefinite article (enas, mia, ena) is identical with the numeral ‘one.’ Indefiniteness in plural nouns is expressed by the bare noun. Demonstrative pronouns are also marked for case, number, and gender. Personal pronouns are inflected for number and case, and the third person pronouns are also inflected for gender. Personal pronouns are divided into weak (clitic) pronouns and emphatic pronouns. Because the verb ending unambiguously indicates person and number, pronouns are rarely used in the subject position and only for emphasis (Holton et al., 1997). Weak (clitic) personal pronouns are monosyllabic, unstressed, and used only for objects. The predominant word order in Greek is subject-verb-object, but word order is flexible because the rich morphology makes it clear which noun is the subject and which the object of the sentence. Greek is a pro-drop language that allows for subject, but not object, ellipsis.

1.1.1.3. The Turkish referential system. In contrast to English and Greek, Turkish does not have a formal article system. Instead, word order, case marking, and the determiner bir (‘one’) are used in combination to mark the definite—indefinite distinction at the clause level. Since grammatical relations are signaled by case markers, word order is flexible. In the neutral subject—object—verb order, the sentence initial position is for given information and the immediately preverbal slot is for new information; for marked orders, the postverbal position is for presupposed information (Erguvanl, 1984). The nominative case for the subject has zero phonological realization, yielding a bare noun. Bare nouns are interpreted as definite in sentence initial position, which requires that the subject noun phrase occupying it be definite (and/or animate), whereas bare nouns in the immediately preverbal position are interpreted as indefinite or nondefinite (Dede, 1986). Definiteness is marked by the accusative case on direct objects; the other case suffixes may also appear on indefinite noun phrases. Unmarked direct objects in preverbal position are indefinite/nonspecific. There is no grammatical gender differentiation in Turkish, either in the nominal or the pronominal systems. Turkish is a pro-drop language which allows for both subject and object ellipsis.

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In view of Hickmann et al.’s distinction of local vs. global cues that languages use in marking referentiality, we characterize English and Greek, our two languages with formal article systems, as languages that use local cues, and Turkish as a language that predominantly relies on global cues. Based on Hickmann et al.'s findings, we expected that Greek- and English-speaking children would acquire indefinite nominals for character introduction earlier than Turkish children.

1.2. Onset and early acquisition of character referentiality

In the current study, we examined the acquisition of character referentiality during the preschool years. While children’s developing referential abilities have been studied across a wide age range spanning from 3 to 10 years, most studies did not make sufficiently fine distinctions during the preschool years. That is, they either did not include the early years (3–5 years; e.g., Vion and Colas, 1999) or they combined these ages so that 3s and 4s formed one group and 5s and 6s another group (e.g., Bamberg, 1986; Kuntay, 2002) or 4s and 5s formed one group that was contrasted with 7s (Hickmann et al., 1996; Hickmann and Hendriks, 1999; for an exception, see Berman and Katzenberg, 1998). Other studies used a larger age gap across the preschool years: that is, 3s vs. 5s (Wong and Johnston, 2004) or 4s vs. 6s (Wigglesworth, 1990) or 5s vs. 7s (Tyler, 1984). Because narrative abilities begin to emerge around 3 years of age (Nelson, 1996), we were interested in delineating more fully the trajectory across 3-, 4-, and 5-year-olds.

During data collection we had the child and the experimenter sit at the same side of the table looking at the pictures together as the child was telling the story, rather than having the child tell the story to an adult who was not looking at the pictures. Several studies using both procedures (e.g., Hickmann and Hendriks, 1999; Kail and Hickmann, 1992; Serattrice, 2008; Warden, 1981) have indicated that they do not produce significantly different results prior to 6 or 7 years of age.

1.3. Task demands: one vs. two main character stories

Another variable we investigated in this study was the complexity of the pictorial material used to elicit the narratives. While such materials have been used widely in narrative research, whether and how the increasing complexity of these stimuli may affect the linguistic skills under consideration has received minimal attention (for exceptions, see McGann and Swartz, 1988; Vion and Colas, 1999). In practice, the great bulk of narrative research examining the acquisition of referential expressions has used pictorial materials that include one main character and one (or more) secondary character(s) (e.g., Bamberg, 1986; Berman and Slobin, 1994; Wong and Johnston, 2004). At times, this condition has been supplemented by using pictorial materials that include many characters with no clearly discernible main character (e.g., Karmiloff-Smith, 1981; Hickmann et al., 1996; Hickmann and Hendriks, 1999; Wigglesworth, 1990). However, some attention has been paid to the structure of the pictorial stimuli. For example, Wong and Johnston (2004) created a set of pictures in which the main character was present in all the pictures while a secondary character appeared only in one picture in the middle of the sequence. Berman and Katzenberg (1998) used pictorial materials that included two characters in all the pictures.

It stands to reason that one element that may contribute to the cognitive demands of the task is the number of main characters included in the story. One would expect that having one main character should be easier for a child to manage than having two main characters, which in turn should be easier than having three main characters. This hypothesis is supported by experimental studies with adults showing that in cases where two or more animate characters have been used, speakers produced more proper names than pronouns, suggesting speaker-internal processes such as competition for attentional resources in the speaker’s representation of the discourse (Arnold and Griffin, 2007). In addition, an experimental study comparing children and adults (Serattrice, 2008) found that 5- to 6-year-olds and especially 10-year-olds produced more noun phrases than pronouns in the presence of a second referent as compared to a single one, though at lower proportions than adults. These findings indicate that the referential expressions used by children may change when the narrative stimuli include two main characters vs. one main character.

The present study explored this hypothesis by examining whether the presence of two main characters, as opposed to a single main character and a secondary one, may markedly change the referential expressions used in preschoolers’ narratives.

1.4. Research questions

Our research questions and specific hypotheses are as follows:

1. Does language structure affect the acquisition of referential expressions among 3–5-year-old learners of English, Greek, and Turkish, and if so how do these effects manifest themselves?

We expected that higher percentages of Greek and English-speaking children (learning languages that mark the new/given distinction through local cues) than Turkish children (learning a language that marks the new/given distinction through global cues) would display the introduction function at an earlier age.
2. What is the order of acquisition of the three key referential functions: introduction, reintroduction, and maintenance?

We expected that appropriate marking of maintenance would be achieved earlier than reintroduction, which in turn would be achieved earlier than introduction.

3. Does the structure of the pictorial stimuli used in eliciting stories, in terms of number of main characters, affect children’s ability to express the different referential functions, and if so how?

We expected that children’s use of appropriate referential forms would be more delayed in the two-main-character story than in the one-main-character story.

2. Method

2.1. Participants

A total of 181 children participated in this study: 56 English, 65 Greek, and 60 Turkish children who were acquiring English, Greek, and Turkish, respectively, as their first language. Children resided in major urban centers in each country: San Diego, CA for US; Athens and Patras for Greece; and Istanbul for Turkey.

Within each language group, 3-, 4-, and 5-year-olds participated, with roughly equal numbers of boys and girls per age group. On average, 20 middle-class children per age group (varying from 18 to 24) were tested. Two stories per child were elicited for analysis. For purposes of the current analysis, we adopted a minimum criterion for a story, requiring that the child mentioned a character and an action for both of the stories to be included in this sample. Eight English 3-year-olds, two Greek 3-year-olds, and seven Turkish 3-year-olds did not meet this criterion for one of their narrations, bringing the 3-year-old totals to: 10 for English, 18 for Greek, and 12 for Turkish. The final sample consisted of 157 children (see Table 1 for sample distribution by age and language along with age means and ranges).

2.2. Materials

The data were collected in the context of a larger study that aimed to develop a mother-report methodology for assessing children’s narrative abilities. Two four-picture sequences were used to elicit the stories, one with human characters (Balloon story) and the other with animal characters (Horse and Bunny story; see Appendix A for the story pictures). The Balloon Story has one main character (the boy) and one secondary character (the balloon man). This story is about a boy who gets a balloon from a balloon man; in the second picture, he walks away happily holding his balloon; in the third picture, the balloon is blown away; and in the fourth, the boy is walking home crying. The Horse and Bunny story includes two equally active main characters who are present in all the pictures, the bunny and the horse. The first picture depicts a bunny picking carrots in a garden while a horse behind a fence is looking on; in the second picture, the bunny is eating a carrot while the horse takes the basket of carrots; in the third, the horse runs with the basket and the bunny chases after him; and in the fourth, they are eating carrots together.

2.3. Procedure

Children were tested in a quiet room in their preschools by trained undergraduate or graduate research assistants. The child and the tester sat side by side. The two picture sequences used to elicit the stories were presented in a

<table>
<thead>
<tr>
<th>AGE/language</th>
<th>3 yrs</th>
<th>4 yrs</th>
<th>5 yrs</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>English N</td>
<td>10</td>
<td>18</td>
<td>17</td>
<td>45</td>
</tr>
<tr>
<td>Mean age</td>
<td>42 mos</td>
<td>54 mos</td>
<td>65 mos</td>
<td></td>
</tr>
<tr>
<td>Age range</td>
<td>37–42 mos</td>
<td>48–59 mos</td>
<td>60–72 mos</td>
<td></td>
</tr>
<tr>
<td>Greek N</td>
<td>18</td>
<td>21</td>
<td>24</td>
<td>63</td>
</tr>
<tr>
<td>Mean age</td>
<td>44 mos</td>
<td>54 mos</td>
<td>62 mos</td>
<td></td>
</tr>
<tr>
<td>Age range</td>
<td>38–47 mos</td>
<td>50–59 mos</td>
<td>62–72 mos</td>
<td></td>
</tr>
<tr>
<td>Turkish N</td>
<td>12</td>
<td>18</td>
<td>19</td>
<td>49</td>
</tr>
<tr>
<td>Mean age</td>
<td>42 mos</td>
<td>53</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Age range</td>
<td>37–42 mos</td>
<td>49–58 mos</td>
<td>60–72 mos</td>
<td></td>
</tr>
<tr>
<td>Total N</td>
<td>40</td>
<td>57</td>
<td>60</td>
<td>157</td>
</tr>
</tbody>
</table>
counterbalanced order. (There was a third picture sequence presented to each child to elicit a narrative, counterbalanced with the other two, but this was not included in the current analysis.) The four pictures per sequence were placed in front of the child one by one, and the tester then highlighted the order by pointing to the series of pictures and saying that they depicted a story. She asked the child to look carefully at all four pictures and then to tell the story to her. Children’s narrations were audio-recorded and transcribed verbatim.

2.4. Coding

The unit of analysis was the clause defined by the presence of a predicate and related arguments, including an explicit or implicit character referent. The following animate referents were included in our coding: For the Balloon story, the boy and the balloon man; for the Horse and Bunny story, the bunny and the horse. Comments directed to the experimenter, false starts, or repetitions were not included. Each referent was coded for discourse function (introduction, reintroduction, and maintenance) and morphosyntactic form (e.g., Indefinite Noun Phrase [NP], Definite NP, Pronoun).

2.4.1. Referential functions

Based on the literature on referentiality, we used the following criteria to identify referential functions: (a) Introduction: The speaker refers to a story character for the first time; (b) Reintroduction: the speaker refers back to a character who was previously mentioned, after having focused on another character in the intervening utterances; and (c) Maintenance: the speaker continues to refer to the same character within an utterance or in successive utterances without changing the thematic focus of the story.

2.4.2. Referential forms

These indicate the lexical forms used to refer to characters. We used four categories:

(a) No mention: This category included instances where one of the two characters per story was not mentioned, so there was no referential form for specific functions. For example, a child might narrate a story referring only to the bunny and not to the horse; in that case the horse received the “no mention” coding for introduction, reintroduction, and maintenance. Or a child might introduce the bunny, but then not reintroduce the bunny after introducing the horse; yielding “no mention” for reintroduction for the bunny.

(b) Pronouns [PRO]: This category included personal pronouns (e.g., he, she, they), demonstrative pronouns (e.g., this, that), null (omitted) pronouns, and, for Greek, the clitic pronouns.

(c) Definite nominals [DefNP]: This category consisted of nouns preceded by definite or demonstrative determiners (e.g., the man, that boy) in English and Greek, and bare nouns in sentence initial or postverbal position, nouns preceded by demonstrative determiners and nouns marked for case (e.g. çocuğ-a [boy-DAT] ‘to the boy’) in Turkish. Possessive NPs (his balloon, balloon-u [balloon-POSS] ‘his balloon’) were also included in this category.

(d) Indefinite nominals [IndefNP]: This category consisted of nouns preceded by indefinite articles in English (e.g., a bunny, a horse) and in Greek (e.g., enas layos [‘one/a bunny’, ena paidaki [‘one/a child’]), and in these two languages we also included the bare noun in singular or plural form. In Turkish, this category consisted of nouns preceded by the indefinite determiner bir (‘one/a’) or the bare noun in immediately preverbal position that is not sentence initial. Thus, in coding the Turkish data, word order was taken into account for the interpretation of the definite/indefinite status of the nominal used.

The following examples illustrate the coding for function and form for both characters in the narratives of an English-, Greek-, and Turkish-speaking 5-year-old child.

(1) English (JB 5;11)

First the bunny [Intro 1st MC: DefNP] took a carrot
And then he [Maintain 1st MC: PRO] ate it
And then the horse [Intro 2nd MC: DefNP] came
An Ø [Maintain 2nd MC: PRO] run with the carrot
Then the horse [Maintain 2nd MC: DefNP] came back
Ø [Maintain 2nd MC: PRO] Run with the carrot
Ø [Maintain 2nd MC: PRO] Run with the carrots again

(2) Greek (MA 5;5)

Ενας λαγός [Intro 1st MC: IndefNP] φίλεβί τα καρότα ‘a bunny is planting [the] carrots’
κε Ø [Maintain 1st MC: PRO] kathòtane
and [he] is sitting
*ke Ø [Maintain 1st MC: PRO] étroye karòta*
and [he] eats [the] carrots
*Ke irthe ena álolo [Intro 2nd MC: IndefNP]*
‘and a horse came’
*Ke to [Maintain 2nd MC: PRO] pire to kalàthi me ta karòta*
‘and [he-clitic] took the basket with the carrots’
*Ta karòta, tou [Maintain 2nd MC:PRO] édhose ke o layòs [Reintro 2nd MC: DefNP]*
‘The carrots, the bunny gave to him’
*To álolo [Maintain 2nd MC: DefNP] ke o layòs [Reintro 1st MC: DefNP] piye*
‘The horse and the bunny went’
*Ke Ø [Maintain 1st+2nd MC: PRO] fàyane mazì karòta*
‘And [they] ate carrots together’

(3) Turkish (EC 5;10)
*Tavs¸an [Intro 1st MC: DefNP] havucu alıyo*
‘[the] rabbit takes the carrot.’
*At [Intro 2nd MC: DefNP] o-na [Maintain 1st MC: PRO] bakiyo*
‘[the] horse is looking at him’
*Tavs¸an [Reintro 1st MC: DefNP] havucu yerken*
‘while [the] rabbit is eating [the] carrot’
*At [Reintro 2nd MC: DefNP] o havucun sepetini alıyo*
‘[the] horse is taking [the] basket of that carrot’
*At [Maintain 2nd MC: DefNP] o sepettekı havuçları yiyo*
‘[the] horse is eating [the] carrots in that basket’
*At [Maintain 2nd MC: DefNP] yiyo*
‘[the] horse is eating’
*O-na [Reintro 1st MC: PRO] da Ø [Maintain 2nd MC: PRO] veriyo*
‘[he: horse] also gives to it’
*Ø [Maintain 1st+2nd MC: PRO] paylaşıyolar*
‘[they] share’

Given the complexity of the coding scheme, two native speakers of each language coded the data independently, and any discrepancies were settled through discussion. The agreement was high for all codes used, and the occasional discrepancies were the result of oversight by one of the coders.

2.5. Data reduction

For all three referential functions, we calculated our results separately for the two characters in the two stories: 1MC (one main character: Boy, and a secondary one: Balloon Man) and 2MC (two main characters: Bunny and Horse). For introductions, we calculated the proportion of referential forms per character per story. Because each character can be introduced into the discourse only once, the number of referential forms for introduction per character equals the number of children in each age group. For reintroduction and maintenance functions, which can be realized more than once in a story, we used all referential acts a child gave per story, and not just the first one. For this reason, we calculated mean proportions, because a child can use more than one form per function. In short, our results are calculated as proportions for introduction and mean proportions for reintroduction and maintenance per age group, separately for each character per story.

3. Results

Tables 2–4 present proportions for introduction and mean proportions for reintroduction and maintenance for English-, Greek-, and Turkish-speaking, 3-, 4-, and 5-year-olds, respectively. We also included the number of subjects and the number of referential acts on which each of these proportions and mean proportions was based. Our discussion of the results focuses on the linguistic forms used most frequently to mark referential functions, based on two criteria. These linguistic forms are designated as frequent if they were present in proportions or mean proportions of 20% or higher; and they are designated as dominant if, in addition to reaching that 20% threshold, they were used by at least half the subjects in the relevant age group (for similar criteria, see Wong and Johnston, 2004). For further clarification, Tables 5 and 6
present the proportions of forms per function for each story and for both characters separately that meet the minimum criterion of 20% (with the dominant forms bolded) and compare them across languages organized per age group, 3-, 4-, and 5-year-olds, respectively. The following presentation of our results is organized by referential function. Within each function, we first discuss the patterns observed within languages for the appropriate linguistic forms (highlighting frequent and dominant linguistic forms), and then we compare these patterns across languages and across story types.

3.1. Character introductions: indefinite nominals

The expected linguistic form for the introduction of characters for all three of the languages being compared is indefinite nominal constructions.

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3.1.1. Within-language patterns

For English-speaking children, for both stories and for both characters in each story, the proportion of indefinite nominals was relatively low at all ages; and while they reached the criterion of minimal frequency (20%) in several instances, they never became dominant forms (see Tables 2, 5 and 6). Indefinite nominals were, overall, slightly more frequent for the 2MC stories for both characters at all ages than for the 1MC story (2MC: range from .29 to .40 for both the bunny and horse characters vs. 1MC: range from .20 to .28 for boy and balloon man; see Table 2). Specifically, for the Balloon story, the proportion of indefinite nominals was minimally frequent only for the boy at ages 3 and 4 (.20 and .28, respectively) and for the balloon man only at age 4 (.22). For the Horse and Bunny story, indefinite nominals were used at levels of minimal frequency at all ages for the bunny (ranging from .29 to .33), and for the horse only at 3 and 4 years (.40 and .33, respectively). There was no clear developmental trend in that indefinite nominals did not become either more frequent or dominant by 5 years of age for both stories and for both characters. In fact, for the 1MC story, 5-year-olds did

Table 3

Proportions, number of subjects (Ss), and number of referential acts (RAs) for linguistic forms by function, age, story type, and character type for GREEK-speaking children.

<table>
<thead>
<tr>
<th>Referential function</th>
<th>Linguistic forms</th>
<th>MC: boy</th>
<th></th>
<th>SC: balloon man</th>
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<tbody>
<tr>
<td></td>
<td>3-Year-olds</td>
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<td>5-Year-olds</td>
<td>3-Year-olds</td>
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<tr>
<td></td>
<td>% Ss RA</td>
<td>% Ss RA</td>
<td>% Ss RA</td>
<td>% Ss RA</td>
<td>% Ss RA</td>
</tr>
<tr>
<td>Introduction</td>
<td>No mention</td>
<td>.17 3</td>
<td>.10 2</td>
<td>.04 1</td>
<td></td>
</tr>
<tr>
<td>Pronoun</td>
<td>.22 4 4</td>
<td>.24 5 5</td>
<td>.13 3 3</td>
<td>.33 6 6</td>
<td>.24 5 5</td>
</tr>
<tr>
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<td>.44 8 8</td>
<td>.48 10 10</td>
<td>.42 10 01</td>
<td>.44 8 8</td>
<td>.33 7 7</td>
</tr>
<tr>
<td>NP-indefinite</td>
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<td>.29 6 6</td>
<td>.46 11 11</td>
<td>.06 1 1</td>
<td>.33 7 7</td>
</tr>
<tr>
<td>Reintroduction</td>
<td>No mention</td>
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<td>.33 7 7</td>
<td>.21 5 5</td>
<td>.89 16</td>
</tr>
<tr>
<td>Pronoun</td>
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<td>.43 10 11</td>
<td>.40 11 14</td>
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</tr>
<tr>
<td>NP-definite</td>
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<td>.24 6 6</td>
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<td>.04 1 1</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>.67 12 3</td>
<td>.52 11</td>
<td>.79 19</td>
</tr>
<tr>
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<td>.85 20 72</td>
<td>.90 22 84</td>
<td>.22 4 5</td>
<td>.40 9 10</td>
</tr>
<tr>
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<td>.06 5 5</td>
<td>.06 4 5</td>
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<td>.07 2 2</td>
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<td>.05 2 2</td>
<td>.08 2 4</td>
<td></td>
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</table>

Referential function | MC: bunny | | MC: horse |
<table>
<thead>
<tr>
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<td>5-Year-olds</td>
</tr>
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<td>% Ss RA</td>
<td>% Ss RA</td>
</tr>
<tr>
<td>Introduction</td>
<td>No mention</td>
<td>.11 2</td>
</tr>
<tr>
<td>Pronoun</td>
<td>.11 2 2</td>
<td>.10 2 2</td>
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<tr>
<td>NP-definite</td>
<td>.39 7 7</td>
<td>.38 8 8</td>
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<td>.75 18 67</td>
</tr>
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<td>.15 9 11</td>
</tr>
<tr>
<td>NP-indefinite</td>
<td>.01 1</td>
<td>.05 1 1</td>
</tr>
</tbody>
</table>

3.1.1.1. Within-language patterns

For English-speaking children, for both stories and for both characters in each story, the proportion of indefinite nominals was relatively low at all ages; and while they reached the criterion of minimal frequency (20%) in several instances, they never became dominant forms (see Tables 2, 5 and 6). Indefinite nominals were, overall, slightly more frequent for the 2MC stories for both characters at all ages than for the 1MC story (2MC: range from .29 to .40 for both the bunny and horse characters vs. 1MC: range from .20 to .28 for boy and balloon man; see Table 2). Specifically, for the Balloon story, the proportion of indefinite nominals was minimally frequent only for the boy at ages 3 and 4 (.20 and .28, respectively) and for the balloon man only at age 4 (.22). For the Horse and Bunny story, indefinite nominals were used at levels of minimal frequency at all ages for the bunny (ranging from .29 to .33), and for the horse only at 3 and 4 years (.40 and .33, respectively). There was no clear developmental trend in that indefinite nominals did not become either more frequent or dominant by 5 years of age for both stories and for both characters. In fact, for the 1MC story, 5-year-olds did
In contrast, the dominant forms for English-speaking children, when introducing a character for the 2MC story, were definite nominal forms for almost every age group and for both characters, except for the 5-year-olds for the bunny where this form was only frequent (.41, used by 7 out of 17 children [henceforth 7/17]; see Table 6). However, pronouns were nonexistent for the 2MC story, except for the bunny at 5 years of age (.29). For the 1MC story, definite nominal forms were dominant only for the balloon man at 3 years (.50, 5/10) and pronouns for the boy at 5 years of age (.71, 12/17). Overall, for the 1MC story, pronouns were equally as frequent as were the definite nominal forms for the boy character, especially at 3 and 4 years. But for the balloon man, pronouns were non-existent and this was true for the horse and bunny characters (see Tables 5 and 6).

Table 4
Proportions, number of subjects (Ss), and number of referential acts (RAs) for linguistic forms by function, age, story type, and character type for TURKISH-speaking children.

<table>
<thead>
<tr>
<th>Referential function</th>
<th>Linguistic forms</th>
<th>3-Year-olds</th>
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<td>N = 19</td>
<td>N = 12</td>
<td>N = 18</td>
<td>N = 19</td>
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<tr>
<td>One main character story: balloon</td>
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<td></td>
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<tr>
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<tr>
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<tr>
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<td>NP-indefinite</td>
<td>.05 1 1 .05 1 3</td>
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<tr>
<td>Maintenance</td>
<td>No mention</td>
<td>.08 1 1 .06 1 1 .05 1 1 1.00 12 .89 16 .90 17</td>
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</table>

Two main character story: horse and bunny

<table>
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<tr>
<th>Referential function</th>
<th>Linguistic forms</th>
<th>3-Year-olds</th>
<th>4-Year-olds</th>
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<td>N = 18</td>
<td>N = 19</td>
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<tr>
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<td></td>
<td></td>
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<tr>
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<td>Pronoun</td>
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<tr>
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</tr>
<tr>
<td>Reintroduction</td>
<td>No mention</td>
<td>.25 3 1 .06 1 1 .16 3 3 .42 5 5 .28 5 5 .53 10</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pronoun</td>
<td>.21 3 5 .33 8 9 .17 6 7 .21 3 3 .23 6 6 .10 3 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NP-definite</td>
<td>.54 7 10 .61 13 18 .67 15 20 .37 5 9 .49 10 16 .37 8 10</td>
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<tr>
<td>Maintenance</td>
<td>No mention</td>
<td>.08 1 1 .11 2 2 .10 2 2 .17 2 2 .22 4 4 .10 2 2</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Pronoun</td>
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<td></td>
<td>NP-definite</td>
<td>.27 5 16 .22 8 12 .36 11 15 .29 5 6 .34 9 16 .36 12 21</td>
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</tbody>
</table>

not reach the criterion of minimal frequency for either character, and for the 2MC story, they did not reach it for the horse character.

In contrast, the dominant forms for English-speaking children, when introducing a character for the 2MC story, were definite nominal forms for almost every age group and for both characters, except for the 5-year-olds for the bunny where this form was only frequent (.41, used by 7 out of 17 children [henceforth 7/17]; see Table 6). However, pronouns were nonexistent for the 2MC story, except for the bunny at 5 years of age (.29). For the 1MC story, definite nominal forms were dominant only for the balloon man at 3 years (.50, 5/10) and pronouns for the boy at 5 years of age (.71, 12/17). Overall, for the 1MC story, pronouns were equally as frequent as were the definite nominal forms for the boy character, especially at 3 and 4 years. But for the balloon man, pronouns were non-existent and this was true for the horse and bunny characters (see Tables 5 and 6).
The patterning of referential acts for the Greek children differs from that of the English children. Indefinite nominals were not only used more frequently for both stories and both characters in each story, but in some cases they were the dominant forms. This was the case for the bunny character in the 2MC story, where indefinite nominals were the dominant forms at every age (.50 at 3, .52 at 4, and .50 at 5 years). And they were frequent in introducing every other character (horse, boy, and balloon man), except for 3-year-olds for the balloon man (see Tables 3, 5 and 6).

Among the Greek preschoolers, there seems to be a developmental trend for the use of indefinite nominals, and this is most clear for the 1MC story for both characters. In introducing the boy, the proportion of indefinite noun phrases at 3 and 4 years was not far above the minimum frequency criterion (.33 and .29 respectively), while at 5 years it came close to becoming the dominant form (.46, 11/24). An even clearer developmental trend is apparent for the balloon man, where indefinite forms were not present at 3 years, but increased steadily at 4 years (.33, 8/24) vs. 5 years (.33, 8/24). However, no such developmental trend was apparent for the bunny character for the 2MC story.

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where the proportion of indefinite nominals was dominant (around .50 at each age group) and was used by 50% of the children even at age 3.

A closer look at the data attests to a developmental trend here as well, since some of the indefinite forms for both 3s and 4s for the bunny character resulted from using bare nouns and not from the use of the indefinite article in Greek. Specifically, about 3 children each at 3 and 4 years of age used bare nouns, while this form was very rarely used by Greek children in introducing any other character—or for other references to any other character. It should be noted, however, that three other 3-year-olds used indefinite nominals in introducing not only one, but both main characters in their 2MC story. While the proportion of children who used indefinite nominals remained the same for 4-year-olds, it increased to 6 children for 5-year-olds, thus indicating a greater generative use of the indefinite article system by this age group.

The other form that was dominant for the Greek children was definite nominals. This was particularly true for the horse character, which was introduced by the definite nominal at each age: .61 at 3 (11/18); .67 at 4 (14/21); and .67 at 5 (16/24).
It was also the dominant form or close to it for the boy character: .44 at 3 (.8/18); .48 at 4 (10/21), and .42 at 5 (10/24). It is interesting that children at all ages displayed a tendency to introduce these two characters second, while the balloon man and the bunny were introduced first. It may be that the second character is seen as somewhat anchored in the narrative discourse and thus tends to receive a definite nominal form equally if not more frequently than an indefinite nominal form. Overall, Greek children showed a greater tendency to use indefinite forms to introduce a character, and the next frequent or dominant form was the definite nominal form. Pronouns were not very frequent in introducing characters and closer inspection of the data indicates that, when used, they were used as null references.

**Turkish children's** character introductions present a different pattern. The use of indefinite nominals was practically nonexistent. They did not exceed the minimum frequency of 20% across ages, stories, and characters, except for the bunny in the 2MC story at age 5 (.21, 4/19). Instead, definite noun phrases were the dominant form at almost all ages (see Tables 4–6). In the 2MC story, the proportion of definite nominals for the bunny was .75 at 3 (9/12), .61 at 4 (11/18) and .79 at 5 (15/19) and for the horse .92 at 3 (11/12), .78 at 4 (14/18), and .79 at 5 (15/19). In the 1MC story, definite nominals were dominant for the boy at all ages (.75, 9/12; .56, 10/18; and .74, 14/19 at 3, 4 and 5 years respectively), and for the balloon man at 3 (.67, 8/12) and 5 years (.63, 12/19). For the 4-year-olds, definite nominals were frequent but not dominant (.39, 7/18). Pronouns were used as frequent forms only by 4-year-olds and for the boy and the bunny characters (.33, 6/18 and .22, 4/18).

Since Turkish relies on the interaction of local and global cues rather than on a formal article system to mark the new/given contrast, we looked further into the ways children marked indefiniteness. All instances of indefinites used the determiner [bir ‘one’ + Noun] construction as in “bir at görmüş”, ‘(he) saw one [a] horse’, except for two instances where the existential construction [var ‘exist’] was used as in “at var ‘horse exists.’” There were no bare nouns in agent role in non-sentence-initial position, or any [bir + Noun-accusative] constructions. Definiteness was expressed either by bare nouns in sentence initial position (range .33 to .70 across age groups) in accordance with the canonical subject–object–verb order, or by accusative and other case marked nouns (range .05 to .25 across age groups), and occasionally with bare or case-marker nouns in post-verbal position (.05 for any character). Our data indicated that Turkish children employed the local marker bir [‘one’ on the occasions that they marked indefiniteness, and relied most frequently on the canonical word order along with case to mark definiteness.

### 3.1.2. Comparisons across languages

Comparing across languages, we see that only the Greek children used indefinite noun phrases as the dominant form to introduce characters. The increasing proportions by age in the 1MC story, reaching .46 among the 5-year-olds for both characters, point to a clear developmental trend, although the use of indefinite nominals as dominant form is evident even at age 3 in the 2MC story (see Tables 5 and 6). But, as we saw, half of these 3- and 4-year-olds relied on a simpler strategy (use of bare nouns) than the generative use of the indefinite article system, which became dominant by 5 years of age. The proportions of indefinite nominals for English-speaking 3- to 5-year-olds (ranging from .20 to .40) were lower than the proportions observed in the Greek children (ranging between .22 to .52), and this was not a dominant form for any age group. Nor was there a clear developmental trend for this language group. In fact, a higher proportion for indefinite nominals was observed among the 3-year-olds, while the 5-year-olds used frequent indefinite nominals only for the bunny character in the 2MC story. The lowest proportions were observed for the Turkish children; they remained below the minimum frequency requirement of 20% except for 5-year-olds in the 2MC story for the bunny character (.21, 4/19).

In short, Greek 5-year-olds indicated the highest level of performance in using indefinite forms for character introductions, followed by English-speaking and lastly by Turkish-speaking children. The most frequently used alternative form for character introductions in all languages was the definite noun phrase at 3 and 4 years. At age 5, the dominant referential form for English was the pronoun, for Greek the indefinite nominal, and for Turkish the definite nominal.

### 3.1.3. Story type comparisons

Comparing character introduction forms in different story types across the three languages brings out three differences. First, the proportion of indefinite noun phrases produced for the 2MC story was higher overall than for the 1MC story. Second, the proportion of definite noun phrases produced in the 2MC story, which includes two equally active participants, was higher than for the 1MC story. Third, English-speaking children used a higher proportion of pronouns in the 1MC story, while Greek- and Turkish-speaking children used a higher proportion of definite nominals for both stories.

This last observation may suggest a less developed level of referential abilities for the English-speaking children, as they display what may be called a weak form of the thematic-subject strategy by using a pronoun to introduce a character, a form more appropriate for reintroduction (Karmiloff-Smith, 1981). However, the high proportion of definite nominals these children used in introducing characters for the 2MC story indicates that these children, like their Greek and Turkish counterparts, could use lexical forms higher in specificity than pronouns in some other cases.
The expected form for reintroducing an already familiar character into narrative discourse is definite nominals. It should be noted that in the Balloon story almost none of the children from any language reintroduced the balloon man, a character that appears only in the first picture (the category of “no mention” ranges from .80 to .90; see Tables 2–4). For this reason, we will not discuss this character for this function any further.

### 3.2.1. Within-languages patterns

#### English-speaking children

The expected definite nominals to reintroduce characters only for the 2MC story, while this form was non-existent for the 1MC story (see Tables 2, 5 and 6). Specifically, for the 2MC story, definite noun phrases were dominant only at 3 years of age for both the bunny (.67, 7/10) and the horse (.50, 5/10), while at 4 and 5 years the use of these forms decreased slightly with age. For the bunny, definite nominals were frequent among the 4s and 5s (.44, 8/18 and .32, 6/17, respectively); and for the horse they were frequent at 4 (.44, 8/18), and non-existent at 5. The dominant category for the bunny and horse characters at 4 and 5 years was the “no mention” category (Bunny .50, 9/18 and .53, 9/17 and Horse .50, 9/18 and .82, 14/17 for 4 and 5 years, respectively). This pattern of results raises some doubts about whether the reintroductions of the English 3-year-olds fully indicate continuity of referent; it may well be that these children reintroduced a character previously introduced because they were simply naming the characters in the pictures. However, it is unclear why the English-speaking 4- and 5-year-olds did not often reintroduce the 2MC characters who were active throughout the story, especially in light of the results from the other two languages (see Table 6).

In contrast, the boy in the 1MC story was reintroduced mainly by pronouns, especially at 4 and 5 years of age, and these forms were strongly dominant (.72, 13/18 and .71, 12/17, respectively; see Table 5). This pattern of results suggests that these children are using a thematic subject strategy to refer to the boy, who appears in all the pictures, so even if they referred to another character in between, they reintroduced this character with a pronoun. It is interesting to note that this strategy was not used in the 2MC story where pronouns were nonexistent at every age (see Table 6).

For the Greek-speaking children, a somewhat different pattern emerges. Definite nominals were used at a higher and more sustained level than for the English-speaking children: they were dominant in the 2MC stories for both characters and for all ages and they were frequent in the 1MC story at 4 and 5 years of age (see Tables 3, 5 and 6). Specifically, the bunny was reintroduced with definite noun phrases that were dominant starting at 3 years and increased over time (at 3: .56, 12/18; at 4: .63, 14/21, and at 5: .77, 12/24). The Greek children, unlike their English counterparts, also used definite nominals to reintroduce the horse, and these forms were dominant at every age, but increased only slightly with age (at 3: .44, 9/18; at 4: .50, 10/21; and at 5: .48, 13/24). The higher use of definite nominals for character reintroduction by Greek children is also apparent in the 1MC story. While such forms were nonexistent for the English children, they are frequent for the Greek children at 4 (.24, 6/21) and at 5 years (.35, 10/24) in reintroducing the boy (see Table 5).

Overall, pronouns were the next most frequent form, and at times emerged as the dominant form, but their use differed by story type. They were less frequently used with the 2MC stories than with the 1MC stories. Specifically, pronouns were frequent at 3 years for the bunny (.27, 6/18) and at 5 years for the horse (.23, 7/24), but were non-existent at every other age for both of these characters. In contrast, for the 1MC story, pronouns were one of the most frequent forms used, along with definite nominals. Specifically, they were frequent and close to dominant at 3 (.42, 8/18), 4 (.43, 10/21), and 5 years (.40, 11/24). Thus overall, for the 2MC story, definite nominals were used more frequently than pronouns, while for the 1MC story, pronouns seem to be used slightly more than definite nominals at all ages. But when compared to the English children, Greek children used more pronouns for the 2MC story and fewer for the 1MC story. In both cases, the other frequent/dominant form was the expected form, definite nominals.

The pattern of results for reintroducing a previously introduced character by Turkish children was, on the whole, closer to the Greek than to the English data. Overall, there was a tendency to use definite nominals for reintroductions for the 2MC story for both characters at all ages and also for the 1MC story, with a notable exception at 5 years (see Tables 4–6). Specifically, for the 2MC story, definite nominals were dominant and gradually increasing for reintroducing the bunny at all ages (at 3: .54, 7/12; at 4: .61, 13/18; at 5: .67, 15/19); but for the horse character, they remained at about the same high rate: close to dominant at 3 (.37, 5/12), dominant at 4 years (.49, 10/18), and frequent at 5 (.37, 8/19); ‘no mention’ was the other frequent category for this character, reaching dominance at 5 years (.53, 10/19). For the 1MC story, Turkish children, like their Greek—but unlike their English—counterparts, used definite nominals frequently for reintroducing the boy character starting at 3 years (.38, 5/12), and they remained modestly frequent at all ages (at 4: .26, 5/18 and at 5: .21, 4/19).

Pronouns were the other frequent form used for either 1MC or 2MC stories. For the 2MC story, pronouns were mostly frequent for both characters at 3 and 4 years of age, but were nonexistent at 5 (for bunny: at 3:.21, 3/12; at 4:.33, 8/18; and for horse: at 3:.21, 3/12 and at 4:.23, 6/18). For the 1MC story, pronouns were mostly frequent from the beginning and increased with age: .21 (3/12) at 3 years and .41 (8/18) at 4 years, becoming dominant at 5 years.
This use of pronouns for both 1MC and 2MC stories is more similar to that of the Greek than the English-speaking children.

3.2.2. Comparisons across languages and story types

Comparing across languages, the pattern of results seems to strongly interact with differences in story type, so for ease of presentation they will be discussed together. Overall, children in all three languages predominantly used definite nominals to reintroduce characters in the 2MC story, while they used pronominals to reintroduce the main character for the 1MC story (see Tables 5 and 6).

This pattern differed somewhat by language. On the one hand, Greek and Turkish children, especially 4- and 5-year-olds, used higher proportions of definite nominals to reintroduce the bunny and the horse at all ages than their English counterparts. This language difference was more pronounced for the horse than for the bunny character. On the other hand, children from all three languages used pronouns to reintroduce the boy in the 1MC story. But English children used a higher proportion of pronouns to reintroduce the boy, especially at 4 and 5 years of age, than did their Greek counterparts, who also frequently used definite nominals, along with pronouns, at both these ages. Turkish children, like their Greek counterparts, made use of both definite nominals and pronominals, though they used a higher proportion of pronouns at 5 years.

A mixture of cognitive and linguistic factors may explain this pattern of results. The tendency to use more definite nominals in the 2MC than in the 1MC story accords with the phenomenon identified by Arnold and Griffin (2007), who found that when two equally active characters were present in the stimuli, adult speakers of English used proper names more often, even if a pronoun could have been used unambiguously to generate the next sentence in the discourse provided to them. It is curious, however, that Greek children seem to show a similar tendency to use definite nominals, along with a high proportion of pronominals, to reintroduce the boy in the 1MC story. This indicates that the Greek children showed this same tendency not only for the 2MC stories, but also for the 1MC story, where the first picture depicted both characters together. This may have something to do with the use of clitics in Greek. In cases where they used definite nominals to reintroduce the boy, it was observed that in the previous sentence the boy was referred to weakly through the clitic. It seems then that children show a higher need to refer to the reintroduced character with a definite noun phrase, even if a pronoun would have been unambiguous.

3.3. Character maintenance: pronominals

The typical forms for maintaining a character within or across utterances are pronominals. For the Balloon story almost none of the English and Turkish children maintained the balloon man, and the category of “no mention” ranged from .89 to 1.00 for this character for these two languages across all ages (see Tables 2 and 4). Thus, this character will not be discussed further for these two languages, but it will be discussed for the Greek children, since some of them maintained this character.

3.3.1. Within-language patterns

In English-speaking children’s narratives, pronouns were the dominant form for both stories and for all main characters across all ages (see Tables 2, 5 and 6). Specifically, the boy in the 1MC story was maintained with a high proportion of pronouns starting at 3 years of age and increasing slightly with age (at 3: .71, 9/10; at 4: .77, 16/18; at 5: .85, 15/17). While we observed a similar pattern for the 2MC story, there were some notable differences. First, while the bunny was also maintained through pronouns as the dominant form across all ages, this started at a lower rate than for the boy and increased mainly between 4 and 5 years (at 3: .50, 6/10; at 4: .54, 11/18; at 5: .79, 15/17). Second, maintenance through pronouns as the dominant form was also observed for the horse, but their use was somewhat lower in frequency than for the bunny, and this frequency increased only slightly with age (at 3: .38, 5/10; at 4: .42, 9/18; at 5: .46, 10/17). The other forms used with some notable frequency were either definite nominals or the ‘no mention’ category.

Definite nominals were dominant only at 3 years of age (.29, used by 50% of the children [5/10]) for the boy in the 1MC story, and their use decreased to non-existent at 4 and 5 years of age. In the 2MC story, definite nominals were also dominant only at 3 years for the horse (.42, 5/10), they were only frequent at 4 years for both the bunny (.34, 8/18) and the horse (.25, 6/18), and were nonexistent for the other ages for both characters. Overall, it seems that the definite nominals were used more frequently at the younger ages and decreased over time. Closer inspection of the data indicates that the definite nominals used at a higher rate among the 3-year-olds did not indicate connectivity, as the younger children seem to be using definite nominals to refer to each picture separately.

Greek children also maintained characters by using pronouns as the dominant form at high rates for all main characters at each age, except for the 3-year-olds for the horse character where definite nominals were the dominant form (.34, 9/18; see Table 3). Specifically, the Greek children used an even higher proportion of pronouns to maintain the boy in the 1MC story than did their English counterparts, and this form was used by almost all the children starting at 3 years of age.
(at 3: .92, 18/18; at 4: .85, 20/21; at 5: .90, 22/24). Similarly high proportions of pronouns were used to maintain the bunny character in the 2MC story and these were again used by the majority of the children starting at 3 years (at 3: .72, 16/18; at 4: .75, 18/21; at 5: .75, 22/24). But for the horse character, pronouns were the dominant form only for ages 4 (.51, 14/21) and 5 (.55, 17/24), and were used at lower rates than for the bunny character, a pattern observed across all languages. Curiously, pronouns were also used frequently to maintain the balloon man among the Greek children at all ages (see Table 5), while maintenance for this character was mainly non-existent for either English or Turkish children. This may have something to do with the fact that many Greek children portrayed the man as related to the boy, introducing him as the boy’s grandpa or his dad, and used the clitic pronoun to maintain this character while focusing on the boy.

The other dominant form for maintenance among the Greek children, but only for the 2MC characters, was definite nominals. This form reached the criterion of dominance for the horse character at every age (at 3: .34, 9/18; at 4: .25, 11/21; at 5: .28, 13/24), while for the bunny it was frequent at 3 (.21, 7/18) and dominant at 5 years (.25, 14/24). Overall, the data reflect a tendency by the Greek children (similar to children in the other two languages) to mark 1MC and 2MC story nominals. This form reached the criterion of dominance for the horse character at every age (at 3: .34, 9/18; at 4: .25, 11/21; at 5: .28, 13/24), while for the bunny it was frequent at 3 (.21, 7/18) and dominant at 5 years (.25, 14/24). Overall, the data reflect a tendency by the Greek children (similar to children in the other two languages) to mark 1MC and 2MC story characters slightly differently, and in particular to mark the horse character as having a slightly different status than the bunny character even while maintaining them.

A similar pattern emerged among the Turkish children in that they used pronouns as dominant forms at high proportions for maintaining all main characters at all ages, but they also used definite nominals as dominant forms—though at a lower rate (see Tables 4–6). Specifically, to maintain the boy in the 1MC story, pronouns were used at a high rate starting at 3 years (at 3: .60, 9/12; at 4: .65, 15/18; at 5: .64, 18/19). Overall, the rates of pronoun use to maintain the boy more closely resemble the rates for the English than for the Greek children, as pronouns were used at a much higher rate. The other dominant form used to maintain the boy was definite nominals, but their frequencies were modest rather than very high (at 3: .32, 8/12; at 4: .29, 11/18; at 5: .31, 16/19). It should be noted, that neither the English nor the Greek children used definite nominals to maintain the boy character, which the Turkish children did consistently at all ages.

For the 2MC story, pronouns were still the dominant form and were used at the same high rate in maintaining both the bunny (at 3: .65, 9/12; at 4: .67, 15/18; at 5: .54, 13/19) and the horse character at every age (at 3: .54, 8/12; at 4: .44, 10/18; at 5: .54, 15/19). Definite nominals were dominant only for the bunny at 5 years (.36, 11/19) and for the horse at 4 (.34, 9/18) and at 5 years (.36, 12/19); but they met the criterion for frequent use at all age groups.

3.3.2. Comparisons across languages and story types

Comparing across languages, the pattern of results again seems to strongly interact with differences in story type, especially for Greek and Turkish children, so language and story-type comparisons will be discussed together.

Overall, the dominant form used to maintain characters was pronominals across the three languages and all age groups (see Tables 5 and 6). This form was used at very high frequencies and by most children in all languages, although the rates varied by story type, being overall higher for 1MC than for 2MC stories. Pronoun use was particularly characteristic of English-speaking children, whereas use of pronouns together with definite nominals was particularly characteristic of Greek children for the 2MC story and Turkish children for both 1MC and 2MC stories.

In the 1MC story, maintenance for the boy was primarily accomplished through pronouns for all languages, except for the Turkish children who also used definite nominals with some frequency (just reaching the criterion of dominance) at each age group. For the 2MC stories, while both characters were maintained by pronouns at high rates, there was also a substantial proportion of definite nominals, especially for Greek and Turkish children. Greek children seemed to differentiate between these two characters, using a higher proportion of pronouns than definite nominals for the bunny than for the horse character, while Turkish children tended to use roughly equal proportions of pronouns and definite nominals for both characters, especially at 5 years of age.

3.4. Adult baseline data

For better interpretation of the developmental patterns, it is useful to compare children’s referential forms to adult patterns in each of these languages. For this reason, we present adult data collected with slightly different stimuli, but under the same conditions as our child data, and we compare the adult data with the pattern of results observed for our 5-year-olds. For the adult data, we used a revised balloon story where the secondary character appears in the third picture: the child is walking happily with a balloon, the balloon flies away, a man helps the child by retrieving the balloon that is caught in the branches of a tree, and the child walks away content. We also used a new two-main-character story, which translated the theme of our horse and bunny story to child characters: a girl is playing with a truck and a boy is watching her, then the boy takes the truck from the girl while she is looking away, then the girl runs after the boy to get her truck, and then they play together with the truck.

For the three referential functions under consideration, the adult narrative data indicate a preference for the expected referential forms across all languages and story types, with some notable exceptions (see Table 7). Specifically, while
Greek adults provided 100% of indefinite forms when introducing the boy and the balloon man in the 1MC story, Turkish and English adults provided an equal proportion (50% each) of indefinite and definite forms when introducing the boy and higher proportions of indefinites when introducing the balloon man (.67 for English and .91 for Turkish). In the 2MC story, the proportion of indefinite constructions was very close for Greek and Turkish adults (.75 each for the first and second characters in Greek, and .75 and .67 for the first and second characters in Turkish), whereas in English the respective proportions were lower (.67 and .58 for the two characters, respectively). These patterns in the referential forms used by adults indicate that indefinite nominals, the expected form for character introductions, were used most consistently by Greek adults, followed by Turkish and then English adults. However, in the children’s data, as we have seen, the pattern was somewhat different. The highest proportion of indefinite forms was observed in Greek preschoolers, but the next highest was in English preschoolers, and the use of this linguistic form for character introductions scarcely appeared in the Turkish data.

For character reintroductions, in the 1MC story the dominant form for English and Turkish children was pronouns, whereas for Greek children definite nominals and pronouns were equally frequent. Adults, however, showed higher variability. When reintroducing the boy in the 1MC story, English adults predominantly used pronouns (.50), Greek adults used an equal proportion of pronouns and definite nominals (.55 and .45, respectively), whereas Turkish adults preferred definite nominals (.76). When reintroducing either of the two characters in the 2MC story, Greek and Turkish 5-year-olds used high proportions of definite nominals for both characters, which was parallel to the adult usage observed in these languages (Greek adults: .72 and .67 for the first and second characters; Turkish adults: .89 and .74 for the first and second characters). However, in the English child data, definite nominals decreased with age, in contrast to the quite frequent use of definite nominals for the first and second characters (.42 and .57, respectively) by the English adults. These comparisons indicate that children’s reintroductions do not exactly mirror the adult patterns, and that story type made a difference in the referential forms used by both adults and children.
For character maintenance, in the 1MC story all children used pronouns predominantly, although Turkish children used definite noun phrases as well. This pattern matches that observed in the respective adult groups. English and Greek adults used pronouns for the boy (.88 and .91, respectively), whereas Turkish adults used definite noun phrases in proportions close to pronouns (.42 and .58 respectively). In the 2MC story, the dominant form in English children’s stories was pronouns, whereas Greek and Turkish children used definite nominals as well. In the adult 2MC stories, the picture was more uniform across the three languages. Pronouns were the dominant form for both the girl (.84 for English, .84 for Greek and .76 for Turkish) and the boy character (range from .80 to .83), whereas the proportions of definite nominals were quite low (range between .08 and .22, see Table 7). In summary, across the three languages the maintenance function was realized predominantly with pronouns by adults and with pronouns and some use of definite nominals by children. Pronouns were the dominant form for English and Greek adults regardless of story type, whereas for Turkish adults definite nominals were also a frequently used form.

This comparison of children’s referential forms with those used by adults, in narratives elicited with similar materials, indicate that 5-year-olds show form-function preferences most similar to adults first for the maintenance and then for the reintroduction functions—although there is still room for improvement. However, adult-like use of referential forms for the introduction function is still precarious and requires further development. Even though adult patterns may appear to account for the patterns for the Greek children, they do not fully account for the patterns observed the English and Turkish children’s narratives. Despite the higher proportion of indefinite nominals used by the Turkish than by the English adults, Turkish children showed the slowest pace of development in this respect. In addition, neither the English nor the Turkish children’s dominant referential forms for introductions matched those of the adults in their respective language groups.

4. Discussion

This study examined the acquisition of referential forms among 3-, 4-, and 5-year-old learners of English, Greek and Turkish to introduce new characters, reintroduce previously mentioned ones, and maintain presupposed ones in narrative discourse. A key question was whether the structure of the referential system in languages that utilize local or global cues to mark the definite/indefinite distinction may affect when children acquire these form/function relations for signaling referential functions. We proceed to summarize and discuss our results, organizing them mainly through our key research questions.

4.1. Effects of language structure on the definite/indefinite distinction

Our first research question focused on the global vs. local cues hypothesis advanced by Hickmann et al. (1996) and Hickmann and Hendriks (1999), employing a new set of languages that provided both similarities and contrasts. The key question was whether children acquiring a language that marks referentiality with local cues have an easier time in expressing the definite/indefinite distinction earlier on, while children acquiring a language that marks referentiality with global cues show a more protracted development, as Hickmann and colleagues found with Chinese children when compared with French, German, and English children.

Our results confirmed that form-function referential relations are acquired earlier in languages that mark the new/given distinction through local than through global cues. Greek preschool children showed higher performance in using...
indefinite nominals to introduce characters than their English- and Turkish-speaking peers, and English-speaking children displayed a higher level of performance than Turkish children. Greek children used the expected indefinite nominals with substantial frequency as early as 3 years and their use increased steadily, becoming the dominant form by 5 years of age. In contrast, English-speaking children used indefinite nominals at a much lower frequency, while Turkish children used them at an even lower frequency or almost not at all at most preschool ages. The fact that almost 50% of Greek 5-year-olds used an indefinite noun phrase to introduce a character regardless of story type indicates that the development of a form-function association between ‘indefinite noun phrase’ and ‘new information’ was already underway for this language group. Only about 29% of English- and 21% of Turkish-speaking 5-year-olds displayed evidence of such an association for the introduction of one character in the 2MC story.

Our results also confirm Hickmann et al.’s (1996) finding that, in their narratives, children at first tend to use local indicators to express information status even in languages where referential distinctions are encoded primarily through global cues. Acquiring a language with global cues, Turkish 3- to 5-year-olds relied on the canonical word order (subject bare nouns in sentence initial position) and accusative case marking to mark definiteness; in other words, they use the morphosyntactic constructions that they have acquired early on to express basic grammatical relations (Aksu-Koç and Slobin, 1985). However, on the relatively scarce occasions that they marked indefiniteness, they did not rely on the global mechanism of word order variation, but used the determiner bir (‘one’), that is, the locally accessible marker for this function.

4.1.1. The structure and quality of the input in acquiring the definite/indefinite distinction

What causal mechanisms mediate the relationship between the referential structures of these different languages and the differential patterns of acquisition of referential devices by young children learning these languages? One possible explanation for the pattern of findings just described might attribute them straightforwardly to adult input. To a certain extent this hypothesis corresponds with the data; and that causal link is inherently plausible, since the referential structures of different languages will influence the linguistic input that children learning those languages experience. In fact, the overall pattern of results for young children’s use of indefinite introductions appears, at first glance, to be similar to the patterns of indefinite introductions by adults speaking those languages in narratives based on similar materials.

However, various interesting discrepancies, some of which were discussed earlier (in section 3.4), suggest that the direct influence of adult input cannot be treated as the full explanation. For example, in the 1MC story, while all Greek adults introduced characters with indefinites, only half of the English and Turkish-speaking adults did so. This input pattern could be taken to explain why Greek preschool children were more advanced in their use of indefinites. In the 2MC story, however, the performance of adults in using the expected indefinite form was very similar across the three languages, whereas children’s performance was not, which suggests that adult input per se may not be a sufficient explanatory factor.

It seems likely, therefore, that a full explanation of the findings must also include a more refined consideration of the structural features of the referential systems in the three languages being compared. In particular, the structure and richness of input cues built into the three languages may help account for the observed differences in early acquisition. Among the key input properties that enable children to pick up regularities about the form-function relations in their language are frequency and unifunctionality, which in turn both contribute to cue-consistency. In general, the more frequent a form is in the input, the earlier it is likely to be acquired (Tomasello, 2003). Unifunctional forms that map onto one function are more transparent and easier to learn than multi-functional ones (Slobin, 1985). And, those form-function relations that are the most stable and reliable—that is, have cue consistency—are acquired earlier than those that are less so (MacWhinney et al., 1984).

In this respect, both Greek and English languages present high cue consistency through their obligatory article systems. Greek provides information with highest density and variability at the local level of the noun phrase for the definite/indefinite distinction. Because both the article and the noun are marked for gender, number, and case, the Greek noun phrase not only provides a high density of local cues and stands as a phonological unit, but it does so with high morphological variability. In English, the definite/indefinite article preceding the noun also provides the advantage of always yielding an article plus noun unit. But with no agreement marking, the noun phrase presents a less dense and less variable bundle of co-occurring features to support the formation of form-function relations.

In contrast to these two languages, the information in the Turkish input for the definite/indefinite distinction is less easy to pick up as there is a complex interplay between the global cues present at the clause level and the local cues present at the level of the noun phrase. Furthermore, the Turkish noun phrase does not present a phonological unit with consistent cues as in the other two languages since the indefinite determiner occurs in prenominal position [bir + Noun], whereas definiteness is indicated by the accusative case suffixed to the noun [Noun-accusative]. Thus, there is neither a definite/ indefinite ‘contrastive pair’ that signals a systematic opposition in terms of information status as in the other two languages (Clark, 1987), nor morphological variability, which is also lacking in English. Bare nouns, instead, get a definite or an indefinite interpretation according to their sentence position. This picture indicates that the cues provided by the Turkish noun phrase are lower in density and variability for signaling the relations between definite/indefinite markers (both local

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and global) and given/new information, which may explain the relatively protracted development observed in Turkish children’s stories.

There is growing evidence that higher morphological variability in a language supports rather than impedes the pace of language development (Dabrowska and Szcerbinski, 2006; Gabor and Lukacs, 2012; Küntay and Slobin, 1996; Xanthos et al., 2011). Particularly relevant for the expression of referentiality are findings by Rozendaal (2008) based on conversational discourse of 2–3-year-old English, Dutch, and French children as well as findings reported by Hickmann (2003) based on narratives of English, French, and German children. Both studies showed that form-function relations emerged earlier in French and German, languages that are morphologically rich with gender and number agreement, supporting our argument that the morphological density and diversity of the Greek noun-phrase enhances acquisition. In fact, Stephany (1998), who compared Greek and German children’s character introductions, reported that 91% of the Greek 6-year-olds used indefinite noun phrases for this purpose, whereas only about 57% of the German 6-year-olds did so. While the performance of her Greek children supports our argument, the discrepancy with German is curious since the German article system is morphologically as rich as the Greek system. However, the fact that German expresses gender and case primarily through the article without agreement with the noun suggests less morphological density for the noun phrase, while the fact that there are several different ways of forming the plural suggests less cue consistency. Further research is needed to test the conjectures advanced here.

4.2. Developmental patterns of referential functions by language and story types

Our second research question concerned the developmental trajectories of linguistic form-function referential relations within and across languages. Because these results were also related to our third research question, whether the number of main characters in the story made a difference for these trajectories, these questions are discussed together.

Overall, the pattern of results supported our second hypothesis that the appropriate realization of the three key referential functions would be earlier for maintenance than for reintroduction, which in turn would be earlier than for introduction. In all three languages, preschoolers’ production of appropriate forms for the introduction function was the least developed. In contrast, their use of appropriate forms for reintroductions and maintenances were both more advanced, with the proportion of appropriate forms and the percentage of children using them being highest for the maintenance function. However, the developmental trajectories observed differed further by language and story type, as we summarize briefly below.

Specifically, for Greek children the use of indefinite noun phrases for character introductions emerged as the dominant form most clearly in the 2MC story. For the English children, indefinite nominals were moderately frequent for the 2MC story, but definite nominals were more frequent at all ages. Even for the Turkish children, who showed the lowest frequency of indefinite nominals, these forms reached the threshold of moderate frequency for the bunny character in the 2MC story at 5 years. In the 1MC story, use of indefinite noun phrases became dominant for Greek at 5 years, in contrast to pronouns for English children, while Turkish children preferred definite noun phrases at all ages. Thus, all children, regardless of language, used higher proportions of indefinite nominals in the 2MC story than in the 1MC story.

Children’s reintroductions of an already introduced character also differed across the two stories and the three languages. In the 1MC story, pronouns were the preferred form for English children, whereas Greek and Turkish children displayed an equally balanced usage of pronominals and definite nominals. In the 2MC story all children used definite nominals with Greek and Turkish children doing increasingly so with age. Such contrasting usage of pronominals vs. definite nominals in the two story types shows that preschoolers, like adults, feel the need to be more explicit when two characters are present, even in contexts when reference would not necessarily be ambiguous (see also Arnold and Griffin, 2007; Serattrice, 2008). Overall, among the three languages, the reintroduction function was realized more consistently with definite noun phrases by Greek and Turkish as compared to English children.

To maintain reference to a character already in the focus of attention, in the 1MC story, Greek and English-speaking children used a very high proportion of pronouns starting at age 3, whereas Turkish children used nominals as well as pronominals at all ages. In the 2MC story, children from all three language groups again displayed a pronoun-dominant strategy, but they also used definite noun phrases. English-speaking children preferred pronouns, whereas Turkish and Greek children used both pronominals and definite nominals.

Several conclusions emerge from this pattern of results. First, these results show that definite constructions are preferred for reintroductions and pronominals for maintenances in all three languages. These results are in line with studies of Italian (Orsolini et al., 1996), French (Vion and Colas, 1999), and Chinese children (Wong and Johnston, 2004), which indicate that children as young as 4 years of age make use of more informative definite forms instead of null forms in reintroductions, and pronominals for maintenance.

Second, our results also indicated some subtle differences in the preferred referential forms for these languages. English-speaking children used a predominantly pronominal strategy and Turkish children preferred definite noun phrases, while Greek children employed more differentiated forms based not only on function but also type of story.
English children used pronouns particularly in their character reintroductions in the 1MC story, revealing a tendency for the thematic subject strategy (Karmiloff-Smith, 1981). However, such usage was not observed among the Greek or Turkish children. This may be explained by the fact that in these languages pronouns are rarely used in subject position and only for purposes of emphasis or contrast. This is the case because the subject is already specified by person/number marking on the verb. It may be that children’s early acquired knowledge of the pragmatics of pronoun use in these languages (Slobin and Talay, 1986) suppresses the overuse of a pronominal strategy in their narratives. Turkish children’s dominant strategy of using definite noun phrases to introduce characters, on the other hand, can be explained by the fact that the bare noun is a form that occurs with high frequency in Turkish input.

Third, the results did indicate that the referential forms used by children were influenced by story type—i.e., one main character vs. two main characters. However, they did not support our hypothesis that children’s use of appropriate referential forms would be more delayed in the 2MC than in the 1MC story. On the contrary, indefinite nominals for character introductions and definite nominals for reintroductions emerged earlier and were more frequent in the 2MC than in the 1MC story. In fact, the 2MC stories offered the opportunity to children from all languages to display their contrastive use of the definite/indefinite distinction as they introduced and reintroduced the two main characters.

Fourth, these results indicated that the age of acquisition of form-function relations is dependent on language structure as well as story structure. Performance in accordance with the requirements of the introduction function was observed earliest, between 3 and 4 years, in narratives of Greek children, who also displayed earlier development compared to their English- and Turkish-speaking counterparts. Age of acquisition for English-speaking children was 5 years, whereas there was extremely weak evidence of sensitivity to the requirements of the introduction function in Turkish children’s narratives even at this age. The emergence of function-appropriate linguistic forms for reintroduction and maintenance, on the other hand, was observed in Greek, English and Turkish around 3 years, with a stronger trend for using expected forms for maintenance than for reintroduction.

Finally, our results corroborated those reported by Hickmann and colleagues (Hickmann, 2003) as well as Wong and Johnston (2004) that among the three functions, the acquisition of obligatory markers for introduction occurs relatively late in all languages whereas children can reintroduce and maintain reference across clauses from 4 years on. However, our results also indicated that, under certain conditions, some sensitivity to the form-function relations can be identified at earlier ages than previously reported. Greek children reached the 50% benchmark for indefinite constructions within the 3–5-years age bracket, whereas reports in the literature center around 7 years of age (Hickmann et al., 1996; Küntay, 2002; Wigglesworth, 1990). Similarly, children in all three languages began to use the expected linguistic forms for reintroduction and maintenance somewhat earlier, from 3 rather than 4 years on.

A question arises, though, whether the use of pronouns for maintenance and definite noun phrases for reintroduction truly mark a grasp of these form-function relationships in the absence of indefinite noun phrases to mark introductions. Our comparison of 1MC vs. 2MC character stories for children’s referential strategies addresses this question. We have seen that English-speaking children use pronominals in high proportions for introduction, reintroduction and maintenance of the main character in the 1MC story, which suggests that it is their overall referential strategy. Similarly, Turkish-speaking children have shown a preference for use of definite forms. Therefore, the use of definite nominals for reintroductions may not be indicative of a full understanding of the given/new distinction in referentiality. However, the differential use of nominals versus pronominals for character reintroductions in 1MC versus 2MC stories early on strongly suggests that children are sensitive to the distinction between presupposed and given information and the appropriate forms to mark it. In short, our results also make clear that using a single set of elicitation materials may provide a misleading picture of the acquisition of referential devices. It is important to emphasize the value of systematically varying significant dimensions of story types—such as number of main characters—so that we can fully uncover the cognitive demands that affect this development and capture the level of referential abilities that children have attained at a given point in development.

In conclusion, several important findings stand out in this study. First, learning to mark information status occurs earlier in languages that use local cues than in languages that use global cues. Second, young children are initially prone to employ local cues in marking information status, even if their language makes use of global mechanisms. Third, the morphological richness of the local cues enhances the development of form-function relations. Fourth, the onset of appropriate referential forms in narrative discourse appears to be highly influenced by the structure of the language being used, and in some contexts it can begin to emerge as early as three to four years. And fifth, variability in narrative elicitation materials provides us with richer information that illuminates children’s developing referential abilities.

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Appendix A

The Balloon Story. This was adopted from the original six pictures story used by Karmiloff-Smith (1981). It was reduced to four pictures to match the number used in our other stories in the larger project.

The Horse and Bunny Story. This was developed in the lab of one of the authors.

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