A Constraint Definition Language and consequences for stress placement

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Starting Point

- The content of markedness constraints is not arbitrary (Eisner 1997; de Lacy 2011) and they are *negative*. *Ban* structures – no requirement of structures. (Note – different from OT negative vs. positive)
- Formalized by definition as *conjunctions of negative literals* (CNLs) (Jardine & Heinz in press), a formal language theory term.
- Only allow banning of structures

Benefits

- An explicit Constraint Definition Language (CDL) for markedness constraints: "An explicit CDL is both useful and ultimately essential to a complete Optimality Theory." (de Lacy 2011).
- as a consequence, certain constraints are not in CON. Importantly for stress placement – ALIGN (Prince & Smolensky 1993)
- If OT involves the "interaction of simple constraints" then a CNL constraint language is desirable (lowest level of logical complexity)

Road Map

- Have categorical constraints defined as CNLs
- Leads to foot placement/stress assignment as a *local* phenomenon
- Address a subsection of Gordon (2002)'s typology of quantity insensitive stress focusing on stressed/unstressed (not primary/secondary as Gordon does)
- Examine the theoretical consequences of this theory of stress

Results

- Reference to distance isn't necessary
- All patterns in the relevant subsection captured, typology of 61 languages
- Avoids problems that can come with a more powerful CDL (ones that permit constraints like ALIGN)
- Has interesting quirks of its own

Of Interest Re: Constraints

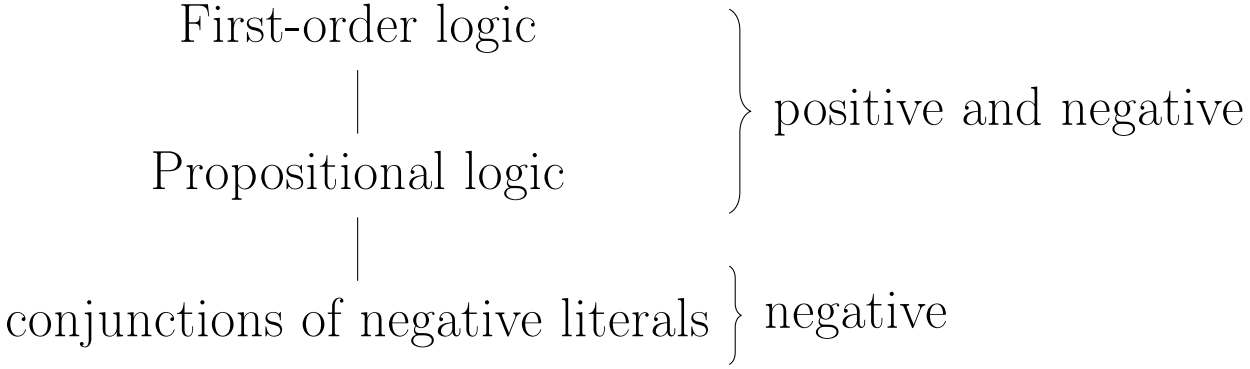
- CNL definition reveals *positional* markedness requirements that do the work of ALIGN in some cases (FTBIN)
- TROCH and IAMB are *foot antagonists* - prefer candidates with fewer feet just as certain ALIGN constraints do
- no PARSE (full set in appendix)

Typology

- focus on single stress ('σσ)σσσ and iterative binary stress ('σσ)('σσ)σ patterns
- 90% of Gordon (2002)'s typology
- any account of stress placement will need to capture these; good "base", further changes more informative

Logical Hierarchy

(1) hierarchy of logical languages (Jardine & Heinz in press)



Definitions

- *conjunction of negative literals*: representation with negation ¬ indicating that that structure is banned, joined by conjunction ∧
- conjunctions comprise constraints banning illicit structures – ¬ a ∧ ¬ b ∧ ¬ c
- example: *Lapse – ¬σ̆σ̆; Iamb – ¬ ('σσ) ∧ ('σ)

Definitions

- only negative: compare Propositional Logic – $\neg(\neg\ a \wedge \neg\ b \wedge \neg\ c)$
- First Order Logic – Can require structures via quantification $\forall, \exists$
- Clear that CNLs are simpler

Local Alignment Constraints

(2) Constraint: ¬ ωF ¬ Fω

(3)

/σσσσσσσσ/	¬ωF	¬Fω
☞ a. (σσ)(σσ)(σσ)σ		*
b. σ(σσ)(σσ)(σσ)	*!	
c. (σσ)σ(σσ)(σσ)	*!	*
d. (σσ)(σσ)σ(σσ)	*!	*

- ¬ωF is violated when a footed syllable is the successor to an unparsed syllable, ¬$F\omega$ the reverse
- No gradience, no precedence

In Action: Single Stress

- Languages with a single fixed stress
- Includes: initial, peninitial, antepenultimate, penultimate, final
- $\sim$70% of languages in Gordon's typology

In Action: Single Stress

(4) initial stress

input	winner	loser	¬ωF	FtBinInit	FtBinMid	FtBinFin	*InitLapse	Troch	Iamb	¬Fω	*LL	*LLR
3syll	('σσ)σ	σ('σσ)	W							L		
4syll	('σσ)σσ	σ('σσ)σ	W								L	L
2syll	('σσ)	(σ'σ)						W	L			
4syll	('σσ)σσ	('σσ)('σσ)							W	L	L	L

In Action: Single Stress

– TROCH and IAMB together prevent additional feet, relative ranking determines foot type of single foot.

(4) initial stress

input	winner	loser	¬ωF	FTBININIT	FTBINMID	FTBINFIN	*INITLAPSE	TROCH	IAMB	¬Fω	*LL	*LLR
3syll	('σσ)σ	σ('σσ)	W							L		
4syll	('σσ)σσ	σ('σσ)σ	W								L	L
2syll	('σσ)	(σ'σ)						W	L			
4syll	('σσ)σσ	('σσ)('σσ)							W	L	L	L

In Action: Iterative Binary Stress

- languages with iterating stress in a single direction
- all permutations of direction/foot type/parse level attested except R-L non-exhaustive iambs (σ'σ)(σ'σ), σ(σ'σ)(σ'σ)
- ∼20% of Gordon's typology

Exhaustive Parse & FtBin

- Iterative stress, exhaustive parse
- ex: Murinbata (Street & Mollinjin 1981)
  ('σσ)
  ('σσ)('σ)
  ('σσ)('σσ)
  ('σσ)('σσ)('σ)
  ('σσ)('σσ)('σσ)
  ('σσ)('σσ)('σσ)('σ)
- $\neg F\omega$ and $\neg\omega F$ can't decide between different unary foot placements
- Solution comes from CNL definition of FtBin

Exhaustive Parse & FtBin

- Conj A = FtBinMid
- Conj B = FtBinInitial
- Conj C = FtBinFinal

(5) Murinbata

input	winner	loser	¬ωF	¬Fω	FtBinInit	FtBinMid	*InitLapse	*LL	*LLR	FtBinFin	Troch	Iamb
3syll	('σσ)('σ)	σ('σσ)	W							L	L	L
3syll	('σσ)('σ)	('σσ)σ		W						L	L	L
3syll	('σσ)('σ)	('σ)('σσ)			W					L		
5syll	('σσ)('σσ)('σ)	('σσ)('σ)('σσ)				W				L		
2syll	('σσ)	(σ'σ)									W	L

Exhaustive Parse & FtBin

- contrast with traditional account - better gradient alignment to an edge i.e. if the unary foot is at a PrWd edge, then it's only a one syllable (one violation) gap to the next foot edge, instead of two if the unary foot were binary instead
- here local bans on where unary foot can appear

ALIGN

- ALIGN-constraints in McCarthy & Prince (1993)'s *Generalized Alignment*
- ∀ Cat1 ∃ Cat2 such that Edge1 of Cat1 and Edge2 or Cat2 coincide. Assign one violation mark ∀ Cat3 that intervenes between Edgel of Catl and the nearest Edge2 of some Cat2
- Gave us a means to talk about alignment in a productive way in Optimality Theory (Prince & Smolensky 1993)

Observations

- ALIGN is atypical among markedness constraints - quantification over multiple variables. Is First Order Logic (FOL) necessary?
- overly complex and make unwanted typological predictions: *Midpoint Pathology* (Eisner 1997), alignment of morphemes (McCarthy 2003)
- Not in CON if CNLs are the constraint definition language for markedness constraints

Issues (from Hyde (2012))

(6)

/σσσσσσσ/	Align(σ, L, F, L; σ)
a. (σσ)σσσσσ	*,**,***,****,***!**,******
b. σ(σσ)σσσσ	*,*,**,***,****,**!***
c. σσ(σσ)σσσ	**,*,*,**,***,****!
☞ d. σσσ(σσ)σσ	***,**,*,*,**,***
e. σσσσ(σσ)σ	****,***,**,*,*,**!
f. σσσσσ(σσ)	*****,****,***,*!*,*,*

- direct result of FOL quantification – count distance from every unique intervener to edge at once
- *gradient* evaluation – more violations for more distance
- contrast with multiple *locus of violation*

Distance Sensitivity

- result of definition of ALIGN
- Hyde (2012) states: "Distance-sensitive alignment actually is a necessary component of the theory" (p. 790). But what is it?
- *Successor relationship*: one element *immediately* follows the other - strictly local. *Precedence relationship*: one follows the other *at any point* - can be non-local.

Take Stock

- Analysis in OTWorkplace (Prince et al. 2007-2017) reveals no Midpoint Pathology
- This approach refers only to successor - no distance-sensitivity but still captures the attested patterns
- CNL is the highest level of complexity needed - no need for FOL

Other Approaches

- McCarthy (2003) - *gradient* nature of the ALIGN constraints is undesirable
- Kager (2001, 2005) - enriched theory of clashes and lapses circumvents ALIGN issues
- Buckley (2009) - *ALIGN "anti-alignment" constraints in a strictly local theory of alignment
- Hyde (2012) - attempts to eschew gradience as well, but keeps non-local evaluation in the constraints
- All share intuition something is wrong, this approach identifies exactly what

What Else?

- Capture the attested patterns with local constraints – good!
- What else is predicted?

Sour Grapes

- most well-known in spreading phenomena: "favors candidates with spreading that is fully successful, but it gives up on candidates where spreading is blocked" (McCarthy 2009)
- compare hypothetical mãw̃ã vs. mawasa
- result of interaction of a constraint motivating spreading (AGREE-R[N]) and IDENT constraint (IDENT([n]))

Sour Grapes

– sour grapes stress – Lang54:
  ('σσ)
  ('σσ)σ
  ('σσ)('σσ)
  ('σσ)σσσ
  ('σσ)('σσ)('σσ)
  ('σσ)σσσσσ

– full parse in even no. forms, minimal parse in odd no. forms – highly unnatural

Sour Grapes

– how does this emerge and why is it sour grapes?

(7) sour grapes

input	winner	loser	¬ωF	FtBinInit	FtBinMid	FtBinFin	*InitLapse	Troch	¬Fω	Iamb	*LL	*LLR
3syll	('σσ)σ	σ('σσ)	W						L			
3syll	('σσ)σ	('σ)(σ'σ)		W				W	L			
5syll	('σσ)σσσ	(σ'σ)('σ)(σ'σ)			W			W	L		L	L
3syll	('σσ)σ	(σ'σ)('σ)				W		W	L			
2syll	('σσ)	(σ'σ)						W		L		
4syll	('σσ)('σσ)	('σσ)σσ							W	L	W	W
5syll	('σσ)σσσ	('σσ)('σσ)σ								W	L	L

Sour Grapes

– "if you can't spread binary feet to the end, then don't spread at all"

– sour grapes pattern emerges from a markedness-only strictly local constraint set

– pattern is of a higher complexity than FOL – far more complex than any constraint in the constraint set

Thanks!

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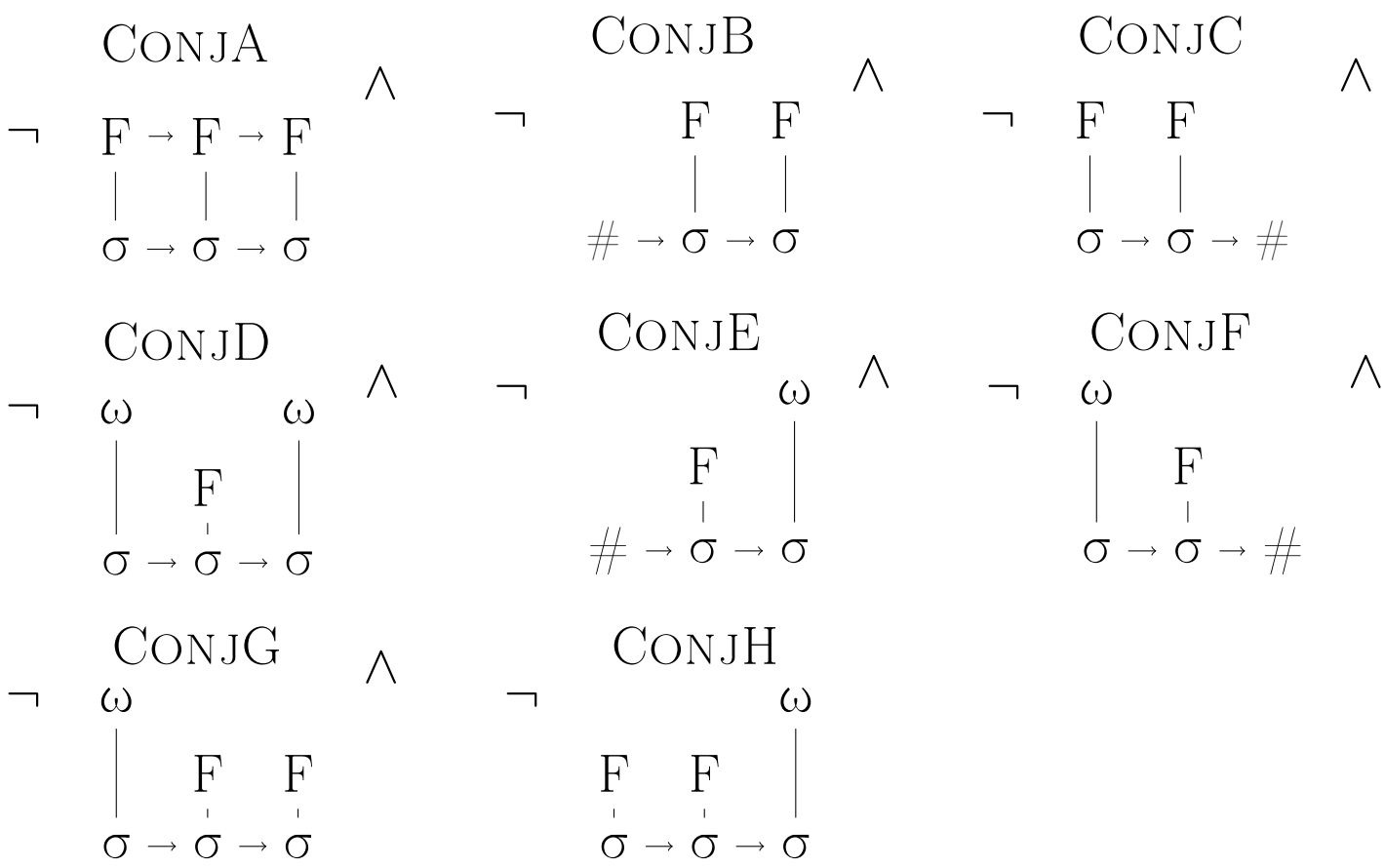
Appendix: Iterative Binary

input	winner	loser	¬ωF	FtBinInit	FtBinMid	FtBinFin	*InitLapse	*LL	*LLR	Troch	¬Fω	Iamb
3syll	('σσ)σ	σ('σσ)	W								L	
4syll	('σσ)('σσ)	σ('σσ)σ	W								W	L
3syll	('σσ)σ	('σ)(σ'σ)		W						W	L	
5syll	('σσ)('σσ)σ	(σ'σ)('σ)(σ'σ)			W					W	L	L
3syll	('σσ)σ	(σ'σ)('σ)				W				W	L	
5syll	('σσ)('σσ)σ	('σσ)σσσ						W	W			L
2syll	('σσ)	(σ'σ)								W		L

Appendix: CNL FtBin

(8) FtBin

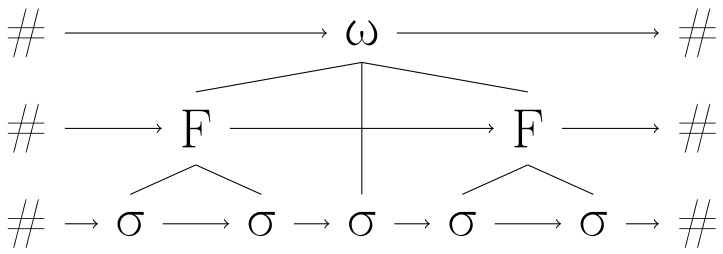


Appendix: Constraint Set

- $\neg\omega F$: see (2)
- $\neg F\omega$: see (2)
- FtBinInitial : violated by an initial unary foot; see (8) ConjB
- FtBinMid: violated by a unary foot between two other feet; see (8) ConjA
- FtBinFinal : violated by a final unary foot; ; see (8) ConjC
- Iamb : violated by trochees and unary feet; $\neg$ ('σσ) $\wedge$ ('σ)
- Trochee : violated by iambs and unary feet; $\neg$ (σ'σ) $\wedge$ ('σ)
- *LongLapse: violated by 3 successive unstressed syllables; $\neg$ σ̆σ̆σ̆
- *LongLapseRight: as *LongLapse but at the right edge; $\neg$ σ̆σ̆σ̆#
- *InitialLapse: violated by 2 unstressed syll at left edge; $\neg$#σ̆σ̆

Metrical Structure

(9)



– PrWd tier, foot tier, syllable tier. Each wrapped in #s (denotes edge). $\rightarrow$ represents successor relation.

– See Nespor & Vogel (1986) and Selkirk (1984) for more