

**Topics in German Phonology**  
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**Handout 4**

**1 The distribution of glides and high vowels**

**1.1 Introduction**

(1) Transcriptions often employed in the literature for German ‘j’ sounds (Drosdowski et al. 1991; Wiese 1996):

a.	Jahr	[ja:ɹ̥]	‘year’
	jemand	[je:mant]	‘someone’
	Boje	[bo:jə]	‘buoy’
b.	Union	[ʔu.nj̥o:n]	‘year’
	Zeit	[tsaj̥t]	‘time’
	heute	[hɔjt̥ə]	‘today’
c.	Taille	[talj̥ə]	‘waist’

(2) Transcriptions used here (see also Hall 2005, 2006b):

a.	Jahr	[ja:ɹ̥]	‘year’
	jemand	[je:mant]	‘someone’
	Boje	[bo:jə]	‘buoy’
b.	Union	[ʔunj̥o:n]	‘year’
	Zeit	[tsaj̥t]	‘time’
	heute	[hɔjt̥ə]	‘today’
c.	Taille	[talj̥ə]	‘waist’

(3) [i] and [j] are in complementary distribution: [j] occurs when adjacent to a vowel (see a-c). Elsewhere [i] occurs. (There is a fourth context as well, i.e. V\_\_ (C), which describes diphthongs like [aj] in words like *Zeit* ‘time’).

a. # \_\_ V ...

b. ...V \_\_ V ...

c. ...C \_\_ V ...

## (4) a. Words illustrating context (3a):

jiddisch	[ˈjɪdɪʃ]	‘Yiddish’
jüdisch	[ˈjyːdɪʃ]	‘Jewish’
Jüngling	[ˈjʏŋlɪŋ]	‘youngster’
jemand	[ˈjeːmant]	‘someone’
jetzt	[jɛtst]	‘now’
jäh	[jɛː]	‘abrupt’
Jugend	[ˈjuːgənt]	‘youth’
jung	[jʊŋ]	‘young’
Jod	[joːt]	‘iodine’
Joch	[jɔx]	‘yoke’
Jagd	[jaːkt]	‘hunt’
Jacke	[ˈjakə]	‘jacket’
jauchzen	[ˈjawχtsən]	‘shout for joy’

## b. Words illustrating context (3b):

Kajüte	[kaˈjytə]	‘cabin’
Major	[maˈjoːɐ̯]	‘major’
Boje	[ˈboːjə]	‘buoy’
Koje	[ˈkoːjə]	‘cabin’
Kajak	[ˈkaːjak]	‘kayak’

## (5) Words illustrating context (3c):

a. prinzipiell	[pʁɪntsiˈpjɛl]	‘in principle’
labial	[laˈbjaːl]	‘labial’
Nation	[naˈtʃjɔn]	‘nation’
Studium	[ˈʃtuːdjʊm]	‘studies (sg.)’
Thrakien	[ˈtraːkjən]	‘Thracia’
Religion	[ʀeliˈɡjɔːn]	‘religion’
Kommission	[kɔmɪˈsjɔːn]	‘commission’
Fusion	[fuˈzjɔːn]	‘fusion’
b. Spanien	[ˈʃpaːnjən]	‘spain’
Gremium	[ˈɡʀeːmjʊm]	‘panel’
Familie	[faˈmiːljə]	‘family’
Materie	[mateːɐ̯jə]	‘matter’

Note: Some of the examples above contain glides that are optional, e.g. *Spanien* is [ˈʃpaːnjən] or [ˈʃpaːniən]. In other words the glide is obligatory, e.g. the ones in (4).

## 1.2 An OT treatment of German Glide Formation (GF)

- (6) Underlying and surface representations for [j]:

Gremium	/gremi:um/	[gremjum]	‘panel’
Studium	/ʃtu:di:um/	[ʃtu:djum]	‘studies (sg.)’

- (7) Constraints and rankings for GF:

- a. ONSET: Syllables have onsets.
- b. MAX- $\mu$ : A mora in the input corresponds to a mora in the output.

- (8) GF applies in prevocalic position (representative of examples 4-6) because of the ranking ONSET » MAX- $\mu$ :

	/pʀɪntsɪpiəl/	ONSET	MAX- $\mu$
a.	[pʀɪn.tsi.pi.əl]	*!	
b.	→ [pʀɪn.tsi.pjəl]		*

	/pʀɪntsɪpjəl/	ONSET	MAX- $\mu$
c.	[pʀɪn.tsi.pi.əl]	*!	
d.	→ [pʀɪn.tsi.pjəl]		

### Notes on literature:

See Hall (2005, 2006b) for an OT analysis of German GF and Hamann (2003) for an alternative. See also Wiese (1996) for a rule-based analysis, although he does not consider all of the data presented below. A more complete rule-based treatment of German GF can be found in Kloeke (1982).

- (9) Another repair strategy in (8) is to insert a consonant between the two vowels. German has a process of Glottal Stop Epenthesis (see Alber 2001 for an OT analysis):

a.	ost	[ʔɔst]	‘east’
	Idee	[ʔide:]	‘idea’
b.	chaotisch	[ka'ʔo:tɪʃ]	‘chaotic’
	Joachim	[jo'ʔaxim]	‘Joachim’
c.	Chaos	[ˈka:ɔs]	‘chaos’

- (10) DEP-C: A consonant in the output corresponds to a consonant in the input

(11) GF applies in /iV/ (representative of examples 4-6):

<u>/printsipiəl/</u>	ONSET	DEP-C	MAX-μ
a. <u>[pʀɪn.tsi.pi.ɛl]</u>	*!		
b. <u>[pʀɪn.tsi.pi.ʔɛl]</u>		*!	
c. → <u>[pʀɪn.tsi.pjɛl]</u>			*

### 1.2.1 Blocking context #1

(12) No glide formation before [i:]

lini-ieren	[liniʔ'i:ɾən]	‘rule’	Lini-e	[ˈli:njə]	‘line’
Alli-ierten	[aliʔ'i:ɾətən]	‘allies’	Alli-anz	[aˈljants]	‘alliance’
Initi-ierung	[initsiʔ'i:ɾʊŋ]	‘initiation’	initi-al	[iniˈtʃa:l]	‘initial’
vari-ieren	[vəriʔ'i:ɾən]	‘vary’	Vari-etät	[varjeˈtɛ:t]	‘variety’
assozi-ieren	[asotsiʔ'i:ɾən]	‘associate’	assozi-ativ	[asotsjaˈtɪf]	‘associative’
plagi-ieren	[plagiʔ'i:ɾən]	‘plagiarize’	Plagi-at	[plaˈɡja:t]	‘plagiarism’
li-iert	[liʔ'i:ɾət]	‘be on intimate terms with someone’.			
Shi-iten	[ʃiʔ'i:ɾən]	‘Shiites’			
Koni-in	[koniʔ'i:n]	‘kind of liquid alkaloid’			

(13) The following examples contain [ji], which must have the input /ji/ because this [ji] contrasts with [ii] in (12):

a.	injizieren	[ɪnʒiˈtʃi:ɾən]	‘inject’
	projizieren	[pʀɔʒiˈtʃi:ɾən]	‘project’
	konjizieren	[kɔŋʒiˈtʃi:ɾən]	‘conjecture’
b.	Jieper	[ˈji:pɐ]	‘craving’
c.	taillieren	[talˈji:ɾən]	‘fit at the waist’ (cf. Taille [ˈtaljə] ‘waist’)

(14) How can one reconcile (12) with (13)? The German data are an example of what McCarthy (2003) calls ‘grandfather effects’, and which Hall (2005, 2006a, c) calls ‘Derived Environment Blocking’.

A DEB effect occurs in a language which tolerates a certain structure [X] which is inherited from the input (/X/), but the same language blocks processes from creating [X]:

a. General process:	/... i V.../	→	[...j V...]
b. Blockage of derived structure:	/... i i.../	→	[...i i...]
c. Preservation of nonderived structure:	/... j i.../	→	[... j i...]

### 1.2.1.1 An OT solution with Comparative Markedness

(15) A Comparative Markedness analysis for German:

a.  $*_{N}ji$ : No new [ji]

b.  $*_{O}ji$ : No old [ji]

c. ONSET: Every syllable must have an onset.

d. FAITH- $\mu$  : The mora must be the same in input and output  
(no insertion or deletion of a mora)

(16)	/atia/	$*_{N}ji$	ONSET	FAITH- $\mu$	$*_{O}ji$
a.	→[atja]			*	
b.	[ati.a] (FFC)		*!		

(17)	/atii/	$*_{N}ji$	ONSET	FAITH- $\mu$	$*_{O}ji$
a.	[atji]	*!		*	
b.	→ [ati.i] (FFC)		*		

(18)	/atji/	$*_{N}ji$	ONSET	FAITH- $\mu$	$*_{O}ji$
a.	[ati.i]		*!	*	
b.	→ [atji] (FFC)				*

### 1.2.1.2 An OT solution with enriched faithfulness constraints

(19) An approach with ‘enriched’ faithfulness constraints (Hall 2005, 2006a, c) requires the following constraints:

a. ONSET: Syllables have onsets

b. MAX- $\mu$ : A mora in the input corresponds to a mora in the output

c. DEP- $\mu$ : A mora in the output corresponds to a mora in the input

d.  $*_{ji}$

(20)	/lini-i:RƏn/	$*_{ji}$	ONSET	DEP-C	MAX- $\mu$
a.	[li.ni.'i:RƏn]		*!		
b.	[li.'njɪ:RƏn]	*!			
c.	→ [li.ni.'ʔi:RƏn]			*	



## (26) GF blocked in /VONiV/:

Hafnium	[hafniʊm]	‘hafnium’
Insignien	[ɪnzɪɡniən]	‘insignia’
Bosnien	[bɔsnɪən]	‘Bosnia’
Osmium	[ɔsmiʊm]	‘osmium’
Kadmium	[katmiʊm]	‘cadmium’

## (27) GF applies in /VSiV/:

Spanien	[ʃpa:njən]	‘Spain’
Gremium	[ɡrɛ:mjʊm]	‘panel’
Familie	[fami:ljə]	‘family’

## (28) GF applies in /VLNiV/:

Kalifornien	[kalifɔrnjən]	‘California’
Fermium	[fɛrmjʊm]	‘fermium’
Spermium	[ʃpɛrmjʊm]	‘spermatozoa’
Vilnius	[vɪlnjʊs]	‘Vilnius’
Holmium	[hɔlmjʊm]	‘holmium’
Salmiak	[zalmjak]	‘ammonium chloride’

Note: There are apparently no examples of /VNLiV/, e.g. a hypothetical word *omlium*.

## (29) GF blocked in /VNNiV/:

Omnium	[ɔmniʊm]	‘omnium’
amniotisch	[amnio:tʃ]	‘amniotic’

Note: There are apparently no examples of /VLLiV/

## (30) Summary of environments for GF and its blockage:

- a. GF applies:
- i. VSOiV (S is more sonorous than O)
  - ii. VLNiV (L is more sonorous than N)
  - iii. VOOiV (O and O are equally sonorous)
- b. GF blocked:
- i. VOLiV (O is less sonorous than L)
  - ii. VONiV (O is less sonorous than N)
  - iii. VNNiV (N and N are equally sonorous)

### 1.2.2.2 An OT analysis of Standard German

(31) The following analysis can be found in Hall (2006b). Two markedness constraints:

- a.  $*_{\sigma}[\text{CCC}]$ : Three consonants in the onset are disallowed.
- b. SYLLABLE CONTACT LAW (SCL):  
In  $\alpha . \beta$  the sonority of  $\alpha$  is greater than the sonority of  $\beta$ .

(32) Four markedness constraints referring to onset well-formedness:

- a.  $*_{\sigma}[\text{Gj}]$ : A sequence of glide plus palatal glide in onset position is disallowed.
- b.  $*_{\sigma}[\text{Lj}]$ : A sequence of liquid plus palatal glide in onset position is disallowed.
- c.  $*_{\sigma}[\text{Nj}]$ : A sequence of nasal plus palatal glide in onset position is disallowed.
- d.  $*_{\sigma}[\text{Oj}]$ : A sequence of obstruent plus palatal glide in onset position is disallowed.

(33) Assumed universal ranking of onset well-formedness constraints:

$*_{\sigma}[\text{Gj}] \gg *_{\sigma}[\text{Lj}] \gg *_{\sigma}[\text{Nj}] \gg *_{\sigma}[\text{Oj}]$

(34) Two constraint conjunctions:

- a.  $\{\text{SCL} \ \& \ *_{\sigma}[\text{Sj}]\}$
- b.  $\{\text{SCL} \ \& \ *_{\sigma}[\text{Oj}]\}$

(35) Ranking required for the present analysis (see Hall 2006b):

$*_{\sigma}[\text{CCC}] , \{\text{SCL} \ \& \ *_{\sigma}[\text{Sj}]\} \gg \text{ONSET} \gg \{\text{SCL} \ \& \ *_{\sigma}[\text{Oj}]\}, \text{MAX-}\mu$

(36) GF blocked in /VOLiV/ (= 25):

	/bibliote:k/	$*_{\sigma}[\text{CCC}]$	$\{\text{SCL} \ \& \ *_{\sigma}[\text{Sj}]\}$	ONSET	$\{\text{SCL} \ \& \ *_{\sigma}[\text{Oj}]\}$	MAX- $\mu$
a.	[bi.bljo.te:k]	*!				*
b.	[bip.ljo.te:k]		*!			*
c.	→ [bi.bli.o.te:k]			*		

(37) GF blocked in /VONiV/ (= 26):

	/bɔsnjən/	$*_{\sigma}[\text{CCC}]$	$\{\text{SCL} \ \& \ *_{\sigma}[\text{Sj}]\}$	ONSET	$\{\text{SCL} \ \& \ *_{\sigma}[\text{Oj}]\}$	MAX- $\mu$
a.	[bɔ.snjən]	*!				*
b.	[bɔs.njən]		*!			*
c.	→ [bɔs.ni.ən]			*		

(38) GF applies in /VOO*i*V/ (= 23):

	/fleksion/	* <sub>σ</sub> [CCC]	{SCL & * <sub>σ</sub> [Sj]}	ONSET	{SCL & * <sub>σ</sub> [Oj]}	MAX-μ
a.	→ [flek.sjɔ:n]				*	*
b.	[flek.si.ɔ:n]			*!		*

(39) GF applies in /VSO*i*V/ (= 24):

	/[tsɛlzi:us]/	* <sub>σ</sub> [CCC]	{SCL & * <sub>σ</sub> [Sj]}	ONSET	{SCL & * <sub>σ</sub> [Oj]}	MAX-μ
a.	→ [tsɛl.zjʊs]					*
b.	[tsɛl.zi.ʊs]			*!		*

(40) GF applies in /VLN*i*V/ (= 28):

	/kalifɔrniən/	* <sub>σ</sub> [CCC]	{SCL & * <sub>σ</sub> [Sj]}	ONSET	{SCL & * <sub>σ</sub> [Oj]}	MAX-μ
a.	→ [ka.li.fɔr.njən]					*
b.	[ka.li.fɔr.ni.ən]			*!		*

(41) Will the analysis work with input /j/?

a. GF applies in /VOO*j*V/ (= 23):

	/fleksjɔ:n/	* <sub>σ</sub> [CCC]	{SCL & * <sub>σ</sub> [Sj]}	DEP-μ	ONSET
a.	→ [flek.sjɔ:n]				
b.	[flek.si.ɔ:n]			*!	*

b. GF blocked in /VOL*j*V/ (= 25):

	/bibljote:k/	* <sub>σ</sub> [CCC]	{SCL & * <sub>σ</sub> [Sj]}	DEP-μ	ONSET
a.	[bi.bljo.te:k]	*!			
b.	[bip.ljo.te:k]		*!		
c.	→ [bi.bli.o.te:k]			*	*

c. GF blocked in /VON*j*V/ (= 26):

	/bɔsnjən/	* <sub>σ</sub> [CCC]	{SCL & * <sub>σ</sub> [Sj]}	DEP-μ	ONSET
a.	[bɔ.snjən]	*!			
b.	[bɔs.njən]		*!		
c.	→ [bɔs.ni.ən]			*	*

(42) GF blocked in /VC*v*iV/:

Kolloquium	[kɔlɔ:kviʊm]	‘colloquium’
Requiem	[rɛ:kviɛm]	‘requiem’
Reliquie	[rɛ:li:kviə]	‘relict’

(43) GF applies in /VviV/ and /VSvV/:

- a. Moldavien [mɔlda:vjən] ‘Moldavia’  
 Skandinavien [skandina:vjən] ‘Scandinavia’  
 Sowjet [zɔvjɛt] ‘Soviet’
- b. Serviette [zɛrvjɛtə] ‘napkin’

(44) Hypothesis: Maybe the ‘v’ in (42) isn’t an obstruent (i.e. [v]), but instead a sonorant (i.e. [v]). By contrast, all other ‘v’s (e.g. those in (43)) are true obstruents.

(45) GF applies in (43) as expected:

	*/ <sub>σ</sub> [CCC	{SCL & * <sub>σ</sub> [Sj}	ONSET	{SCL & * <sub>σ</sub> [Oj}	MAX-μ
a. [mɔl.da:vi.ən]			*!		
b. → [mɔl.da:vjən]					*

(46) GF blocked in (42):

	*/ <sub>σ</sub> [CCC	{SCL & * <sub>σ</sub> [Sj}	ONSET	{SCL & * <sub>σ</sub> [Oj}	MAX-μ
a. [kɔ.lo:k.vjəm]	*!				*
b. [kɔ.lo:k.vi.əm]		*!			*
b. → [kɔ.lo:kvi.əm]			*!		

### 1.2.2.3 A rule-based alternative

(47) GF as a nonlinear rule: [need to add ‘-’ over first mora]



- Conditions: (a) The sonority of  $C_a$  is greater than the sonority of  $C_b$ ; or  
 (b)  $C_a$  and  $C_b$  are obstruents

### 1.2.2.4 OT alternative #1:

- (48) a.  $*_{\sigma}[\text{Lj}] \gg *_{\sigma}[\text{Nj}] \gg *_{\sigma}[\text{Oj}]$   
 b.  $*_{\sigma}[\text{Lj}] \gg *_{\sigma}[\text{Nj}] \gg \text{ONSET} \gg *_{\sigma}[\text{Oj}]$

(49) GF applies in /VLOiV/ (= 24):

	$*_{\sigma}[\text{CCC}]$	$*_{\sigma}[\text{Sj}]$	ONSET	{SCL & $*_{\sigma}[\text{Oj}]$ }	MAX- $\mu$
a. $\rightarrow [\text{tsel.zj\text{us}}]$					*
b. $[\text{tsel.zi.us}]$			*!		*

(50) Incorrect winner selected in context /VLNiV/ (= 28):

	$*_{\sigma}[\text{CCC}]$	$*_{\sigma}[\text{Sj}]$	ONSET	{SCL & $*_{\sigma}[\text{Oj}]$ }	MAX- $\mu$
a. $\leftarrow [\text{ka.li.f\text{ö}r.nj\text{ə}n}]$		*!			*
b. $[\text{ka.li.f\text{ö}r.ni.\text{ə}n}]$			*		*

(51) The alternative will only go through if words like *Kalifornien* in (50) are parsed [...LN.jV]:

- a. GF applies: i. /VSOiV/  $\rightarrow$  [VS.OjV]  
 ii. /VLNiV/  $\rightarrow$  [VLN.jV]  
 iii. /VOOiV/  $\rightarrow$  [VO.OjV]
- b. GF blocked: i. /VOLiV/  $\rightarrow$  [VO.LiV]  
 ii. /VONiV/  $\rightarrow$  [VO.NiV]  
 iii. /VNNiV/  $\rightarrow$  [VN.NiV]

### 1.2.2.5 OT alternative #2

(52) Alternative ranking for Standard German:

$*_{\sigma}[\text{CCC}, \{\text{SCL} \& \text{MAX-}\mu\}] \gg \text{ONSET} \gg \text{MAX-}\mu$

(53) GF blocked in /VOLiV/ (= 25):

	$*_{\sigma}[\text{CCC}]$	{SCL & MAX- $\mu$ }	ONSET	{SCL & $*_{\sigma}[\text{Oj}]$ }	MAX- $\mu$
a. $[\text{bi.bljo.te:k}]$	*!				*
b. $[\text{bip.ljo.te:k}]$		*!			*
c. $\rightarrow [\text{bi.bli.o.te:k}]$			*		

(54) GF applies in /VLSiV/ (=28):

	* <sub>σ</sub> [CCC]	{SCL & MAX-μ}	ONSET	{SCL & * <sub>σ</sub> [Oj]}	MAX-μ
a. → [ka.li.f̥ɔ̯.njən]					*
b. [ka.li.f̥ɔ̯.ni.ən]			*!		*

(55) Given Richness of the Base, any analysis should work with an underlying /j/ as well. Will alternative #2 work with /j/?

(56) Why no [j] after OL (according to OT analysis in 1.2.2.2)?

	* <sub>σ</sub> [CCC]	{SCL & * <sub>σ</sub> [Sj]}	ONSET	{SCL & * <sub>σ</sub> [Oj]}	MAX-μ
a. [bi.bljo.te:k]	*!				*
b. [bip.ljo.te:k]		*!			*
c. → [bi.bli.o.te:k]			*		

(57) Why no [j] after OL (according to OT alternative #2)?

	* <sub>σ</sub> [CCC]	{SCL & MAX-μ}	ONSET	{SCL & * <sub>σ</sub> [Oj]}	MAX-μ
a. [bi.bljo.te:k]	*!				*
b. ←[bip.ljo.te:k]					*
c. [bi.bli.o.te:k]			*!		

## 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.
- Drosdowski, G. et al. 1991. *Duden. Das Aussprachewörterbuch. Wörterbuch der deutschen Standardaussprache*. Mannheim: Dudenverlag.
- Hall, T. A. 1992. *Syllable Structure and Syllable Related Processes in German*. Tübingen: Niemeyer.
- Hall, T. A. 2005. German glide formation as the interaction of markedness and faithfulness. *CLS* 41.
- Hall, T. A. 2006a. Derived environment blocking effects in Optimality Theory. *Natural Language and Linguistic Theory*. In press.
- Hall, T. A. 2006b. German glide formation and its theoretical implications. Ms.
- Hall, T. A. 2006c. Against Comparative Markedness. Ms.
- Hamann, S. 2003. German glide formation functionally viewed. *ZAS Papers in Linguistics* 32: 137-154.
- Kloke, W. U. S. van Lessen 1982. *Deutsche Phonologie und Morphologie. Merkmale und Markiertheit*. Tübingen: Niemeyer.
- McCarthy, J. 2003. Comparative markedness. *Theoretical Linguistics* 29: 1-51.
- Wiese, R. 1996. *The Phonology of German*. Oxford: Clarendon Press.