Icy Targets

When a feature [F] is realized over multiple segments, phonological theory typically offers two mechanisms to contain the spreading of [F]: (i) reaching the edge of some prosodic or morphological domain; (ii) encountering a blocking segment. Here, I focus on a third mechanism—*icy targets*. An icy target undergoes spreading from [F], but then blocks any further spreading. No previous OT analysis predicts icy targets. Binary Domains Theory (BDT) is presented here to account for the pattern.

An example of icy targets is u-umlaut in Icelandic. The data in (4) show that Icelandic has an alternation in which /ʏ/ fronts and rounds a preceding /a/ to [œ] (4-a). There is a separate vowel reduction process which raises non-initial instances of [œ] to [ʏ]. The resulting [ʏ] allows spreading of [front] and [round] further to the left (4-b). Some roots do not reduce (4-c), yielding a derived [œ] that blocks any further spreading. [œ] is an icy target.

BDT builds on Autosegmental Phonology (AP; Goldsmith 1976, et seq.), according to which (i) feature spreading is associating a feature with feature nodes, (ii) no feature node can be skipped (Locality Condition), and (iii) association lines cannot cross. However, BDT is different in that the relationship between adjacent feature nodes linked to the same instance of a feature is hierarchical. This hierarchical relationship is captured by the notion of headedness, where the distribution of heads is entirely predictable and governed by three restrictions on Gen. First, every pair of adjacent feature nodes linked to the same autosegment has a unique head (∆), not shared with any other feature node, and these heads can be referred to by constraints. Second, for every head there is a dependent. Third, a trigger of an F-spreading process must be a head of [F].

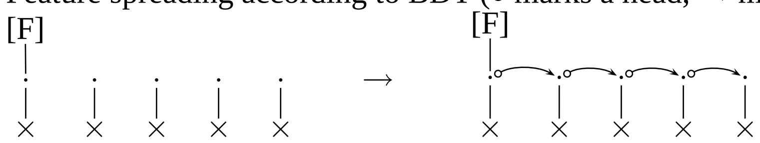
BDT relies on two concepts to express hierarchy: headedness and binarity. Headedness is a relation found throughout prosodic theory, where any prosodic constituent has a head. Headedness has also been proposed for feature spreading (Cole and Kisseberth 1995a,b, Cassimjee and Kisseberth 1998, McCarthy 2004, Smolensky 2006), and BDT follows this approach.

The idea that feature spreading involves a binary constituent is also consistent with many other aspects of linguistic theory. For example, syllables are standardly assumed to consist of not more than two moras, feet contain two syllables (e.g. Hayes 1995), and PWds have also be analyzed as binary (Itô and Mester 1992, Ussishkin 2000, Karvonen 2005). Binarity is also found in feature spreading processes, particularly those involving tone. For example, many Bantu languages (see Kisseberth and Odden 2003 for an overview), a few Japanese dialects (Nitta 2001) and Serbo-Croatian (Inkelas and Zec 1988, Zec 1999) show tonal spreading within a binary domain.

This paper demonstrates that feature spreading is more like prosodic processes than previously assumed; both involve headed binary constituents. According to BDT, a dependent of one binary domain may also be a head of another domain. Although prosodic phenomena generally do not involve overlapping constituents, these are commonly used for ambisyllabic segments (Kahn 1976). More recently, Hyde (2002) shows that overlapping footing makes the right predictions about possible stress systems. With overlapping binary domains, BDT allows for iterative spreading (Walker 2000, Kaplan 2008).

In autosegmental terms, feature spreading can be represented as a rule that links a feature [F] from a trigger to a target node. BDT requires a revised notation for feature spreading (1). Like in AP, links represent associations between features and feature nodes. In addition, BDT also expresses hierarchy (between feature nodes with respect to the feature) via a head-dependent relationship. In (1), we see four domains of [F], four heads, and four dependents. The domains overlap in that the dependent of one domain (on the left) is the head on another (on the right).

(1) Feature spreading according to BDT (○ marks a head, → marks a dependent)



Feature heads of BDT are evaluated by markedness constraints (Kenstowicz 1997, de Lacy 2002, 2006, Smolensky 2006). These constraints penalize heads of a feature [F] that are also associated with a feature [G]. Recall that in Icelandic both [ʏ] and [œ] can be associated with [front] (and [round], henceforth omitted). While these two features spread from [ʏ], they cannot spread from [œ]. The constraint active in Icelandic prohibits heads of [front] to be [low] vowels, and thus penalizes spreading from [œ], but not from [ʏ]. The constraint $*\Delta_{\text{[front]}}$[low] in (2) prohibits low vowels from heading a domain.

(2) $*\Delta_{\text{[front]}}$[low]
Assign a violation mark for every root node ×, iff × is a Head of the feature [front] and × is associated with [low].

The constraint in (2) interacts with two other constraints involved in feature spreading. In Icelandic, ALIGN([front], L; PWd, L; V) (≡ Assign a violation mark for every vowel that is between the leftmost segment associated with [front] and the left edge of a PWd; cf. Hyde 2008) outranks DEPLINK[front] (≡ Let $\times_i \Re \times_o$. Assign a violation mark, iff $\times_o$ is associated with [front] and $\times_i$ is not). In a form without reduction (3), $*\Delta_{\text{[front]}}$[low] outranks ALIGN-L([front], PWd). Candidate (c) crucially violates $*\Delta_{\text{[front]}}$[low], since [œ] contains a head. Candidate (b) wins, because it violates ALIGN-L([front], PWd) only once.

(3) japœnʏm 'Japanese.DAT.PL'

/japan-ʏm/	$*\Delta_{\text{[front]}}$[low]	ALIGN-L([front], PWd)	DEPLINK[front]
a. j a p a n ʏ m		**!	
b. ☞ j a p œ n ʏ m		*	*
c. j œ p œ n ʏ m	*!		**

To conclude, Icelandic u-umlaut shows hierarchical feature spreading, in which not all segments that can have a feature may spread it. BDT transfers well established phonological concepts such as headedness and binarity into the theory of autosegmental spreading. Other languages also exhibit icy targets. For example, Nati in Sanskrit (Whitney 1889, et seq.) is a process that spreads retroflexion from the continuants {r, ʂ} to the first following /n/. The resulting retroflex [ɳ] is an icy target, blocking any further spreading. In Ikwere nasal harmony (Clements and Osu 2005) derived nasal sonorant stops block further spreading from an input nasal vowel. By using BDT, I show that all these quite different feature spreading processes show a consistent pattern.

(4) Icelandic u-umlaut (Anderson 1972, 1974, Orešnik 1975, 1977)

	NOM.SG	DAT.PL	
a.	b[a]rn	ˈb[œ]rn[ʏ]m	‘child’
	ˈd[a]lir	ˈd[œ]l[ʏ]m	‘valley’
b.	ˈf[a]tn[a]ð	ˈf[œ]tn[ʏ]ˌð[ʏ]m	‘suit of clothes’
	ˈb[a]k[a]ˌri	ˈb[œ]k[ʏ]ˌr[ʏ]m	‘baker’
c.	ˈj[a]p[a]ˌni	ˈj[a]p[œ]ˌn[ʏ]m	‘Japanese’
	ˈ[a]lm[a]ˌn[a]k	ˈ[a]lm[a]ˌn[œ]k[ʏ]m	‘calendar’