Topics in German Phonology
Phonology Fest
Indiana University
June 2006
Handout 1

1 Opacity and Paradigm Uniformity in German

1.1 Introduction

(1) Definition of opacity (Kiparsky 1973: 79):
A phonological rule P of the form A → B / C __ D is opaque if there are surface structures with any of the following characteristics:

a. Instances of A in the environment C __ D (underapplication)

b. Instances of B derived by P that occur in environments other than C __ D. (overapplication)

1.2 Final Devoicing and Vowel Lengthening

1.2.1 The canonical pattern

(2) Alternations between voiced and voiceless obstruents:

a.	Dieb	[diːp]	'thief'	Dieb-e	[diː.bə]	'thieves'
	Rad	[ʀaːt]	'wheel'	Rad-es	[ʀaː.dəs]	'wheel (gen. sg.)'
	Tag	[taːk]	'day'	Tag-e	[taː.gə]	'days'
	Nerv	[nɛʀf]	'nerve'	nerv-ös	[nɛʀ.vøːs]	'nervous'
	Haus	[haʊs]	'house'	Haus-es	[haʊ.zəs]	'house (gen. sg.)'
	orange	[oʀaŋʃ]	'orange'	orang-e	[oʀaŋ.ʒə]	'orange (adj. ending)'
b.	bunt	[bʊnt]	'colorful'	bunt-e	[bʊn.tə]	'colorful (adj. ending)'
	krank	[kʀaŋk]	'sick'	krank-e	[kʀaŋ.kə]	'sick (adj. ending)'
	nass	[nas]	'wet'	nass-e	[nasə]	'wet (adj. ending)'
	Bach	[bax]	'stream'	Bäch-e	[bɛçə]	'streams'
c.	streb-sam	[ʃtʀeːp.zaːm]	'ambitious'	streb-e	[ʃtʀeː.bə]	'strive (1 sg)'
	Bünd-nis	[bʏnt.nɪs]	'alliance'	Bund-es	[bʊn.dəs]	'alliance (gen sg.)'
	bieg-sam	[biːk.zaːm]	'bendable'	bieg-en	[biː.gən]	'bend (1 pl)'
	les-bar	[leːs.baːʁ̞]	'readable'	les-en	[leː.zən]	'read (1 pl)'

(3) Final Devoicing (FD): [–sonorant] → [–voice] / ___]$_\sigma$

(4) Long vowels contrast with short vowels before sonorant consonants (in a) and before a voiceless obstruent (in b):

a.	Stall	[ʃtal]	'stall'	Stahl	[ʃtaːl]	'steel'
	Hölle	[hœlə]	'hell'	Höhle	[høːlə]	'cave'
b.	Bett	[bɛt]	'bed'	Beet	[beːt]	'bed (horticulture)'
	Bett-en	[bɛtən]	'beds'	Beet-e	[beːtə]	'beds (horticulture)'
	bitte-n	[bɪtən]	'ask'	biet-en	[biːtən]	'offer'
	spuck-en	[ʃpʊkən]	'spit'	spuk-en	[ʃpuːkən]	'spook'
	schoss	[ʃɔs]	'shot'	Schoss	[ʃoːs]	'lap'
	offen	[ɔfən]	'open'	Ofen	[oːfən]	'oven'

(5) Long vowels occur regularly before a voiced stop (see a) or voiced fricative (see b); short vowels are rare in this position (King 1969, Jessen 1996); see (7) below):

a.	Leber	[leːbɐ]	'liver'
	Vogel	[foːgəl]	'bird'
	Laden	[laːdən]	'store'
b.	Hase	[haːzə]	'hare'
	Riese	[ʀiːzə]	'giant'
	Garage	[gaʀaːʒə]	'garage'
	Löwe	[løːvə]	'lion'

(6) Vowel Lengthening (VL): V → Vː / ___ [+voice, –son]

(7) Idiosyncratic exceptions to Vowel Lengthening involve both stops (in a) and fricatives (in b). The first are loans from languages like Dutch or Yiddish or historically derived from Low German dialect spoken in Northern Germany. The examples in (b) are loans from English, French, or Slavic (see Jessen 1996):

a.	Bagger	[ag]	'excavator'	b.	Blizzard	[ɪz]	'blizzard'
	Egge	[ɛg]	'harrow'		clever	[ɛv]	'clever'
	Ebbe	[ɛb]	'low tide'		Sovjet	[ɔv]	'Soviet'
	Robbe	[ɔb]	'seal'		Puzzle	[ʊz]	'puzzle'
	Krabbe	[ab]	'crab'		Saison	[ɛz]	'season'

Note: Jessen observes that there are far fewer examples in the (7b) category; these examples strike him as having a 'strong foreign character'.

(8) Final Devoicing and Vowel Lengthening apparently don't interact:

a.	*Hase* /hazə/	*Haus* /haʊz/	b.	*Hase* /hazə/	*Haus* /haʊz/
1. FD	----	haʊs	1. VL	haːzə	-----
2. VL	haːzə	------	2. FD	-----	haʊs
	[haːzə]	[haʊs]		[haːzə]	[haʊs]

1.2.2 Paradigm Uniformity effects

(9) Vowels are predictably long before a voiceless obstruent if the vowel is long in another member of the 'paradigm':

Dieb	[diːp]	'thief'	Dieb-e	[diː.bə]	'thieves'
Rad	[ʀaːt]	'wheel'	Rad-es	[ʀaː.dəs]	'wheel (gen. sg.)'
Tag	[taːk]	'day'	Tag-e	[taː.gə]	'days'
beige	[beːʃ]	'beige'	beig-e	[beːʒə]	'beige (adj. ending)'
lies	[liːs]	'read (imper. sg.)'	les-en	[leːzən]	'read'

(10) Two historical stages illustrating Final devoicing and Vowel Lengthening (King 1969):

a. Stage 1:

Rad	[ʀat]	'wheel'
Rad-es	[ʀaːdəs]	'wheel (gen. sg.)'

b. Stage 2:

Rad	[ʀaːt]	'wheel'
Rad-es	[ʀaːdəs]	'wheel (gen. sg.)'

According to King (1969: 53): "Final Devoicing was an innovation in the grammar of most German dialects around A.D. 1000, in any case not later than 1200. Lengthening of vowels before voiced obstruents was an innovation in the grammar of Early Modern German; that is, the documents indicate that it was a rule added around A.D. 1400, several centuries later than the final devoicing rule was added."

1.2.2.1 Rule ordering analysis

(11) Rule ordering analysis (King 1969: 51-54; Downing, Hall & Raffelsiefen 2005b):

	Stage 1:			*Stage 2:*	
	/ʀad/	/ʀad-əs/		/ʀad/	/ʀad-əs/
1. FD	ʀat	------	1. VL	ʀaːd	ʀaːd-əs
2. VL	-----	ʀaːd-əs	2. FD	ʀaːt	-----
	[ʀat]	[ʀaːdəs]		[ʀaːt]	[ʀaːdəs]

Notes:

● There is no Vowel Lengthening in nonalternating examples like *weg* [vɛk] 'away' because the historical /g/ was restructured to /k/.

● Stage 2 illustrates 'overapplication' (see 1b), i.e. Vowel Lengthening overapplies in the example [ʀaːt].

● King (1969: 53) writes: "In traditional presentations this change [i.e. the change from short to long vowels, T. A. H.] would be called *analogical levelling*, here levelling under pressure from other forms in the paradigm that have long vowels."

1.2.2.2 Paradigm Uniformity analysis

(12) Four (simplified) paradigms in (a-d) for Stage 2 for the example *Rad* ~ *Rad-es*. Paradigm (a) is correct and (b-d) are not.

a. → [ʀaːt~ʀaːdəs] overapplication

b. [ʀaːdəs~ʀadəs] 'backwards' application

c. [ʀat~ʀaːdəs] normal application

d. [ʀat~ʀadəs] underapplication

(13) Complete paradigms involve all words with the same lexeme. This is illustrated below for the one lexeme 'Rad'. In each paradigm there are inflectional *and* derivational forms. Note that the stem vowel is consistently long, even though the vowel quality varies.

	'Rad' paradigm:	
example	*stem vowel*	*gloss*
Rad	[aː]	'bicycle, wheel'
Rad-es	[aː]	'bicycle (gen. sg.)'
Räd-er	[ɛː]	'bicycles'
Räd-er-n	[ɛː]	'bicycles (dat.)'
Räd-chen	[ɛː]	'small wheel'
Rad-ler	[aː]	'cyclist'

(14) The following analysis has the output-output constraints in (a); see Benua (1997), who posits similar constraints for other languages.

a. O-O-μ: Vowels in output forms have the same number of moras in other members of the paradigm

b. *V [+vc]: No output with a short vowel before a voiced obstruent

c. DEP-I-O-μ: No insertion of a mora

d. MAX-I-O-μ: No deletion of a mora

(15) Vowel Lengthening in the canonical phonology follows from the ranking *V [+vc] » DEP-I-O-μ. Note that it does not matter if the input vowel is long or short.

	/haːzə~hazə/	*V [+vc]	DEP-I-O-μ
a.	→ [haːzə]		*
b.	[hazə]	*!	

(16) The PU effect (i.e. 'overapplication') requires the ranking O-O-μ, *V [+vc] » DEP-I-O-μ. The assumption here is that the stem vowel is short in the input, but the same results would obtain with an input long vowel.

	/ʀad/	O-O-μ	*V [+vc]	DEP-I-O-μ
a.	→ [ʀaːt~ʀaːdəs]			**
b.	[ʀaːt~ʀadəs]	*!		*
c.	[ʀat~ʀaːdəs]	*!		*
d.	[ʀat~ʀadəs]		*!	

(17) The ranking O-O-μ, *V [+vc] » DEP-I-O-μ in (16) matches the general ranking for overapplication in paradigms proposed by Benua (1997: 43), namely:

O-O-Identity, Markedness » I-O Faithfulness.

See also McCarthy's (2005) Optimal Paradigms model, which has a similar general ranking for overapplication

(18) An examination of inflectional paradigms reveals that the stem vowels will maintain a consistent length, regardless of whether or not the following sound is a voiced obstruent. Some examples in (18a-b). Recall from (4) above that vowel length in these contexts is not predictable. It will be shown below that these paradigm uniformity effects do not require an O-O constraint.

a. uniform vowel length before an input voiceless obstruent:

Input short stem vowel:			*Input long stem vowel:*		
Bett	[bɛt]	'bed'	Beet	[beːt]	'bed (horticulture)'
Bett-en	[bɛtən]	'beds'	Beet-e	[beːtə]	'beds (horticulture)'
offen	[ɔfən]	'open'			
offen-e	[ɔfənə]	'open (adj. ending)'			

b. uniform vowel length before an input sonorant:

Input short stem vowel:			Input long stem vowel:		
Stall	[ʃtal]	'stall'	Stahl	[ʃtaːl]	'steel'
Stall-es	[ʃtaləs]	'stall (gen. sg.)'	Stahl-es	[ʃtaːləs]	'steel (gen. sg.)'

(19) For examples in (18) with a long input stem vowel, e.g. *Beet*, the constraint MAX-I-O-μ is required:

	/beːt/	O-O-μ	MAX-I-O-μ	*V [+vc]	DEP-I-O-μ
a.	→ [beːt~beːtə]				
b.	[beːt~bɛtə]	*!	*		
c.	[bɛt~beːtə]	*!	*		
d.	[bɛt~bɛtə]		*!*		

(20) The constraint DEP-I-O-μ accounts for examples in (18) with a short input stem vowel, e.g. *Bett*:

	/bɛt/	O-O-μ	MAX-I-O-μ	*V [+vc]	DEP-I-O-μ
a.	[beːt~beːtən]				*!*
b.	[beːt~bɛtən]	*!			*
c.	[bɛt~beːtən]	*!			*
d.	→ [bɛt~bɛtən]				

Note: Based on the examples presented above it cannot be determined where MAX-I-O-μ and DEP-I-O-μ are ranked with respect to the other constraints in (19-20).

(21) Strong verbs alter the vowel quality in the preterite and in the past participle (Ablaut). Although the vowel quality changes, the quantity is usually constant:

Infinitive-preterite-past participle:	*vowels*	*gloss*
beginnen, begann, begonnen	[ɪ a ɔ]	'begin'
bewegen, bewog, bewogen	[eː oː oː]	'move'
empfehlen, empfahl, empfohlen	[eː aː oː]	'recommendl'
fliegen, flog, geflogen	[iː oː oː]	'fly'
lügen, log, gelogen	[yː oː oː]	'lie'

(22) Exceptions to the generalization in (21) involve certain strong verbs:

Infinitive-preterite-past participle:	*vowels*	*gloss*
bitten, bat, gebeten	[ɪ aː eː]	'request'
fallen, fiel, gefallen	[a iː a]	'fall'
fliessen, floss, geflossen	[iː ɔ ɔ]	'flow'
kommen, kam, gekommen	[ɔ aː ɔ]	'come'

1.3 The distribution of superheavy syllables

1.3.1 The canonical pattern

(23) Superheavy syllables in word-final position:

a. short vowel+two or more consonants:

Kalb	[kalp]	'calf'
Amt	[amt]	'office'

b. long vowel+one or more consonant:

viel	[fiːl]	'many'
zahm	[tsaːm]	'tame'

c. diphthong+one or more consonant:

Bein	[baɪn]	'leg'
Baum	[baʊm]	'tree'
euch	[ɔʏç]	'you (pl.)'

(24) Distribution of superheavy syllables:

a. Superheavy syllables in word-final position:

W<u>erk</u>	[vɛɐ̯k]	'work'
Asph<u>alt</u>	[asfalt]	'asphalt'
Z<u>eit</u>	[tsaɪt]	'time'
B<u>uch</u>	[buːx]	'book'
Bisch<u>of</u>	[bɪʃoːf]	'bishop'

b. Superheavy syllables before a compound boundary:

W<u>erk</u>-statt	[vɛɐ̯k.ʃtat]	‘workshop’
Z<u>eit</u>-geist	[tsaɪt.gaɪst]	‘Zeitgeist’
B<u>uch</u>-weizen	[buːx.vaɪ.tsən]	‘buckwheat’

c. Superheavy syllables before a CVC suffix:

l<u>eb</u>-los	[leːp.loːs]	‘lifeless’
<u>Ein</u>-heit	[aɪn.haɪt]	‘unit’
l<u>ieb</u>-lich	[liːp.lɪç]	‘dearly’

d. No superheavy syllables morpheme-internally:

	*[a.ʀeːl.na]	(cf. Arena [a.ʀeː.na] ‘arena’)

(25) Idiosyncratic exceptions to the generalization in (24d):

Sk<u>ulp</u>tur	[skʊlp.tuːɐ̯]	‘sculpture’
<u>ark</u>tisch	[aʀk.tɪʃ]	‘arctic’
<u>Auk</u>tion	[aʊk.tsjoːn]	‘auction’

(26) Generalization true for the canonical phonology:

A superheavy syllable occurs only at the right edge of a phonological word

(see Hall 2002a, b 2005, Raffelsiefen 2004).

(27) References on the phonological words in German include:
Booij (1985), Wiese (1996), Hall (2002a, b), Raffelsiefen (2004)
→ All of these authors argue that each part of a compound is a phonological word (=24b) and that consonant-initial suffixes like *–los* and *–lich* in (24c) are noncohering, i.e. that they do not belong to the phonological word of the stem:

(28) Prosodic structures (i.e. phonological words) of the examples in (24b-c). By contrast, vowel-initial suffixes are cohering (see 27c).

a. Compounds:

$(\text{Werk})_{PW}$ - $(\text{statt})_{PW}$	‘workshop’
$(\text{Zeit})_{PW}$ - $(\text{geist})_{PW}$	‘Zeitgeist’
$(\text{Buch})_{PW}$ -$(\text{weizen})_{PW}$	‘buckwheat’

b. Consonant-initial suffixes:

$(\text{leb})_{PW}$ -$(\text{los})_{PW}$	‘lifeless’
$(\text{Ein})_{PW}$ -$(\text{heit})_{PW}$	‘unit’
$(\text{lieb})_{PW}$ -$(\text{lich})_{PW}$	‘dearly’

c. Vowel-initial suffixes (both inflectional and derivational):

$(\text{leb-e})_{PW}$	‘love (1 sg)’
$(\text{schlaf-en})_{PW}$	‘sleep (1 pl)’
$(\text{freud-ig})_{PW}$	‘joyous’

(29) Only phonological words can be 'gapped' (see Booij 1985, Wiese 1996):

a. mütter- und väterlich 'motherly and fatherly
b. *winz- oder riesig 'tiny or huge'

(30) One exception to the generalization in (28c) is the suffix *-artig*. In the literature on German phonology it is common to treat *-artig* as the second part of a compound word.

fremd-artig [fʀɛmt.aʀ.tɪç] 'strange'

(31) How does one predict the contrastive prosodic structures in consonant-initial vs. vowel-initial suffixes? Raffelsiefen (1999, 2005) proposes the constraints in (31a-b) for English. (She argues that the same contrast between (28b-c) holds for English). Hall (2002b) adopts this treatment for German.

a. ONSET: Syllables have onsets

b. ALIGN-SUFFIX: The left edge of a suffix aligns with the right edge of a phonological word.

(32) An example with a consonant-initial suffix:

	/liːb-lɪç/	ONSET	ALIGN-SUFFIX
a.	→ $(.liːb.)_{PW} – (lɪç)_{PW}$		
b.	$(.liːb.-lɪç)_{PW}$		*!
c.	$(.liː.b-lɪç)_{PW}$		*!

(33) An example with a vowel-initial suffix:

	/liːb-ə/	ONSET	ALIGN-SUFFIX
a.	$(.liːb.)_{PW}$ -ə	*!	
b.	→ $(.liː.bə)_{PW}$		*

(34) Constraints and ranking for canonical pattern of phonotactics (i.e. generalization 26). The way in which superheavy syllables are represented in terms of moraic structure will not be discussed below (see Hall 2002a, b).

a. ALIGN-SH: Align the right edge of a superheavy syllable (SH) with the right edge of a phonological word.

b. MAX-I-O: An input segment must have an output correspondent

c. MAX-I-O, ALIGN-SH » MAX-I-O-μ

(35) A hypothetical word which could potentially violate ALIGN-SH:

	/aʀeːlna/	MAX-I-O	ALIGN-SH	MAX-I-O-μ
a.	→ [a.ʀɛl.na]			*
b.	[a.ʀeːl.na]		*!	
c.	[a.ʀeː.na]	*!		

Note: See Hall & Hamann (2003), who show that vowel shortening has occurred in historical loan words which could potentially have violated ALIGN-SH.

(36) VOSV is parsed V.OSV iff OS is a permissible onset:

a.	Metro	[meː.tʀo]	'metro'	b.	Tritt	[tʀɪt]	'kick'
	Afrika	[aː.fʀi.ka]	'Africa'		frei	[fʀaɪ]	'free'
	Kobra	[koː.bʀa]	'cobra'		bringen	[bʀɪŋən]	'bring'
	Iglu	[iː.glu]	'igloo'		Glanz	[glants]	'brightness'
	Problem	[pʀo.bleːm]	'problem'		Probe	[pʀoːbə]	'sample'
	Magnet	[ma.gneːt]	'magnet'		Gnom	[gnoːm]	'gnome'

(37) VOS-V is parsed V.OS-V iff OS is a permissible onset

a.	fiebr-ig	[fiː.bʀɪç]	'fieverish'	b.	Brot	[bʀoːt]	'bread'
	ekl-ig	[eː.klɪç]	'disgusting'		Klang	[klaŋ]	'sound'
	nebl-ig	[neː.blɪç]	'foggy'		Blei	[blaɪ]	'lead'
	regn-en	[ʀeː.gnən]	'rain'		Gnom	[gnoːm]	'gnome'

(38) VOSV is parsed VO.SV iff OS is not a permissible onset:

Atlas	[at.las]	'atlas'
Athlet	[at.leːt]	'athlete'
Technik	[tɛç.niːk]	'technology'
ethnisch	[ɛt.nɪʃ]	'ethnic'
Rhythmus	[ʀʏt.mʊs]	'rhythm'
Atmosphäre	[at.mo.sfɛː.ʀə]	'atmosphere'

(39) Constraints and ranking for canonical syllabification patterns in (36-38; see Hall 2005):

a. ONSET WELLFORMEDNESS (OWF): Certain obstruent-sonorant sequences are ungrammatical in the onset (e.g. *$_{\sigma}$[tl, *$_{\sigma}$[dl, *$_{\sigma}$[tm).

b. NOCODA: The syllable is open

c. NOCOMPONSET: At most one segment occurs syllable-initially

(40) Tableaux illustrating canonical syllabification:

	/pʀobleːm/	OWF	NoCoda	NoCompOnset
a.	→ [pʀo.bleːm]			*
b.	[pʀob.leːm]		*!	

	/atlas/	OWF	NoCoda	NoCompOnset
c.	[a.tlas]	*!		*
d.	→ [at.las]		*	

(41) A hypothetical word which could potentially violate Align-SH if it surfaced faithfully:

	/aːtlas/	Max-I-O	OWF	Align-SH	Max-I-O-μ
a.	[aː.tlas]		*!		
b.	[aːt.las]			*!	
c.	[aː.las]	*!			
d.	→ [at.las]				*

1.3.2 Paradigm Uniformity analysis

(42) Words containing VːOS-V, in which OS is not a permissible onset (see 42a). Note that these words illustrate a kind of 'underapplication' because we have a superheavy syllable in an illicit position.

a.

Atm-ung	[aːt.mʊŋ]	'breathing'
atm-e	[aːt.mə]	'breathe (1 sg.)'
Siedl-ung	[ziːd.lʊŋ]	'settlement'
Siedl-er	[ziːd.lɐ]	'settler'
Basl-er	[baːz.lɐ]	'one from Basel'
ein-ebn-en	[aɪn.eːb.nən]	'level off'

b. c.

Atem	[aː.təm]	'breath'	/aːtm/
siedel-n	[ziː.dəln]	'settle'	/ziːdl/
Basel	[baː.zəl]	'Basel'	/baːzl/
eben	[eː.bən]	'even'	/eːbn/

Note: The underlying form of the stems contains no schwa (see c). See Wiese (1996) and references cited therein.

(63) Possible approaches:

a. Benua (1997) accounts for underapplication with a mechanism she calls Recursive Evaluation.

b. McCarthy's (2005) OP model: "…underapplication can only win when overapplication is blocked by a high-ranking constraint…True under-application is predicted never to occur…" (p. 197)

(44) The incorrect winner is selected given the ranking MAX-I-O » OWF » ALIGN-SH » MAX-I-O-μ:

	/aːtm-ʊŋ/	MAX-I-O	OWF	ALIGN-SH	MAX-I-O-μ
a.	aːt.mʊŋ			*!	
b.	aː.tmʊŋ		*!		
c.	← at.mʊŋ				*
d.	a.tmʊŋ		*!		*
e.	aː.mʊŋ	*!			

(45) Six paradigms for {Atmung, Atem}. A is correct, B-F are incorrect:

A	B	C	D	E	F
aːt.mʊŋ	aːt.mʊŋ	at.mʊŋ	at.mʊŋ	aː.mʊŋ	aː.tmʊŋ
aː.təm	a.təm	aː.təm	a.təm	aː.təm	aː.təm

Note that the paradigms here involve derivational and inflectional forms.

(46) Constraints and rankings required for the PU effect:

a. O-O-μ: Vowels in output forms have the same number of moras in other members of the paradigm

b. STRESSED SYLLABLE LAW (SSL): Stressed syllables are heavy

c. O-O-μ, SSL, MAX-I-O, OWL » ALIGN-SH » MAX-I-O-μ

(47) Correct winner is selected given ranking in (18c):

	/aːtm-ʊŋ/	O-O-μ	SSL	MAX-IO	OWF	ALIGN-SH	MAX-I-O-μ
a.	→ aːt.mʊŋ ~ aː.təm					*	
b.	aːt.mʊŋ ~ a.təm	*!	*			*	*
c.	at.mʊŋ ~ aː.təm	*!					*
d.	at.mʊŋ ~ a.təm		*!				**
e.	aː.mʊŋ ~ aː.təm			*!			
f.	aː.tmʊŋ ~ aː.təm				*!		

Notes: The underapplication candidate in (47a) wins out over the overapplication candidate in (47d). This is achieved with the constraint SSL, which has the function of killing off the overapplication candidate.

1.4 s-Dissimilation in Swabian German

1.4.1 The canonical pattern

(48) Contrast between [s] and [ʃ] in two contexts in Standard German and Swabian German:

	Standard	*Swabian*	
nass	[nas]	[nas]	'wet'
Tisch	[tɪʃ]	[tɪʃ]	'table'

(49) The contrast between [s] and [ʃ] is neutralized to [ʃ] before all consonants except for /k/ in both Standard German and Swabian German, cf. (a-b) vs. (c). These data are usually assumed to require a rule of s-Dissimilation, according to which /s/ becomes [ʃ] before /p t/ (Scott 2006, Alber 2001):

		Standard	*Swabian*	
a.	Speck	[ʃpɛk]	[ʃpɛk]	'bacon'
	Speise	[ʃpaizə]	[ʃpais]	'food'
	Knospe	[knɔspə]	[knoʃpə]	'bud'
	Haspel	[haspəl]	[haʃpəl]	'hasp'
b.	stark	[ʃtaʀk]	[ʃtɔɐk]	'strong'
	Staat	[ʃtaːt]	[ʃtaːt]	'country'
	Fenster	[fɛnstɐ]	[fɛnʃtɐ]	'window'
	Konstanz	[kɔnstants]	[kɔnʃtants]	'Constance'
	Post	[pɔst]	[poʃt]	'mail'
	Last	[last]	[laʃt]	'burden'

c.	Skat	[skaːt]	[skaːt]	‘card game’
	Sklave	[sklaːvə]	[sklaːvə]	‘slave’
	Skelett	[skelɛt]	[skəlɛt]	‘skeleton’
	brüsk	[bʀʏsk]	[bʀʏsk]	‘brusque’
	Kiosk	[kiːɔsk]	[kiɔsk]	‘kiosk’

(50) [s] regularly becomes [ʃ] before [p t] (but not before [k]) in loan words in both varieties of German:

Stop	[stɔp] ~ [ʃtɔp]
Stil	[stiːl] ~ [ʃtiːl]
Spezies	[speːtsjəs] ~ [ʃpeːtsjəs]

(51) s-Dissimilation before sonorant consonants (including [v]):

	Standard/Swabian	
schreiben	[ʃʀaibən]	‘to write’
Schlange	[ʃlaŋə]	‘snake’
Schmuck	[ʃmʊk]	‘jewelry’
Schnee	[ʃneː]	‘snow’
schwarz	[ʃvaʀts]	‘black’

(52) Provisional rule:

/s/ → [ʃ] / __ [p t v n m l ʀ] (every consonant except for /k/)

(53) The relevant feature for s-Dissimilation has been argued to be [high] (see Hall 1992, Wiese 1996, Alber 2001). [high] is assumed not to be a daughter of [DORSAL] because the rule applies before coronal, labial and dorsal segments:

	p b m v	t d s z	ʃ ʒ	k g	ʀ
[LAB]	√				
[COR]		√	√		
[DOR]				√	√
[high]	–	–	+	+	–

Note: Various models of feature geometry have proposed that [high] is independent of [LAB], [COR] and [DOR]; see, for example, Lahiri & Evers (1991).

(54) s-Dissimilation rule in two dialects:

a. Standard German: /s/ → [+high] / # __ [–high]
b. Swabian German: /s/ → [+high] / __ [–high]

(55) Constraints necessary for the canonical pattern:

a. OCP-[high]: [αhigh] [αhigh] is disallowed

b. IDENT-[high]: [αhigh] in input is [αhigh] in output correspondent

c. *[–high]: No [–high] consonants.

(56) Lexical contrast between /s/ and /ʃ/ (see 48):

	/nas/	IDENT-[high]	*[–high]
a.	→[nas]		*
b.	[naʃ]	*!	

	/tɪʃ/	IDENT-[high]	*[–high]
c.	[tɪs]	*!	*
d.	→ [tɪʃ]		

(57) s-Dissimilation for the example *Last* [laʃt] ‘burden’ in Swabian German with two possible inputs:

	/last/	OCP-[high]	IDENT-[high]	*[–high]
a.	[last]	*!		*
b.	→ [laʃt]		*	

	/laʃt/	OCP-[high]	IDENT-[high]	*[–high]
c.	[last]	*!	*	*
d.	→ [laʃt]			

1.4.2 Paradigm Uniformity effects

(58) No s-Dissimilation in Swabian German if the /s/ and consonant are separated by a morpheme boundary (Scott 2006). This is true for derivational (see a) and inflectional morphemes (see b-c. Note that s-Dissimilation underapplies in these examples.

a.	mass-los	[maslos]	‘immoderate’
	ess-bar	[ɛsbaɐ]	‘edible’
b.	muss-te	[mʊstə]	‘had to (preterite)’
c.	ge-küss-t	[gəkyst]	‘kissed (past part.)’
	ge-wuss-t	[gəvust]	‘knew (past part.)’

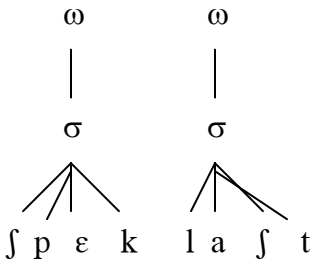
1.4.2.1 A prosodic solution

(59) Swabian German s-Dissimilation:

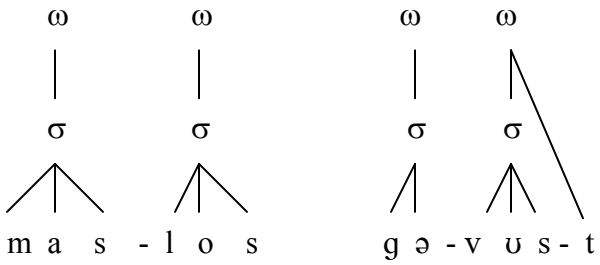
/s/ → [+high] / __ [–high]

Condition: /s/ and following segment belong to the same phonological word (ω)

(60) Prosodic condition illustrated with the two examples *Speck* and *Last*:



(61) To account for the examples in (58) one would need to have prosodic structures in which /s/ does not belong to the same phonological word as the following consonant. This is illustrated with the two words *mass-los* and *ge-wuss-t*:



(62) Recall from (27-29) that consonant-initial suffixes like *–los* are separate phonological words.
Problem with the prosodic solution: What independent evidence is there that the /t/ in an example like *gewusst* in (61) is extrasyllabic, but not the /t/ in an example like *Last* (see 60)? See Hall (2002a), who argues that there are no extrasyllabic consonants in German

1.4.2.2 A Paradigm Uniformity analysis

(63) The following is the inflectional paradigm for the example *lesen* 'to read' (Scott 2006). Note that the stem-final [s] is realized as [s] in the 3 sg and 2 pl forms, even though it is in the correct enviroment for s-Dissimilation:

	Example	*morph. Structure*	*stem-final C*
1 sg	[leːs]	/leːs/	[s]
2 sg	[liːʃ]	/liːs-ʃ/	[s]
3 sg	[liːst]	/liːs-t/	[s]
1 pl	[leːsət]	/leːs-ət/	[s]
2 pl	[leːst]	/leːs-t/	[s]
3 pl	[leːsət]	/leːs-ət/	[s]

(64) Four candidates (paradigms) to consider for the pair [leːs] ~ [liːst] (see 63). Only two members of the paradigm are considered here.

a. [leːʃ ~ liːʃt….] overapplication

b. [leːʃ ~ liːst….] 'backwards' application

c. [leːs ~ liːʃt….] normal application

d. → [leːs ~ liːst….] underapplication

(65) Possible approaches:

b. Benua (1997) accounts for underapplication with a mechanism she calls Recursive Evaluation.

b. McCarthy's (2005) OP model: "…underapplication can only win when overapplication is blocked by a high-ranking constraint…True under-application is predicted never to occur…" (p. 197)

(66) In the following analysis the following O-O constraint is necessary:

O-O-[high]: [high] in output forms in same paradigm is the same

(67) The 'overapplication' candidate in (a) is incorrectly selected. The intended winner is (d).

	/leːs ~ liːs-t/	OO-[high]	OCP-[high]	IDENT-[high]
a.	[leːʃ ~ liːʃt]			**
b.	[leːʃ ~ liːst]	*!	*	*
c.	[leːs ~ liːʃt]	*!		*
d.	← [leːs ~ liːst]		*!	

Note: It is not important to identify a particular member of the 'lesen' paradigm as the base (i.e. the input). What is important is that the final member of the base be /s/.

(68) The analysis requires a constraint which penalizes one of the members of the (67d) paradigm but none of the members of the (67a) paradigm. This markedness constraint is presented in (b) below:

a. ANCHORING-IO: Any segment at the right periphery of the output GrWd has a correspondent at the right periphery of the input GrWd.

(No deletion/epenthesis at the edge).

Kager (1999: 137; after McCarthy & Prince 1995)

b. ANCHOR-IO-PLACE: The final segment of the word should not change (its place specification). See Oostendorp (2000)

(69) The high ranking markedness constraint now enables the underapplication paradigm to be selected:

	/leːs ~ liːs-t/	OO-[high]	ANCHOR-IO-PLACE	OCP-[high]	IDENT-[high]
a.	[leːʃ ~ liːʃt]		*!		**
b.	[leːʃ ~ liːst]	*!	*	*	*
c.	[leːs ~ liːʃt]	*!			*
d.	→ [leːs ~ liːst]			*	

References

Alber, B. 2001. Regional variation and edges: glottal stop epenthesis and dissimilation in standard and Southern varieties of German. *Zeitschrift für Sprachwissenschaft* 20: 3-41.

Benua, L. 1997. *Transderivational identity: Phonological relations between words*. Ph.D. dissertation: University of Massachusetts Amherst.

Booij, G. 1985. Coordination reduction in complex words: a case for prosodic phonology. In *Advances in Nonlinear Phonology*, Harry van der Hulst and Norval Smith (eds.), 143-160. Dordrecht: Foris.

Downing, L, T. A. Hall & R. Raffelsiefen (eds.) 2005a. *Paradigms in Phonological Theory.* Oxford: Oxford University Press.

Downing, L., T. A. Hall & R. Raffelsiefen 2005b. Introduction: The role of paradigms in phonology. In: Downing, Hall & Raffelsiefen (2005a: 1-16).

Hall, T. A. 1992. *Syllable Structure and Syllable Related Processes in German*. Tübingen: Niemeyer.

Hall, T. A. 2002a. Against extrasyllabic consonants in German and English. *Phonology* 19.1: 33-75.

Hall, T. A. 2002b. The distribution of superheavy syllables in Standard German. *The Linguistic Review* 19: 377-420.

Hall, T. A. 2005. Paradigm uniformity effects in German phonology. *Journal of Germanic Linguistics* 17.4: 225-264.

Hall, T. A. & S. Hamann 2003. Loanword nativization in German. *Zeitschrift für Sprachwissenschaft* 22: 56-85.

Jessen, M. 1996. The revelance of phonetic reality for underlying phonological representation : the case of tense versus lax obstruents in German. In : U. Kleinhenz (ed.) *Interfaces in Phonology.* 294-328. Berlin : Akademie-Verlag.

Kager, R. 1999. *Optimality Theory*. Cambridge: Cambridge University Press.

King, R. 1969. *Historical Linguistics and Generative Grammar*. Englewood Cliffs, NJ : Prentice-Hall.

Kiparsky, P. 1973. Abstractness, opacity and global rules. In : O. Fujimura (ed.) *Three Dimensions of Linguistic Theory*. 57-86. Tokyo: TEC.

Lahiri, A. & V. Evers 1991. palatalization and coronality. In: C. Paradis & J.-F. Prunet (eds.) *The Special Status of Coronals. Internal and External Evidence*. 79-100. San Diego: Academic.

McCarthy, J. & A. Prince 1995. Faithfulness and reduplicative identity. In : Beckman, J., L. Walsh Dickey & S. Urbanczyk (eds.) *Papers in Optimality Theory:* 249-384. University of Massachusetts Occasional Papers in Linguistics 18. Amherst, Mass.

McCarthy, J. 2005. Optimal paradigms. In : Downing, Hall & Raffelsiefen (2005a: 17-210).

Oostendorp, M. 2000. Wieringse nasaalvelarisiering. *Taal en Tongval LLL* 1 : 163-188.

Raffelsiefen, R. 1999. Phonological constraints on English word formation. In *Yearbook of Morphology 1998*, G. Booij & J. van Marle (eds.) 225-287. Dordrecht : Kluwer.

Raffelsiefen, R. 2004. *Phonological Effects in Word Formation*. Habilitationsschrift. Free University of Berlin.

Raffelsiefen, R. 2005. Paradigm uniformity effects versus boundary effects. In : Downing, Hall & Raffelsiefen (2005a: 171-262).

Scott, J. H. G. 2006. Dissimilation of coronal fricatives in Swabian german tautomorphemic /sC/ clusters. Ms. Indiana University.

Wiese, R. 1996. *The Phonology of German*. Oxford: Clarendon Press.