The too-many-solutions problem in OT in a representational perspective

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V West Germanic Gemination

Goal of this meeting

To show that, sometimes, the too-many-solutions problem can be solved with representations. Specifically, I will show that the grid, motivated in the third meeting, can help us solving a problematic aspect of West Germanic Gemination.

Steps in the presentation

- What is West Germanic Gemination?
- The traditional analysis.
- Some fundamental criticism: Opacity, Bermúdez-Otero (1999).
- An alternative: Licensing-by-Stress.
- Why the alternative analysis seems problematic.
- A representational solution.

What is West Germanic Gemination?

In this talk I will develop an analysis of a notorious gemination process that applied in West Germanic, the predecessor of the modern languages English, German, Dutch and Frisian. This process has taken place before 400 AD. The time of its beginning is not so clear.

The data

Denton (1999:6): 'West Germanic Consonant Gemination occurred between a short vowel and an immediately following *j, w, r* or *l*.'
Kim (2000:100-101): 'In West Germanic, any single consonant except *r* geminates when preceded by a short vowel and followed by /j, w, l, r/ (Prokosch 1938:87-88, Lass 1994:35). Gemination does not take place when the consonant is preceded by a long vowel, a diphthong, or a consonant. … WGG occurs regularly before /j/. All preceding consonants, such as stops, nasals, glide, and liquids (except /r/) are geminated before /j/. However, there are many exceptions to WGG before /w, l, r/. For example, only velars were geminated before /w/ and only voiceless stops became double before liquids, /l, r/.'

The following data are from Murray and Vennemann (1983) and Simmler (1974), who is the most important, and impressive philological source.

(1) ***Glide in the Onset***

a) Voiceless stop in the coda

sat.jan *Go.*	settian *OS*	settan *OE*	‘to set’
skap.jan *Go.*	skeppian *OS*	scieppan *OE*	‘to create’
vek.ja *ON*		weccan *OE*	‘to wake up’

b) Voiceless fricative in the coda

haf.jan *Go.*	heffan *OHG*	hebban *OE*	‘to lift’
hlah.jan *Go.*		hlehhan, hlihhan *OE* hlichan, hlihgan	‘to laugh’
smið.ja *ON*		smiþþe *OE*	‘smith’

c) Nasal in the coda

kun.jis *Go.*	kunnies *OS*	cynnes *OE*	‘race’ (gen.)
win.ja *Go.*		wynn *OE*	‘lust’
frem.ja *ON*		fremman *OE*	‘to use’

d) Liquid in the coda

hal.ja *Go.*	hellia *OS*	helle *OE*	‘hell’
wil.ja *Go.*		willa *OE*	‘will’
sal.jan *Go.*		sellan, sillan *OE* syllan	‘transmit’

e) The /r/ did not lengthen, with the exception of OHG, occasionally.

nas.jan *Go.*	nerian *OE,OS*	nerian, nerien *OHG* neren, nerren	‘to save’
haz.jan *Go.*	herian *OE*		‘to praise’
ver.ja *OIc*	swerian *OE, OS*	swerien, sweren *OHG* swerren, swerran	‘to swear’
far.jan *Go.*	ferian *OE, OS*	ferien, fergen *OHG* feren, ferren	‘to go by boat’
fer.ja *OIc*	feri *ME*	vere, ver *MHG*	‘ferry’
war.jan *Go.* ver.ja *OIc.*	werian *OE, OS*	werigen, weren *MHG* wern	‘to defend’

f) The other glide, /w/, combines only with /k/, where gemination did occur.

naqaþs *Go.*	nackot *OHG*	‘naked’

g) ***Liquid in the Onset***

akrs *Go.*	akkar *OS*	‘acre’
vakr *ON*	wækker *OE*	‘awake’
bitr *ON*	bittor, bitter *OE* biter, bitor	‘bitter’
snutrs *ON*	snottor, snotor *OE*	‘smart’
facla *Vulg.L*	faccala *OHG*	‘torch’
ep.le *ON*	æppel *OE*	‘apple’
stup.la *Vulg. L*	staphalun *OHG*	‘corn-stalk’

h) Voiced obstruents did not lengthen before a liquid:

ligrs *Go.*	leger *OE*, legar *OHG*	‘bed’
nadrs *Go.*	natra *OHG*	‘adder’
fugls *Go.*	fugol *OE*, fogal *OHG*	‘bird’
	weder *OE*, wetar *OHG*	‘weather’

i) Voiced obstruents did lengthen before a glide

lag.jan *Go.*	leggian *OS*		‘to lay’
wag.jan *Go.* seg.ja *ON*		wecgan *OE*	‘to move’
bid.jan *Go.*	biddian *OS*	biddan *OE*	‘to ask for’
þridja *Go.*		þridda, þirda *OE* ðridda	‘the third’
midjis Go.		midde *OE*	‘middle’
veð.ja *ON*		weddian *OE*	‘to contract’

(2) A note on the relation with epenthesis
In the nom. and in the acc. there was an epenthetic vowel blocking gemination. (Wilmanns 1911: 191)
*akroz *ProtGerm.* > *akra *WestGerm.* > *akr > *akar *WestGerm.*
*aploz *ProtGerm.* > *apla *WestGerm.* > *apl > *apul *WestGerm.*

This explains doublets, as in OHG: ahhar ~ acchar
afful ~ apful

Murray and Vennemann (1983: 521, footnote 7):
‘Thus starting from stem alternations $^{+}$*a.kar*, $^{+}$*ak.kra* and $^{+}$*a.pul*, $^{+}$*ap.pla*, Old English generalized $^{+}$*a.kar* (*æcer*, ModE. *acre*) in the first paradigm but $^{+}$*ap.pla* (*æppel*, ModE. *apple*) in the other, while Old High German generalized both - creating doublets of which, however, only the stems with geminates survive in NHG *Acker*, *Apfel*.’

(3) In Italian intervocalic clusters did something similar (Murray and Vennemann 1983:527)

	Latin	*Italian*	
$C^{\$}i$	sapiat	sappia	'he knows'
	cufia	cuffia	'bonnet'
	radium	raggio	'ray'
	vindemia	vendemmia	'grape harvest'
$r^{\$}i$	morio	muoio	'I die'
$C^{\$}u$	futuo	fotto	'I fornicate'
	habui	ebbe	'I had'
	ianuarius	gennaio	'January'
	volui	volli	'I wanted'
$r^{\$}u$	paruit	parve	'it seemed'
$C^{\$}r$	labrum	labbro	'lip'
	febrem	febbre	'fever'
	Africa	Affrica	'Africa'
$C^{\$}l$	oc(u)lus	occhio	'eye'
	fib(u)la	fibbia	'buckle'
	duplus	doppio	'double'
	teg(u)la	tegghia	'baking pan'

	Latin	*Italian*	*Abbruzzese*	
$C^{\$}l$	sub(u)la	subbia	subbla	'chisel'
	neb(u)la	nebbia	nebbra	'fog'

(4) Important question:
Is this a natural phenomenon? Hock (1986:117) notes that the most common environment for consonant gemination is in intervocalic clusters in which the second consonant is a sonorant. This is the environment where West Germanic gemination applied, but also gemination in Romance, Greek and Pali.

The traditional analysis

West Germanic Gemination; The traditional analysis (Murray and Vennemann 1983), also: Murray (1988, 2000) and Vennemann (1988); for an overview of the theoretical literature on WGG cf. in particular Moon (1996).

(5) *The Syllable Contact Law* (SCL) (Murray and Vennemann 1983:520)
The preference for a syllabic structure $A^{\$}B$, where *A* and B are marginal segments and where *a* and *b* are the Consonantal Strength values of A and *B* respectively, increases with the value of *b* minus *a*.

(6) *Corollary*
The tendency for a syllable structure $A^{\$}B$ to change, where *A* and *B* are marginal segments and *a* and *b* are the Consonantal Strength values of *A* and *B* respectively, increases with the value of *a* minus *b*.

(7*) Scale of Consonantal Strength* (Murray and Vennemann 1983:519)

glides	liquids	nasals	voiced fricatives	voiceless fricatives, voiced stops	voiceless stops
1	2	3	4	5	6

(8) Murrray and Vennemann (1983:522): 'Gemination is thus recognized as another means of eliminating violations of the SCL, and WGmc. gemination has received a principled explanation.'

(9) An illustration

sat.jan > sat.tjan	-5 > 0
hlah.jan > hlah.hjan	-4 > 0
kun.jis > kun.nies	-2 > 0
hal.ja > hel.lia	-1 > 0
ner.jan	-1 = -1
ak.ra > ak.kra	-4 > 0
lig.ra	*-3 = -3*
lag.jan > lag.gjan	-4 > 0

(10) Why not simply syllabify the consonant cluster in the onset? This would surely create a nice contact between the two syllables (presumably a positive value, which is even more than 0).

(11) *The Stressed Syllable Law* (SSL) (Murray and Vennemann 1983:526)
The preferred stressed syllable (in Germanic) has exactly two morae

(12) Let us neglect *nerjan* and *ligra* for the moment. Now WGG can be understood as a sound change which satifies both the SSL and the SCL. The latter means specifically: get rid of the negative values.

(13) The problem of *ligra* (where the voiced consonant does not lengthen) could in principle be understood in terms of the markedness of voiced geminates. We know that voiced geminates are marked, cf. Kawahara (2005), to mention just one source.

(14) The problem of *ner.jan* (where the /r/ does not lengthen can perhaps be explained in terms of the marked status of geminate *r*'s. This is proposed by Ham (1998). Hall (undated) proposes that the sequence *rj* is very bad in the onset, because it is difficult to pronounce. Ham (1998) has a constraint disallowing a front glide at the beginning of a syllable. This enforces gemination in *lag.jan*, even though the result is a voiced geminate. Apart from these modifications, Ham and Hall accept Murray and Vennemann's basic idea that West Germanic Gemination was triggered by the *Syllable Contact Law* and the *Stressed Syllable Law*.

Some fundamental criticism: Opacity, Bermúdez-Otero (1999)

Bermúdez-Otero (1999) points out that at some point in time the change created a *synchronic alternation*. Example (Bermúdez-Otero 1999:171):

tru.mi.da	trymede *OE*	'strengthen, 1sg. pret. ind.'
trum.mjan	trymman *OE*	'strengthen, inf.'

Here is another example from Middle Dutch. It is taken from Van Bree (1987:227): Look how nicely Gothic /j/ corresponds to geminates in Middle Dutch.

Gothic		Middle Dutch
lagjan	'to lay, inf.'	le*gg*hen
lagju	1sg. pres. ind.	le*gg*he
lagis	2sg.	le*g*hes
lagiþ	3sg.	le*g*het
lagjom	1pl.	le*gg*hen

This raises the question why an intervocalic *singleton* is not lengthened. That would nicely satisfy PKPROM (= SSL (BH)).

In other words, why don't we get *trum.mida*?

Bermúdez-Otero further notes (p. 172): 'In this analysis, West Germanic Gemination has nothing to do with PKPROM (= SSL (BH)), or with constraints on rhyme structure in general: consonant lengthening is regarded as a by-product of the rise of CONTACT under conditions of moraic stability.'

(15) In Bermúdez-Otero's analysis a kind of Opacity is created. The representation contains an opaque mora. The essence of Bermúdez-Otero's analysis is as follows:
a) at the lexical level: *[Cj » CONTACT
b) at the next level: MAXMORA + CONTACT » *[Cj

(16) *[Cj » CONTACT

trumjan	*[Cj	CONTACT
☞ μ μ tru m.jan		*
μ tru .mjan	*!	

(17) CONTACT, MAXMORA » *[Cj

μμ trum.jan	MAXMORA	CONTACT	*[Cj
μ tru .mjan	*!		*
μ μ tru m.jan		*!	
☞ μμ tru m.mjan			*

(18) The transparant (ungrammatical) form; the result of CONTACT » *[Cj

trum.jan	MAXMORA	CONTACT	*[Cj
☞ μ tru .mjan			*
μ μ tru m.jan		*!	
☞ μμ tru m.mjan			*

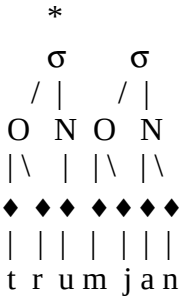
(19) Under the ranking CONTACT » *[Cj, applied in a single step, an incorrect form is derived. This is the transparent form. With multiple application of constraint evaluation we derive the correct form. In this form there is an unexpected mora. It is unexpected, because its presence is not motivated phonologically.

An alternative: Licensing-by-Stress

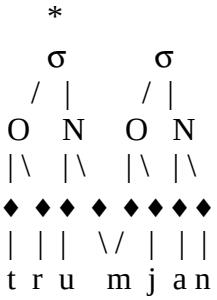
In this section I propose an alternative analysis of WGG. *Complex onsets are marked*. For this reason *they must be licensed by the stressed syllable*. In order to be licensed, the first consonant of the cluster *spreads to the left*, to the stressed syllable. In this account, there is no *Syllable Contact Law*, and there is no *Opacity*. Before I will develop the analysis I will have to explain a few theoretical assumptions I will be making.

(20) the way I see it:

a)



b)



In the representation in (20a) the complex onset is entirely in the domain of the unstressed syllable. In the representation in (20b), on the other hand, it is not only in the domain of the unstressed syllable, but it is also partly dominated by the stressed syllable. Due to this property, it is licensed by the stressed syllable.

Positional Licensing: This is a family of constraints requiring that marked structure coincide with a strong position. Literature: Zoll (1996, 1997, 1998), Walker (2001a,b, 2005), Kaun (1995), Smith (2002). The following is an exact copy of Walker's (2005) version.

(21) LICENSE(F, S-Pos): 'Feature [F] is licensed by association to strong position S.'

Let: i. *f* be an occurrence of feature [F] in an output O (optional restrictions: (a) *f* is limited to a specification that is perceptually difficult, (b) *f* belongs to a prosodically weak position, (c) *f* occurs in a perceptually difficult feature combination),

ii. *s* be a structural element (e.g. σ, μ, segment root) belonging to a perceptually strong position S in O,

iii. and sδf mean that *s* dominates *f*,

Then (∀f) (∃s)[sδf].

The constraint I will be working here is the following:

(22) LICENSING(ONSET-STRESS)

The head of an Onset can only license a dependent segment if it (i.e. the onset head) is linked to a stressed position

A reinterpretation of *COMPLEX(ONSET)

LICENSING(O-S) does a lot of the work of *COMPLEX(ONSET). It is well known that complex onsets are marked. Suppose now that, for some reason, in some language, the head of the onset cannot be stressed. If, in a language where the onset cannot be stressed, *Faithfulness* is low ranked, then we have a language *without complex onsets*. In other words, the constraint *COMPLEX(ONSET) can be eliminated. The absence of complex onsets emerges from the interaction of several constraints. Two crucial constraints are *Faithfulness* and LICENSING(ONSET-STRESS). The third is a constraint preventing onsets from being stressed (more about this later). This is demonstrated in the following tableau. CONSTRAINTC in this tableau is some constraint that is antagonistic to LIC(O-S).

(23) LIC(O-S), CONSTRAINTC » MAX(SEGMENT)

papra	LIC(O-S)	CONSTRAINTC	MAX(S)
pá.pra	*!		
páp.pra		*!	
☞ pá.pa			*

I also need a specific version of LIC(O-S). In many languages a complex onset with a front glide in the dependent position is not allowed. This is the same constraint as the one proposed by Bermúdez-Otero.

(24) LICENSING(ONSET/V-STRESS)

The head of an Onset can only license a dependent vowel if it (i.e. the onset head) is linked to a stressed position

This constraint does not make a distinction between front and back glides in the dependent position of the onset. In Germanic it is difficult to decide because the back glide had a very restricted distribution. In modern Dutch, however, there is a clear distinction between the two. Words with /j/ in dependent position are not allowed; words with back glides in dependent position are possible.

(25) twee ‘two’ kwaad ‘angry’ zweet ‘sweat’
twijfel ‘doubt’ kwijt ‘lost’ zwijg ‘to be silent’

The two constraints LIC(O-S) and LIC(O/V-S) are in a stringency relation, cf. in particular de Lacy (2002). This means that the stricter constraint can only take effect if it is higher ranked than the more general constraint, and some constraint separates them that is antagonistic to both. This predicts that in some languages complex onsets are freely allowed, whereas in others only complex onsets with a dependent consonant exist; in still other languages no complex onsets are allowed at all. There are no languages that do allow complex onsets with a dependent vowel but not complex onsets with a consonantal dependent position. The relevant rankings are:

(26) a) MAX(S) » LIC(O-S) » LIC(O/V-S)
b) LIC(O-S) » MAX(S) » LIC(O/V-S)
c) LIC(O-S) » LIC(O/V-S) » MAX(S)
d) MAX(S) » LIC(O/V-S) » LIC(O-S)
e) LIC(O/V-S) » MAX(S) » LIC(O-S)
f) LIC(O/V-S) » LIC(O-S) » MAX(S)

(26a) derives a language where complex onsets can have a dependent consonant as well as a dependent vowel. (26b) is of the type already ‘documented’ in (23), provided, as we have seen there, that there is another antagonistic constraint. (26c) is the same as (26b), provided that there is some antagonistic constraint, blocking the satisfaction of the dominating constraint. (26d) is the same as (26a). (26e) is the language where complex onsets are allowed, provided it does not have a dependent vowel. (26f) gives the same results as (26c). Again, this ranking yields a language where complex onsets are not allowed. Let me now illustrate the effects of the ranking in (26e).

(27) a) LIC(O/V-S) » MAX(S) » LIC(O-S)

papra	LIC(O/V-S)	MAX(S)	LIC(O-S)
☞ pa.pra			
pa.pa		*!	

(27) b) LIC(O/V-S) » MAX(S) » LIC(O-S)

pa pja	LIC(O/V-S)	MAX(S)	LIC(O-S)
☞ pa.pa		*	
pa.pja	*!		*

Voiced geminates are marked
To account for WGG I also need a constraint accounting for the marked status of voiced geminates. I formulate this constraint in the following way:

(28) *VOICEDGEMINATE (*VOIGEM)

This constraint penalizes a configuration where the feature Voice is linked to two root nodes.

A reinterpretation of NOCODA

It is well known that consonants in the coda position are marked. Traditionally this is expressed by the constraint NOCODA.

(29) NOCODA
*C]$_\sigma$

Let us restate this in terms of licensing. The idea is that a consonant must be licensed by the onset.

(30) LICENSING(CONSONANT-ONSET)
A Consonant must be licensed by an Onset

LIC(C-O), like NOCODA, explains why syllabification tends to maximize the onset. Our example *papra*, for instance, is preferably syllabified as *pa.pra*, rather than *pap.ra*.

(31) LIC(C-O)

papra	LIC(C-O)
☞ pa.pra	
pap.ra	*!

This is not to say (of course) that all languages necessarily have onset maximization. We can get the syllable boundary in between the two consonants with the following ranking:

(32) LIC(O-S), MAX(S) » LIC(C-O)

papra	LIC(O-S)	MAX(S)	LIC(C-O)
pa.pra	*!		
☞ pap.ra			*
pa.pa		*!	

It is also possible to derive a language where consonant clusters are not allowed, because they do not have complex onsets, neither do they have coda consonants. We have to come back to this situation later (there is something very important behind it).

(33) LIC(O-S), LIC(C-O) » MAX(S)

papra	LIC(O-S)	LIC(C-O)	MAX(S)
pa.pra	*!		
pap.ra		*!	
☞ pa.pa			*

The constraint LIC(C-O) has to be relativized to sonority degree. The higher a consonant's sonority, the lower the pressure put on it by LIC(C-O). This accounts for the traditional observation that coda consonants are preferably sonorant consonants, rather than obstruents (Zec 1988, 1995; Morén 1997, to name but a few).
Languages typically have a cut-off point; a consonant of equal or higher sonority than that point is allowed in the coda, whereas a consonant of lesser sonority is not allowed in the coda. I will represent the cut-off point schematically, with subscripted LOWSON. We can now write the following constraint:

(34) LICENSING(CONSONANT$_{LOWSON}$-ONSET)
A Consonant of equal or lower sonority than x must be licensed by an Onset

Now we can construct a ranking that accounts for a language where only consonants of relatively high sonority are allowed in the coda. This is shown in the following two tableaux.

(35) LIC(C_{LOWSON}-O) » MAX(S) » LIC(C-O)

parpa	LIC(C_{LOWSON}-O)	MAX(S)	LIC(C-O)
pa.pa		*!	
☞ par.pa			*

(36) LIC(C_{LOWSON}-O) » MAX(S) » LIC(C-O)

papra	LIC(C_{LOWSON}-O)	MAX(S)	LIC(C-O)
☞ pa.pa		*	
pap.ra	*!		*

Notice that we are talking here, in this example, about a language that does not allow complex onsets. This is a language with high ranking LIC(O-S), as we have seen before in (32).

Notice also that the two constraints LIC(C_{LOWSON}-O) and LIC(C-O) are in a stringency relation. The specific constraint can only take effect if it is higher ranked than the general constraint, with some constraint antagonistic to both separating them. This has already been demonstrated in (35) and (36).

Let us begin with the consonant of the highest sonority degree that is still geminated. This is /l/, at least if it is followed by /j/. We have seen this in (1d).

The first important constraint is LIC(C_{LOWSON}-O). We have to fix the cut-off point at sonority degree /r/. Any consonant that is of lower sonority than /r/ violates this constraint, if it is syllabified in the coda. It must therefore be syllabified in the onset. Following Murray and Vennemann (1983) I assume that /r/'s sonority degree is greater than /l/'s.

The second important constraint is LIC(O/V-S). This constraint only tolerates a vowel in the dependent position of an onset if the onset's head is also syllabified in the stressed syllable.

Satisfaction of both constraints derives a geminate /l/ if it is followed by a front glide.

(37) LIC(C_{LOWSON}-O), LIC(O/V-S)

helja	LIC(C_{LOWSON}-O)	LIC(O/V-S)
hel.ja	*!	
he.lja		*!
☞ hel.lja		

With these two constraints all consonants, except /r/ will be lengthened, because they have to be syllabified in the onset, as well as in the coda of the stressed syllable. This explains all the forms in (1a-d).

It also explains the forms in (1i). In these forms a voiced consonant precedes the front glide. However, we must rank both constraints above *VOIGEM. This is shown in the following tableau.

(38) LIC(C_{LOWSON}-O), LIC(O/V-S) » *VOIGEM

legjan	LIC(C_{LOWSON}-O)	LIC(O/V-S)	*VOIGEM
leg.jan	*!		
le.gjan		*!	
☞ leg.gjan			*

Recall from (1h) that voiced consonants are not lengthened if they precede a liquid. This can only be accounted for if LIC(O-S) is ranked below *VOIGEM.

(39) LIC(C_{LOWSON}-O) » *VOIGEM » LIC(O-S)

fuglV	LIC(C_{LOWSON}-O)	*VOIGEM	LIC(O-S)
fug.lV	*!		
☞ fu.glV			*
fug.glV		*!	

In this analysis the voiced consonant is syllabified in the onset. This is a consequence of high ranking LIC(C_{LOWSON}-O). This constraint must be high ranked because of the way it interacts with *VOIGEM in cases where the voiced consonant precedes a front glide (cf. the tableau in (38)).

The claim that a voiced consonant is syllabified in the onset if it is followed by a liquid differs from Murray and Vennemann's analysis!!!

Recall that /r/ is not geminated, not even before a /j/. We have seen this in (1e). To account for this we have to rank *GEM above LIC(C-O). *GEM is the general constraint penalizing any geminate (be it voiced or voiceless). In its turn *GEM is dominated by LIC(O-S). The opposite ranking would block gemination in cases where a voiceless consonant precedes a liquid.

(40) LIC(O/V-S) » LIC(O-S) » *GEM » LIC(C-O)

werjan	LIC(O/V-S)	LIC(O-S)	*GEM	LIC(C-O)
we.rjan	*!	*		
☞ wer.jan				*
wer.rjan			*!	

The following tableau shows that LIC(O-S) dominates *GEM. Relevant forms have been supplied in (1g).

(41) LIC(O-S) » *GEM

akrV	LIC(C_{LOWSON}-O)	LIC(O-S)	*GEM
ak.rV	*!		
a.krV		*!	
☞ ak.krV			*

(42) ***West Germanic Gemination***

LIC(C_{LOWSON}-O), LIC(O/V-S) » *VOIGEM » LIC(O-S) » *GEM » LIC(C-O)

Why the alternative analysis seems problematic

The analysis of WGG hinges on the idea that complex onsets must be licensed by stress. In order to satisfy the constraints LIC(O/V-S) and LIC(O-S) a consonant spreads to the stressed syllable. This analysis creates an instance of the Too-Many-Repairs problem.

In OT, targets are defined that are in need of repair. *Targets and repairs are disconnected.* This means that a given target can be repaired in a variety of ways. Which repair is chosen, depends on constraint interaction. We have already seen examples of this. Let us study NOCODA again, also known as LIC(C-O). We take our favorite example *papra*.

A coda consonant is marked. Therefore, it is a target for repairs. At least three repair mechanims are attested (43-45).

(43) A language where an intervocalic cluster is syllabified in the onset

LIC(C-O), MAX(S) » LIC(O-S)

papra	LIC(C-O)	MAX(S)	LIC(O-S)
pap.ra	*!		
pa.pa		*!	
☞ pa.pra			*

(44) A language where an intervocalic cluster is heterosyllabified

LIC(O-S), MAX(S) » LIC(C-O) (see also tableau (32))

papra	LIC(O-S)	MAX(S)	LIC(C-O)
pa.pra	*!		
☞ pap.ra			*
pa.pa		*!	

(45) A language where an intervocalic cluster is annihilated

LIC(O-S), LIC(C-O) » MAX(S) (repeated from tableau (33))

papra	LIC(O-S)	LIC(C-O)	MAX(S)
pa.pra	*!		
pap.ra		*!	
☞ pa.pa			*

By disconnecting targets from repairs we derive typologies (constraint interaction). This is one of the central points of OT, so they better be good, these typologies. The typology in (43)-(45) is a sound one.

But the analysis also makes a highly undesirable prediction. It predicts that languages should exist where complex onsets attract stress. This is very marginal at best. One possible example is Nankina (Spaulding and Spaulding 1994, Gordon 1999, 2002).

Imagine a language where stress is normally assigned to the first syllable. Let us summarize the constraints accounting for this regular pattern as REGULARSTRESS (REGS). Suppose now that in this language REGS is dominated by LIC(O-S).
Now what happens? Let us have a look again at the formulation of the two versions of Licensing-by-Stress we have seen sofar.

(46a = 21) Walker's version of Licensing-by-Stress
LICENSE(F, S-Pos): 'Feature [F] is licensed by association to strong position S.'

(46b = 22) LIC(O-S)
The head of an Onset can only license a dependent segment if it (i.e. the onset head) is linked to a stressed position

There are small differences between the two versions, but that is mainly due to the fact that the one we have worked with sofar, (46b), is not quite precise. (What does 'stressed position' mean?). But let us assume that it is identical to (46a).

We take our favourite examples *papra* and *papa* again, but extend it with one syllable.: *papapa* and *paprapa*.

(47) LIC(O-S) » REGS

papapa	LIC(O-S)	REGS
☞ (pá.pa)pa		
pa(pápa)		*!

(48) LIC(O-S) » REGS

paprapa	LIC(O-S)	REGS
(pá.pra)pa	*!	
☞ pa(prápa)		*

It seems, then, that it is very easy to account for onset-sensitivity. It is predicted that complex onsets can easily attract stress. This prediction is false (pace Nankina). In other words, the analysis so far creates a typological problem. This is an instance of the too-many-solutions problem.

A representational solution

Prosodic structure has two dimensions: the tree dimension, and the grid dimension. This is a very old idea. Actually, it is the original representation of stress (Liberman and Prince (1977). Recently, it has been reinstalled again by Hyde (2001).

Mora Projection
- a mora projects a gridmark
- a head mora projects a gridmark

Onsets never have a gridmark, because only moras project a mark.

(49) the structure of syllable weight

The classical theory		Hyde's theory	
light syllable	heavy syllable	'light' syllables	heavy syllable
			*
*	*	* *	* *
(μ)	(μ μ)	(μ) (μ μ)	(μ μ)

(50) a light and a heavy syllable with a complex onset in our system

The fact that onsets have nothing do to with gridmarks solves much of our problem. Even in languages where Licensing-by-Stress is very important, in the sense that it dominates the regular stress rules, it makes no sense to move the stress to the syllable containing the complex onset. Thus, a repair strategy like the one in (48) is just not possible. Even if stress moves to the syllable with the complex onset, the latter is still not licensed by the former, because onsets do not have a gridmark.

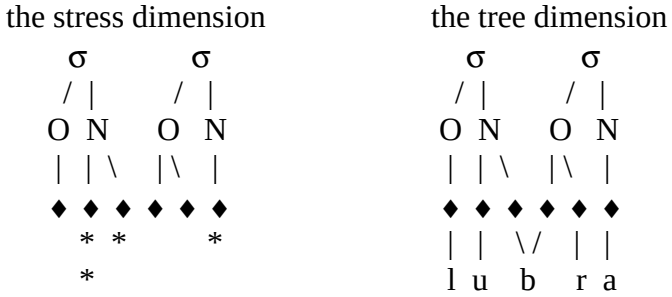
Notice, though, that we have to be precise about the exact meaning of the words 'linked' and 'stressed position' in (46b=22), our definition of Licensing-by-Stress. 'linked' means 'associated', in the autosegmental sense, and 'stressed position' means 'gridmark', nothing else.

Interestingly, our system predicts that stress shift does make sense if it moves to the syllable *preceding* the intervocalic cluster! In that case the first consonant of the cluster can be linked to a gridmark, either because it is just located in the coda (and not in the onset), or because it is located in the coda and the onset (in which case it is lengthened). Interestingly, this kind of stress shift is attested. It has applied in Late Latin, according to Fouché (1960). Scholars disagree whether stress shift was accompanied by gemination. Fouché says it was.

(51)

Latin	Late Latin
colubra	colubra
cathedra	catedra
podagra	podagra
alacre	alecru

(52) the structure of *lubra*



(53) Latin: REGS » LIC(O-S)
Late Latin: LIC(O-S) » REGS

Licensing-by-Stress, as defined by Walker, predicts that there are languages where complex onsets can only appear in the stressed syllable. Thus, /prapra/ could survive as [prápa]. This is shown in the following tableau.

(54)

prapra	NOUNLICENSED COMPLEXONSET	NO CODA	MAX(S)	NOCOMPLEX ONSET
prá.pra	*1			**
práp.ra		*!		*
☞ prá.pa			*	*
pa.pa			**!	

Interestingly, in our system there is no way to derive this language! I know, however, that child phonology does make a difference between consonant clusters in stressed syllables (which are allowed) and clusters in unstressed syllables (which aren't): Tessier (2007).

Conclusions:

i. WGG is the result of the constraint requiring complex onsets to be licensed by stress.
ii. It does not make sense to move the stress onto the onset in order to license it, because onsets are not represented on the grid.
iii. It does make sense, though, to move the stress to a syllable immediately before the syllable with a complex onset. This is far from problematic, because this phenomenon has been attested.
iv. We might have an answer to the question why there are no languages where stress shifts onto a syllable with a complex onset.