Metrical control

The objects that are depicted on the cards and maps and that areused in a majority of our experiments are chosen according to the metrical and prosodic properties that their names have in the language to be elicited. For choosing these objects, it is necessary to have as much previous information as possible about the phonological features of the language.

One of the most frequent features that may influence the position of the lexical accent[1] is *syllabic weight*. If it is said that the language makes a difference between *light* and *heavy* syllables in its phonology, the words that we want to elicit must vary systematically with respect to this feature in every position in the word. But what does it mean for a syllable to be light or heavy in a language? Generally, open syllables (V or CV) are called *light*, and *heavy* are those that are closed (VC or CVC) or, if there is distinctive vocalic length in the language, those that have a long vowel (V: or CV:).

Languages differ with regard to the manner in which this distinction may influence phonological processes. Thus, there are languages in which syllable structure has no effect on accent placement within the word, and in which accent position is fixed. For example, in Hungarian (cf. Siptár & Törkenczy 2007: 21; Rounds 2002), the accent is always on the initial syllable in each word, regardless of whether it is open or closed, or whether the word contains no (1a), one (1b) or several (1c) long vowels, of the number of syllables in the word, or whether it is a morphologically simple (1a), complex (1b) or a compound (1c) word. Neither are there restrictions on the possibility for forming closed syllables containing long vowels (CV:C). The apostrophe (ˈ) marks primary accent position, the accent (‘) indicates long vowels.

(1) Húngaro

a.	ˈiskola	‘school‘
b.	ˈforrósod-ik warm.up-3SG.PRES	‘grows hot’
c.	ˈszéna-nátha hay-cold	‘hay fever’

However, there are also languages in which syllabic weight does play an important role for phonotactics and accent position. For example, in Áncash Quechua (Parker 1976), there is distinctive vocalic length (3a-d) which interacts with phonotactics insofar as it is disallowed to form closed syllables containing a long vowel of the type CV:C (3e-f). In Egyptian Arabic (cf. Hayes 1995: 67–71; Woidich 2006), on the other hand, which also has distinctive vocalic length (2a-d), a similar restriction exists which is less absolute, since it is allowed to form such syllables (that may be called *super-heavy*), but only in word-final position (2e-f). In this language, syllabic weight also influences accent position: if the final syllable is super-heavy or CV:, it bears the primary accent (2g-h). If not, it depends on the weight of the penult: if that is heavy, it bears the accent (2i-j). In Quechua, things are more complicated: while accentuation systems have been described in Parker (1976) for Ancash-Huaylas varieties that partially make use of syllable weight, for Conchucos Quechua, the evidence we have leads us to the conclusion that there is no lexical accent at all, just a phrasal one (cf. Buchholz & Reich 2018).

(2) Egyptian Arabic

a.	dam	‘blood’
b.	daam	‘he persisted’
c.	sab	‘he cursed’

[1] Also called stress. We mean the most prominent position in the prosodic word, which might be expressed via several different acoustic cues.

d. saab ‘he left’
e. beet + kum -> betkum ‘your (2 pl) house’
house + 2PL
f. filuus + na -> filusna ‘our money’
money + 1PL
g. kaˈtabt ‘I wrote’
h. gaˈto: ‘cake’
i. ˈbeetak ‘your (m.sg.) house’
j. taˈlaata ‘three’

(3) Áncash-Huaylas Quechua
a. puka-y ‘redden’
red-INF
b. pu:ka-y ‘blow’
blow-INF
c. wa:ta ‘domestic animal’
d. wa:ta-: ‘I take care of it’
take.care-1
e. rika: + n -> rikan ‘he sees’
see + 3
f. rika: + ma: + n -> rika:man ‘he sees me‘
see + 1OBJ + 3

Also in Spanish a phenomenon related to syllabic weight can be observed, even though it is a language without distinctive vocalic length. It is well known that the primary accent always falls on one of the final three syllables of a word, and never on one that is further to the left:

(4) Spanish
a. conociˈmiento ‘knowledge’
b. fonoˈlógico ‘phonological’
c. coliˈbrí ‘hummingbird’
d. *ˈdesambiguación ‘disambiguation’

And even though it is not entirely predictable, it has been shown that accent position in the most frequent nonverbs can be explained very well according to a phonotactic factor: if the final syllable ends on a vowel or on /s/, the penult will bear the accent in the overwhelming majority of cases, whereas if it ends on a consonant other than /s/, the final syllable itself will bear the accent (see Table 1, adapted from Face 2006: 1240; Eddington 2000: 96).

Word ending	*Final accent*	*Penult accent*	*Antepenult accent*
vowel	178	2494	178
/s/	20	909	94
consonant (except /s/)	778	176	2
total	976	3579	274

Table 1: Accent position on the 4829 most frequent polysyllabic nonverbs in Spanish.

In this way, it can be said that in Spanish, speaking quantitatively and without taking other things into account (cf. Face 2006), what counts as a heavy syllable for accentuation purposes is one that is closed ending in a consonant other than /s/, and a light one is one that is either open or closed ending in /s/.

The goal of this short digression has been to demonstrate that syllabic weight is an important feature in the phonology of many languages, but that it has to be taken into account that its effect can vary with respect to several factors, such as (a) how many distinctions there are in the language (light/heavy or light/heavy/super-heavy?), (b) exactly which are the conditions that suffice to classify a syllable as belonging to either of these categories (open, closed, closed but only when ending in some consonants, with long vowel?), and (c) in which way these distinctions may have an effect on different phonological processes. At the same time, we have also seen another related but independent feature, that of distinctive vowel length, which might or might not exist in a language and if it does, might or might not play a role in various phonological processes, such as accentuation.

Coming back to the metrical control, all of this means that it is necessary to systematically vary the structure of the words that are going to be used in our experiments, by paying attention to those features that might influence accentuation and of whose existence in the language we are already aware. Therefore, the type and number of these features determines the combinatorics for how the words we use should differ structurally. For example, if we assume a simple two-way difference between light (CV) and heavy (CVC) syllables in the language we are doing research on, with words of syllable length one or two, we get the following combinations:

(5)

Monosyllabic words	Bisyllabic words
CV	CV.CV CV.CVC
CVC	CVC.CV CVC.CVC

If we include trisyllabic words, we will have to add 2^3 =8 combinations, so that we end up with 14 words in all:

(6) Trisyllabic words

CVC.CV.CV	CV.CVC.CV	CV.CV.CVC
CVC.CVC.CV	CVC.CV.CVC	CV.CVC.CVC
CV.CV.CV		
CVC.CVC.CVC		

This combinatorics should be extended also to tetrasyllabic and even pentasyllabic words, if monomorphemic words of this length are known to exist in the language that is investigated.

That said, as seen above, in many languages there is not just one single relevant feature that is expressed this transparently: some languages have contrastive vowel length, so that syllables of type CV, CV: and CVC might each influence lexical accent placement differently. There are also languages that distinguish light, heavy and super-heavy syllables; languages that can place a particular segment only once per word; languages that differentiate between accented and unaccented words; languages with lexical tone; and much more. There is quite a large number of features that would have to be considered if there is evidence for their existence in a language.

Combining that many features systematically quickly brings us to a required number of cards that is unusable for practical reasons (having three relevant features in words of up to 4 syllables already results in $3^1+3^2+3^3+3^4=120$ combinations). Luckily, often these features are limited in their occurrence to once per word, or the actual reality of existing words is more restrictive than the theoretical possibilities of combinations. Other ways for coping with so many combinatory possibilities would be to make combinations using a Latin square (cf. Abbuhl et al. 2013), or to use different subsets of cards for different speakers. Nonetheless, the task of creating a set of words that can reliably be elicited and

that effectively explore all the possible combinations is very demanding and implies specific difficulties that arise with each new language.

After completing the set of words that follow the metrical control, appropriate images for each of the words must be found or created to put them on the cards (and on the maps). Keep in mind that that objects must be well-known and their pictures easily recognizable to the speakers.

Before starting the first experiment session, it is of vital importance to check the chosen objects and words together with a local consultant, to make sure that all the objects are really called (and pronounced) as thought. It is quite possible that changes need to be made after this step so that the words most likely to be elicited by the cards will indeed be in accordance with the metrical control.

References

Abbuhl, Rebeka, Susan Gass & Alison Mackey. 2013. Experimental research design. In Robert J. Podesva & Devyani Sharma (eds.), *Research methods in linguistics*, 116–134. Cambridge: Cambridge University Press.

Buchholz, Timo & Uli Reich. 2018. The realizational coefficient: Devising a method for empirically determining prominent positions in Conchucos Quechua. In Ingo Feldhausen, Jan Fliessbach & Maria d. M. Vanrell (eds.), *Methods in prosody*: *A Romance language perspective* (Studies in Laboratory Phonology 6), 123–164. Berlin: Language Science Press.

Eddington, David. 2000. Spanish stress assignment within the analogical modeling of language. *Language* 76(1). 92–109.

Face, Timothy L. 2006. Cognitive factors in the perception of Spanish stress placement: implications for a model of speech perception. *Linguistics* 44(6). 1237–1267.

Hayes, Bruce. 1995. *Metrical stress theory*: *Principles and case studies*. Chicago: University of Chicago Press.

Parker, Gary. 1976. *Gramática quechua: Ancash-Huailas*. Lima: Ministerio de Educación.

Rounds, Carol. 2002. *Hungarian*: *An essential grammar* (Routledge essential grammars). London: Routledge.

Siptár, Péter & Miklós Törkenczy. 2007. *The Phonology of Hungarian* (The phonology of the world's languages). Oxford: Oxford University Press UK.

Woidich, Manfred. 2006. *Das Kairenisch-Arabische*: *Eine Grammatik* (Porta linguarum Orientalium 22). Wiesbaden: Harrassowitz.

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