The surface phonological representation of a sentence consists of a segmental representation (root nodes and segmental features), a tonal representation, and a prosodic structure representation, the latter consisting of a hierarchical representation of prosodic constituents as well as a representation of the prominence (head) of each constituent. According to the **prosodic structure hypothesis**, prosodic structure organizes sentence phonology and phonetics just as it does word phonology and phonetics (Selkirk 1978 et seq, Nespor and Vogel 1986, Pierrehumbert and Beckman 1988). The constituents of the prosodic hierarchy most directly relevant to sentence phonology are the prosodic word, the minor and major phonological phrases (aka accentual and intermediate phrases), the intonational phrase and the utterance, in that order. These constituents and their prominent heads, claimed to be universally present, constitute the structure with respect to which phonological and phonetic phenomena are defined.

Tonal phenomena are perhaps most revealing of the categorical organization of the sentence into prosodic constituents. The tones playing a role in sentence phonology have various sources. There are tones which are contributed by the lexical representation of individual words, there are tones that are phrase-level morphemes, and there are tones that are epenthetic. Sentence-final tonal morphemes indicating the role of a sentence in a discourse like the declarative low (L) boundary tone of English, appear in all types of languages. Other tonal morphemes seen in the sentence may be indicators of the focus status of a constituent, as with the focus H tone in Swedish (Bruce 1977), or various of the pitch accents of English-- H*, L*, L+H*, L*+H (Pierrehumbert and Hirschberg 1990). Some tones that appear in the sentence are apparently neither lexical nor morphemic but rather epenthetic, present to satisfy phonological constraints. Phonological constraints determine the precise location in the sentence of these various sorts of tones and tend to produce representations in which individual tones align with either the prominent head of a prosodic constituent or with the edge of a constituent. In Bengali (Hayes and Lahiri 1991), a default tone is epenthesized on the prominent syllable of a phonological phrase. In English, pitch accent morphemes, plausibly generated as part of the morphosyntax of the sentence, are drawn to phrasally prominent syllables, while in Chichewa (Kanerva 1989), a lexical H tone in a word shifts its position in order to coincide with a phrasal prominence. The edges of prosodic phrases are also a standard location for tone. In Bengali (Hayes and Lahiri 1991) and Japanese (Pierrehumbert and Beckman 1988) epenthetic tones mark the edges of major and minor phonological phrases, respectively. It is conceivable as well that the presence of certain tonal morphemes in particular locations in surface morphosyntactic representation, such as the continuation H tone of English, may induce the presence of a prosodic phrase edge at that location in surface phonological representation. Aside from constraints calling for the coincidence of tones and prosodic heads or edges, there are also constraints which call for the spreading of tone, or which rule against certain sequences of tone, and so on, and these too appeal to prosodic constituent structure. For example, for a tone to spread from one syllable to another, the syllables must be adjacent within a particular prosodic constituent (see Myers 1987 on Shona). A prosodic constituent may thus constitute the domain within which a phenomenon takes place.
Prosodic structure also organizes sentential segmental phonology and phonetics. Recent phonetic work shows that the left edge of different levels of prosodic constituent structure is the locus of articulatory strengthening, for example, the introduction of a prevocalic glottal stop in English (Dilley and Shattuck-Hufnagel 1996), or the degree of linguopalatal contact of /n/’s in French (Fougeron and Keating 1997). Moreover, external sandhi phenomena are restricted by prosodic structures as documented in Nespor and Vogel 1986, among others. For example, in Bengali (Hayes and Lahiri 1991), a word-final r assimilates completely to a following coronal consonant just when this segmental sequence lies within the same phonological phrase:

(1)  (æL* moli H ) ( raL* m-er bari H ) (lʊL* ketβɪl H)L%  
Shamoli Ram’s house entered “Shamoli entered Ram’s house.”

(2)  (øL* mor H ) (tβaL* dor H ) (taL* ra-ke H ) (dɪɛL* tβe H)L%  
[r] [tβ] [r] [t]  
Amor scarf Tara –to gave “Amor gave the scarf to Tara.”

(3)  (øL* mor tβa dor tara-ke H ) (dɪɛL* tβe H)L%  
[faster speech]  
[tβtβ] [tt]  
“Amor gave the scarf to Tara.”

Note that in this Bengali case the prosodic constituent relevant for defining the domain of assimilation is exactly the one relevant for determining the presence of the epenthetic H phrase edge tone, and for determining the presence of the phrasal prominence which receives an epenthetic L* pitch accent. This is an example of the domain convergence that the prosodic structure hypothesis predicts: it is expected that distinct types of phonological phenomena may converge on the same prosodic constituent structure, collectively providing important evidence for that constituency in the first place.

Prosodic structure is itself determined by various kinds of constraints. There are phonological constraints on prosodic structure per se, construable as prosodic markedness constraints. A basic type are constraints on prosodic domination, which require that, in the unmarked case, prosodic structure is strictly layered, in the sense that a constituent of a higher level in the prosodic hierarchy immediately dominates only constituents of the next level down in the hierarchy (see Selkirk 1995). One further sub-type are alignment constraints calling for the alignment of edges of prosodic phrases and prosodic phrasal prominences (Truckenbrodt 1995). And another are constraints on the size, specifically the binarity, of prosodic constituents (Selkirk and Tateishi 1988, Selkirk 2000). The existence of these properly phonological constraints on the domain structure of phonology provides one of the strongest arguments for the autonomy of this (prosodic) domain structure from the surface morphosyntactic structure of the sentence. Alongside these phonological constraints on phonologically relevant higher order structure, there are constraints which call for a certain faithfulness to the morphosyntactic structure of the sentence. Selkirk 1986 proposes a class of constraints which require that the edges of designated syntactic constituents in morphosyntactic structure (word, maximal projection) align with the edge of corresponding constituents in prosodic structure. Truckenbrodt 1995 proposes that the Focus representation of a sentence is reflected in the
prosodic prominence structure of the sentence. An understanding of the precise ways in which the information structure and constituent structure of surface morphosyntactic structure impinges on the surface phonological structure continues to be a matter of current research.

Current models of grammar construe the phonological and morphosyntactic output representations as being co-present and therefore allow in principle that phonological constraints other than the quite general faithfulness constraints cited above might include direct appeals to morphosyntactic conditions. A strong version of the prosodic structure hypothesis holds that effects of morphosyntactic structure on sentence phonology and phonetics are never direct, but always mediated by prosodic structure (Selkirk 1986, Nespor and Vogel 1986), while a weak version of the hypothesis would allow that some constraints on phonological phenomena also have direct access to morphosyntactic representation (Kaisse 1985). The co-presence of phonological and morphosyntactic output representations also raises the question whether phonological constraints ever determine aspects of surface morphosyntactic form (Inkelas and Zec 1990). Some (e.g. Vallduví 1991, Zubizarreta 1998) have proposed that the phonological imperative to align a phrasal prominence towards the right end of a sentence might be responsible for the (syntactic) ordering of nonfocus, non-phonologically prominent, constituents away from the right edge. Further research on these questions needs to be carried out in order to determine just what phonology-syntax interactions are possible.


Truckenbrodt, H. 1995 *Phonological Phrases: Their Relation to Syntax, Focus and Prominence*. Ph.D. dissertation, Department of Linguistics, MIT.
