The emergence of nominal inflection in Greek[1]

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1. Introduction

Children are sensitive to the typological properties of the language they are acquiring from early on (Slobin 1997; Laaha and Gillis (eds.) 2007). Those growing up with highly inflected languages such as Modern Greek will frequently hear different grammatical forms of a given lexeme used in different grammatical and semantic-pragmatic contexts. In spite of the fact that the Greek noun is not as highly inflected as the verb, acquisition of nominal inflection of this inflecting-fusional language is quite complex, comprising the three categories of case, number, and gender. As is usual in this type of languages, the formation of case-number forms obeys different patterns applying to largely arbitrary classes of nominal lexemes partially based on gender. In addition, frequency of occurrence of the three gender classes and case-number forms of nouns greatly differs in spoken Greek, both type- and tokenwise. In contrast to a child acquiring a typically agglutinating language such as Turkish, where nouns form a single inflectional class, a child learning an inflecting-fusional language like Greek must construct different inflectional patterns depending not only on parts of speech but also on subclasses within a given part of speech, such as gender classes of nouns and inflectional classes within or (exceptionally) across genders. It is therefore to be expected that the early development of case and number distinctions will apply to specific nouns and subclasses of nouns rather than the totality of Greek nouns.

1.1. The usage-based approach to language acquisition

In order to capture the process of inflectional development of the noun by the analysis of observational data of an inflecting-fusional language like Greek, the grammatical forms and functions of the individual nouns found in each child's speech must be studied in detail so that classes of nouns sharing inflectional properties can be established and patterns of use emerge. Usage-based cognitive-functional theory of language and language acquisition according to which "language structure emerges from language use" (Tomasello 2003: 5; see also Bybee 2001), seems particularly suitable for capturing the development of nominal inflection in an inflecting-fusional language exhibiting many distinct inflectional patterns. Another advantage of this approach for describing the structure and acquisition of languages of this morphological type is that affixes are taken to emerge from associations between inflected word forms so that "the stems and affixes … are never extracted from the word in which they occur" (Bybee 2001: 24). Since grammatical generalizations are based on particular forms they "can only be emergent patterns, not explicit rules" and are best described by schemas, which are "organizational patterns in the lexicon" (Bybee 2001: 26). Schemas are "highly affected by the number of participant items" so that "productivity is gradient"; they are furthermore "highly affected by the particulars of existing types" so that they apply to subclasses rather than to entire classes of parts of speech. As will be shown in the present paper, the development of Greek nominal inflection is more adequately captured by emergent generalizations or schemas than by across-the-board algebraic or symbolic rules (see also Christofidou 2004; Stephany 2006).

In a highly inflected language like Greek, inflectional patterns exhibit different degrees of productivity including highly productive and totally unproductive ones. A morphological model such as the dual mechanism or dual process approach to language acquisition of generative grammar (e.g. Pinker 1991; Clahsen 1999), establishing a mere dichotomy between regular and irregular forms, where the first are considered to be generated by rules while the latter are listed in the lexicon, is thus inadequate to capture morphological storage and processing in a language of this type.

As far as frequency of occurrence is concerned, token frequency must be distinguished from type frequency. While the token frequency of grammatical word forms favors rote learning and thus entrenchment, type frequency, "the number of different word forms that are instances of a particular schema" (Croft and Cruse 2004: 296), favors pattern construction ("rule formation") in language acquisition (Tomasello 2003: 235). Since "the primary factor determining the existence of a schema … is a (relatively) high type frequency" (Croft and Cruse 2004: 302), high type frequency is of prime importance for the development of inflectional patterns by the child.

1.2. The pre- and protomorphology approach

Most of the empirical work done within the "Crosslinguistic Project on Pre- and Protomorphology in Language Acquisition" (coordinated by Wolfgang U. Dressler, Austrian Academy of Sciences, Vienna) is based on or at least compatible with the model of Natural Morphology (e.g. Dressler (ed.) 1997; Voeikova and Dressler (eds.) 2002; Bittner, Dressler, and Kilani-Schoch (eds.) 2003). This approach to acquisition theory may be characterized as a non-nativist, functional structuralist model which pays special attention to the influence of language typology on language acquisition. It considers acquisition of morphology in children studied from the onset of speech through the end of their third year to proceed in three subsequent stages (also called 'phases'),[2] namely premorphology followed by protomorphology and finally leading to 'morphology proper'. So far, special emphasis has been put on the first two of these stages. Although, as in most other theoretical approaches, language acquisition is considered to start with item-based learning (Bittner, Dressler, and Kilani-Schoch 2003: vii), 'morphological operations' and later on grammatical rules are stressed. Thus, the "premorphological phase" is defined "as the phase where only few morphological operations occur – both extragrammatical (or 'expressive') ones, such as reduplications … and precursors of later grammatical rules" (Voeikova and Dressler 2002: 3). In the "protomorphological phase", "the system of morphological grammar and its subsystems start to develop" so that morphological patterns begin to be creatively constructed (Voeikova and Dressler 2002: 3-4). One type of evidence that a child has entered this second stage of morphological development is the emergence of 'miniparadigms' (see section 4 below).

The emphasis put on morphological operations and grammatical rules partially contrasts with the usage-based approach described above. While the pre- and protomorphological approach postulates different stages of morphological development finally leading to a morphological component of grammar governed by symbolic rules, an approach following the basic tenets of usage-based theory considers morphological acquisition to consist in the construction of schemas of different degrees of generality and abstractness. The latter approach therefore does not only allow to keep track of the specific linguistic forms from which schemas emerge and on which they rely, but also makes it unnecessary to assume 'turning points' in linguistic development leading to a qualitatively different stage. Instead, the process of language acquisition can be taken to consist of "smoothly gliding developmental phases" (Christofidou and Stephany 2003: 117).

1.3. Goals and overview of the chapter

In the present chapter, we will trace the early development of inflection in the noun (with some outlooks on the definite article) in five monolingual Greek children from the second half of their second to the last part of their third year. It will be shown that the question whether case or number distinctions of the Greek noun develop first (Christofidou 1998) cannot be answered globally, since the development of these categories partially depends on gender classes and declensional classes of nouns. Our study will thus also contribute evidence to the much-debated question whether, in Modern Greek, gender determines inflection class or vice versa (see section 2). Moreover, the role played by gender in the early development of case distinctions, which was studied in the speech of a Greek boy between the end of his second through the first half of his third year by Christofidou and Stephany (1997) and Christofidou (2003), will be further examined in this subject as well as four other ones.

After a sketch of Modern Greek nominal inflection (section 2), the data analyzed in the present study will be presented (section 3). The first part of the analysis (section 4) will consist in quantitative approaches to the development of case, number, and gender of the Greek noun in child and input data (with a comparison between child-directed and adult-directed speech). After measuring the onset and development of inflection of the noun in a global way by determining the number of grammatical types per lexeme (mean size of paradigm) (section 4.1), the development of the inflectional system of the noun will be described in more detail by tracing the emergence of grammatical contrasts and the formation of paradigms in different classes of nouns (section 4.2). The role played by the tokens of inflectionally marked forms of nouns in child speech and child-directed discourse will be determined by applying the parameter of PBF (Percentage of Base Forms) to our data (section 4.3). The quantitative study will be completed by a functional analysis of case and number forms of nouns and definite noun phrases in the children's speech (section 5). Finally, some theoretical conclusions will be drawn from our results (section 6).

2. Greek nominal inflection

The Greek nominal system comprises the three grammatical categories of gender, case, and number. It distinguishes three genders (masculine, feminine, and neuter), four cases (nominative, genitive, accusative, and vocative), and two numbers (singular and plural).

Two main proposals for the description of the Greek declensional system coexist until the present day: one is primarily based on gender (e.g. Triantafyllidis [1941] 1978; Seiler 1958; Christofidou 2003) and the other one on the distribution of inflectional endings (e.g. Kourmoulis 1964; Mackridge 1985; Klairis and Babiniotis 2005). The gender-driven approach is supported by diachronic arguments (Seiler 1958)[3] as well as synchronic ones (Christofidou 2003). The main synchronic criteria advanced by Christofidou (2003) are inflectional productivity and the morphological integration of loan words or neologisms (see Dressler 1997). The latter show that inflection is determined by gender assignment rather than the phonological structure of noun endings. As will be shown by evidence from Greek first language acquisition, inflectional endings and declensional patterns of nouns have to be considered as overt markers of gender classes since the development of nominal inflection largely proceeds within gender classes.

Gender assignment may depend on semantic or formal information (Corbett 2003). As is common in Indo-European languages, the Greek gender system comprises a more or less small core of semantic gender assignment based on animacy and sex distinctions (especially of human nouns) with an ensuing interdependence of case and gender (Lyons 1968: 293-294; Corbett 2003: 311). As noted by Stephany (1997a), the interdependence of case and animacy is “especially noticeable in early child Greek” (p. 220) so that the syntactic functions of arguments are mostly unambiguous even in the absence of subject and object marking (pp. 220-221).

In Standard Greek, large numbers of nouns are not covered by semantic assignment rules but by formal information (Setatos 1998; Ralli 2002; Christofidou 2003: 117-124). Modern Greek gender is not phonologically determined, however, since it cannot be assigned on the basis of a single form of the noun, but is based on more than one inflected form (on a similar situation in Russian see Corbett 2003: 312-316). Examples such as *xéri* ‘hand:NEUT’ vs. *míti* ‘nose:FEM’ demonstrate that Greek gender assignment is not founded on the final vowel of the inflectionally unmarked singular case form. Neither is it determined by the final stem vowel as shown by examples such as *papú* ‘grandfather:MASC:OBL:SG’ (*papús* ‘NOM:SG’) vs. *maimú* ‘monkey:FEM:NOM/ACC:SG’. What is relevant for gender assignment in Greek is the inflectional type of the noun. While *papús* is inflected according to the pattern of 'diptota' masculine nouns (*papús* 'MASC:NOM:SG' vs. *papú* 'MASC:OBL:SG') (see below), the noun *maimú* follows the pattern of feminine nouns (*maimú* 'FEM:NOM/ACC:SG' vs. *maimús* 'FEM:GEN:SG'), so that *papús* is masculine whereas *maimú* is feminine. Although a given Greek gender class may comprise more than one declensional type (e.g. 'diptota' and 'triptota' masculine nouns, see below), the reverse does not hold since, with the exception of the regressive class of feminine nouns ending in *–os* (e.g. *i jatrós* 'the:FEM:NOM:SG surgeon:FEM:NOM:SG'), no declensional type comprises more than one gender (see Christofidou 2003: 114-115). Because of the strong interrelation between the declensional type of the noun and its gender, the grammatical category of gender emerges in direct interdependence with the particular case-number forms of nouns in the acquisition of Greek.

The distribution of the three genders in Greek texts is by no means uniform. In a representative corpus of oral and written text analyzed by Kavoukopoulos (1996: 10) gender distribution in (97% of) nouns is the following: 42% feminine, 32% neuter, and 23% masculine. According to a much smaller corpus of 600 randomly selected nouns (see Mackridge 1985: 52 following Mirambel 1959: 84) the percentage of neuter nouns exceeds that of feminine ones, but masculine nouns are again the least frequent ones. As will be shown in section (4.2), neuter nouns are the most frequent ones in both early child Greek and child-directed speech followed by feminine and finally masculine ones.

The nominative may be considered as the basic form of the Greek case system since it represents the citation form of nouns and is used to express the grammatical subject as well as predicative nouns referring to the subject. It also occurs in verbless phrases like *(na) o Giórgos* '(there is) George', in signatures, inscriptions etc. (see Mackridge 1985: 55; Tzartzanos [1946] 1991: 82). In contrast to the nominative, which is marked by final *–s* in the nominative singular of masculine nouns (e.g. *o ánthropos* 'the:MASC:NOM:SG man:MASC:NOM:SG'), the accusative is unmarked in the singular of all three genders so that nouns end in the thematic vowel (e.g. *ton/tin/to ánthropo/kiría/pedhí* 'the:MASC/FEM/NEUT:ACC:SG man:MASC/lady:FEM/child:NEUT:SG'). Due to its unmarked character the accusative singular represents the 'base form' of nouns in early child Greek (see section 4.3). The accusative expresses the direct object of transitive verbs (e.g. *vlépo to mathití* 'I see the pupil:MASC:ACC:SG') and is used in complements to prepositions (e.g. *apó tin pórta* 'from the:FEM:ACC:SG door:FEM:ACC:SG') and adjectives (e.g. *jemáto lulúdhja* 'full (of) flowers:NEUT:ACC:PL') as well as in nominal adverbials denoting time, place etc. (e.g. *ti níxta* '(at) the:FEM:ACC:SG night:FEM:ACC:SG') (see Mackridge 1985: 58; Tzartzanos [1946] 1991: 84).

Depending on gender and inflectional classes of nouns, the GEN:SG is marked by final *–s*, vowel change or vowel addition, or may remain unmarked (see below). It is used more rarely than the accusative and the nominative (Chatzisavas 1992: 76), its main functions being possessive and partitive. The genitive can be considered to be regressive in colloquial Modern Greek (Kavoukopoulos 1989: 265-284; Anastasiadi-Simeonidi 2003: 29), since it is often substituted by prepositional phrases, mostly with inanimate nouns (e.g. *to pódhi apó to trapézi* 'the leg of the:NEUT:ACC:SG table:NEUT:ACC:SG' instead of *to pódhi tu trapeziú* 'the leg the:NEUT:GEN:SG table:NEUT:GEN:SG' (= the leg of the table)). Moreover, neuter diminutives ending in *–áki* (e.g. *pedh-áki* 'child-DIM:NEUT:NOM/ACC:SG') as well as some other nouns do not form the genitive case (Thomadaki, forthcoming). It is interesting to note that, according to the corpus analyzed by Kavoukopoulos (1989: 279), in written texts the genitive is almost as frequent as the nominative and even more frequent than the accusative, while in spoken Greek the nominative occurs four times as frequently and the accusative twice as frequently as the genitive.

The vocative plays a minor syntactic and functional role and is formally distinguished from other cases only in some animate masculine nouns ending in *–os* (e.g. *Aléksandhros/Aléksandhre* 'Alexander:MASC:NOM/VOC:SG').

Masculine nouns ending in *–os* and a few such feminine nouns (e.g. *o ánthropos* 'the:MASC:NOM:SG man:MASC:NOM:SG', *i odhós* 'the:FEM:NOM:SG street:FEM:NOM:SG') distinguish three forms each in the singular and plural, namely nominative, accusative, and genitive (see table 1). Most Greek nouns, however, namely feminines, neuters, and masculines not ending in *–os*, contrast only two forms each in the singular and plural, either the genitive and the nominative/accusative (feminines and neuters) or the nominative and an oblique case (masculine nouns not ending in *–os*). Nouns belonging to these two declensional types are referred to as 'three-case nouns' ('triptota') and 'two-case nouns' ('diptota') respectively. The only nouns which formally distinguish all four Greek cases in the singular belong to an animate subset of masculines ending in *–os* (see table

1). Since there is considerable syncretism of cases in Greek nouns, the definite article (and to a certain extent also the indefinite article and adjectives) has an important role to play in case distinction. It differentiates the accusative from the nominative with feminine and masculine nouns in both numbers (*i/tin* 'the:FEM:NOM/ACC:SG', *o/ton* 'the:MASC:NOM/ACC:SG', *i/tis* 'the:FEM:NOM/ACC:PL', *i/tus* 'the:MASC:NOM/ACC: PL').

Table 1. The main declensional system of the Greek noun

	Masculine		Feminine	Neuter
	Subclass I	Subclass II		
		SINGULAR		
NOM	o patéras	o ánthropos	i mitéra	to moró
GEN	tu patéra	tu anthrópu	tis mitéras	tu morú
ACC	ton patéra	ton ánthropo	tin mitéra	to moró
VOC	patéra	ánthrope	mitéra	moró
		PLURAL		
NOM	i patéres	i ánthropi	i mitéres	ta morá
GEN	ton patéron	ton anthrópon	ton mitéron	ton morón
ACC	tus patéres	tus anthrópus	tis mitéres	ta morá
VOC	patéres	ánthropi	mitéres	morá
gloss	'father'	'human being'	'mother'	'baby'

3. Data

The Greek child and input data analyzed in the present paper partly come from the longitudinal observation of the boy Christos from the second half of his second year (1;7.11) through the last third of his third year (2;8.25) (Christofidou corpus) and the four children Spiros, Mairi, Janna, and Maria at one, two, or three different points in time during approximately the same age range (Stephany corpus) (see table 2).[4]

The audiotapes of the boy Christos, the at the time only child of an upper middle-class family growing up monolingually in Athens, consist of (almost) weekly recordings of (approximately) 20 min. each of (semi-) spontaneous speech produced in playing situations or while looking at picture books. The boy may be characterized as an analytic ('referential') child, since formulaic and frozen forms are rare in his speech.

Christos' data have been divided into three periods: Period I (1;7-1;10) is premorphological for nouns since these are not yet contrastively marked for case or number (Christofidou 2004; see also Kilani-Schoch et al. 1997: 18-20). In Period II (1;11-2;4) the contrastive use of noun forms emerges (see also Kilani-Schoch et al. 1997: 22-26). In Period III (2;5-2;8) more complex morphological patterns like the dissociation of declension classes within the same gender develop (see also Kilani-Schoch et al. 1997). One-month samples of Christos' input at 1;7, 2;0, and 2;5 have also been analyzed for the present study.

The corpus collected by Stephany and published in the database of the CHILDES Project (MacWhinney 2000), represents the computerized transcriptions of the audiotaped speech of four children gathered in natural speech situations such as playing or eating, in the children's homes or a day nursery (Janna). With the exception of Janna, who grew up in an upper middle-class family, the other children come from lower middle-class families. All of them were only children during the period of observation, typically interacting with their mothers (Mairi, Spiros), grandmother and mother (Maria), nurses and parents (Janna). Mairi, the linguistically most advanced child of the four children studied by Stephany may be characterized as a 'referential' child, much like Christos. When she was first observed at the age of 1;9, the development of inflection was well under way with verb inflection being much more advanced than nominal inflection (on the development of verb inflection see Stephany 1985, 1997a; Christofidou and Stephany 2003).

Table 2. The child data

Subject	Age	Words/ Utterances	Age	Words/ Utterances	Age	Words/ Utterances
Christos	1;7-1;10	1,425/1,153	1;11-2;4	12,116/5,984	2;5-2;8	13,153/4,953
Spiros	1;8-1;9	738/446	-	-	-	-
Mairi	1;9-1;10	5,761/1,796	2;3	2,912/1,175	2;9	3,179/1,148
Janna	1;10-1;11	836/547	2;5	956/374	2;11	1,304/422
Maria	-	-	2;3	1,221/476	2;9	1,475/470

In the present paper, we will study the development of nominal inflection as reflected by the tape-recorded production data of Christos and the four children observed by Stephany and compare their acquisition of the grammatical categories of the Greek noun, namely case, number, and gender, with special emphasis on Christos and Mairi and their input.

Christos' corpus starts slightly after the onset of speech. The boy was continuously observed from 1;7 through 2;8. Mairi's speech was not documented from the onset of speech, but was audiotaped at three points of development (see table 2).

4. Quantitative approaches to the developmental course of Greek nominal inflection

In this section, the early development of nominal inflection will be traced by the application of several quantitative measures to the grammatical forms of nouns. As stated above, these are ratio of grammatical types per noun (sect. 4.1), types of marked inflectional forms and size of nominal paradigms (sect. 4.2), and finally PBF (Percentage of Base Forms), a quantitative study of tokens of unmarked forms (sect. 4.3). Child speech will be compared to child-directed speech (henceforth CDS) and – as far as possible - to adult-directed speech (ADS).

4.1. Grammatical types per noun

Inflection consists in the usage of different grammatical forms of a given lexeme. Therefore, the growing ratio of grammatical forms per lexeme (or mean size of paradigm; see Xanthos and Laaha 2007: 13) at different points in time may be considered as a measure of inflectional development. In the premorphological stage of language acquisition, lexical items ideally occur in a single form each so that the ratio of grammatical forms and lemmas will theoretically equal 1. The three children first observed by Stephany (1997a) at 1;9 (Spiros, Mairi) and 1;11 (Janna) have already started to use more than one form per noun on average since their ratios of grammatical form types per lemma exceed 1.00, albeit slightly. The ratio of the linguistically least advanced child Janna is below 1.05, which means that she uses less than every 20th lemma of her 30 nouns in more than one grammatical form. Although the most advanced child Mairi does so with nearly every 7th of her 94 noun lemmas already at 1;9, her development only rises to less than the use of every 5th noun in more than one form at 2;9 (fig. 1a). The ratio of grammatical forms and noun lemmas of Mairi's mother's CDS at 1;9 does not considerably exceed the child's ratio at 2;9 The mother's ratio only surpasses the child's at 1;9, while both ratios more or less coincide during the child's third year of life. This means that Mairi's frequency of contrasting grammatical forms of nouns reaches the input norm already in the first half of her third year (fig. 1a).

There is individual variation of the type/lemma ratio among the three children observed longitudinally by Stephany. Both Janna and Maria remain considerably below the ratio reached by Mairi in the last period of observation.

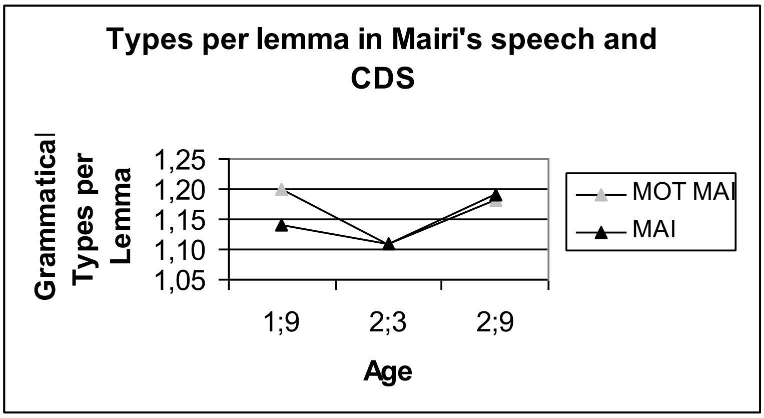

Figure 1a. Grammatical types per lemma in Mairi's speech and CDS

Turning to Christos, who was first observed somewhat earlier, it is found that in period I (1;7-1;10) the type/lemma ratio nearly corresponds to the ideal value of premorphology (fig. 1b). In the next six months, the boy uses almost every 5th noun in more than one form on average. The reason why the child's ratios in periods II (1;11-2;4) and III (2;5-2;8) seem to exceed those of the input is probably due to the restricted input samples analyzed, which cover only one month each as compared to the child's periods of 4 to 6 months. Nevertheless, these results show that the use of contrasting grammatical forms of nouns in Christos' speech at least reaches the input norm in the first half of his third year, as is the case with Mairi.

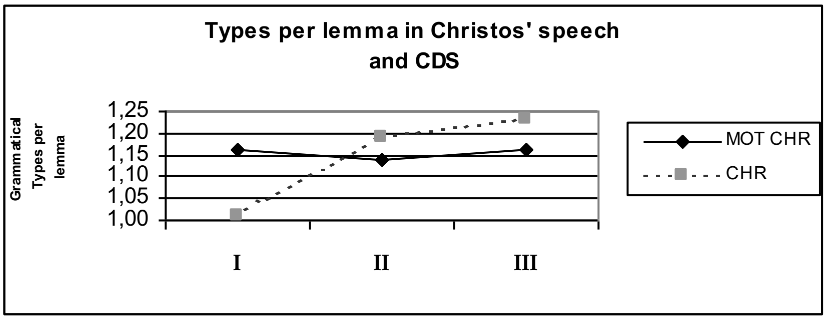

Figure 1b. Grammatical types per lemma in Christos' speech and CDS

For a language like Greek, in which the categories of case and number are differently expressed in noun classes essentially based on gender, the average number of grammatical types per noun occurring at different points of development is too global a measure of inflectional development. In order to gain a deeper insight into the process of inflectional development, paradigm formation of nouns must be studied in detail.

4.2. Paradigm formation of Greek nouns

Development of inflection sets in as soon as lexemes occur in more than a single grammatical form. The notion of 'miniparadigm' (Kilani-Schoch and Dressler 2002: 50-52; Bittner, Dressler, and Kilani-Schoch 2003) covers the early phases of paradigm construction, distinguishing between mere occurrence of more than one grammatical form of a lexeme and "morphological relatedness" between distinct grammatical forms (Kilani-Schoch and Dressler 2002: 50). A "true miniparadigm" is defined "as corresponding to a non-isolated set of minimally three phonologically unambiguous and distinct inflectional forms of the same lemma produced spontaneously in contrasting syntactic or situative contexts in the same month of recordings" (Bittner, Dressler, and Kilani-Schoch 2003: xvi).

In contrast to the development of Greek verbal inflection (see Christofidou and Stephany 2003: 107-113), the notion of miniparadigm is of limited value for the description of the early development of nominal inflection, since it is only applicable to case distinctions in the SG of MASC 'triptota' nouns (ending in *–os*), which may distinguish four case forms, but occur less frequently in child speech as well as in child-directed and adult-directed speech than NEUT and FEM nouns, both type- and tokenwise (see below). All other Greek nouns are 'diptota' nouns, distinguishing merely two case forms in the SG (see sect. 2 above). For the majority of Greek nouns, "true miniparadigms" would thus have to include a singular case contrast besides at least one PL form. It is therefore to be expected that early Greek nominal paradigms will mainly be limited to two forms, either two SG case forms or one SG and one PL form. For this reason, the description of paradigm formation in Greek language acquisition cannot be limited to miniparadigms but must include contrasts of two grammatical forms of a given lexeme, be these case or number contrasts. Since the development of specific case or number distinctions of Greek nouns is bound to gender, which mainly determines their inflectional class (see sect. 2 above), paradigm formation of NEUT, FEM, and MASC nouns will be described separately.

As hypothesized, there are no true miniparadigms to be found in Mairi's speech (table 3a), but, interestingly, they only marginally occur also in her input. During the girl's entire period of observation 84% to 89% of nouns are limited to one grammatical form. The percentage of lexemes occurring in two grammatical forms is somewhat higher with MASC nouns than nouns belonging to the other two genders, since MASC nouns are the only ones which mark the NOM:SG and distinguish it from the unmarked ACC:SG (see table 4 below). Roughly the same picture emerges from the child's input.

Table 3a. Grammatical forms and nominal paradigms in Mairi's data

Age	Noun lemmas		1 form	2 forms
1;9	NEUT	55	48 (87%)	7 (13%)
	FEM	27	26 (96%)	1 (4%)
	MASC	12	8 (67%)	4 (33%)
	Total	94	82 (87%)	12 (13%)
2;3	NEUT	65	59 (91%)	6 (9%)
	FEM	49	44 (90%)	5 (10%)
	MASC	18	14 (78%)	4 (22%)
	Total	132	117 (89%)	15 (11%)
2;9	NEUT	69	59 (85.5%)	10 (14.5%)
	FEM	45	38 (84%)	7 (16%)
	MASC	14	10 (71%)	4 (29%)
	Total	128	107 (84%)	21 (16%)

As far as Christos is concerned, a single true three-member miniparadigm occurs in period II (1;11-2;4) and an additional one in period III (2;5 –2;8) (table 3b). The miniparadigm found in both periods consists of the three case forms of the boy's name used almost exclusively instead of the respective pronouns for expressing self-reference and possession (*o Chrístos/tu Chrístu/ton Chrísto* 'the:NOM/GEN/ACC:SG Christos:NOM/GEN/ACC:SG'). This miniparadigm also occurs in his mother's babytalk in reference to her son. In contrast to what is found in both Mairi's speech and her input, a relatively high percentage of MASC nouns occur in two grammatical forms in Christos' speech from age 1;11 on and to a certain extent also in his input. It may be hypothesized that the frequent use of three different grammatical forms of the MASC proper noun *Chrístos* by the dyad Christos-Mother and the ensuing familiarity of the child with this paradigm will facilitate the use of other MASC nouns in more than one grammatical form.

Table 3b. Grammatical forms and nominal paradigms in Christos' data

Age	Noun lemmas		1 form	2 forms	3 forms
1;7-1;10	NEUT	32	31 (97%)	1 (3%)	-
	FEM	14	14 (100%)	-	-
	MASC	7	7 (100%)	-	-
	Total	53	52 (98%)	1 (2%)	-
1;11-2;4	NEUT	113	94 (83%)	19 (17%)	-
	FEM	88	79 (90%)	9 (10%)	-
	MASC	55	33 (60%)	21 (38%)	1 (2%)
	Total	256	202 (79%)	53 (20.6%)	1 (0.4%)
2;5-2;8	NEUT	122	96 (79%)	26 (21%)	-
	FEM	105	92 (88%)	13 (12%)	-
	MASC	47	21 (45%)	24 (51%)	2 (4%)
	Total	271	206 (76%)	63 (23%)	2 (1%)

As assumed above, types of marked case-number forms are unevenly distributed across gender classes in both Mairi's and Christos' speech (figs. 2a and 2b; for raw numbers of noun lemmas see tables 3a and 3b). While Mairi uses 50% of MASC nouns in the NOM:SG already at 1;9, the proportion of MASC nouns occurring in this marked form rises to 64% by 2;9. Only one MASC lemma each is found in the marked forms GEN:SG and PL:ACC at 2;3 and 2;9. In contrast to MASC nouns, the much larger number of NEUT lemmas only shows a number contrast, with little change in the percentage of lemmas used in this marked form in the course of development. FEM nouns are the only ones to give evidence of both a number and a case contrast from 1;9 on. The number of FEM nouns occurring in the PL increases more rapidly than lemmas used in the GEN:SG.

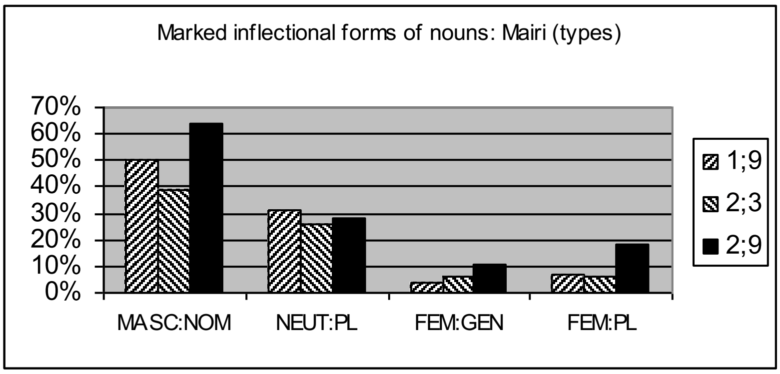

Figure 2a. Development of marked inflectional forms of nouns in Mairi's data

Christos' development of grammatical types is comparable to Mairi's: Marked forms of MASC nouns are mainly limited to the NOM:SG and the marked GEN:SG (ending in *–u*) only occurs with the lemma *Chrístos* in period II. Marked NOM/ACC:PL forms of NEUT nouns occur in the three periods,[5] while FEM nouns show both a number and case contrast from 1;11 onward (fig. 2b). Only a single PL form of a MASC noun occurs in period III (*jeraní* 'crane:MASC:NOM:PL'). In spite of the fact that Christos' percentages of MASC nouns marked for the NOM:SG are much lower than Mairi's, he uses about twice as many nouns of this gender in this form (see tables 3a and 3b). While NOM:SG forms of MASC nouns increase typewise in Christos' speech, they decrease tokenwise from 55% in period II to 37.5% in period III. The reason is that the boy gradually abandons the strategy of referring to himself by his name.

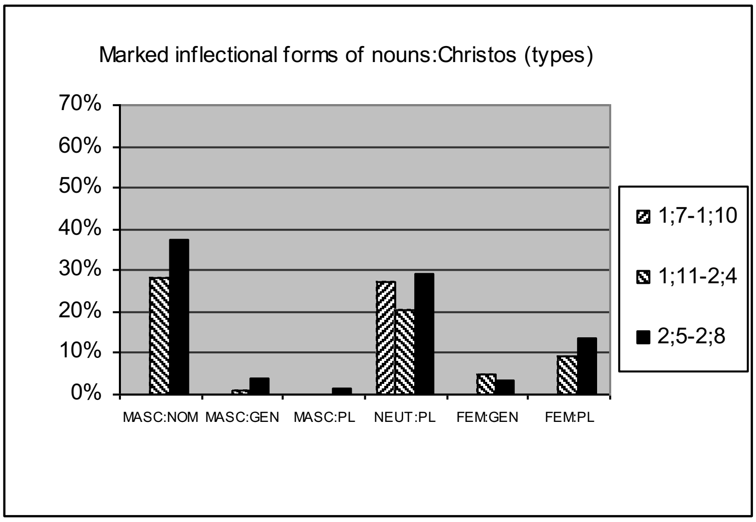

Figure 2b. Development of marked inflectional forms of nouns in Christos' data

With the other three children, nominal inflection develops in roughly the same way as with Mairi and Christos. While MASC nouns are limited to the NOM-ACC contrast, NEUT ones only exhibit a number contrast. With Spiros FEM nouns only distinguish number at 1;9 and Janna also develops the GEN:SG of these nouns before the number contrast (at 2;5 vs. 2;11). With Maria, a late talker, the marked NOM:SG form of MASC nouns only emerges at 2;9. Her NEUT and FEM nouns are limited to a number contrast at 2;3 and there is a single instance of the GEN:SG found at 2;9.

These findings clearly demonstrate that the development of inflectional types and paradigm formation proceeds within gender classes of nouns rather than across-the-board. Thus, the number contrast primarily develops in the NOM/ACC form of NEUT nouns and to a smaller extent of FEM ones. Since the GEN is extremely rare or even impossible with NEUT nouns (see sect. 2), the NOM/ACC is the only case form occurring in child Greek and CDS. In contrast to NEUT nouns, MASC nouns at first only develop a case distinction, mainly the NOM-ACC:SG contrast. As mentioned above, MASC nouns are the only ones to mark the NOM:SG contrasting it with the ACC:SG, which is an unmarked form in all three genders. The marked GEN:SG form of 'triptota' subclass II MASC nouns ending in *–os* is much less used than the NOM:SG and may develop much later. With FEM nouns, both a number contrast develops in the NOM/ACC form and a case contrast between the NOM/ACC:SG and GEN:SG. With the exception of the GEN of NEUT nouns, the children studied in the present paper learn to exploit the possibilities offered by the case system of nouns in the SG until the end of the observational period (2;8, 2;9, 2;11) (see table 4).

Table 4. Emergence of case-number contrasts of nouns in Stephany's and Christofidou's corpora

Masculine	NOM:SG –*s* ACC/OBL:SG -V (V = thematic vowel)	Mairi 1;9, Spiros 1;9, Janna 1;11, Christos 1;11, Maria 2;9
	GEN:SG -*u*	Spiros 1;9, Mairi 2;3, Christos 2;4
Neuter	NOM/ACC:SG NOM/ACC:PL	Mairi 1;9, Spiros 1;9, Christos 1;9, Janna 1;11, Maria 2;3
Feminine	NOM/ACC:SG NOM/ACC:PL	Mairi 1;9, Spiros 1;9, Janna 1;11, Christos 1;11, Maria 2;3
	GEN:SG	Mairi 1;9, Christos 1;11, Maria 2;9, Janna 2;11

A comparison of the children's use of nouns in their marked case-number forms with the mothers' CDS will help to explain the above findings. With the exception of the marked GEN:SG of MASC subclass II nouns, the categories of marked inflectional forms of nouns in Mairi's speech coincide with those most strongly represented in the input (see figs. 2a and 3a). The other types of marked inflectional forms of Greek nouns, such as the VOC:SG of MASC subclass II nouns, NOM:PL and ACC:PL forms of MASC nouns, and the GEN of NEUT nouns in the SG and PL, occur with even less lemmas than the GEN:SG and NOM/ACC:PL of FEM nouns in Mairi's input from 1;9 to 2;9 and are also very infrequent tokenwise.

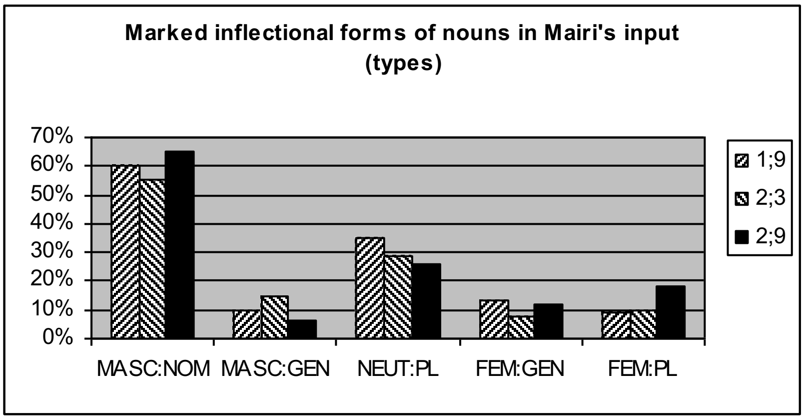

Figure 3a. Marked inflectional forms of nouns in Mairi's input

Use of nouns in marked inflectional forms is also similar in the dyad Christos-Mother (see fig.s 2b and 3b). Furthermore, the selection and ranking of marked forms of nouns in the three genders coincides in both mother-child dyads. The fact that NOM:PL or ACC:PL forms of MASC nouns, which rarely occur in Christos' speech between 2;5 and 2;8, are not documented in his input is probably due to the small sample analyzed for the present study. As far as marked case-number forms of nouns are concerned, our results show that caretakers and children mainly rely on the communicatively most important ones and that the choice of specific inflectional forms differs according to gender class.

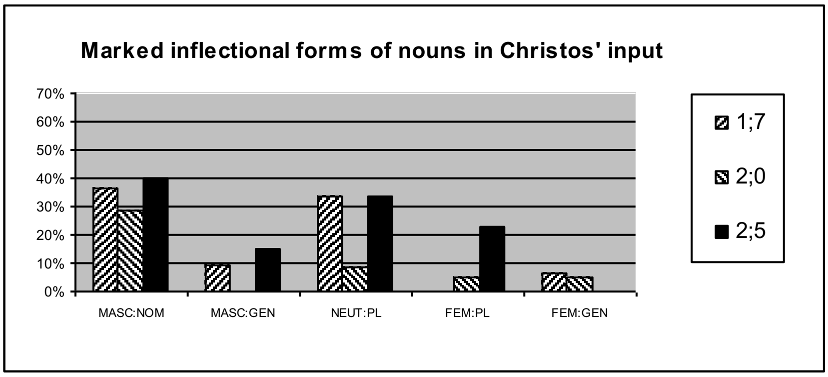

Figure 3b. Marked inflectional forms of nouns in Christos' input

Although Chatzisavas (1992) counted tokens of inflectional forms of nouns rather than form types, a comparison of the ranking order of marked case-number forms of each gender occurring in adult-directed spoken Greek (ADS) with the percentages of lemmas used in marked inflected forms by Christos' and Mairi's mothers in their CDS is illuminating (see figs. 3a and 3b). Marked SG forms of MASC nouns are strongly biased toward the NOM both typewise in CDS and tokenwise in ADS. In contrast to this, the marked forms of NEUT nouns are predominantly NOM/ACC:PL, while both the GEN:SG and NOM/ACC:PL of FEM nouns are used to an almost equal degree, but less frequently than the marked forms of the MASC and NEUT gender just mentioned. In their child-directed register the mothers follow the distribution of grammatical forms found in adult-directed spoken Greek in an even more pronounced way in some respects (infrequent use of the GEN as compared to the NOM or NOM/ACC) and in others they differ from it by mainly limiting themselves to a smaller inventory of marked forms (SG forms of MASC nouns and NOM/ACC forms of NEUT nouns).

After having studied the typewise development of marked inflectional forms of nouns, we will now turn to the tokenwise distribution of marked and unmarked case-number forms.

4.3. Percentage of Base Forms (PBF)

Percentage of Base Forms (PBF) is a parameter devised by Voeikova and Gagarina (2002: 123) for studying the interdependence of the acquisition of Russian nominal inflection and syntax on the one hand and that of nominal inflection and the lexicon on the other. It simultaneously serves as a measure of the increasing role played by case and number distinctions of nouns in the course of language acquisition tracing the use of marked vs. unmarked inflected forms in children's speech. Whereas in articleless languages such as Russian, noun forms are the only locus of expression of the grammatical categories of the noun, in Greek, the distinction of certain grammatical forms of the noun exhibiting syncretism is achieved with the help of determiners, especially the definite article, so that its development has an important role to play in certain distinctions of case-number forms of nouns. In the present section we will focus on the use of grammatical forms of the noun itself, not only for the sake of comparability of our study with other languages, especially articleless ones, but also because the distinction of grammatical forms by periphrastic means plays a secondary role as compared to synthetic techniques (see sect. 5 below; also see Stephany 1997a).

PBF has been defined for Russian as "the percentage of noun tokens in the nominative" (Voeikova and Gagarina 2002: 123). While PBF amounts to 30% in adult-directed Russian speech and reaches a minimum of about 42% in one child's input, the corresponding value in two children's speech studied until the age of 2;3 is roughly 50% (Voeikova and Gagarina 2002: 123). The most suitable candidate for Greek base forms of nouns is the inflectionally unmarked SG form ending in the thematic vowel. Depending on the inflectional class of the noun, this is the NOM/ACC:SG of FEM and NEUT nouns and the ACC:SG of MASC ones. These inflectionally unmarked forms of nouns are the first ones to emerge in Greek language acquisition (Stephany 1997a: 200; Christofidou and Stephany 1997: 129; see also sect. 5).

In a language with a completely regular, agglutinating morphology such as Turkish, lacking declensional subclasses of nouns, a single PBF value calculated for nouns quite generally is sufficient to compare the child's development of noun inflection to that of the input (on Turkish see Ketrez and Aksu-Ko□, this volume). By contrast, in languages of the inflecting-fusional type such as Greek, a general PBF value established across genders and inflectional classes can only give a rough indication of the development of nominal inflection, while the more specific properties of the developmental process must be worked out by distinguishing between inflectional and gender classes (see below).

Calculated across gender and inflectional classes, PBF amounts to roughly 54% in adult-directed spoken Greek (based on Chatzisavas 1992). In Mairi's mother's CDS, PBF values approach 80% and thus exceed the value characteristic of adult-directed speech (ADS) (see fig. 4a). PBF values found in the input vary intersubjectively. While this value remains high in Mairi's mother's CDS during the child's development from 1;9 to 2;9, the corresponding value of Christos' input drops from an initial 79% to 63% from 2;0 on, approaching the PBF value of ADS (see fig. 4b). In contrast, PBF values of two other mothers' CDS of Stephany's corpus at their children's respective ages of 1;9 and 1;11 even exceed those of Mairi's mother, amounting to 87% and 81%. Comparing PBF in CDS to that found in ADS more generally it can be noted that the characteristics of ADS are emphasized in CDS so that the percentage of tokens of marked inflectional forms young Greek children have to cope with is minimized. Besides the reduction of the inventory of inflected forms found in section

(4.2.), this is another way in which Greek mothers simplify the input in the domain of inflectional forms of nouns.

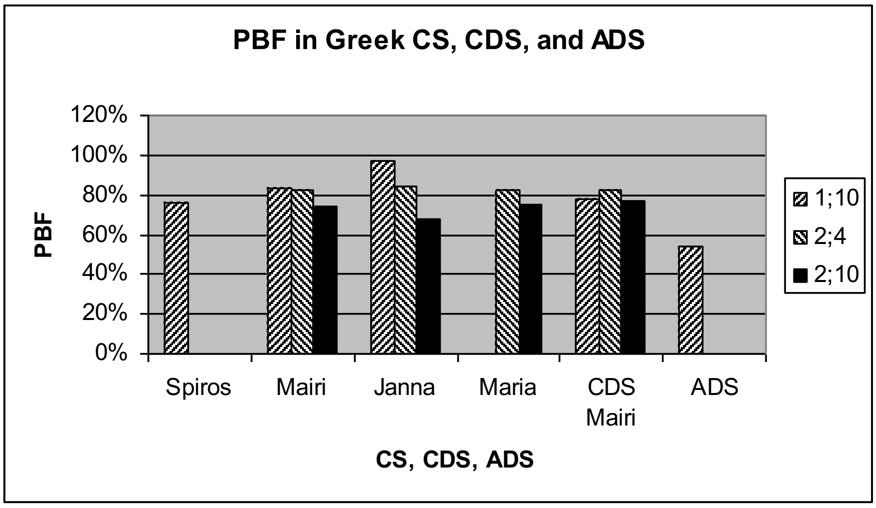

Figure 4a. PBF in Greek child speech (Corpus Stephany), child-directed speech, and adult-directed speech

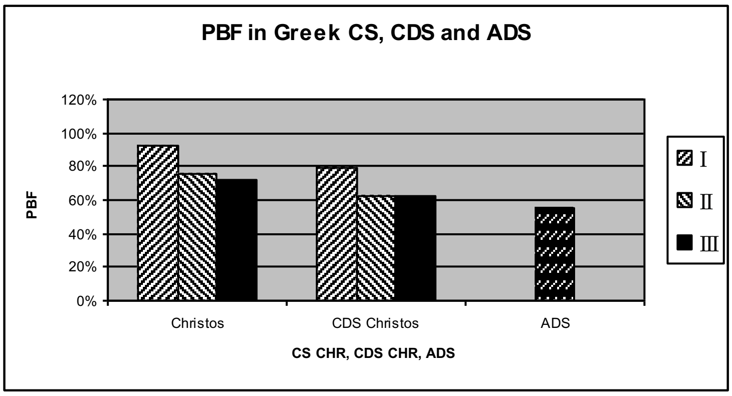

Figure 4b. PBF in Christos' CS and CDS and in ADS

As is to be expected, PBF values gradually decrease in the children's course of development (figs. 4a and 4b). The most drastic drops occur with

Janna and Christos after 1;11. Overall, the children's PBF values are closer to CDS than to ADS.

In order to gain a deeper insight into the distribution of the respective PBF values in Greek ADS and CDS and into the children's development of nominal inflection, PBF has been calculated separately for each gender class. A comparison of child speech (CS) with CDS and ADS shows the same ranking order in the three types of speech reaching from FEM nouns with the highest PBF values to MASC ones with the lowest (see tables 5a and 5b). The only exception are MASC nouns, which are exclusively used in their unmarked form by Christos before 1;11 and by Maria at 2;3 (PBF 100%). Otherwise, MASC nouns have considerably lower PBF values than the other two gender classes. As with the general PBF values mentioned above, gender sensitive PBF values in CDS are much higher than in ADS, with the exception of MASC nouns in Mairi's input and in Christos' from 2;0 on. This shows that inflectionally marked forms and their contrast with unmarked ones plays a greater role with MASC nouns in the mothers' discourse than with the other two genders. This seems to have an influence on the children's development, since they make use of the NOM-ACC:SG contrast with a high percentage of MASC nouns (see figs. 2a and 2b above).

Table 5a. PBF values of nouns in CS, CDS, and ADS according to gender (Corpus Stephany)

Gender class	CS									CDS (MOT Mi)			ADS (based on Cha-tzisavas 1992)
	1;10 (1;9, 1;11)			2;4 (2;3, 2;5)			2;10 (2;9, 2;11)			1;9	2;3	2;9	
	Mi	Ja	Sp	Mi	Ja	Ma	Mi	Ja	Ma				
Feminine	98	100	86	94	95	96	86	94	92	95	93	90	65
Neuter	76	97	85	75	80	70	71	64	65	77	71	76	57
Masculine	69	91	30	62	43	100	47	33	65	36	46	21	38

Table 5b. Christos' PBF values of nouns in CS and CDS according to gender

Gender class	CS (Christos)			CDS (MOT Chr.)		
	1;7-1;10	1;11-2;4	2;5-2;8	1;7	2;0	2;5
Feminine	100	95	89	99	92	77
Neuter	82	83	71	80	88	68
Masculine	100	42	55	56	24	43

Studying the role of marked vs. unmarked forms of nouns in Mairi's and Christos' speech in more detail, only with MASC nouns there is a considerable drop of inflectionally unmarked forms to be observed in both children unitl the end of observation (see tables 5a and 5b). Although the distribution of marked and unmarked forms of nouns per gender in the children's speech roughly corresponds to the input, both mothers offer many more instances of inflectionally marked MASC nouns at each developmental stage than their children produce. This will contribute to the entrenchment of such forms in the children's memory.

Another distributional characteristic of Greek ADS, CDS, and CS is that the frequency of nouns of the three genders occurring in discourse differs (for ADS see Chatzisavas 1992 and Kavoukopoulos 1996). MASC nouns are encountered much less frequently than those of the other two genders both type- and tokenwise. Again, this tendency is more pronounced in CDS than in ADS and accordingly also in CS (tokens of MASC nouns: ADS: 23%; CDS: 7% - 17%; CS: 7% - 19%, with the exception of 25% found with one child at 2;9). While FEM nouns occur more frequently than NEUT ones in ADS, the latter tend to exceed the former in CDS as well as CS. This may be attributed to the high number of NEUT diminutives ending in *–aki* typical of child-centered speech situations (Stephany 1997b; Thomadaki and Stephany 2007). While the children's early inflectional development of NEUT nouns can be explained by the fact that nouns belonging to this gender are very frequent in the input both type- and tokenwise, the same cannot be said of FEM nouns and even less of MASC ones, which occur much less frequently. The reasons for the emergence of particular types of inflectionally marked forms must therefore be sought in their functional load in discourse on the one hand and in its formal marking on the other.

The only relevant (and sometimes the only possible) inflectional distinction with most neuter nouns, many of which refer to objects or (toy) animals and are attributed the NEUT gender by derivation, is the number contrast, uniformly expressed by final *–a* and therefore quite salient. In contrast, many FEM and MASC nouns are proper nouns, kinship terms, or animal names referring to animate beings. With these classes of nouns, the SG is much more commonly used than the PL. Although a distinction between NOM and ACC seems to be functionally important with such nouns irrespective of their gender class, the reason for the earlier development of this case contrast with MASC nouns is that it is marked on the noun itself while FEM nouns can only distinguish between the two cases by the form of the DEF.ART (see sect. 5.1.2 below). Thus, the tokenwise most infrequent class of MASC nouns is the first to develop a functionally important case contrast, while the priority of the functionally important number contrast of NEUT nouns may be partly due to their high frequency. As shown in section 4.2, the NOM-ACC contrast of MASC nouns is, however, even more strongly exploited typewise than the number contrast of NEUT nouns in the children's input. The results obtained by the study of PBF lend further support to our finding that the different grammatical categories of Greek nominal inflection develop locally with certain subclasses of nouns rather than across-the-board.

5. Development of case and number distinctions in Greek nouns

In the first part of this section (5.1), we will trace the development of forms and functions of case in the SG in MASC and FEM nouns in the observational periods of the children. In the second part (5.2), the development of case-number forms in the PL will be described. Since NEUT nouns do not develop case distinctions in our data, they will only be analyzed in section 5.2. The DEF.ART plays an important role in the distinction of syncretistic inflectional forms such as the NOM/ACC:SG of FEM nouns, so that its development offers important insights into the role of synthetic vs. periphrastic marking of case-number distinctions in Greek language acquisition.

5.1. Development of singular case distinctions in Greek nouns

While the most important syntactic function of the NOM-ACC distinction is the expression of subject vs. object, the GEN primarily expresses the possessive. In Stephany's data it also fulfills the benefactive function by 2;9/2;11 (Stephany 1997a: 205). Besides the functions of subject, object, and possessive, another function emerging early is the locative, which is expressed by a diversity of linguistic means, namely locative adverbs and prepositional phrases (for details see Stephany 1997a: 205, 282-287). Comitative and instrumental meanings of prepositional phrases introduced by *me* 'with' have emerged by 2;3/2;5 in Stephany's data. Temporal and manner adverbials play a less important role than locative ones and are expressed by adverbs (e.g. *tóra* 'now', *metá* 'later', *étsi* 'this way'). For a detailed analysis of the argument structure of sentences found in

Stephany's corpus between 1;9/1;11 and 2;9/2;11 see Stephany (1997a: 272-288).

5.1.1. Development of singular case distinctions of masculine nouns
5.1.1.1. Emergence of the nominative-accusative contrast

There is evidence in the four children's data of Stephany's corpus as well as in Christos' speech that the inflectional development of MASC nouns starts with their unmarked SG form ending in the thematic vowel (e.g. *papú* 'grandfather:OBL:SG'). This 'all-purpose' unmarked form splits into a new marked NOM:SG form ending in *–s* and the old unmarked form, which then specializes to an OBL case form. The –V vs. –V*s* pattern is the most important inflectional development of MASC nouns (see sect. 2). The OBL case form of MASC subclass II nouns (ending in *–os*) is limited to ACC contexts and the VOC with some nouns (but see below on Christos' development), while the OBL form of other MASC nouns is used in VOC, GEN, and ACC contexts. As shown in sections (4.2) and (4.3), the communicative importance of the NOM:SG of MASC nouns is reflected by their distribution in the children's discourse. Thus, in Mairi's speech at 1;9, 65% of MASC noun tokens function as NOM and only 35% as ACC (n = 102). With both Spiros and Mairi, synthetic as well as periphrastic marking of the NOM-ACC:SG contrast of MASC sets in before the end of the second year (by 1;9), but both techniques are differently weighted in the two children's speech: While Spiros relies more heavily on synthetic marking, in Mairi's speech periphrastic marking also plays an important role (see also Stephany 1997a: 226-229). In Christos' speech there is clear evidence for these techniques in the second observational period (1;11-2;4). With Maria and Janna, the NOM-ACC contrast also emerges in the first part of the third year. In order to gain a deeper insight into the development of the NOM-ACC contrast of MASC nouns Christos' and Mairi's data will be analyzed in more detail.[6]

Within a month after the first occurrence of the NOM:SG marker *–s* in *papús* 'grandfather:MASC:NOM:SG' at 1;11.0, Christos uses the marked NOM:SG forms of 88% of MASC noun tokens in contexts where these are required, while "only 2% of forms marked by *–s* are misused with an oblique function (n = 97)" (Christofidou and Stephany 1997: 134; see also Christofidou 2004). Since one third of unmarked forms of MASC nouns used in NOM contexts are accompanied by the MASC:NOM:SG form *o* of the DEF.ART, only 9.7% of MASC:SG NPs functioning as NOMs are unmarked for case in Christos' period II data (1;11-2;4).[7] Still, the DEF.ART plays a minor disambiguating role in Christos' speech as compared to the synthetic marking of the NOM:SG on the noun. This is also shown by the observation that he starts to overgeneralize –*s* marking to foreign names like *Plúto*, which are uninflected in the input, less than two weeks after the first occurrence of the first form marked for NOM:SG (see Christofidou and Stephany 1997: 130-134). Thus, from early on, the NOM-ACC contrast becomes productive with MASC nouns (referring to male beings). The –V/-*s* contrast of MASC nouns is never overgeneralized to feminine nouns.

The first contrast of a NOM:SG and ACC:SG form of one and the same MASC noun occurs at 1;11.13, two weeks after the appearance of the marked NOM (*papús*/*papú* 'grandfather:NOM/ACC:SG') (Christofidou and Stephany 1997: 134). In the beginning, NOM:SG forms of MASC nouns are used to identify animate beings, but from 2;2.14 on, they also occur with inanimate nouns (e.g. *jeranós* 'crane') (Christofidou and Stephany 1997: 132). There is further evidence that Christos marks the MASC:NOM:SG systematically. One is single instead of double case marking of appositional constructions such as N*íko papús* for *papús Níkos* 'grandfather:MASC:NOM:SG Nikos:MASC:NOM:SG' (1;11.13).[8] The other one is the correct application of the contrastive marked/unmarked pattern to most MASC forms of pronouns and adjectives from 1;11 on. Until the age of 2;4, 76% of NOM pronoun tokens (n = 21) and 80% of the respective adjective tokens (n = 15) are correctly inflected. Most of these MASC:NOM:SG tokens consist of the pronoun *aftós* 'this' and the adjectives *kalós* 'good' and *kakós* 'bad', all of which are contrasted with other case and gender forms. Summarizing our findings so far, it can be said that the basic declensional pattern V-*s* vs. –V of Greek nouns (see section 2) is well established in the MASC gender in Christos' speech by 2;4. In the next four months, this patterns gains in productivity, since, by 2;8, it has risen from 28% to 37.5% of MASC types (see fig. 2b in sect. 4.2 above).

In Mairi's data there is evidence for the NOM:SG-ACC:SG contrast of MASC nouns already by 1;9; this contrast is still far from being generally established, however. Mairi uses the unmarked form of MASC nouns ending in the thematic vowel in many nominative as well as oblique contexts so that the original system lacking case distinctions still determines more than half of her tokens of these nouns occurring in NOM contexts (45% marked MASC:NOM tokens, n = 66). The fact that, with a single exception, marked MASC:NOM:SG forms are limited to NOM contexts (30 tokens) while, in ACC contexts, only unmarked forms occur (31 tokens), is further evidence of the development of the NOM-ACC contrast. In addition, the MASC:NOM:SG form *o* of the DEF.ART is found with 75% of unmarked MASC noun tokens occurring in NOM contexts (n = 36), while *o* is only once wrongly used in an ACC context. Taking periphrastic case marking into consideration, tokens of MASC NPs marked for NOM:SG in the appropriate contexts amount to 87% (n = 68) in Mairi's speech already at 1;9. While variable synthetic marking or use of the unmarked form in NOM:SG contexts continues to occur in the girl's speech at 2;3 and 2;9, the NOM-ACC:SG contrast *o*/*to*(*n*) of the DEF.ART becomes more firmly established in the course of her third year so that, by 2;9, the NOM:SG is no longer overused in ACC contexts either with MASC nouns or the DEF.ART. Comparing Christos' development of the NOM-ACC contrast of MASC nouns to Mairi's, it can be stated that this boy, like Spiros, relies more heavily on synthetic marking than the girl. It must not be forgotten that, in contrast to Mairi, both Christos and Spiros may be expected to hear many examples of the NOM-ACC:SG contrast of their respective first names, which belong to the class of MASC nouns.

Although in a language like Greek, which does not rely on word order for distinguishing between subject and direct object, acquisition of the NOM-ACC contrast seems to be of major importance, Stephany (1997a) found that there is no relationship between the emergence of case marking and transitive constructions and that "what is relevant for the distinction of subject and object in child Greek is the semantic category of animacy rather than the grammatical category of case" (p. 220).

5.1.1.2. The vocative and genitive

Besides the NOM and ACC the other two grammatical cases which may be formally distinguished with MASC nouns are the VOC and GEN, both of which are much less frequently used in spoken Greek than the NOM and ACC (see sect. 2). With the exception of certain MASC subclass II nouns ending in *–os*, the unmarked form of the noun ending in the thematic vowel is used as an OBL form for the VOC, ACC, and GEN (e.g. *jóka* 'little.son:DIM:MASC:VOC:SG' from *jókas* NOM:SG). Only certain MASC nouns ending in *–os* distinguish a special VOC form ending in *–e* (e.g. *Aléksandhre* 'Alexander!' (NOM *Aléksandhros*), but *Chrísto* 'Christos!', *Spíro* 'Spiros!').

There is a single token of the marked VOC of subclass II MASC nouns in Stephany's corpus (Mairi, 1;9, *píthike* 'monkey:MASC:VOC:SG') and Christos only uses the marked VOC with a single lexeme (*líke* 'wolf:MASC:VOC:SG') in the third period (2;5-2;8). Most of the altogether infrequent instances of the VOC are correctly expressed by the unmarked form of subclass I MASC nouns (e.g. Christos, 1;11-2;4, *papú* 'Grandpa:MASC:VOC:SG').

Subclass II 'triptota' MASC nouns also distinguish the GEN:SG from the other ccases by the ending *–u* (e.g. *líku* 'wolf:MASC:GEN:SG'), while 'diptota' MASC nouns (subclass I) use a common oblique case form for GEN, ACC, and VOC (see sect. 2) so that with this latter class the difference between the ACC and GEN:SG is only expressed by the form of the article (e.g. *ton*/*tu* 'the:MASC:ACC/GEN:SG', *énan*/*enós* 'a:MASC:ACC/GEN:SG').

In Christos' data, the GEN:SG of 'triptota' MASC nouns is the second marked noun form to appear at 2;3.18 with the sporadically used GEN of his own name expressing possession (*Chrístu* 'Christos:MASC:GEN:SG'). However, the MASC:GEN:SG form *tu* of the DEF.ART emerges earlier (in period II, 1;11-2;4) and is used with the unmarked form of both subclasses of MASC nouns (21/3 tokens of Standard Greek 'diptota'/'triptota') (see examples 1 answering the question 'whose is this?'). Christos thus first constructs a nonstandard unitary 'diptota' class of MASC nouns merely distinguishing the NOM:SG form ending in *–s* from an unmarked OBL:SG one ending in the thematic vowel, thereby following the more frequent inflectional pattern of subclass I MASC nouns (see Christofidou and Stephany 1997: 136; Christofidou 2004: 6-9).

(1) Christos, 2;3

a. *tu* *Mimíti (= Dimítri)*
the:MASC:GEN:SG Dimitris:MASC:OBL:SG
'Dimitris'.'

b. *tu* *Físto* instead of
of.the Christos:MASC:OBL:SG
tu *Chrístu*
of.the Christos:MASC:GEN:SG
'Christos'.'

Within the month following its emergence (at 2;3.18), the *–os*/*-u* pattern becomes more frequent but remains limited to the lexical item *Chrístos*. In the third period (2;5-2;8) it is extended to two other MASC proper nouns ending in *–os* (*Ángelu* and *Jórghu* 'GEN'). All 31 GEN tokens of the three lexemes are properly used and 30 of them are accompanied by the correct MASC:GEN:SG form *tu* of the DEF.ART. At the end of period II (2;4), Christos thus starts to distinguish between the two declensional patterns of MASC nouns marking animate nouns ending in *–os* ('triptota', subclass II) by final *–u* in the GEN:SG while using the unmarked general OBL form of other MASC nouns ('diptota', subclass I) for expressing the possessive or benefactive functions (for a detailed analysis see Christofidou 2004: 6-11).

In contrast to Christos' development, there is no evidence in Stephany's data for an initial overextension of the unmarked form of nouns ending in *–os* to the GEN. In this corpus the GEN:SG occurs very infrequently with MASC nouns so that there are just a few marked GEN forms to be found (e.g. Spiros 1;9, *Píu* for *tu Spíru* 'the:MASC:GEN:SG Spiros:MASC:GEN:SG'; Mairi 2;3, *tu babá* 'the:MASC:GEN:SG Daddy:MASC:OBL:SG'). In Janna's and Maria's corpora MASC nouns are not found in GEN contexts. The experimental studies referred to by Stephany (1997a: 218) demonstrate that consistent marking of the GEN:SG by *–u* on 'triptota' MASC nouns (subclass II, ending in *–os*) is only achieved by 4;10.

5.1.2. Development of singular case distinctions of feminine nouns

The only case distinction marked on FEM:SG nouns is that between the GEN:SG ending in *–s* and the unmarked NOM/ACC form ending in the thematic vowel (see sect. 2). The NOM:SG and ACC:SG are distinguished by the definite article (*i*/*ti*(*n*) 'the:FEM:NOM/ACC:SG') while the GEN:SG is marked both on the noun and by the article (*tis*/*mías* 'DEF/INDEF.ART:FEM:GEN:SG'). As mentioned in section (2), the GEN is much more infrequently used in adult-directed spoken Greek than the NOM and ACC. The same is true of CDS and child speech so that FEM nouns by far most frequently occur in their unmarked NOM/ACC form (see figs. 2a, 2b, 3a, and 3b in sect. 4.2).

As far as Christos' development of case distinctions with FEM nouns is concerned, in period I (1;7-1;10) evidence for the NOM-ACC contrast is limited to 7 tokens of a single lemma (e.g. *i jajá* 'the:FEM:NOM:SG grandmother' vs. *s*(*t*)*i jajá* 'to.the grandmother'). In the next period (1;11-2;4) the number of such tokens increases considerably (139 NOM vs. 87 ACC tokens). Since the DEF.ART is correctly formed in 86% of NOM and

83% of ACC tokens occurring in NOM and ACC contexts respectively, the NOM-ACC contrast with FEM NPs has developed to a considerable degree by 2;4, in spite of the fact that the OBL form *ti* of the DEF.ART used by the child does not distinguish between ACC and GEN (see below).

The first marked GEN:SG form of a FEM noun occurs at 1;11 (*mamá-s* 'Mummy:FEM-GEN:SG') in Christos' speech. Since this form remains the only one between 1;11 and 2;1, it may be taken to be rote-learned (see also Christofidou and Stephany 1997: 135). Between 2;1 and 2;4, GEN:SG forms of 5 lexemes occur in 20 tokens, varying with the unmarked NOM/ACC form (5 tokens) (e.g. 2;2.14, *Eléni-s* 'Helen:FEM-GEN:SG'; 2;2.26 *tsi mamá* for *tis mamá-s* 'the:FEM:GEN:SG mummy:FEM-GEN:SG'). In period II (1;11-2;4) Christos begins to use a child OBL form *ti* of the FEM DEF.ART which does not distinguish the GEN from the ACC. 39% of FEM noun tokens occurring in GEN contexts (n = 41) are accompanied by *ti* (or rarely *tsi*) and one is constructed with the correct form *tis*. Three of the 17 noun tokens accompanied by the OBL form *ti* of the DEF.ART are unmarked for the GEN:SG so that GEN and ACC are not distinguished. Taking both synthetic and periphrastic marking of the GEN:SG of FEM nouns into consideration, Christos succeeds in marking 66% of these nouns carrying a possessive function in period II. The FEM:GEN:SG form *tis* of the DEF.ART emerges at 2;4 resulting in a potentially unambiguous three-case distinction of NOM, ACC, and GEN with FEM nouns. In the third period (2;5-2;8), the boy distinguishes the three cases of FEM NPs in 56% of tokens (n = 463) by employing both synthetic and periphrastic techniques.

The development of case contrasts with FEM nouns in Mairi's speech is still in a beginning stage at 1;9. Not only is the DEF.ART missing with 54% of FEM nouns (n = 140), but, as with Christos, a common FEM:OBL:SG child form *ti* covering both the ACC and the GEN of the DEF.ART is found besides the standard ACC form *tin* (used with vowel-initial nouns in ACC contexts). In addition, the most entrenched NOM:SG form *i* also occurs in one GEN and one ACC context. The NOM is functionally much more important with FEM nouns than the ACC, since 41% of FEM noun tokens accompanied by the DEF.ART occur in the NOM and only 5% in the ACC. The GEN is marginal. The only example of a synthetically marked GEN:SG is the form *Méri-s* combined with the NOM form of the DEF.ART instead of the GEN (example 2). The other instance of a FEM noun used in a possessive function consists of the child OBL form of the article and the unmarked form of the noun (*ti Pégi* for *tis Pégi-s* 'the:FEM:GEN:SG Peggy:FEM-GEN:SG' (= (It's) Peggy's)).

(2) Mairi, 1;9

i	*Méri-s*	*íne*	instead of
the:FEM:NOM:SG	Mairi:FEM-GEN:SG	is	
tis	*Méri-s*	*íne*	
the:FEM:GEN:SG	Mairi:FEM-GEN:SG	is	

'It's Mairi's.'

By 2;3, the NOM-ACC contrast of FEM NPs is more firmly established, since both cases are marked by the respective forms of the DEF.ART with equal frequency (34 tokens each of *i* vs. *ti*/*tin*), although FEM nouns are more often unaccompanied by the DEF.ART in ACC than in NOM contexts (zero article in 15 NOM vs. 22 ACC contexts). Evidence for the synthetic GEN with FEM nouns remains scarce, since only five of the girl's 49 FEM nouns are used in GEN contexts, with three of them marked by final *–s* or varying between their unmarked and marked forms (e.g. *ti** *méris*/*méri** for *tis méri-s* 'the:FEM:GEN:SG Mairi:FEM-GEN:SG'). As the FEM DEF.ART continues to be limited to the distinction between the NOM:SG *i* and the child OBL form *ti*, only a simple contrast between NOM and OBL is achieved by periphrastic case marking, while the GEN is distinguished from the other two cases by synthetic marking. The most important achievement found at 2;9 is the emergence of the GEN:SG form *tis* of the DEF.ART and the more systematic marking of the GEN on FEM nouns, finally establishing the three-way contrast between NOM, ACC, and GEN in the SG. However, standard and non-standard forms continue to vary in GEN contexts (*tis*/*ti**/∅ N-*s*, *ti**/*i** N-V). Case distinctions of FEM nouns only begin to develop in the third year with the other children (for details see Stephany and Christofidou, forthcoming).

5.1.3. Summary of case development

Although SG case distinctions marked on MASC and FEM nouns both oppose the unmarked form of the noun ending in the thematic vowel to a marked form ending in *–s*, the marked forms play different functional roles in the two genders, expressing agent (MASC) vs. possessor (FEM). Both of these functions are communicatively important from early on, especially so with animate referents. However, at least in Mairi's early speech (on Christos see below), the possessive relation is by far most frequently expressed pronominally (e.g. Mairi 1;9, *to pirúni mu* 'the:NEUT:NOM/ACC:SG fork:NEUT:NOM/ACC:SG' me:GEN' (= my fork); see Stephany 1997a: 240) rather than by the marked GEN form of FEM nouns (86 PRO tokens vs. 1 N token) (Stephany 1997a: 217). In contrast to this, the marked NOM:SG form of MASC nouns is used for pointing and identifying or expresses the grammatical subject. It is therefore to be expected that this form develops earlier and more quickly than the marked GEN:SG of FEM nouns, in spite of the fact that both are signaled by final *–s* following the thematic vowel. This is indeed what we have found with the five children studied in the present chapter, irrespective of the age at which the NOM-ACC contrast of MASC nouns and the GEN-NOM/ACC opposition of FEM nouns appear. Once both contrasts have begun to develop, the functional distinctions and distributional differences between the –V/-*s* patterns of MASC and FEM nouns contribute to a gender distinction of Greek nouns (see Stephany 1997a: 220).

While the Greek DEF.ART is strongly grammaticized and frequently occurs in the input, Greek children at first tend to omit it in a substantial number of tokens (Stephany 1997a: 226). Still, we found that the distinction between NOM and ACC forms of FEM nouns (*i*/*ti*(*n*) –V) emerges before the end of the second year in Christos' and Mairi's speech, but only in the first half of the third year with Janna and Maria. The periphrastic distinction of GEN and ACC of subclass I ('diptota') MASC nouns (*tu*/*to*(*n*) –V) emerges in the period from 1;11 to 2;4 in Christos' speech, but only by 2;3 with Mairi and even after 2;9 and 2;11 with Maria and Janna. While the synthetically marked GEN of MASC subclass II ('triptota') nouns is emerging in Spiros' speech at 1;9 and in Mairi's at 2;3, Janna and Maria do not show evidence of its appearance until the end of observation. The difference between the emergence of the NOM-ACC contrast with FEM nouns and the GEN case in the MASC gender may be attributed to the low frequency of MASC nouns. Christos' early expression of the possessive relation with MASC nouns by the DEF.ART is due to the fact that, in contrast to Mairi, he denotes possession by using names, including his own, (mostly in the GEN) rather than pronouns.

Comparing the respective roles of periphrastic and synthetic case marking in the early development of Greek noun inflection, we have shown that children do not rely on periphrastic means for marking case distinctions, not even with syncretistic case forms such as the ACC:SG and GEN:SG of subclass I MASC nouns and the NOM:SG and ACC:SG of FEM nouns. As has been demonstrated above, the DEF.ART nevertheless contributes to unambiguously marking case even if it is not yet systematically used. To the extent that article use becomes more reliable the number of case distinctions comes to be more adultlike and the case system is more firmly established (see also Stephany 1997a: 226-234).

Christos is the only child who at first inflects all MASC nouns according to the pattern found in the more frequently used subclass I 'diptota' nouns, which distinguish the marked NOM from a general unmarked OBL form used in ACC as well as GEN contexts so that the latter are only distinguished by the form of the article. This results in a single inflectional paradigm of MASC and FEM nouns each (Christofidou and Stephany 1997: 136; Christofidou 2004) and a corresponding biunique relation between inflectional pattern and gender (on NEUT nouns see sect. 5.2.3 below). It is only at 2;3.18 that he starts to distinguish between two declensional patterns of MASC nouns marking animate nouns ending in –*os* ('triptota', subclass II) by final –*u* in the GEN:SG while using the unmarked general OBL form of other MASC nouns ('diptota', subclass I) accompanied by the GEN:SG form *tu* of the DEF.ART for expressing the possessive or benefactive functions. An explanation for this finding could be that case marking by vowel substitution (GEN:SG of subclass II nouns) is less transparent than case marking by the addition of –*s* (NOM:SG of both subclasses of MASC nouns). But most importantly, the GEN:SG of MASC nouns also occurs much less frequently than the NOM:SG. With the other children studied in the present paper, there is no evidence for the construction of a unitary two-case distinction of MASC nouns preceding the distinction of two declensional subclasses, although this may be due to the fact that these children's data were not continuously selected.[9]

Since instances of overgeneralizations of inflectional patterns remain few in the speech of the children studied in the present paper and do not occur in each of the corpora, "there is no 'stage of overgeneralizations' to be found in the development of MG nominal (or verbal) inflection" (Stephany 1997a: 225) and thus no evidence "for an overall U-shaped learning curve for the acquisition of word forms" (Stephany 1997a: 323).[10] Rather, overgeneralizations are analogical formations occurring from early on.

NEUT nouns do not occur in the GEN in our data, the only exception being a single, probably rote-learned token found in Janna's data at 2;11 (*tu sxolí-u* 'the:NEUT/MASC:GEN:SG school:NEUT-GEN:SG'). This state of affairs may be explained by the fact that the frequently occurring NEUT diminutives lack the GEN (see sect. 2) and also that many neuters are inanimate and are therefore not used with a possessive function (Christofidou and Stephany 1997: 136; see also Stephany 1997a: 217).

There is thus no case distinction to be found with NEUT nouns in our data so that their inflectional pattern is limited to a number distinction in the NOM/ACC.

5.2. Development of the plural in Greek nouns

In the speech of the five children studied in the present chapter, the formal distinction of SG and PL is marked early and frequently on the NOM/ACC form of NEUT nouns although it also emerges with FEM nouns before the end of the second year. PL forms of MASC appear in the last part of the third year with only two children and are limited to one or two tokens.

5.2.1. Neuter nouns

In Christos' speech 29% of all NEUT nouns are used in the PL at 2;8 (see fig. 2b, sect. 4.2). If just the forms of NEUT nouns are taken into consideration, the plural emerges early and is richly documented both type- and tokenwise in Christos' speech. In the first period (1;7-1;10), NEUT:PL forms are even the only marked forms of nouns Christos uses (9 PL types each ending in *–ja* (14 tokens) or *–a* (15 tokens)). In spite of a considerable number of types and tokens of NEUT:PL forms, it remains uncertain whether Christos uses both numbers contrastively in this early period. Of the three PL types already occurring in the first recording one belongs to the class of pluralia tantum, a second one only occurs in the PL throughout the entire first period (*pedhjá* 'child:NEUT:NOM/ACC:PL') and the third one (*ghliká* 'cake:NEUT:NOM/ACC:PL') is an imitation.[11] The drop of NEUT:PL types in comparison to other inflectionally marked forms, which can be observed in period II (1;11-2;4) (see fig. 2b), indicates that many early plural forms are used as lexical rather than inflected forms.

Although in period II types and tokens of NEUT:PL forms increase considerably (27 types and 206 tokens), there is as yet no clear contrastive use of SG and PL forms to be found (for details see Christofidou 1998: 51-52). First number contrasts are observed after 2;0 (e.g. at 2;3.5, *dzipáki*/*dzipákja* 'jeep:NEUT:NOM/ACC:SG/PL'), but some PL forms continue to be used in both SG and PL contexts (e.g. *kakálja* for *portokálja* 'orange:PL' and *portokáli* 'orange:SG'); also, SG and PL forms may vary in successive utterances (Stephany 2002: 15; for details see Christofidou 1998: 52-53). This state of affairs points to the fact that Christos has not yet fully grasped the contrast between SG and PL forms of nouns, an interpretation also corroborated by informal tests conducted by his mother, where the boy alternates between NEUT PL and SG forms in reference to one or several entitites of the same kind (Christofidou 1998: 53-54). Finally, at 2;4, the first clear instances of a contrastive use of both number forms are found (example 3). In the third period (2;5-2;8) the use of PL forms of NEUT nouns rises further both type- and tokenwise and there is clear evidence that both numbers are distinguished both formally and functionally (see Christofidou 1998).

(3) Christos, 2;4.12

MOT:	*aft-á*		*ti*	*íne*	*edhó?*
	this-NEUT:NOM/ACC:PL		what	are	here
	'What are these over here?'				
CHR:	*papákja*.				
	duck:DIM:NEUT:NOM/ACC:PL				
	'Ducklings.'				
MOT:	*papákja*. (agreeing)				
CHR:	*dhen*	*íne*	*papáki*		
	not	is	duck:DIM:NEUT:NOM/ACC:SG		
	a(f)t-ó.				
	this-NEUT:NOM/ACC:SG				
	'This (one) is not a duckling.'				
MOT:	*dhen íne papáki aftó? íne kokoráki*.				
	'This one is not a duckling? It's a little cock.'				

In Christos' development synthetic PL marking of NEUT nouns clearly precedes analytic marking. In period I (1;7-1;10), NEUT:PL nouns are not yet accompanied by the DEF.ART, although it must be mentioned that article use is not syntactically obligatory in 28 of the 29 instances. In period II (1;11-2;4) 84% of tokens continue to be bare nouns (n = 207). Also, the DEF.ART does not reliably mark the PL since the forms *to* 'the:NEUT:NOM/ACC:SG' and (rarely) *tu* 'the:NEUT:GEN:SG' vary with correct *ta* 'the:NEUT:NOM/ACC:PL'. In the last observational period (2;5-2;8), Christos uses 45% of his plural forms of NEUT nouns with the correct form of the DEF.ART.

PL forms of NEUT nouns are well documented in Mairi's and Spiros' speech before the end of the second year and in Janna's and Maria's in the first half of the third year (for Mairi see fig. 2a, sect. 4.2). Since, with the exception of Janna at 1;11, the absolute number of NEUT nouns by far exceeds that of the other two genders in Stephany's child data, PL forms of NEUT nouns are accordingly the best documented overtly inflected forms of nouns, both type- and tokenwise. In Mairi's corpus, there is a total of 53 NEUT nouns used in the plural, 17 types at 1;9 and 2;3 each and 19 at 2;9 (72, 33, and 50 tokens respectively, 155 tokens overall). In comparison to this, only 22 MASC and FEM nouns each occur in the marked forms of the NOM:SG (73 tokens) and the GEN:SG or NOM/ACC:PL (28 tokens) respectively in her entire corpus.

Mairi expresses the PL of NEUT nouns synthetically as well as periphrastically already at 1;9, when 63% of the 84 NOM/ACC:PL tokens are accompanied by the correct form of the DEF.ART (*ta*) or (rarely) some other determiner or modifier agreeing with the noun in gender, number, and case. At 2;3 there is one instance of an error consisting in a combination of the SG form *to* of the DEF.ART with a PL form of the noun. This indicates that the synthetic technique of signaling number is more reliable than the periphrastic one in Mairi's speech. At 2;9, all plural forms of neuter nouns are correctly formed both synthetically and periphrastically.

Although many PL forms of NEUT nouns occurring in Mairi's data at 1;9 refer to pairs or common multitudes of entities (e.g. *mátja* 'eyes', *dhódja* 'teeth'), in the course of development, a growing number of NEUT:PL forms belong to countable nouns not generally used in the plural (e.g. *pedh-ákja* 'child-DIM:NEUT:NOM/ACC:PL'). While she contrasts the SG and PL forms of nouns of both of these classes formally as well as semantically/pragmatically already by 1;9 (examples 4), the SG and PL of nouns belonging to the second class are opposed more frequently at 2;3 and 2;9. While the percentage of PL forms occurring with NEUT nouns remains more or less stable from 1;9 to 2;9, more NEUT nouns occurring in the PL are contrasted with their SG form at 2;9 than at 1;9 (58% vs. 41%).

(4) Mairi, 1;9

a.

na	(*min*)	*k*(*r*)*iósi*	*to*
MOD.PTL	(not)	catch.a.cold:3S	the:SG
moró		*mu*.	
baby:NEUT:NOM/ACC:SG		of.me	

'So that my baby will not catch a cold.'

b.

MOT:	*pu*	*pái*	*o*	*píthikos?*
	where	goes	the	monkey
	'Where is the monkey going?'			
MAI:	(*s*)*ta*		*morá*.	
	(to) the:PL		baby:NEUT:NOM/ACC:PL	

'To the babies.'

With the exception of a PL formation of the uncountable babytalk word *mimí* 'boo-boo' in *éxo polá mimíka** 'have:1S many:NEUT:NOM/ACC:PL boo-boo:NEUT:PL*' (= I have many wounds) produced by Mairi at 2;3, almost all of her PL tokens of NEUT nouns are correctly expressed by forms ending in *–a* from 1;9 on. These PL forms either belong to the inflectional pattern *-i*/*-ja* (*máti*/*mátja* 'eye/eyes')with the PL ending *–a* added to the SG form of the noun[12] or they follow the pattern *–o/-a* (*zóo*/*zóa* 'animal/animals') in which the final thematic vowel is substituted by /a/. In spite of the fact that the *-i*/*-ja* pattern is much more frequent than the *–o/-a* pattern, both of them are well represented in all three stages of Mairi's development with no overgeneralizations to be observed. In contrast to this, only a single rote-learned form of the rather infrequent imparisyllabic pattern *–a*/*-ta* occurs at 2;9 in the girl's speech (*práma-ta* 'thing:NEUT-NOM/ACC:PL').

Given that, at 1;9, 14 NEUT nouns following the *–i*/*-ja* pattern occur in the PL (66 tokens) and that SG and PL forms are contrasted with five of them, it may be affirmed that this pattern has become productive in Mairi's speech before the end of the second year. This claim is supported by several current measures of productivity. Brown and Cazden's by now classic criterion of appearance of a grammatical morpheme in 90 percent of obligatory contexts in three successive speech samples (see Brown 1973: 271) is fulfilled in Mairi's eight samples gathered between the ages of 1;9.18 and 1;10.3. As far as paradigmatic relations between forms are concerned, the first of Pizzuto and Caselli's (1994: 156) two criteria of productivity, namely appearance of the same root in at least two distinct inflected forms (see Gathercole, Sebastián, and Soto 1999: 144), is satisfied by those NEUT nouns which appear in both numbers, while their second criterion, which requires that the same inflection is used with at least two different nouns, is by far exceeded by NEUT nouns belonging to the *–i*/*-ja* pattern. Besides these criteria, the occurrence of overextensions of inflectional patterns is taken as evidence of analogy or productivity. Mairi produces the first such form at 2;3. The productivity measure of miniparadigms is inapplicable to NEUT nouns in our data, since due to lacking case distinctions they do not occur in more than two distinct inflected forms (see table 4, sect. 4.2). According to the usage-based approach to language, "the productivity of a pattern, expressed in a schema, is largely, though not entirely, determined by its type frequency" (Bybee 2001: 13), which makes a pattern more familiar to the child (Slobin 1985:

1165-1166). The *–i*/*-ja* pattern, which is used with many more nouns than the *–o*/*-a* pattern (partially due to the high frequency of NEUT diminutives ending in *–áki*/*-ákja*), can be claimed to be more productive in the three stages of Mairi's language acquisition and will therefore have formed a stronger schema (see also Stephany 1997a: 325). Another explanation of the higher productivity of the *–i*/*-ja* pattern observed in Mairi's as well as Christos' speech may be its diagrammatic iconicity, which the *–o*/*-a* pattern lacks (see Jakobson 1965; Dressler 1987: 102-103; Kilani-Schoch and Dressler 2005).

The *–i*/*-ja* pattern found in Christos' speech between 1;11 and 2;4 also meets both of Pizzuto and Caselli's criteria of productivity (1994: 156), although it must be recognized that these criteria represent a minimal requirement for inflectional development (Gathercole, Sebastián, and Soto 1999: 144; see also Christofidou and Stephany 2003: 108). Since obligatory contexts of PL forms cannot always be determined in Christos' early data, Brown's criterion of use in 90% of obligatory contexts is inapplicable. The first overextension of a PL pattern is found after 2;8 in the boy's speech (Christofidou 1998).

Just as with Christos, synthetic marking of the PL of NEUT nouns precedes periphrastic marking also with the other three children observed by Stephany so that Mairi's early periphrastic marking may be an exception. At 1;9, Spiros distinguishes two NEUT nouns not only formally but also semantically (see Stephany 2002: 16). Maria and Janna give evidence of a semantic-pragmatic distinction of SG and PL of NEUT nouns in the first half of their second year (for details see Stephany and Christofidou, forthcoming).

5.2.2. Feminine and masculine nouns

In contrast to NEUT nouns, which only develop a number distinction in early child Greek, MASC ones are at first limited to a case distinction in the SG. Although FEM nouns develop both a case distinction in the SG and a number distinction, the latter plays a more important role than the former (for Mairi and Christos see figs. 2a and 2b, sect. 4.2).

While PL forms of NEUT nouns already occur in Christos' earliest data (1;7-1;10), the first synthetically marked FEM PLs are only found in period II (1;11-2;4), where 10 FEM nouns occur in their PL forms ending in *–es* (31 tokens). Except for *fókja* 'seal:FEM:NOM/ACC:SG' (PL *fókjes*), there is no evidence for a spontaneous contrastive use of both numbers for any of them. The FEM PL develops rapidly between 2;5 and 2;8 documented by 46 PL tokens, 36 of which are contrasted with their SG forms.

Although the DEF.ART does not distinguish the NOM:SG and NOM:PL of FEM nouns (*i* 'the:FEM:NOM:SG/PL'), 46% of FEM PL nouns are constructed with the DEF.ART in Christos' period III (n = 46), as compared to only 16% in period II (n = 31). As has been found with NEUT nouns, synthetic number marking is preponderant also with FEM nouns. It is interesting to note that in period II there is one instance in which the ACC:PL of a FEM noun is distinguished from the NOM:PL by the form of the DEF.ART (*tis* 'the:FEM:ACC:PL' vs. *i* 'the:FEM:NOM:PL'). This distinction becomes more frequent in period III (12 tokens NOM:PL vs. 9 tokens ACC:PL). In the third period the undeclinable numeral *dhío* 'two' and the acronym *BMW* (make of car) are once inflected for PL (*dhíes bebés* for *dhío beemvé* 'two BMW').

With Mairi and Spiros the PL of FEM nouns has emerged before the end of the second year, but it occurs quite rarely. In Janna's and Maria's data it is found in the first half of the third year. As with Christos it is synthetically marked (for details see Stephany and Christofidou, forthcoming). At 1;9, Mairi uses only two of her 27 FEM nouns in their PL form. Both of these nouns usually occur in the plural and follow the *–a*/*-es* pattern (e.g. *karamél-es* 'candy:FEM-NOM/ACC:PL'). There is no remarkable change in the use of FEM:PL forms in Mairi's speech at 2;3, when three of 49 FEM nouns occur in the PL, two of them following the–*a*/*-es* pattern and one being an instance of the less frequent imparisyllabic PL ending in *–dhes* (*maimú-dhes* 'monkey:FEM-NOM/ACC:PL' from *maimú* 'monkey:FEM:NOM/ACC:SG'). All PL forms are adequately used referring to more than one referent, although Mairi only contrasts SG and PL with one of the three nouns. Use of the underdifferentiated child form *ti* of the DEF.ART covering the ACC of both numbers (Standard Greek *ti*(*n*)/*tis* 'the:FEM:ACC:SG/PL') with the SG and PL form of a FEM noun in one instance shows that the child relies on synthetic marking for expressing the number distinction. By 2;9, 8 of 45 FEM nouns occur in the PL, 7 of them following the *–a*/*-es* pattern. The ending *–es* (9 tokens) varies with nonstandard *–e* (3 tokens). Again, SG and PL are only contrasted with a single noun.

With MASC nouns, the number distinction is only found in one (possibly imitated) form in period III (2;5-2;8) of Christos' data and with the exception of a single instance in Mairi's speech at 2;9, PL forms of MASC nouns do not occur in the data of the children observed by Stephany (see however Stephany 1997a: 237).

Since the GEN:PL has not yet emerged in our data, synthetically marked PL case forms are limited to the NOM/ACC with NEUT and FEM nouns and to two isolated MASC:NOM:PL and MASC:ACC:PL forms in Mairi's speech and one MASC:NOM:PL form in Christos'. There is a slight indication of the emergence of the periphrastically marked NOM-ACC contrast of PL forms of FEM nouns in Christos' and Janna's third year.

5.2.3. Summary of number development, with a note on gender

Inflectional marking of the PL expressed by synthetic means is the earliest inflectional domain to develop with a substantial number of nouns in the NEUT gender and to gain productivity already by 1;9 with Mairi and between 1;11 and 2;4 with Christos. Although the PL is also expressed by synthetic means with FEM nouns from the very beginning, it occurs much less frequently. There is only slight evidence for the emergence of the PL with MASC nouns in our data and almost none for the NOM-ACC contrast in the PL. With FEM nouns the emergence of the SG-PL distinction precedes case distinctions in the SG in some children and may develop more rapidly than the latter (Christos and Mairi). There is some evidence of the periphrastically expressed NOM-ACC:PL contrast of FEM nouns in Christos' speech between 2;5 and 2;8 and in Janna's at 2;11.

In contrast to the role played by the DEF.ART in case distinction (see sect. 5.1), "determiner use is in general irrelevant for distinguishing singular and plural" in Greek child speech (Stephany 1997a: 215). Although NEUT nouns marked for PL are frequently accompanied by the NEUT:PL form of the DEF.ART agreeing with the noun in the three grammatical categories of the Greek nominal system,[13] "there is no doubt that synthetic marking of the category of number on the noun stem is more basic in Greek language development than its marking by the use of a plural determiner" (Stephany 1997a: 216). The main reason is that the PL is only frequently used with NEUT nouns, where it is clearly marked on the noun. In contrast to learner varieties of second languages lacking inflectional morphology, lexical expression of number by numerals or other quantifiers constructed with nouns unmarked for number is not typical of Greek first language acquisition.[14]

Since number serves a more strongly semantic-pragmatic function than case, the former may be considered as a less prototypically inflectional category than the latter, sharing properties of derivation "because it is more relevant to the meaning of the noun" (Bybee 1985: 34; see also

Christofidou, Doleschal, and Dressler 1991: 76; Christofidou 1998: 56-57; Corbett 2000: 263).[15] Still, number is grammaticized in Greek as it is in many languages, participating in the agreement system of verbs and nouns. Although, in early child Greek, use of PL forms of nouns depends on semantic-pragmatic factors, input frequency, or the preceding context, there is evidence for its grammatical function from early on at least with Christos and Mairi, since adjectives or pronouns may agree with nouns in number (e.g. Mairi, 1;9, *meghál-a dhódja* 'big-NEUT:NOM/ACC:PL tooth:NEUT:NOM/ACC:PL').

As pointed out in section 5.1.3, case distinctions of MASC and FEM nouns result in a biunique relation between inflectional pattern and gender in Christos' speech and also mainly so in Stephany's corpus (-*s* vs. -V MASC:NOM:SG vs. MASC:ACC:SG but –V vs. -*s* FEM:NOM/ACC:SG vs. FEM:GEN:SG). Number distinction in NEUT nouns follows another pattern (-V vs. –(*j*)*a* NEUT:NOM/ACC:SG vs. NEUT:NOM/ACC:PL) and completes the picture by adding the third gender of the Greek language. Since inflectional patterns of nouns have been found to develop within gender classes (or even semantic subclasses within these), the former can be considered as overt markers of the latter. Furthermore, the strong grammaticization of the DEF.ART and its consequently frequent occurrence in the input contribute to the entrenchment of gender distinctions, especially so with undeclinable loanwords (e.g. *o Donald* 'the:MASC:NOM:SG Donald').

6. Conclusions

One of the main results of the present study of the development of nominal inflection in Greek language acquisition is that children start to inflect nouns from early on. In the four children observed before the end of the second year, the ratio of grammatical types per noun exceeds 1.00, albeit only slightly as far as Christos (1;8) and Janna (1;11) are concerned. While these two children nearly conform to the ratio of 1.00 of an ideal premorphological stage (Christos 1.01, Janna 1.03), the other two children reach ratios of 1.08 (Spiros) and even 1.14 (Mairi) at a comparable age (1;9), although it must be taken into consideration that none of the children of Stephany's corpus was observed from the onset of speech. Interestingly, Mairi's value is nearly as high as that of Christos' mother's CDS at 1;7, namely 1.16 (Mairi's mother's ratio at 1;9 is 1.20).

These results are confirmed by the PBF values found at the same ages. Overall PBF values of nouns are highest for Christos (92%) and Janna (99%) and considerably lower for Spiros (77%) and Mairi (81%). PBF values differ with different inflectional (gender) classes of nouns, which shows that inflectional development does not set in simultaneously with all nouns and develops at a different pace in each class. While PBF is highest for FEM nouns in three children's speech, it is much lower for MASC nouns in Spiros' and Mairi's data (Spiros: FEM 86%, MASC 30%; Mairi: FEM 98%, MASC 69%) but only a little lower in Janna's (FEM 100%, MASC 91%). Only with Christos, PBF reaches 100% in both FEM and MASC nouns, while in NEUT ones it amounts to 82%. Mairi follows the model of the input (FEM 95%, MASC 36%) more closely than Christos (FEM 99%, MASC 56%).

Another parameter indicating that, in spite of low form/lemma and high PBF ratios, nominal inflection has begun to develop, is the number and type of inflectional contrasts. In two of the four children studied before the end of their second year (Mairi and Spiros at 1;9), three types of inflectional contrasts of nouns have emerged, namely the NOM-ACC contrast with MASC nouns and the number contrast with NEUT and FEM ones. In addition, Mairi gives evidence of the NOM-GEN contrast of FEM nouns. With Christos, both number forms of NEUT nouns emerge at 1;7, although there is as yet no evidence for a semantic-pragmatic distinction between them. The first case contrast to appear with Christos at 1;11 is that between NOM and ACC of MASC nouns. Although the children studied in the present paper were not found to rely much on periphrastic marking for distinguishing between grammatical categories, there is evidence for the emergence of the contrast between NOM:SG and ACC:SG of FEM nouns expressed by the form of the DEF.ART already before the end of the second year, at least with Christos and Mairi. Especially in Mairi's speech at 1;9 (and in Christos' between 1;11 and 2;4), unmarked forms of MASC nouns are often accompanied by the MASC:NOM:SG form of the DEF.ART, which contributes to the number of tokens where the NOM-ACC contrast is expressed. With Mairi the *–i*/*-ja* pattern of plural formation of NEUT nouns has become highly productive already by 1;9 according to several criteria. Productivity of this pattern is only achieved by Christos between 1;11 and 2;4 by the weaker criteria of Pizzuto and Caselli (1994).

The question is whether there is evidence for a premorphological stage in our data. A positive answer is totally excluded for Mairi since, by 1;9, she not only gives evidence of the development of several inflectional categories in the nominal domain, but her mean size of paradigm (form/lemma ratio) of verbs amounting to 2.3 by far exceeds that of nouns (1.14). At this age, she uses 14 different grammatical types of verb forms in an adequate way (Christofidou and Stephany 2003: 96, 101; see also Stephany 1985). Unfortunately, we do not know anything about her earlier inflectional development, since she was first observed at 1;9.

Christos' inflectional development of nouns, is much less advanced between 1;7 and 1;11 than Mairi's at 1;9. Even if we accepted that his noun morphology looks as if he were in a premorphological stage (Christofidou 2004), we could not deny the fact that, between 1;8 and 1;11, he already uses two to three different grammatical types of verb forms fulfilling different communicative functions (Christofidou and Stephany 2003: 96, 100). This indicates that inflection develops locally in domains where it is functionally important for the child.

Even Janna, who at 1;11 quotes lowest on almost all measures of noun inflection, gives evidence of inflectional development having set in not only in the nominal but especially so in the verbal domain. At 1;11, she uses three moods, two aspects, two tenses, and both the first and third person SG and PL of verbs (Stephany 1985, 1997a). Even if we played down her achievements in noun inflection we would hardly want to postulate that she is simultaneously in the premorphological and the protomorphological stage of development. The advantage of phase models is that changes in development do not "involve fundamental changes across the entire cognitive domain" such as language acquisition (Karmiloff-Smith 1992: 18) but are postulated to occur "at different times across different micro-domains and repeatedly within each domain" (p. 6) such as nominal and verbal inflection and their sub-domains (inflectional/gender classes of nouns, *aktionsart* classes of verbs). In such models the development of case distinctions with MASC nouns but of number distinctions with NEUT ones can easily be accommodated since neither of these grammatical categories develops across-the-board in Greek nouns. Rather, development is local, being at first based on particular lexical items and limited to certain subclasses within larger classes (see also Stephany 1997a: 325). This is at least the state of affairs which emanates from our production data. As long as children only contrast SG and PL of NEUT nouns in their speech, but not of MASC ones, we do not have evidence for affirming that they have generalized the number contrast to all nouns.

As pointed out above, the development of nominal inflection in Greek starts out from the inflectionally unmarked forms of nouns ending in their thematic vowel (see also Stephany 1997a). In adult- as well as child-directed speech, these forms represent the most frequently occurring inflected forms. Given that in the earliest phases of Greek language development inflectional contrasts of noun forms are largely or completely missing, must these forms be taken to lack inflection? In order to answer this question it is important to note that, in spite of being inflectionally unmarked, these forms fulfill certain functions not only in adult discourse but also in child speech, since they are learned by the child together with their occurrence in certain contexts and are mostly adequately used from the very beginning. As soon as the child picks up different grammatical forms from the input, each of them possibly occurring with a different lexical item, and uses them in different contexts, inflectional distinctions can be assumed to have emerged in principle. However, rather than being realized with one and the same noun (e.g. *líkos*/*líko* 'wolf:MASC:NOM/ACC:SG') they may be distributed over several lexemes in the child's speech (e.g. Spiros, 1;9, *líkos* 'wolf:MASC:NOM:SG' vs. *kathréfti* 'mirror:MASC:ACC:SG'). Once inflectional distinctions develop with one and the same lexeme so that its forms are contrastively used, we may assume that the children have grasped "the inflectional principle" of Greek (Stephany 1989: 159; see also Stephany 1997a: 322-323). When case contrasts emerge with Christos, they immediately occur with one and the same lexeme (1;11.13, *papús*/*papú* 'grandfather:MASC:NOM/ACC:SG'). Once marked grammatical forms have emerged, the old forms of nouns ending in the thematic vowel, which are underdifferentiated for case in the child's system (Stephany 1997a: 323), will specialize to fulfill the functions of a specific case form (ACC or OBL) thereby developing into grammatical forms of the adult language (see also Katis 1984; Stephany 1985, 1992). In the course of time, grammatical distinctions will generalize and spread out within specific subclasses of lexemes following the same inflectional pattern and beyond. In this view, children are considered to gradually construct the inflectional system of their language, based on the way they hear it used by their caretakers. It therefore seems preferable not to assume two strictly distinct stages of inflectional development, a premorphological stage qualitatively different from the following (proto-)morphological one but rather to view inflectional structure as 'emergent'.

Our findings are readily interpretable in the framework of usage-based models of language acquisition since such theories focus "on concrete examples of specific grammatical structures rather than on abstract, generalizable rules" and "young children's linguistic skills (and perhaps even adults') are much less abstract than previously believed" (Karmiloff and Karmiloff-Smith 2001: 139-140) and linguistic structure (grammar) is "not an overarching set of abstract principles, but more a question of spreading of systematicity from individual words, phrases, and small sets" (Hopper 1987: 144). As pointed out by Stephany (1992: 290), in this view "it is not necessary to be able to handle large amounts of data simultaneously in order to learn the grammar of a language." Also, variation in language use of individual speakers (see Bybee and Hopper (eds.) 2001) and in the construction of grammar by individual children is to be expected in such a theoretical framework.

Although we have been able to show in this paper that nominal inflection begins to develop early, i.e. at least in the second half of the second year, it remains an open question how Greek language acquisition starts out in the first half of the second year with early talkers.

Notes

[1] We would like to thank Evangelia Thomadaki and Maria D. Voeikova for thoughtful comments on an earlier version of this paper.

[2] On the difference between stage and phase models of development see Karmiloff-Smith (1992).

[3] Seiler (1958) shows that although declension was based on the phonological structure of noun endings in Ancient Greek, the Greek declensional system changed to a gender-driven one after the Hellenistic period.

[4] Computer-assisted coding and analysis of both corpora were effected within the CHILDES Project (MacWhinney 2000).

[5] But see 5.2.1. for details.

[6] For details on the other three children's development see Stephany and Christofidou (forthcoming).

[7] For a detailed analysis of definite NPs in Christos' data see Marinis (2003).

[8] For a more detailed analysis of appositional constructions in Greek child speech see Marinis (2003: 191-212).

[9] In contrast to our analysis Marinis (2003: 124) affirms "that case syncretism does not seem to influence the acquisition of case marking" arguing that Christos masters marked case forms of Greek nouns of the three genders basically at the same age, especially those of the two subclasses of MASC nouns. In taking only those contexts into consideration which require marked forms of nouns, Marinis leaves aside an essential aspect of the Greek declensional system, namely the functional contrast between marked and unmarked forms, and assumes that marked case forms are acquired across gender classes. The reason why Marinis did not find a significiant difference between the acquisition of marked forms of 'diptota' and 'triptota' MASC nouns is most probably due to the fact that the GEN occurs much less frequently than the NOM so that the number of tokens of the marked GEN

form of 'triptota' nouns does not have an important role to play. However, in order to understand the role of case syncretism in acquisition it is necessary to study the emergence and early contrastive use of case forms rather than their mastery in a detailed way.

[10] On the development of the inflection of the verb see Stephany (1985, 1989, and 1997a) and Christofidou and Stephany (2003).

[11] Marinis (2003: 119) postulates that PL marking sets in already at 1;11 in Christos' speech counting nouns that are attested in both the singular and the plural. In contrast to this, Christofidou (1998) considers Christos' early use of (mostly neuter) plurals to mainly constitute rote-learned standard reactions to standard pictures in a book or to be imitations, at least until 2;0.

[12] Final /i/ becomes a palatal glide before the plural suffix.

[13] Agreement errors concerning the category of number also occur. On grammatical agreement in early child Greek see Stephany (1997a: 204-205, 225-226, 251-252, 275 et passim).

[14] As pointed out by Stephany (2002: 17-18), the lexical technique of marking plurality by numerals or quantifiers used pronominally or in loose connection with nouns may precede inflectional number marking in first language acquisition of languages (e.g. Spiros, at 1;9, *pol-á* 'many-NEUT:NOM/ACC:PL').

[15] On the cognitive base of number see Wiese (1997) and Stephany (2002: 8-10).

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