Morphological Syncretism in Declension Paradigms: A Harmonic Grammar Account
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The presence of morphological syncretism in declension paradigms renders a typological investigation of linking systems a challenging task. The aim of this paper is provide a competing-motivation account of German determiner and weak adjective declensions (e.g. Bierwisch 1967, Blevins 1995, Wiese 1996, Müller 2002) with a typological extension. What is notable about the present account is that it is couched within the framework of **Harmonic Grammar** (Smolensky and Legendre 2006, Pater 2009), which allows us to derive both language-internal and typological variation of declension paradigms from a competition between numerically weighted **markedness constraints** and **faithfulness constraints** as in (2)-(4) and the morphology-phonology mapping:

(1) a. **Case Hierarchy** (Silverstein 1980/1993):
Nom[inative]⇔Dat[ive] < Acc[usative](/Ergative) < Gen[itive]
b. **Gender Hierarchy** (Steinmetz 1985): Masc[uline] < Fem[inine] < Neut[er]
c. **Number Hierarchy** (Corbett 2000): Sing[ular] < Pl[ural] (< Dual)
d. **Macrorole Hierarchy** (Van Valin and LaPolla 1997): Act[or] < Und[ergoer]
(2) a. *{Gen}, *{Gen, Acc}, *{Gen, Acc, Dat}
b. *{Neut}, *{Neut, Fem}, *{Neut, Fem, Masc}
c. *{Pl}
(3) a. *{Gen} & *{Neut, Fem}, *{Gen, Acc, Dat} & *{Neut}, *{Pl} & *{Gen}, ...
b. *{Und/Neut} & *{Gen, Acc, Dat}, *{Und/Fem} & *{Gen, Acc, Dat},
*{Und/Pl} & *{Gen, Acc, Dat}
(4) a. MAX [Case], MAX [Gender], MAX [Number]
b. IDENT [Case], IDENT [Gender], IDENT [Number]

Markedness constraints in (2) are derived from **markedness hierarchies** in (1a)-(1c) in terms of **stringency relation** (de Lacy 2006) and they are antagonistic to faithfulness constraints in (4). The stringency constraints in (2) are freely rankable/weightable and enable us to describe the German declension paradigms with extensive syncretism in a more flexible way than the counterparts in the classical OT (Prince and Smolensky 2004).

(3a,b) are additional markedness constraints derived from (1) and (2): (3a) is derived from (2) through **constraint conjunction** (Smolensky 1995), but, in contrast to the original formulation, is meant to reflect, as a very first approximation, a synergistic, interactive effect of any two/three of the markedness constraints in (2), while (3b) originates ultimately from frequency distribution of NPs (cf. Jäger 2004, Krifka 2009); (3b) involves **harmonic alignment** of (1d) with (1b,c) in addition to constraint conjunction and penalizes extra marking on the frequent types of undergoers. I assume that (2)-(4) apply only to contrastive feature values (cf. Calabrese 2005).

An empirical focus here is on the declensions of *der* 'the' and *kein* 'no' in Table 1 and the weak adjective declension in Table 2. Six key observations are in order (the first five are about Table 1, while the sixth one is about Table 2): **(i)** no gender distinction in the plural; **(ii)** no distinct accusative in the singular feminine, singular neuter, and plural; **(iii)** a parallelism between the singular masculine and singular neuter (except for the singular neuter nominative of *der*); **(iv)** no distinction between the dative and genitive in the singular feminine; **(v)** a parallelism between the singular feminine and plural (disrupted by the plural dative form); and **(vi)** *-e* encodes the singular nominative and singular feminine/neuter accusative, while *-en* fills in the rest of the paradigm.

My proposal is a two-stage (i.e. syntax-morphology and morphology-phonology) account of the German declension paradigms. First, two sets of constraints in Table 5 receive as input the sets of fully specified, syntactic number/gender/case feature values and output their often syncretized, morphological counterparts (e.g. 'Sing/Fem/Gen→Sing/Fem/Dat', 'Sing/Neut/Gen→Sing/Masc/Gen'). I have used HaLP (Potts et al. 2007) to calculate numerical weights of the constraints. Their weights are responsible for observations **(ii)-(iv)**. Second, these morphological outputs are mapped phonological exponents in (5a)-(5g) (some of which crucially involve **underspecification**) in accordance with the **Morphological Blocking Principle** (Andrews 1990; cf. Halle 1997):

(5) a. *kein/der₁* [Sing, Masc, Nom] b. *das* [Sing, Neut, Nom]
c. *keinen/den* [Ø, Ø, Ø] d. *keinem/dem* [Sing, Masc, Dat]
e. *keines/des* [Sing, Masc, Gen] f. *keine/die* [Ø, Ø, Nom]
g. *keiner/der₂* [Ø, Ø, Dat]

(5f,g) are underspecified as regards gender and number and cover the singular feminine and plural. This explains observations **(i)** and **(v)** (except for the plural dative form to be explained below).

It is important to note that most plural nouns in German receive a plural AND dative index and that these indices alone suffice to identify the plural dative uniquely. This suggests the need to broaden the optimization domain from a determiner in isolation to a full NP (Hughes 2003). This move requires the whole phrasal domain to realize the number/gender/case value and explains why the plural dative form of *der/kein* bears no number or case value as in (5c) (the number and case value are realized on the head noun) and why the weak adjective declension is impoverished into (5h) and (5i) (all the other, more marked feature values are realized on the co-occurring determiner and head noun) (observation **(vi)**), on the assumption that morphosyntactic features expressed on head nouns are the least costly, while those expressed on attributive adjectives are the most costly:

(5) h. *gut-e* [Sing, Ø, Nom] i. *gut-en* [Ø, Ø, Ø]

Finally, I will show that the above two-stage account of the German declensions lends itself to two extensions: an Old English determiner *se* 'the, that' in Table 3 and a Yiddish determiner *der* 'the' involving an impoverished paradigm in Table 4.

Table 1: Declensions of German Determiners (*der* 'the', *kein* 'no')

	Singular			Plural		
	Masculine	Feminine	Neuter	Masculine	Feminine	Neuter
Nominative	der/kein	die/keine	das/kein	die/keine		
Accusative	den/keinen	die/keine	das/kein	die/keine		
Dative	dem/keinem	der/keiner	dem/keinem	den/keinen		
Genitive	des/keines	der/keiner	des/keines	der/keiner		

Table 2: Weak Declension of German Adjectives (e.g. *gut* 'good')

	Singular			Plural		
	Masculine	Feminine	Neuter	Masculine	Feminine	Neuter
Nominative	gut-e	gut-e	gut-e	gut-en		
Accusative	gut-en	gut-e	gut-e	gut-en		
Dative	gut-en	gut-en	gut-en	gut-en		
Genitive	gut-en	gut-en	gut-en	gut-en		

Table 3: Declension of Old English Determiners (e.g. *se* 'the, that') (Mitchell and Robinson 2007)

	Singular			Plural		
	Masculine	Feminine	Neuter	Masculine	Feminine	Neuter
Nominative	se	sēo, sīo	þæt	þā		
Accusative	þone	þā	þæt	þā		
Dative	þǣm, þām	þǣre	þǣm, þām	þǣm, þām		
Genitive	þæs	þǣre	þæs	þāra, þǣra		

Table 4: Declension of a Yiddish Determiner (*der* 'the') (Birnbaum 1979)

	Singular			Plural		
	Masculine	Feminine	Neuter	Masculine	Feminine	Neuter
Nominative	der	di	dos	di		
Accusative	dem	di	dos	di		
Dative	dem	der	dem	di		

Table 5: Numerical Weights of the Constraints in (2)-(4) (an irrelevant cell is shaded)

	MAX [Gender]	MAX [Num]	MAX [Case]	IDENT [Gender]	IDENT [Num]	IDENT [Case]	*{N}	*{N, F}	*{N, F, M}	*{Pl}
G *der*	5	4	6	3	3	3	1	1	1	1
G *kein*	5	4	5	3	3	3	3	1	1	1

*{G}	*{G, A}	*{G, A, D}	*Und/F & *{G, A, D}	*Und/N & *{G, A, D}	*Und/Pl & *{G, A, D}	*{G} & *{N, F}	*{Pl} & *{Gen}	*{G, A, D} & *{N}
1	1	1	5	4	5	2	2	2
1	1	1	4	4	4	2	2	1

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