



The acquisition of case in German. A longitudinal study of two Viennese children

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ABSTRACT

We study the acquisition of case by two young Viennese children, a boy and a girl according to their longitudinal corpora of output and maternal input. In critical discussion of previous psycholinguistic literature and of various theoretical approaches the analysis supports the insistence of Natural Morphology on markedness hierarchies, universal preferences (especially transparency, salience as an expression of figure-ground contrast and optimal size on the positive side, little iconicity and much ambiguity as negative factors), typological adequacy, productivity as a property of system adequacy. Interindividual differences in their development are explained by the boy being a segmental child, the girl rather a prosodic child.

KEYWORDS: case, first language acquisition, German.

1. *Theoretical aspects of German case*

1.1. *Definition, formation and function of case*

A case system is an inflectional system for marking noun/determiner phrases and their parts for their relation to their head. Typically heads are verbs, prepositions or postpositions (cf. Blake, 2004: 1073), seldom adjectives or nouns (except for Gen). Case indicates primarily the syntactic function of the NP/DP, thus case inflection belongs according to Dressler (1989) and Booij (1996) to prototypical, contextual inflection. Among the many theories of case (cf. Blake, 1994, 2004; Butt, 2006, 2009; Malchukov and Spencer, 2009) we follow the model of Natural Morphology (Wurzel, 1984; Kilani-Schoch and Dressler, 2005).

For the article language German the notion of syntactic case (Spencer, 2009: 185) as property of a NP/DP is more important than that of morphological case, as case expressed on a noun. Of its four cases, Nom(inative) and Acc(usative) are clearly structural, Dat(ive) and Gen(itive) less so, because they are also lexical/inherent (Butt, 2006: 58, 67; Wegener, 1995: 127 f.). According to the majority of arguments used in the literature (cf. Mayerthaler, 1987: 41, 48; Malchukov and Spencer, 2009: 653; Whaley, 1997: 154; Plank, 1980:

296; Bayer *et al.*, 2001: 502 f.), German seems to have the following markedness hierarchy: Nom > Acc > Dat > Gen.

In spoken German use of the Gen is rather limited to prenominal and thus generally possessive proper names, including the type *Mutter+s Freude* “mother’s joy” (Wegener, 1995: 145). Case is mainly marked on articles and other determiners. Moreover case marking is receding in spoken language (Wegener, 2007; Roelcke, 2011: 147). In Viennese dialect and colloquial use Dat often is replaced by Acc.

Standard German (including the Austrian German standard) shows the following case and gender paradigm of the determiner phrase (see Tables 1 and 2):

CASE	FEMININE	WEAK MASCULINE	STRONG MASC.	NEUTER
Nom with definite article	die weite Jacke	der wilde Löwe	der rote Ball	das kleine Haus
Nom with indef. article	eine weite Jacke	ein wilder Löwe	ein roter Ball	ein kleines Haus
Gen	der/einer weiten Jacke	des/eines wilden Löwen	des/eines roten Balls	des/eines kleinen Hauses
Dat	der/einer weiten Jacke	dem/einem wilden Löwen	dem/einem roten Ball	Dem/einem kleinen Haus
Acc with definite article	die weite Jacke	den wilden Löwen	den roten Ball	das kleine Haus
Acc with indef. article	eine weite Jacke	einen wilden Löwen	einen roten Ball	ein kleines Haus
English	the/a large jacket	the/a wild lion	the/a red ball	the/a little house

Table 1. *Standard German case paradigms in the Singular*
(s. Korecky-Kröll and Dressler, 2009: 271)

CASE	FEMININE	WEAK MASCULINE	STRONG MASC.	NEUTER
Nom = Acc with definite article	die weiten Jacken	die wilden Löwen	die roten Bälle	die kleinen Häuser
Nom = Acc indef. (no art.)	weite Jacken	wilde Löwen	rote Bälle	kleine Häuser
Gen with defin. art.	der weiten Jacken	der wilden Löwen	der roten Bälle	der kleinen Häuser
Gen indef.	weiter Jacken	wilder Löwen	roter Bälle	kleiner Häuser
Dat	(den) weiten Jacken	(den) wilden Löwen	(den) roten Bällen	(den) kleinen Häusern
English	(the) large jackets	(the) wild lions	(the) red balls	(the) little houses

Table 2. *Standard German case paradigms in the Plural*
(s. Korecky-Kröll and Dressler, 2009: 271)

1.2. *Psycholinguistic aspects*

Wegener (1995: 163 ff.) studied the validity, salience and frequency of German case markers and concluded:

Validity is highest for Dat, because it has the fewest syncretisms with other cases. Acc has a unique marking only with masculines, Nom only with masculine definite article and noun (or indefinite article with attributive adjective). But this presupposes acquisition of gender, which takes time. Prenominal and gender-independent Gen of proper names has high validity.

As to salience of case markers, Standard German articles are syllabic, but only the indefinite ones are stressable.

As to frequency, masculines and feminines dominate over neuters, Nom over Acc, Dat and Gen are rarer. But in prepositional phrases Dat – particularly with locative meaning – is more frequent *jedoch* than primarily directional Acc (Rickheit, 1975; Wegener, 1995: 170). In a recent investigation of the spoken substandard of Cologne and Bonn, Kösters-Gensini (2002) found for PPs 76,45% Dat, 23,2% Acc and 0,36% Gen, for other NPs 69,8% Nom, 26,7% Acc, 3,2% Dat, 0,35% Gen.

For sentence processing Bader and Lamers (2009: 402 ff.) have appealed to the ‘Human Sentence Processing Mechanism’, whose primary task is to integrate each word into unfolding phrase structures. Ambiguities, as in case syncretism, especially if they appear in garden-path-sentences, slow down processing time.

The word order preference for the order ‘subject – object’ (studied by Frazier, 1987), which is also assumed in naturalness theory (Dressler, 1994) and optimality theory (Lamers and de Hoop, 2005), experimentally confirmed also for German (Bader and Meng, 1999; Friederici and Mecklinger, 1996; Bader and Lamers, 2009: 408 ff.; cf. Tracy, 1984: 303 ff.) effects case interpretation especially during processing of those garden path sentences, where the direct or indirect object precedes the subject (Bader and Lamers, 2009: 411). In garden path sentences ambiguous Acc and Dat objects are automatically interpreted as Acc (Hopf *et al.*, 1998, 2003; Bader and Lamers, 2009: 411).

Analogously ungrammatical sentences with a falsely Nom-marked NP in the position of a Dat object are evaluated as erroneous significantly less often than those with a falsely Dat-marked NP in subject position (Bader and Bayer, 2006; Meng and Bader, 2000; Bader and Lamers, 2009: 416).

In summary, Nom is preferred over Acc, which is preferred over Dat (Bader and Lamers, 2009: 413).

1.3. German cases in naturalness theory

German cases can be evaluated according to the three subtheories of naturalness, i.e. of 1. universal preferences/markedness, 2. typological adequacy, 3. language-specific system adequacy (Mayerthaler, 1981; Wurzel, 1984; Dressler *et al.*, 1987; Dressler, 1994; Kilani-Schoch and Dressler, 2005).

As in the article language German, cases are signalled primarily by articles, 'constructional iconicity' of case forms is rather low. Naturalness on this universal parameter shows up only in the following instances:

1) via suffix *-(e)n* in the whole paradigm of weak masculine nouns except in the morphosemantically unmarked Nom Sg, e.g. *der Löwe* "the lion" – *des, dem, den; die, der, den, die Löwe-n*);

2) via suffix *-(e)s* of the Gen Sg of strong masculines and neuter nouns and via suffix *-n* in Dat Pl, if the Nom Pl ends in stem-final *-er/el*, highest after a Pl suffix *-e/er* (semi-agglutination);

3) via oblique case suffixes *-r* of feminine indefinite articles (and similar pronouns) and oblique case suffixes of definite adjectives.

'Indexicality' of case is rather high in the initial position of articles within the noun/determiner phrase (NP/DP).

'Morphotactic transparency' is on the one hand high, because case suffixes can be easily separated from bases in nouns, adjectives, indefinite articles, all pronouns (except personal pronouns), less so from the submorphemes of definite articles and interrogative pronouns. And by the absence of umlauting, case marking is more transparent than plural marking. On the other hand transparency is low due to discontinuous case marking via articles, inflectional suffixes on nouns and attributive adjectives.

'Morphosemantic transparency' of cases is in general high, as in inflection in general, i.e. the meaning of a base and of a case predicts the meaning(s) of a specific case form, but still it must be judged in its sentence context. For example, a Nom encoding the animate agent as subject is morphosemantically more transparent than encoding an inanimate object or an abstract state of affairs in the Nom (s. Mayerthaler, 1981: 14 ff.).

On the preference parameter 'biuniqueness/uniqueness/ambiguity' the least natural option ambiguity has high type and token frequency, first because of relatively rare case marking on nouns, second by the many case syncretisms on articles and other determiners and attributive adjectives. Moreover all case suffixes are homophonous with other inflectional markers, even

within declension with plural and gender marking. Thus only the Dat singular marker *-m* is unique, but ambiguous for gender (masculine and neuter).

The preference parameter of contrasting ‘figure and ground’ assigns nearly no figure properties to case marking: ‘perceptual salience’ of case suffixes is small, because they are either consonantal (nasal being sometimes syllabic) or have unaccented vowels, only their word-final position provides them with some salience, especially for children due to the recency effect. Articles, which carry in German the main load of case marking have some salience as initial elements of the noun/determiner phrase (but the primacy effect is not yet important for small children), are syllabic, have the status of words, but definite articles are always unstressed and indefinite articles have only secondary stress, if at all (cf. Wegener, 1995: 168 f.).

The preference parameter of ‘binarity’ plays a higher role, because declension is marked on nouns adjectives and articles by a single suffix, with the exception of Dat plural, where plural and Dat are separately marked (*de-n gut+e+n Kind+er+n* “to the good children”). Also determiner phrases are more often binary (article + noun) than longer.

Like many plural forms, on the preference parameter of ‘optimal length’ the shortness of case suffixes is optimal.

In regard to ‘typological adequacy’ German case marking fits well to the mixed type of German, because it combines isolating articles (consisting of a submorphemic stem plus suffix in definite articles). Case agreement is carried out by means of inflecting-fusional suffixes, signalling number and case cumulatively, except in certain Dat plurals which are semi-agglutinating (*Kind-er-n*).

As to language-specific ‘system adequacy’, its most important property ‘productivity’ holds for case, since syntactic case assignment is productive, except in obsolete Gen objects which do not occur in child-directed speech (CDS) and in substandard possessive constructions. Case marking, however, is recessive in the Gen Sg. of masculine and neuter nouns, in substandard dative plurals (Dressler, 2003: 34).

2. *Case acquisition in German: summary of research*

2.1. *Generative approaches*

Systematic research of case acquisition in German started only in the 1980s, predominantly by representatives of generative approaches.

Clahsen (1984) investigated longitudinally the spontaneous speech of two male twins (1;6 – 3;6) and of their younger sister (1;2 – 2;5) and assigned their productions to the following developmental phases: I) no inflectional marking, II) case-neutral markings of oblique cases of NPs and pronouns, III) differentiation of oblique cases, more frequently of Acc than Dat, and more of attributive adjectives than of articles.

Based on longitudinal data of four children, Tracy (1984) stressed that morphological case marking emerges in German clearly later than in strongly inflecting languages with more case suffixes (e.g. Russian). The case system there apparently belongs to ‘core grammar’, but is ‘peripheral’ in German. Acquisition of German case marking presupposes at least the emergence of a rudimentary article and pronominal system; except for pronominal *-s*-Gen, which therefore emerges relatively early (from ca. 1;9 onwards). Otherwise Tracy connects case acquisition to the development of syntax (cf. Schaner-Wolles *et al.*, 1986 on development of case in passive sentences). In a similar study of six children Tracy (1986) adds that Acc emerges before Dat, but that case differentiation occurs later in prepositional phrases. Similar results have been found in Clahsen *et al.* (1994).

In her detailed PhD thesis, Eisenbeiss (2003) investigated, in the framework of Chomsky’s (1995) Minimalist Programm feature-governed acquisition of NP phrases in five longitudinal corpora and two transversal studies at the ages of 1;11 – 3;6. Some important results are:

In children’s utterances there are no true deviations from the target language, only certain underspecifications of features in terms of phonological reductions of D-elements (i.e. determiners) and morphological marking (Eisenbeiss, 2003: 458).

There is no universal order of acquisition, case markings is first limited to isolated nouns, which is interpreted as «children first integrating features into lexical entries for inflected full forms such as [Gen] *Mamas* and only later create, on the basis of such full-form entries, decomposed entries for stems and affixes such as *-s*» (Eisenbeiss, 2003: 459).

Dat marking of indirect objects in sentences with trivalent verbs has the same frequency of correctness as Nom marking of subjects and Acc marking of direct objects, whereas Dat marking of objects of mono- and bivalent verbs and prepositional complements is often replaced by overgeneralisations of Nom or Acc marking, because these Dat and prepositional markings are based on lemma-specific properties of case of verbs and prepositions, and which must be learned separately for each lemma (Eisenbeiss, 2003: 459).

2.2. *Functionalist approaches*

Based on earlier diary studies and on the Meike corpus (Miller, 1976) Mills (1985) found that case forms of personal pronouns are easier to acquire, because of greater distinctivity, than case forms of articles (Mills, 1985: 182), except for uniquely marked articles. Whereas article-marked Gen is not attested until age 6, possessive, pronominal *-s*-marked Gen of proper names emerge at about 2;6¹ and can sometimes be overgeneralised to common nouns and other possessive constructions (Mills, 1985: 185 f.). In general, German case marking is acquired later than other categories because of its complexity.

In the framework of constructivist ‘Usage-Based Theory’ Wittek and Tomasello (2005) investigated German case acquisition in three ample transversal studies with pseudowords. Following Slobin (1982) they hypothesized and confirmed experimentally that German acquiring children, because of the local cues of case, acquire transitive active and passive constructions faster than English acquiring children, who must rely on less transparent because global cues of word order (supported by Lindner’s 2003 comprehension experiments).

A recent study of German case acquisition is by Pelham (2011) who investigated the input of 24 English and 24 German acquiring children for the use of personal pronouns which show case ambiguities: 63,3% tokens of English pronouns were ambiguous, only 7,6% of German pronouns. But German articles are still more ambiguous (77%). This may explain why German acquiring children produce many article errors, whereas they have much fewer problems with pronouns than English learning children.

Pelham (2011: 260, 263 f.) explained these results with her ‘Input-Ambiguity Hypothesis’². Because of children’s limited attention resources, ambiguous input cases may effect an initial ‘case blindness’, which induces them to ignore also the (few) unique case markings.

An extensive survey of different theoretical approaches to case acquisition of various languages can be found in Eisenbeiss *et al.* (2009).

¹ There are substantive interindividual differences, since TRACY (1984) found them already at the age of 1;9.

² This hypothesis builds on the ‘Competition Model’ of BATES and MACWHINNEY (1987). But her model is a top-down model, whereas she considers the ‘Competition Model’ as a bottom-up model.

2.3. *Approaches of Natural Morphology*

Dressler and Karpf (1995) started to distinguish three basic phases in the acquisition of morphology:

1) The premorphological phase where only isolated inflection forms occur.

2) In the protomorphological phase children (starting usually before age 2) detect morphology as non-chaotic variation of meaning and form (Dressler *et al.*, 2003): German case distinctions emerge later than number distinctions, diminutives and noun compounds. The criterion for assuming children's detection of morphology is the mini-paradigm criterion: when a child's spontaneous corpus contains of one and the same word-class the same 3 different non-formulaic inflectional forms of 3 words spontaneously and in different contexts, then we can assume that the child has detected these patterns and the general morphological principle of recurrence of meaning and form. This also leads to first overgeneralisations (Dressler *et al.*, 2003, Bittner *et al.*, 2003; cf. also Eisenbeiss *et al.*, 2009).

3) In the phase of Morphology Proper, which is adultlike (usually starting before the age of 3) first complete paradigms appear, first limited to frequent words. Later on, the beginning of this phase has been classified as core morphology (Ravid *et al.*, 2008). Case forms now are used in different adultlike semantic functions, but errors may still occur in unproductive and rare forms. Therefore a child's case system does not yet correspond completely to the adult system (cf. also Eisenbeiss *et al.*, 2009: 381).

Bittner (2006) compared acquisition of case and gender in the longitudinal spontaneous productions of the girl Simone from 1;9 to 4;0. For articles and pronouns, she found acquisition priority of lexical-functional features (e.g. definiteness), only afterwards of case and finally gender because case is acquired more easily than gender because of its connection to the thematic role and case position (Bittner, 2006: 117).

Simone's first 'case paradigm' at 2;7 consists of the definite articles *die*, *der*, *den*, *dem* (Bittner, 2006: 124 f.). A first gender differentiation between feminines and non-feminines emerges at 2;7 via *dem*, correctly used for masculines and neuters with nearly no overgeneralisation. Afterwards *die*-overgeneralisations vanish from Dat contexts and *den*-overgeneralisations of feminines disappear from Acc contexts, followed by the beginning of the dissociation of masculines and neuters. Thus case features are acquired

before gender features. And case acquisition follows the markedness scale from unmarked Nom over Acc to Dat and finally Gen.

Thus within Natural Morphology, on the basis of universal, typological and language specific preference parameters, certain case forms are predicted to be preferred by children. These predictions are in general confirmed empirically.

Language type has been found to codetermine course of acquisition. Whereas in inflecting-fusional languages plural emerges before case, the opposite is true for agglutinating languages (s. Stephany and Voeikova, 2009). And whereas in agglutinating languages (e.g. Turkish or Finnish) case forms are used productively very early (even at 1;0 – 1;3), it is only about 1;9 for the strongly agglutinating Slavic or Baltic languages (s. Stephany and Voeikova, 2009, Savickienė, 2003), in weakly inflecting languages, such as German, only about 2;2 – 2;3 (cf. also Eisenbeiss *et al.*, 2009: 382).

3. *Case acquisition by two Viennese children*

This subchapter studies, how far the different acquisition sequences and strategies, described in the preceding chapter, hold also for these two children Jan and Katharina, whether there exist important interindividual differences and how all this can be best explained, by referring to the three subtheories of Natural Morphology, i.e. to universal markedness/preference parameters, to typological adequacy of German morphological patterns, and to the language-specific system adequacy of German declension with an emphasis on degrees of productivity.

3.1. *Jan and Katharina*

Jan is the second-born of two boys of a Viennese mid-to-high SES family. He is an early talker who likes to imitate his parents' and his older brother's language. He was recorded from age 1;3 to 6;0, in regular intervals (at least 30 minutes per month, but up to 4 hours per month from 1;8 to 2;11, i.e. during the most interesting period of acquisition).

As far as acquisition of case is concerned, Jan's protomorphological phase reaches from 1;10 to 2;9, morphology proper starts at 2;10 (recorded data after 3;0 are too few for determining the end of core morphology). For other categories (e.g. plural, compounding, diminutives, ...), first evidence for protomorphology appears already at 1;8.

Katharina is the second-born of three girls of another Viennese mid-to-high SES family. Being a shy and quiet girl who prefers letting her older sister speak for her, she is a relatively late talker. She was recorded from age 1;6 to 3;0 in monthly intervals, but with two gaps at the ages 1;7 and 2;7. Recording times per month range from 2 to 92 minutes (mean: 47 minutes). Katharina's protomorphology stretches from 2;6 (at least) to the end of recordings (3;0).

A part of Jan's input and output data of 1;3 – 2;7 has been studied already by Korecky-Kröll and Dressler (2009) for case acquisition. Here we study additional data up to the age of 3 and few data up to 6, plus Katharina's data (see also Korecky-Kröll, 2011). Some basic assumptions remain the same: Children start with either base forms or the most frequent forms. In German, both coincide as Nom.Sg. In verb-based constructions Acc is more central and frequent than Dat, and Gen is little used in colloquial German. Gen is noun-dependent and thus difficult to compare with Acc and Dat. But in substandard and dialectal Austrian German (such as in many other varieties), Gen. is often replaced by Dat in possessive and prepositional phrases, such as *Paulis Auto* "Paulie's car" → *dem Pauli sein Auto* or *das Auto vom Pauli*; *wegen des* "because of the" → *wegen dem*. In certain paradigms, the Viennese dialect replaces Dat with Acc (e.g. *mit den Kinder-n* "with the children" → *mit die Kinder*). Moreover, in Austrian and Bavarian German, proper names and mass nouns (especially in CDS) are preceded by articles and are therefore more often overtly case-marked than in Standard German, e.g. *der Pauli* "the Paulie", *eine Milch* "a milk" (cf. Eroms, 1989).

3.2. *Distribution and development of case positions in the two corpora*

Two quantitative analyses have been performed: the first concerns case positions (3.2), the second case markings (3.3), both in terms of token frequencies: utterances which consist of a single noun have been generally coded as unclear (unless contextually clear, e.g. in answers, or in vocative use, a subcategory of Nom).

CASE	JAN	MOTHER (J)	KATHARINA	MOTHER (K)
Nom	38,39%	46,12%	37,03%	50,01%
Acc	20,37%	31,01%	12,94%	26,13%
Nom^Acc	1,68%	1,14%	3,46%	1,80%
Dat	8,37%	17,47%	6,73%	15,34%
Acc^Dat	0,05%	0,00%	0,06%	0,00%
Gen	0,39%	0,63%	0,00%	0,03%
Dat^Gen	0,00%	0,04%	0,00%	0,03%
unclear	30,75%	3,59%	39,78%	6,66%
TOTAL	100,00%	100,00%	100,00%	100,00%
Total noun tokens (absolute)	12093	25988	1561	3605

Table 3. *Distribution of case positions in the corpora (% tokens)*

As indicated in Table 3, unclear positions are very frequent in both children (Katharina's most frequent category with 39,78%, Jan's second frequent with 30,75%), naturally in their mothers they are rare, with 3,59% and 6,66%. Most of the unambiguous case positions are Nom in all corpora, 46,12% and 50,01% of the mothers, 38,39% as Jan's most frequent position, 37,03% as Katharina's second frequent position.

Nom is followed in all corpora by Acc. The percentages are: Jan's mother 31,01% of all case positions, Katharina's mother 26,13%, Jan 20,37%, Katharina 12,94%.

Dat is clearly less frequent, about half of Acc: Jan's mother 17,47%, Katharina's mother 15,34%, Jan 8,37%, Katharina 6,73%.

Gen is extremely rare: Katharina has none, her mother a single token, Jan 47 tokens (0,39%), and his mother 164 tokens (0,63%).

The distributions in CDS differ substantially from those of adult adult-directed written (Meier, 1967) and oral corpora (Kösters-Gensini, 2002), especially in lower occurrence of Dat and much lower of Gen.

How does the distribution of case positions change in the development of spontaneous child speech?

Jan starts with over 90% of unclear forms at 1;3 – 1;8, mostly in holophrases. At 1;8 the first three article-marked but imitated NPs occur in Nom and Acc contexts, very first Dat as well, partially even suffixed (*Pferde-n* "horses"): the context renders Dat probable, but they could be also over-generalisations of *-(e)n*-plurals. Probably targeted prepositional phrases with (target language) Dat (e.g. *Pferd sittn* ← *auf dem Pferd sitzen* "sit on the horse") or Acc (e.g. *Wasser debm* ← *ins Wasser geben* "put into water") lack both prepositions and articles at the same age.

In early protomorphology, i.e. from 1;9 to 1;11, Jan's syntax strongly develops as well as clearly identifiable case positions (from 12,35% to 62,21%), over 90% at 2;2.

Jan's first Gen (1;10) is a prenominal possessive *-s*-form in the elliptical answer *Jans* to the question *Hast du da ein Handy?* "Do you have a cell-phone?". At 1;11 the first complete possessive NP (*Papas Kakao* "daddy's (hot) chocolate") occurs. Jan's only two postnominal Gen tokens appear very late: 4;11: *Fahrzeuge der Fahrschule* "vehicles of the driving school", 5;5: *Rummy ist eines meiner Lieblingsspiele* "R. is one of my favourite games".

At 1;11 he produces frequently the (partially imitated, partially spontaneous, rote-learned) preposition phrase *Fernseher am Bauch* "TV on the belly". At 2;0 Dat-marked preposition phrases diversify. At 1;11 the first Acc-marked PP, but without article: *in rote Lade* "into red drawer". However, up to 2;1 prepositions are mostly omitted.

From 2;1 to 2;4 Jan substitutes prepositional Dat often with Acc, not only the articles *dem-den*, which are difficult to discriminate, but he also clearly confuses locative and directional PPs (s. 3.6). At 2;4 first correct directional PPs with clear article marking, e.g. *in die andere Richtung* "in the other direction" appear.

As in Jan's later phases, also in his mother's later corpus Nom decreases in favour of other cases, indicating fine-tuning: as soon as Jan often produces correct Nom, she confronts him with more oblique cases. She produces few Gen (0,69% or 164 tokens), mostly prenominal possessive forms with *-s*-marking. Further Gen occur, when she reads out to Jan.

Katharina starts with the Nom *Mama!* in vocative function, exclusively up to 1;9, and at 1;11 vocatives prevail again.

Katharina's real case acquisition starts at 2;0 when first article-marked NPs (partially imitated, partially spontaneous) appear in Nom (e.g. *der Papi* "the daddy") and a first overgeneralised Nom or Acc instead of Dat. Besides, she also uses several prenominal fillers instead of articles (e.g. *e Juu [: Uhr]* "filler clock" (2;0)). At 2;3 first clear Acc occur, e.g. *Fisch esse* "eat fish".

PBs become productive only at 2;5, but without overt articles, maximally with fillers (e.g. *mit a Löffel* "with filler spoon"). Starting with 2;6 Katharina overgeneralises (5 months later than Jan) prepositional Acc instead of Dat.

In the first months, Katharina's mother uses only unambiguous case

positions, only later ambiguous ones. Similar to Jan's mother, her percentage of Nom decreases slightly in favour of other cases. This seems to not only fine-tuning but also scaffolding, i.e. advancing in providing input which she thinks the child should acquire next.

3.3. *Distribution and development of correct case markings*

The marking categories are case suffixes, inflected and uninflected determiners and adjectives, prepositions and all possible combinations of these categories.

Among Jan's unmarked and correctly marked cases the unmarked forms clearly dominate with 57,61%, followed by inflected determiners (28,49%), prepositions plus inflected determiners (5,25%). All other case marks are each below 3%. The first case markers occur later (1;5) than the first unambiguously identifiable case positions (1;3, s. 3.2).

At 1;10 the first preposition emerges (*mit Auto* "with car"), at 1;11 the first double marking (preposition plus inflected adjective: *in rote Lade* "into red drawer"), at 2;4 the first triple marking by preposition plus correct determiner and inflected adjective (z. B. *in die andere Richtung* "in the other direction"), but they remain rather rare (45 tokens).

In Katharina's corpus the unmarked forms dominate even more (67,51%), next come inflected determiners (24,31%), then prepositions plus inflected determiners (4,2%).

Jan's mother had more diversity in combinations of case markers than Jan: inflected determiners dominate (47,43%), before unmarked forms (19,16%) and prepositions plus determiners (16,63%). Katharina's mother shows the same rank order.

Now we pass more precisely to the correct case markings (i.e. without errors and unmarked forms). In all corpora correctly marked Nom dominates (Jan 55,57%, his mother 45,56%, Katharina 45,18%, her mother 44,12%) before Acc (Jan 25,55%, his mother 33,44%, Katharina 27,06%, her mother 32,21%) and Dat (Jan 14,96%, his mother 21,87%, Katharina 17,66%, her mother 21,26%). Gen and ambiguous case forms are rare.

Jan's few marked case forms in 1;5 and 1;8 are imitated and rote-learned. At 1;9 Nom increases, at 1;10 also Acc, and particularly from 2;10 onwards, Nom decreases in favour of Dat, see Figure 1.



Figure 1. *Jan's changes of correct case marking (tokens, %)*

Jan's input similarly shows first an increase and then a decrease of Nom because of later increasing Dat, whereas Acc remains rather stable.

Katharina starts at 2;0 with correctly marked Nom; her first Dat and Acc at 2;1 are rote-learned. Later Nom increases, also Dat, whereas Acc slightly decreases. Similarly, in Katharina's input, first Nom and Acc dominate, whereas Dat increases later on.

3.4. *Distribution of correct case forms and naturalness theory*

Since constructional iconicity plays a small role in adult case marking (cf. 1.3), it is rather irrelevant in its acquisition.

In regard to morphosemantic transparency (s. Table 4) we analyse case positions (cf. 3.2) and correctly marked case forms (cf. 3.3): do the often-noted connections between case and animacy have an impact on frequency of use in the corpora? Nom, Dat and Gen because of their frequent roles as agent, recipient and possessor should tend to be animate, Acc as predominately patient to be inanimate. These relations are classified here as transparent, the opposed ones as opaque.

ANALYSIS	CASE POSITIONS		CORRECT CASE MARKINGS	
	TRANSPARENT	OPAQUE	TRANSPARENT	OPAQUE
TYPE OF CASE MARKER	ANIMATE NOM, DAT, GEN; INANIMATE ACC	INANIMATE NOM, DAT, GEN; ANIMATE ACC	ANIMATE NOM, DAT, GEN; INANIMATE ACC	INANIMATE NOM, DAT, GEN; ANIMATE ACC
Jan TOK	53,20%	46,80%	48,40%	51,60%
Mother (J) TOK	61,59%	38,41%	57,41%	42,59%
Katharina TOK	77,54%	22,46%	67,91%	32,09%
Mother (K) TOK	74,88%	25,12%	67,55%	32,45%

Table 4. *Relative frequencies of case markers according to morphosemantic transparency (comparison of case positions and correctly marked forms)*³

Regarding case positions, Table 4 shows a significant preponderance of transparent relations in all four corpora, especially for Katharina.

The second analysis, that of correct case marking gets significant results in the corpora of Katharina and the two mothers, but is contradicted in Jan's corpus.

For both children semantic relations seem to support case acquisition, more for Katharina than for Jan. This may have to do with Jan's pleasure in playing with vehicles, which are used often in Nom and are inanimate, but also treated as animate by Jan, sometimes imitated by his mother. Thus morphosemantic transparency clearly influenced acquisition. On the other hand, rampant ambiguity of case marking leads to many errors in acquisition (s. 3.7).

All case positions, except the already mentioned obsolete ones (especially the object Gen and postnominal non-possessive Gen), are productive, which facilitates acquisition. Among types of case marking also only the -s-Gen has limited morphological productivity. This explains the scarcity of Gen in our child data.

3.5. *Interindividual aspects*

Whereas Jan started as a segmental child (cf. Peters and Menn, 1993; Peters, 1997) in his holophrastic utterances with mostly unclear case positions, Katharina's first noun is *Mama!*, used in the first two months only in voca-

³ Prepositional phrases have been excluded from Tab. 4, because animacy does hardly influence degree of transparency.

tive function. Afterwards, until 2;5, unclear case positions prevailed.

Jan's first (imitated) case marking (1;5) included an adjective (*hohen Turm* "high tower" (Acc), whereas Katharina's first, partially imitated, partially spontaneous NPs contain already articles (all Nom): *der Uhu* "the eagle owl", *ein/mein Puppe* "a/my dollie", *der Papi* "the daddy"). Thus, as in number acquisition, Jan, as segmental child, focused on content words and later on had significantly more case suffixes on nouns than Katharina, who, as a more prosodic child, preferred to include articles.

A preference for suffixed nominal case forms appeared in Jan already at 1;8, when he used correctly Nom vs. Dat in partially imitated, otherwise rather rote-learned bare noun forms in Dat Plural (*Pferd-e-n* "horses", *Hund-e-n* "dog-s") vs. Nom *Pferd-e*:

At 2;0 he produced a clear contrast of Plural Acc vs. Dat, omitting articles and a preposition:

- 7.3 *JAN: bausteine auch nicht ess(e)n "also not eat building stones"
 *JAN: bausteinen (s)piel(e)n "play (with) building stones"

In contrast, Katharina produced only two case suffixes on nouns: *beim Hase-n* "next to the hare", (Dat at 2;8) and *mit *eine-n Polizist-en* "with a (Acc instead of Dat) policeman" at 2;11; whereas these singular weak masculine oblique cases became productive with Jan as the latest microclass (3;0) became productive; earlier he used base forms of nouns, e.g. 2;1 **Hase streicheln* "caress hare".

Jan's preference for suffixed case forms can be best seen in Gen. Although rare, prenominal *-s*-forms emerged early (1;10) and became productive at 1;11, postnominal Gen only at 4;11. Table 5 shows with selected typical examples how his case markings filled up in time.

MARKER	GEN/NUM	NOM	ACC	DAT	GEN
NOUN-SUFFIX	f. SG				2;0 Laalaas Ball
	m. SG		3;0 einen Drachen	3;0 zu diesem Drachen	1;10 Jans (Handy)
	n. SG				-
	PL			1;10 Steinen	
ADJ-SUFFIX	f. SG	1;10 alte Zeitung	2;0 andere Lade	-	-
	m. SG	1;9 hoher Turm	1;11 anderen Topf	-	-
	n. SG	1;11 kleines Haus	2;5 neues Aufnahmegerät	2;0 riesengroßen Rettungsauto	-
	PL	1;10 (nor)male Autos	1;11 grüne Socken	-	-
DEFART.	f. SG	2;0 die Laalaa	2;1 die Blume	4;11 der Bank	4;10 Fahrzeuge der Fahrschule
	m. SG	1;10 der Mist	2;2 den Lieferwagen	2;2 dem Kasperl	-
	n. SG	1;11 das Müllauto	2;0 das Auto	-	-
	PL	2;1 die Schweine	2;2 die Ohren	4;11 den Häuschen	-
INDEF.ART.	f. SG	2;0 eine Frau	1;10 eine Suppe	-	-
	m. SG	1;11 ein Apfel	2;0 so einen Zug	-	-
	n. SG	1;11 ein Auto	2;0 ein Auto	-	-
	PL				5;5 eines meiner Lieblingsspiele
DEFART +ADJ-SUFFIX	f. SG	2;2 die große Straße	3;0 die arme Kirche	-	-
	m. SG	2;1 der zweite Patschen	2;7 den anderen Fünfer	-	-
	n. SG	2;3 das schwere Buch	2;4 das grüne Buch	-	-
	PL	2;6 die anderen Autos	4;2 die ganzen Packungen	-	-
INDEF. ART. +ADJ-SUFFIX	f. SG	2;2 eine kleine Katze	2;3 eine andere Gutenachtgeschichte	-	-
	m. SG	2;2 ein großer Mann	2;6 einen alten Ford	-	-
	n. SG	2;1 ein sportliches Auto	2;4 ein kaputtes Haus	-	-
	PL				
PRÄP + DEFART	f. SG		2;4 in die Schiffsschaukel	2;1 auf der Straße	-
	m. SG		2;6 in den Kofferraum	[1;11 am Bauch] 2;0 im Hof	-
	n. SG		2;2 ins Haus	2;1 im Kinderzimmer	-
	PL		3;3 in die Zähne	2;2 mit den Autos	-

continues

MARKER	GEN/NUM	NOM	ACC	DAT	GEN
PRÄP+ INDEF. ART	f. SG		2;10 in eine Maus	3;0 von einer Straße	-
	m. SG		3;5 in einen Tunnel	2;10 mit einem Kaugummi	-
	n. SG		2;5 an ein Fenster	2;11 in so einem Haus	-
	PL				
PRÄP + DEF.ART+ ADJ-SUFFIX	f. SG		2;4 in die andere Richtung	2;4 aus der großen Flasche	-
	m. SG		-	2;4 im großen Film	-
	n. SG		4;10 aufs narrische Bein	3;9 mit (de)m kleinen Lego	-
	PL		-	-	-
PRÄP+ INDEF. ART+ ADJ-SUFFIX	f. SG		2;10 in eine sprechende Maus	6;0 mit einer anderen Farbe	-
	m. SG		-	5;1 bei einem schlimmen Notfall	-
	n. SG		-	-	-
	PL		-	-	-

Table 5. *Emergence of Jan's case markings (spontaneous correct forms)*⁴

Thus among spontaneous nominal case suffixes Jan started at 1;10 with an *-s* Gen (*Jan-s*) and a Dat Plural in *-n* (*Stein-e-n*). But adjectival case suffixes emerged earlier: Nom *boh-er Turm* (1;9). At 1;10 also indefinite and later definite articles emerged in Nom and Acc. In contrast to Jan, Katharina as a rather prosodic child (cf. Peters, 1997) started with articles (2;0) much earlier than with adjectival case markings at 2;4.

In Jan's corpus the mini-paradigm criterion got fulfilled at 2;2 with the contrast between Nom Sg. *das/ein Auto*, Nom & Acc *sportlich-es Auto* "sportive car", Nom & Acc Pl. *die Auto-s*, Dat Pl. *mit den Autos*; Nom *der/ein Kasperl* "Punch", Acc *den Kasperl*, Dat *dem Kasperl* plus a large number of two-way oppositions. Katharina's corpus is too small for showing more than two-way oppositions (since 2;6).

⁴ Forms in Italics are inflected such as corresponding articles (e.g. Acc possessive *meinen* "my" like *einen*, demonstrative *diesen* like *den*), forms in square brackets are rote-learned or imitated. Grey cells in the table represent non-existent forms in the language, white cells containing a hyphen represent forms which exist in the language, but which do not appear in the corpus.

3.6. Case errors

Due to massive syncretism and homophony (cf. *der* = 1. Nom Sg. masc., 2. Gen & Dat Sg. fem., 3. Gen Pl., see also Tables 1 and 2), German case errors are often difficult to distinguish from gender and number errors. There are many of these ambiguous errors in Jan's and Katharina's data (e.g. **ein Fisch* "a fish" in Acc context, in which the error direction may either be Acc → Nom or masc. → neut.; or *mit *der Zug* "with the train", in which the error direction may either be Dat → Nom or masc. → fem.).

The following tables (6, 7) show half of Jan's and Katharina's errors, which are most probably true case errors:

AGE	PRODUCED FORM	TARGET FORM	ENGLISH	ERROR DIRECTION
1;11	Da ist ein *weißen Hügel	Da ist ein weißer Hügel.	There is a *white hill.	NOM → ACC
1;11	Drücken *der Lautsprecher.	Drücken den Lautsprecher.	(To) press *the loudspeaker.	ACC → NOM
2;1	*Hase halten (2x)	den Hasen halten	(To) hold the *hare.	ACC → NOM
2;1	Jan: Da gibt's viele Garasn [: Garagen]. Mot: mhm. Jan: *Eigenen Daras [: Garage]	(Eine) eigene Garage	Jan: There are many garages. Mot: uh-huh. Jan: *Own garage.	ACC/NOM → DAT (?) & Fem → Masc
2;1	*Großer Autobus einsteigen Leute.	In den großen Autobus steigen Leute ein.	*Big bus enter people (= People enter the big bus).	ACC → NOM
2;2	Satten von *die Suhen	Schatten von den Schuhen	Shadow of *the shoes.	DAT → ACC
2;2	Ich war auch in *die Donau.	Ich war auch in der Donau.	I was also in *the Danube.	DAT → ACC
2;2	*Der Papa auch nicht hauen.	Den Papa auch nicht hauen.	Not (to) beat (*the) daddy.	ACC → NOM
2;3	Die Frau geht da *im Haus.	Die Frau geht da ins Haus.	The woman is walking there *in the house (= into the house).	ACC → DAT
2;3	*Der Ball hab ich auch oros [: orange] gemacht.	Den Ball hab ich auch orange gemacht.	I made *the ball orange.	ACC → NOM
2;3	Der Bär sucht den *Löwe. (2x)	Der Bär sucht den Löwen.	The bear is looking for the *lion.	ACC → NOM
2;3	*Die Laalaa gefällt das nicht.	Der Laalaa gefällt das nicht.	This does not please (*the) Laala (= Laala does not like this).	DAT → NOM
2;5	für *den Autos	für die Autos	for *the cars	ACC → DAT
2;5	Schau, der Peter gibt *die Heidi Hand.	Schau, der Peter gibt der Heidi die Hand.	Look, (the) Peter gives (*the) Heidi hand (= Peter is shaking hands with Heidi)	DAT → ACC
2;6	und dann hols von *die Leuten	hols von den Leuten	and then take it from *the people!	DAT → ACC (?)

continues

AGE	PRODUCED FORM	TARGET FORM	ENGLISH	ERROR DIRECTION
2;6	Mot: Wen hat die Sophie ausgeschnitten? ... Jan: *Der Dipsy!	Den Dipsy!	Mot: Whom has (the) Sophie cut out? Jan: *The Dipsy.	ACC → NOM
2;7	Mot: Züge fahren da auch ... Jan: Und *einen Anhänger.	Und ein Anhänger.	Mot: Trains are going there as well. Jan: and *a trailer.	NOM → ACC
2;8	Mot: ...turnen im Zirkus. Jan: Und ich in *deine Wohnung. (2x)	Und ich in deiner Wohnung.	Mot: ...do gymnastics in the circus. Jan: and I in *your apartment.	DAT → ACC
2;9	Aber auf *der Zahl hast du auch Tixo draufgepickt.	Aber auf die Zahl hast du auch Tixo draufgepickt.	But on *the number you pasted some Scotch.	ACC → DAT
2;10	Was in [//] ist in *euren Schlafzimmer?	Was ist in eurem Schlafzimmer?	What is in *your bedroom?	DAT → ACC (+ gender error)
2;11	Ich mag auch *kalter Kakao (2x).	Ich mag auch kalten Kakao.	I also like *cold chocolate.	ACC → NOM
2;11	Das heißt dann *warmen Kakao.	Das heißt dann warmer Kakao.	This means *warm chocolate.	NOM → ACC

Table 6. *Jan's case errors (1;3 – 2;11)*

AGE	PRODUCED FORM	TARGET FORM	ENGLISH	ERROR DIRECTION
2;0	Mot: Wem gehört die Puppe? Kat: *Die Kathi!	Der Kathi!	Mot: To whom does the doll belong? Kat: (*The) Kathi.	DAT → NOM
2;6	Und du mit *unser Auto.	Und du mit unserem Auto.	And you with *our car.	DAT → ACC
2;6	auf der *große Rutsche	auf der großen Rutsche	On the *big slide.	DAT → ACC
2;6	Und *die Moni was anziehen.	Und der Moni was anziehen.	And dress (*the) Moni in something.	DAT → ACC
2;8	Hat gesagt: *erstem August. (2x)	Hat gesagt: erster August	Has said: *first (of) August.	NOM → DAT

Table 7. *Katharina's case errors (1;6 – 3;0)*

Both children often replace Acc with Dat (cf. § 2), Jan also Acc with Nom, both children also other cases with Nom (the base case): a wrong Nom occurs 17 times in the above tables. Most of the times, when even a gender or number substitution would be conceivable, also case substitution is involved, as in Jan's *drücken *der Lautsprecher* (1;11); there are 4 more examples of this kind, when some other wrong case than Nom appears. But there are also other error directions, which disconfirms the importance of distinguishing (e.g. Eisenbeiss *et al.*, 2006) structural and lexical case.

Both children appear to have most problems in producing correct cases,

when they have to form a case as an answer to a question uttered by their mother (Jan 2;6, 2;7, 2;8, Katharina 2;0), i.e. when case is determined syntactically by the preceding context. These are the instances of errors which are most easy to distinguish from gender and number errors. Thus they confirm that many ambiguous errors are basically case errors.

Clear case errors in the above tables occur also with the singular article **einen* (Jan 2;7), the plurale tantum **die Leuten* (Jan 2;6), which has a correct dative marking on the noun but an erroneous Nom or Acc article, or with Jan's first example *ein *weißen*, where there is a correct Nom article but an erroneous oblique adjective suffix.

Jan appears to consolidate his case system at the beginning of the morphology proper phase (2;10), when he correctly distinguishes between directional and locative PPs (cf. § 3.5), his very last error occurring at 2;9. Also other case errors vanish at 2;11. Also Katharina's case errors seem to cease at 2;9.

3.7. Conclusion

Also Jan's and Katharina's corpora show that the German case system is more difficult to acquire than gender and plurals (cf. Korecky-Kröll and Dressler, 2009; Korecky-Kröll, 2011; Korecky-Kröll *et al.*, in press) because of its high complexity, small iconicity and salience and much ambiguity. But because of many syncretisms it is difficult to distinguish case, gender, number and definiteness errors. In acquiring case each child used different strategies: the segmental child Jan focussed first (from 1;10, the beginning of his protomorphological phase, onwards) on suffix marking (in Gen Sg, Dat Pl and attributive adjectives), whereas Katharina as rather prosodic child started with fillers which she soon (2;0) replaced with articles.

Decomposition in form and meaning starts only in the protomorphological phase. Before, as also supposed by Usage Based Theory (Wittek and Tomasello, 2005) and by Eisenbeiss (2003: 459), children produce inflected full forms but treat them as indecomposable units with both lexical and some rudimentary grammatical meaning. Afterwards productivity of forms in the input influenced order of acquisition (negatively for less productive or unproductive uses of Gen).

Jan's first spontaneous case suffixes emerged at 1;8, but they are isolated, as to be expected for the premorphological phase. As an early talker, he produced, from 2;0 onwards, form oppositions of prenominal Gen, noun-

suffixed Dat Plurals as well as article- und adjective-marked Nom und Acc, which shows also in early overgeneralisations; Dat articles emerged only at 2;2. Thus he combined two strategies: he focussed 1. on the positional salience of nominal suffixes and the transparency effect of animateness, 2. on the markedness hierarchy of cases from Nom over Acc to Dat (cf. § 2.3 and Bittner, 2006, who attributes the most marked status to Gen, but in Jan's data, this is confirmed only for postnominal Gen). This means that he followed the typical acquisition order: 1. omission, 2. emergence with errors, 3. largely correct usage. Accordingly he had his high point of case errors at 2;3, which also fell still in the period of unconsolidated gender acquisition (up to 2;5). His case system consolidated at 2;10 with the beginning of the subperiod of core morphology and thus of the period of morphology proper (cf. §§ 1.3, 2, 3.4), when Jan started to distinguish correctly between directional und locative prepositional phrases.

Katharina, as a late talker, produced her first case form opposition, between Nom and Dat, only at 2;6. Then she also substituted Acc and Nom for Dat. Generally cases of feminines became productive earlier than those of neuters and masculines, which indicates a gender-based difference also in the input gender use. Like her mother, Katharina preferred for the expression of possession the dialectal possessive Dat (e.g. *der Juli ihres* "to Julie her" instead of Gen *Julis*, cf. § 3.1). Therefore her corpus totally lacks Gen. Although no case errors occur in the terminal months of her scarce corpus (2;9 to 3;0), her case acquisition cannot be confirmed to be consolidated, because many cells in her case paradigms remained unfilled. Other differences between the two children can be explained by Jan being a segmental child, Katharina rather a prosodic child.

Transparent semantic relations (i.e. animate nouns in Nom, Dat or Gen and inanimate nouns in Acc case) were shown to support case acquisition, but more for Katharina than for Jan who often treated vehicles as living beings (see also Korecky-Kröll, 2011: 87 f.).

As our typological study of case and number acquisition (Stephany and Voeikova, 2009) in the framework of the 'Crosslinguistic Project of Pre- and Protomorphology' (cf. also Xanthos *et al.*, 2011) evidences on a larger and quantitative systematic level, Tracy (1984) was quite right in concluding that morphological case marking emerges in the weakly inflecting German language clearly later than in strongly inflecting Slavic languages and Lithuanian: the criterion is degree of morphological richness.

Abbreviations

Acc	=	accusative
Dat	=	dative
DP	=	determiner phrase
fem.	=	feminine
Gen	=	genitive
masc.	=	masculine
neut.	=	neuter
Nom	=	nominative
NP	=	noun phrase
Pl	=	plural
PP	=	preposition phrase
Sg	=	singular

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