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The prosody of Spanish acronyms

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Abstract
This paper presents a first attempt to formally characterize the prosodic properties of Spanish acronyms. Based on the examination of a dataset and the results of a written questionnaire and perception test administered to native speakers, the stress patterns and prosodic size of Spanish acronyms are investigated. We show that stress in acronyms follows the regular stress patterns of the language. We further claim that acronyms are restricted to an upper limit of three syllables, which we explain by resorting to layered feet. Additionally, we show that an interesting minimality requirement applies exclusively to acronyms, one that must be expressed not in terms of syllable weight, but rather in terms of the number of segments.

Keywords Acronym · Layered feet · Maximality · Minimality · Spanish

1 Introduction

Acronyms result from a productive abbreviation process of word formation that consists of extracting the initial parts of a multi-word base, generally a nominal phrase, in such a way that the resulting string of letters can be pronounced as a single word (Casado Velarde 1999). In Spanish, the extracted initial portions that constitute acronyms usually correspond to the initial letter of (generally) lexical words in the base (1a), but they can also correspond to initial syllables (1b). More rarely, acronyms are built from strings that do not coincide with a particular prosodic constituent (e.g., a syllable and the onset of the following syllable, or a syllable without its coda) (1c). The examples in (1) display the orthographic and phonetic forms of various Spanish

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acronyms, followed by their bases. The parts of the base that are used to form each acronym are indicated in boldface.

(1) Acronyms in Spanish according to how they are derived from the original noun phrase

a. Initial letters
AMPA ['am.pa] **A**sociación de **M**adres y **P**adres de **A**lumnos
'Association of Students' Parents'
ESO ['e.so] **E**ducación **S**ecundaria **O**bligatoria
'Compulsory Secondary Education'

b. Initial syllables
ADENA [a.'ðe.na] **A**sociación para la **De**fensa de la **Na**turaleza
'Association for the Defense of Nature'
UTECO [u.'te.ko] **U**nión **Te**rritorial de **Co**operativas
'Territorial Union of Cooperatives'

c. Strings not coinciding with any prosodic category
AEMET [a.e.'met] **A**gencia **E**statal de **Met**eorología
'State Meteorological Agency'
RENFE ['reŋ.fe] **Re**d **N**acional de **F**errocarriles **E**spañoles
'Spanish National Railway Network'

Acronym formation is based on the ability to read and write and is therefore claimed to lie at the boundaries of grammar. According to Fábregas (2013: 310), the phenomenon of spelling out certain abbreviations, resulting in initialisms where each letter name is pronounced individually, provides evidence for the claim that acronym formation lies at the boundaries of grammar (e.g., PP [pe.'pe] *Partido Popular* 'Popular Party'). However, the author presents compelling evidence to support the integration of these words into the Spanish lexicon, as they serve as bases for the formation of derived forms (e.g., *pep-ero* 'someone who votes for the PP'). Likewise, acronyms can be inflected for plural (e.g., AMPAs ['am.pas] *Asociaciones de Madres y Padres de Alumnos* 'Associations of Students' Parents,' AVEs ['a.βes] *Alta Velocidad* 'high speed (trains)').

When the resulting abbreviated form of a syntactic unit does not adhere to Spanish phonotactic restrictions, it is realized as an *initialism* (2) (Casado Velarde 1999: 5081). In (2a), for instance, the sequence [rpf] is not a possible coda in Spanish and the abbreviated form [fm] in (2b) does not contain a vowel—the only possible syllable nucleus in the language—hence speakers pronounce each letter name of these abbreviations separately. By contrast, other languages like Hebrew insert vowels to repair otherwise impossible consonant clusters (e.g., the written acronym for *Mefaked XaTiva* 'squadron commander brigadier' is MXT, realized as [ma'χat], Bat-El 1994). The study of the prosodic properties of Spanish initialisms falls outside the scope of this article as does the mechanism that parses out the segments (letters or phonemes) themselves. Their multiple stresses and intonational patterns seem to suggest that they correspond to prosodic compounds or phonological phrases rather than single prosodic words (see also Krämer 2018: 4 for Italian), though further experimental investigation needs to be carried out to confirm or falsify these observations for

Spanish. In this study, we focus on acronyms that can be oralized as single prosodic words.[1]

(2) Initialisms in Spanish

a.	IRPF	[ˈi e.re pe ˈe.fe]	**I**mpuesto sobre la **R**enta de las **P**ersonas **F**ísicas 'Income Tax on Individuals'
b.	FM	[ˈe.fe ˈe.me]	**F**recuencia **M**odulada 'Frequency modulation'

Even though acronyms have been regarded as lying at the boundaries of grammar, crosslinguistic research on the prosodic properties of acronyms has shown that their form often complies with the phonological principles of particular languages and, moreover, they tend to manifest productive default patterns and unmarked structures in terms of syllable shape, word size or stress assignment (e.g., for Hebrew, see Bat-El 2000; Zadok 2002; for Italian, Krämer 2009, 2018; for Brazilian Portuguese, Wetzels 2007; Hermans and Wetzels 2012). However, we also find languages in which acronyms do not display the expected unmarked structures or default patterns. For instance, experimental work on Greek has shown a preference for final stress in acronyms, even though antepenultimate or penultimate stress has generally been considered to be the default (e.g., Topintzi and Kainada 2012; Revithiadou et al. 2015). Likewise, in European Portuguese, acronyms seem to display a minimality condition that must be expressed not in terms of syllable weight (Veloso 2017), but rather in terms of the number of segments, even though syllable weight seems to be a relevant phonological property when it comes to assigning stress in non-verbs (e.g., Brandão de Carvalho 2008, 2011; Wetzels 2007).

With respect to Spanish acronyms, the literature contains only a few cursory observations regarding their stress patterns (based on the examination of a small number of common acronyms, Roca 2006) and some of their general linguistic properties from a descriptive perspective (Casado Velarde 1999). A comprehensive formal study and analysis of the prosodic features of Spanish acronyms is still lacking. The present paper seeks to fill this gap, in the process pursuing two goals. The first goal is to provide a detailed description of the stress patterns of Spanish acronyms and determine if there are any minimality or maximality restrictions on their prosodic size (Sect. 3). To achieve this goal, we first created and annotated a dataset of 578 acronyms (Sect. 3.1). Analysis of this dataset allowed us to derive a set of generalizations, on the basis of which we designed a questionnaire (Sect. 3.2) and a perception test (Sect. 3.3) that we then used to test Peninsular Spanish speakers' phonological intuitions regarding the stress patterns in acronyms and the potential existence of minimality requirements on non-existent acronyms. Once the main generalizations regarding the preferred size and stress of Spanish acronyms are established, the second goal of this investigation is to develop an Optimality Theoretic analysis of the stress patterns found in acronyms

[1] In our opinion, most initialisms surface with just two stresses, suggesting that they are always parsed into two prosodic words, usually with initial and penultimate or final stress. This means that not all letter names in an initialism are parsed into their own prosodic word, as in [ˈka.xe][ˈβe] (KGB), where the letter <G> seems unaccented, avoiding stress clashes. Square brackets in the previous example indicate prosodic word boundaries. We leave for future research a comprehensive prosodic analysis of initialisms in Spanish (see Cabré 2002 for preliminary ideas about initialisms in Catalan).

using layered feet (Sects. 4 and 5). Before proceeding to a description of the data, the next section reviews the prosodic framework to be employed in our analysis and provides some general background on Spanish unmarked stress, minimality restrictions and gliding.

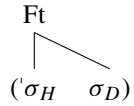
2 Background

2.1 Prosodic framework: Metrical theory and layered feet

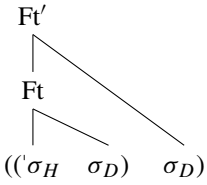
Building on seminal work on foot structure (Hayes 1980; Selkirk 1980; Prince 1980), recent developments in metrical theory have proposed that, under certain circumstances, a weak syllable may be adjoined to a binary foot (which may be either disyllabic or bimoraic), giving rise to an internally layered ternary (ILT) foot (see (3)) (Bennett 2012; Martínez-Paricio 2013a; Martínez-Paricio and Kager 2015) (in the figures in (3), the subscripts H and D stand for "foot head" and "foot dependent," respectively, and foot boundaries are indicated with brackets).

(3) Example of a standard foot (a) vs. an ILT foot (b)

a. Standard foot



b. ILT foot with a right adjunct



This minimally recursive foot is not a distinct category from the traditional binary foot; both reflect "the same types of distributional evidence from phonological and morphophonological processes: stress assignment, segmental strengthening and weakening phenomena, tonal distributions, instances of stress-dependent vowel harmony, truncation, certain types of metrically conditioned affixation, etc." (Martínez-Paricio and Kager 2021: 42–43). The difference between ILT feet and standard feet is structural. Whereas a traditional foot consists of a foot head and a foot dependent, ILT feet contain a foot head and two dependents. Additionally, the head of the ILT foot is dominated by two foot nodes (not just one), and this characteristic is sometimes exploited by languages to code subtle prominence contrasts that go beyond the traditional dichotomy between strong and weak (see Martínez-Paricio 2013a for details).

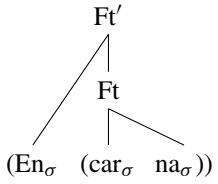
On the phonological side, reference to ILT feet provides an explanation for the typology of rhythmic stress, including ternary rhythm (Martínez-Paricio and Kager 2015), and sets a limit on the maximum size of stress windows, which universally does not exceed three syllables (Caballero 2008, 2011; Kager 2012). For example, an ILT foot has been posited in Spanish metrical representations to restrict the size of its stress window (Sect. 2.2). Beyond stress, research has suggested that ILT feet offer a unified account of various foot-conditioned phonotactic and tonal distribution

patterns that were previously not well understood. On one hand, ILT feet provide a clear domain for ternary tone phenomena, such as tonal spreading and specific tonal distributions (Martínez-Paricio 2013a; Morén-Duolljá 2013; Iosad 2016; Breteler and Kager 2017, 2022; Breteler 2018; Kager and Martínez-Paricio 2019). On the other, several foot-dependent cross-linguistic segmental strengthening and weakening effects can also be analyzed through a layered-foot approach (Jensen 2000; David and Cho 2003; Bennett 2012, 2013; Harris 2013; Kager and Martínez-Paricio 2018). Overall, these studies show how the number of foot projections dominating a syllable and/or its specific position within the foot (e.g., initial vs. non-initial, head vs. non-head) may give rise to subtle phonological strength distinctions, which cannot be accounted for in a model based on standard feet.

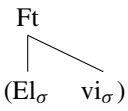
In the realm of morphology, it has been argued that the ILT foot exerts control over the location of specific infixes in English (McCarthy 1982; Yu 2004) and the emergence of specific semantically empty interfixes in Catalan (Mascaró 2021). Beyond this, reference to ILT feet facilitates a unified account of maximality and minimality conditions in languages in which truncated forms cannot be bigger than three syllables or smaller than a closed syllable (for Italian, see Krämer 2018; for Spanish, see Martínez-Paricio and Torres-Tamarit 2019; for Sardinian, see Cabré et al. 2021) as well as minimality restrictions in languages in which lexical items must contain three moras (Blevins and Harrison 1999). These size restrictions do not provide direct evidence for layering per se, but they back up the idea that morphophonological processes can refer to a ternary foot. Note that once ILT feet are allowed in metrical representations—and assuming truncated forms must correspond to a foot (McCarthy and Prince 1986)—maximal and minimal restrictions on the size of foot-truncated forms arise automatically. This has been argued to be the case in Spanish, where hypocoristics are maximally trisyllabic (e.g., *Encarna* < *Encarnación*, (4a)) and minimally bimoraic (e.g., *Cris* < *Cristina*, (4c)), although the most common hypocoristics correspond to disyllabic trochees (*Elvi* < *Elvira*, (4b)) (Martínez-Paricio and Torres-Tamarit 2019).

(4) Types of hypocoristics in Spanish

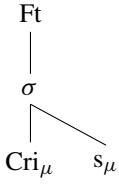
a. ILT foot



b. Disyllabic Ft



c. Bimoraic Ft



In this paper, we add new morphophonological evidence in favor of the existence of ILT feet: we show that acronyms in Spanish are maximally trisyllabic and argue that this maximality restriction can be captured by reference to an ILT foot.

2.2 Spanish default stress, minimality and gliding

2.2.1 Default stress

Words ending in a vowel in Spanish display a strong preference for penultimate stress (e.g., *camíno* 'path,' *amíga* 'friend-F.'), whereas words ending in a consonant tend to exhibit final stress (e.g., *universidád* 'university,' *camión* 'truck'). Looking at native Spanish words from Núñez Cedeño and Morales Front (1999), Roca (2006) found that these two stress patterns overwhelmingly predominate: of 91,000 words, 88% of those ending in a vowel showed penultimate stress, while 97.8% of those ending in a consonant showed final stress. Therefore, this is considered the default stress in the language. Stress patterns that do not follow these two generalizations are considered exceptional. Still, even in words with irregular stress, stress must be located within a right-aligned window of three syllables (Harris 1983). Importantly, to derive the fact that the antepenultimate syllable is the furthest stress can fall from the right edge of the word, scholars have posited a lexically indexed constraint which aligns an ILT foot of a dactylic shape to the right edge of the prosodic word (e.g., $((sába)_{Ft}na)_{Ft}$ 'sheet,' Martínez-Paricio 2021). Our investigation of acronyms will strongly corroborate the default status of penultimate stress when the acronym ends in a vowel and final stress when it ends in a consonant (Sects. 3.1 and 3.2).

2.2.2 Minimality restrictions in Spanish lexical words

A minimality condition has often been claimed to be active in Spanish lexical words, requiring them to be minimally of the form (C)VX, where X can be a coda consonant or the offglide in a falling diphthong (cf. Elordieta 2014: 17). This restriction has been formulated in terms of foot structure, requiring that lexical words must minimally contain a bimoraic foot (e.g., $ma_{\mu}r_{\mu}$ [ˈmaɾ] 'sea,' $le_{\mu}y_{\mu}$ [ˈlej] 'law') (Dunlap 1991). As pointed out by Elordieta (2014), CV lexical words are normally disallowed in Spanish, although there are a few exceptions—for instance, musical notes (e.g., *do*, *re*, *mi*, etc.), some letter names (e.g., *a*, *be*, *ce*), a few nouns, some of them borrowed (e.g., *té* 'tea,' *fe* 'faith') and a few inflected forms of irregular verbs with a (C)VC shape in the infinitive (e.g., *di* 'I gave,' *dar* 'to give'; *va* 's/he goes,' *ir* 'to go'). Dunlap (1991: 75) reported that these, and two obsolete shortenings, are the only monomoraic lexical words in a search of 70,500 words. Hence, the hypothesis that the minimal lexical word in Spanish must be bimoraic is robustly supported. Contrarily, function words, and especially unstressed function words, can be monosyllabic with the shape CV (e.g., *la* 'the-F.,' *que* 'that-COMPL') (Elordieta 2014: 18).

In any case, monosyllables are rare in the Spanish core vocabulary. A list of the 2,000 most frequent words (both lexical and functional) in a database of Spanish film and television subtitles retrieved from Wikipedia[2] shows that half of these are disyllables, one third are trisyllables and only 7.4% are monosyllables, as illustrated in Table 1. And from all those monosyllables, which include function words, half

[2]The full corpus can be accessed online: https://tinyurl.com/3edvjeum. Since these lists contain words in real contexts of use, they are inflected. Frequency is calculated by word per million, and ranges, for our dataset of the 2,000 most frequent words, from 40,880 to 29.

Table 1 The 2,000 most frequent words in a database of Spanish film and television subtitles

σ size	No.	%
1	148	7.4
2	1026	51.3
3	677	33.85
4	124	6.2
5	21	1.05
6	3	0.15
7	1	0.05

of them have the shape (C)VC. These data demonstrate a preference for disyllabic words, a consistent pattern that is supported by the acronyms in our corpus.

2.2.3 Gliding and its relation with stress and minimality

In Peninsular Spanish, gliding generally applies to unstressed underlying high vowels (/i, u/) adjacent to another vowel (Hualde 1999, 2005), which gives rise to different sorts of rising- and falling-sonority diphthongs (5). Yet, exceptional hiatuses are also possible for some speakers if the high vowel is located (i) in the first syllable of the word (e.g., *p*[i.ˈa]*no* 'piano'), (ii) at a morpheme boundary (e.g., *virt*[u.-ˈo]*so* 'virtuous') or (iii) in words where a stressed high vowel is present in the morphological paradigm (e.g., *f*[i.ˈa]r 'to trust,' cf. *f*[ˈi.a]*n* 'they trust') (Navarro Tomás 1918; Hualde 1999, 2005; Cabré and Prieto 2006).

(5) Diphthongization in Spanish[3]

/karies/	[ˈka.ɾjes]	*caries*	'caries'
/muela/	[ˈmwe.la]	*muela*	'molar'
/biuda/	[ˈbju.ða]	*viuda*	'widow'
/bainija/	[baj.ˈni.ʝa]	*vainilla*	'vanilla'
/sauna/	[ˈsaw.na]	*sauna*	'sauna'

Onglides and offglides have been claimed to behave differently with respect to default stress assignment: word-final offglides seem to behave like coda consonants in that they favor ultimate stress (e.g., *caray* [ka.ˈraj] 'interjection'), whereas if there is an onglide in the last syllable, and this syllable ends in a vowel, stress is penultimate (e.g., *radio* [ˈra.ðjo] 'radio,' *agua* [ˈa.ɣwa] 'water'). This has led scholars to propose different moraic structures for prevocalic and postvocalic glides in word-final syllables; namely, onglides have been argued to be in a branching nucleus, sharing a mora with the next vowel ($[GV]_{\mu}$), whereas final offglides have been claimed to project their own mora as codas ($V_{\mu}G_{\mu}$) (see Hualde 1991; Lipski 1997; Baković 2006; Martínez-Paricio 2013b). By investigating the interaction between diphthongs and minimality requirements in acronyms, our study aims to explore their specific moraic and syllabic structure.

[3] In Peninsular Spanish, sequences of high vowels (both /iu/ and /ui/) are generally produced as rising diphthongs, not falling diphthongs, except for the adverb *muy* ([ˈmuj]) 'very,' which is pronounced with a falling diphthong (Navarro Tomás 1918; Cabré and Ohannesian 2017).

3 Data

In this section we describe the data and how we collected them, and then move on to the main descriptive generalizations.

3.1 Dataset: Minimal and maximal acronyms

In order to provide a well-grounded description of the minimal and maximal prosodic restrictions on the particular size of Spanish acronyms, we first created and annotated a dataset of 578 real acronym words, extracted from a list of acronyms and initialisms obtained from the *Wikilengua del español*.[4] Sequences of letters that clearly did not respect basic Spanish phonotactics—and, as a result, were unequivocally pronounced as initialisms by the authors of this paper, both native speakers of Peninsular Spanish—were not included in the dataset. For instance, monosyllables with potential complex codas such as *APG or *ABC were not included in the dataset, since complex codas of this sort are not possible in Spanish.

As summarized in Table 2, inspection of our dataset revealed that slightly more than half of the 578 acronyms were disyllables (52.9%). This seems to be the preferred size for acronym words in Spanish, which is consistent with the prototypical disyllabic truncated patterns reported elsewhere for the language, in both proper and common noun truncation (Prieto 1992; Casado Velarde 1999; Núñez Cedeño and Morales Front 1999; Piñeros 2000a,b). The remaining acronyms were either monosyllables (26.5%) or trisyllables (19.7%), this being the general maximal size for an acronym in Spanish. We only found five quadrisyllabic items, which constitute a numerically negligent minority. Crucially, these quadrisyllabic forms (ECOPETROL, EUROVISION, Polisario, Retevisión, ENSIDESA) look more like blends or compounds, as more than one morpheme can be clearly identified, e.g., eco+petrol, euro+visión, rete+visión, en+side+sa).

We then looked at the distribution of syllable shapes across the abbreviations labeled as monosyllables in Table 2. As can be seen in Table 3, the vast majority of the 153 monosyllables in our dataset, 73.2%, displayed a CVC shape. 15% displayed a VC shape and 9.8% a CV shape.

Interestingly, both authors of this article have a strong preference to realize CV and VC abbreviations[5] as initialisms rather than as acronyms. These comprise 38

Table 2 Prosodic shape of real acronym words in the dataset of 578 acronyms

Size	%	No.	Examples
disyllables	52.9%	306	AFI, DRAE, LOE
monosyllables	26.5%	153	CAM, CIS, TAC
trisyllables	19.7%	114	MINECO, PETRONOR, SEMARNAT, INDUBAN
quadrisyllables	0.9%	5	
	100%	578	

[4] https://www.wikilengua.org/index.php/Lista_de_siglas_A.

[5] Note that <h> in Spanish is mute, so HE, if oralized as an acronym, would just be ['e]. The authors pronounce HE as an initialism, ['atʃe 'e], instead.

Table 3 Syllable shape of 153 monosyllables

Syll. shape	%	No.	Examples
CVC	73.2%	112	CAM, CIS, MEC
VC	15%	23	EN, IS, UD
CV	9.8%	15	CE, DO, PA
V	0.7%	1	HE
CCV	0.7%	1	FLA
CCVC	0.7%	1	FROM
	100%	153	

forms out of the 153 monosyllables included in the dataset. The other forms, in principle, may be read as either acronyms or initialisms, although some forms have been conventionalized as either one or the other. Hence, some sort of minimality condition seems to be at work in the oralization of this sort of abbreviation: whereas monosyllabic acronyms of a larger size are accepted (e.g., C(C)VC, CCV), CV and VC forms are dispreferred as acronyms at least in the authors' idiolects. There is only one case of CCV in the dataset, which is also accepted as an acronym by the authors. These interim descriptive generalizations based on the authors' judgments are summarized in (6).

(6) Interim descriptive generalizations about the oralization of abbreviations
   a. CV and VC forms are preferentially oralized as initialisms.
   b. C(C)VC and CCV are accepted as acronyms.

To further investigate the exact nature of this minimality condition, and corroborate its empirical reality in acronyms with the judgments of additional speakers, we designed both a written task (Sect. 3.2.2) and a follow-up perception test with monosyllables (Sect. 3.3).

3.2 Results of the questionnaire

With our written questionnaire we sought not only to test the nature of the minimality condition just described (i.e., the hypothesized preference for initialisms in CV and VC acronyms), but also to identify the most frequent stress patterns in acronyms. Additionally, we wanted to test whether in short acronyms the relative position of high vowels within a sequence of vowels (e.g., $CV_{high}V$, CVV_{high}) had any influence on its particular syllabification (as a diphthong, giving rise to a monosyllable, e.g., PAU [ˈpaw], or as a hiatus, giving rise to a disyllable, e.g., FIE [ˈfi.e]). The investigation of abbreviated forms containing onglides and offglides and their relationship with minimality is potentially pertinent, given the purported divergence in moraic organization between onglides and offglides. Informants were directly asked about their preferred pronunciation for a list of 54 acronyms, which included both existing and non-existent but possible acronyms. This written questionnaire, designed as a multiple-choice task, was completed in the classroom by 60 native Peninsular Spanish speakers aged 17–21, all first-year undergraduate students at the Complutense University of Madrid during the 2019–2020 academic year. The questionnaire contained three specific tasks, each with a different goal, as described in the next sections. The results of all these tasks are available as supplementary materials.

3.2.1 Task 1

To test the productivity of the so-called default stress pattern (final stress in C-final words, penultimate stress in V-final words), we presented informants with a list of 20 proper noun phrases each of which is the basis for an acronym in Spanish (e.g., ***T**ren **A**rticulado **L**igero **G**oicoechea **O**riol*), followed by its disyllabic acronym (e.g., TALGO), each of which instantiated a different combination of open (CV) and closed (CVC) syllables. All acronyms included in the task exist in Spanish, but most of them were not known by all the speakers, as some reported to us. We then asked them to assign to each acronym one of two pronunciation patterns, penultimate stress or final stress. The two patterns were presented in the questionnaire as two options, i.e., a. *tal-**gó*** and b. ***tál**-go*. The informant was asked to choose the form that he or she would use. Syllables were separated by hyphens and the stressed syllable was indicated with an accent and in boldface. The results are summarized in Table 4. Given that a final *-s*, corresponding to the plural morph in Spanish, has sometimes been claimed to be extrametrical, we undertook a specific count of the stress patterns of acronyms ending in *-s* (Cs in Table 4). 300 responses were expected for each category (5 shapes × 60 participants). In five cases, no response was given or two were selected. These were not counted.

These results reveal a clear preference for penultimate stress in disyllabic forms ending in an open syllable (e.g., TÁLGO) or in a syllable closed by an *-s* (e.g., ÁES). By contrast, if the final syllable is closed by any other consonant, final stress is favored (e.g., INÉF, MUNPÁL)—although penultimate stress is possible more than one-third of the time. This overall pattern, which follows a highly non-random distribution (χ^2 test, $N = 1195$, $p < 0.001$), suggests that the shape of the final syllable in acronyms is decisive in conditioning the type of stress: closed syllables favor final stress and open syllables favor penultimate stress. This matches the results of the stress frequency data in the core Spanish vocabulary (Sect. 2.2), although in C-final acronyms penultimate and final stress is more evenly distributed.

We carried out a follow-up task to ascertain the stress preferences in Spanish trisyllabic acronyms. In this case, a total of 30 native speakers from Madrid and Valencia were asked to read a total of 16 trisyllabic acronyms inserted in a carrier sentence. The experimenter transcribed what the speaker read.[6] As in the previous task, these acronyms were real Spanish acronyms, but some of them were not known by all the speakers, as they reported to us. For each of the eight possible combinations of open (CV) and closed (CVC) syllables, two acronyms were included in the task. The

Table 4 Stress assignment in disyllabic existing acronyms

Shape	Penultimate	Final	No.
CVC.CV (e.g., TALGO)	**97.6%** (293)	2.4% (7)	300
CV.CVs (e.g., MIDAS)	**87.2%** (258)	12.8% (38)	296
CV.CVC (e.g., CESID)	36.7% (110)	**63.3%** (190)	300
CVC.CVC (e.g., MUNPAL)	38.1% (114)	**61.9%** (185)	299

[6] We thank an anonymous reviewer for suggesting that we expand the number of informants in this specific task, since originally we only reported our own intuitions regarding the location of stress in trisyllabic acronyms.

Table 5 Stress assignment in trisyllabic existing acronyms

Shape	Antepen.	Pen.	Final	No.
CV.CV.CV (e.g., FENOSA)	0%	**100%** (60)	0%	60
CV.CVC.CV (e.g., MINURSA)	0%	**100%** (60)	0%	60
CVC.CV.CV. (e.g., MERCASA)	0%	**100%** (60)	0%	60
CVC.CVC.CV (e.g., FUNDESCO)	0%	**100%** (60)	0%	60
CV.CV.CVC (e.g., CONATEL)	1.65% (1)	1.65% (1)	**96.7%** (58)	60
CV.CVC.CVC (e.g., SEMARNAT)	0%	6.7% (4)	**93.3%** (56)	60
CVC.CV.CVC (e.g., CONMEBOL)	1.7% (1)	3.3% (2)	**95%** (57)	60
CVC.CVC.CVC (e.g., INTELSAT)	0%	0%	**100%** (60)	60

results, presented in Table 5, corroborate our intuitions. When the trisyllabic forms end in a light syllable, stress is categorically penultimate. The presence of a closed syllable in the first position (CVC.CV.CV, CVC.CVC.CV) has no effect. When the forms end in a heavy syllable, stress is almost categorically final (only two instances of antepenultimate stress were collected).[7] It is clear that only the shape of the final syllable in trisyllabic acronyms conditions the location of stress. 60 responses were obtained for each category (2 tokens × 30 participants).

3.2.2 Task 2

A second task was designed to test whether acronym formation is subject to any minimality condition. We presented informants with a list of 20 nonce, single-vowel abbreviations consisting of different syllable shapes, namely CV, VC, CVC and CCV (4 shapes × 5 vowels = 20). Onsets were always [p], and codas were always [l], and the complex onset was [fr]. Again, we provided informants the source (in this case fictitious) of each acronym followed by the acronym itself in parentheses. This time we asked them to indicate whether they would pronounce the abbreviation as an acronym (that is, as a word) or as an initialism (spelled out). The two patterns were presented in the questionnaire as two options, e.g., for POL, *Partido Obrero Libertario* 'Libertarian Workers' Party' they had to choose between (a) the acronym (*pol*) or (b) the spelled out option (*pe o ele*). The results of this task appear in Table 6. 300 responses were expected for each category (5 shapes × 60 participants). In two cases, no response was given or both were selected. These were not counted.

The pronunciation of these small abbreviations as acronyms or initialisms differed significantly depending on their syllable shape (χ^2 test, $N = 1198$, $p < 0.001$). The results in Table 6 show that CV and VC abbreviations, which consist of two segments, are strongly dispreferred as acronyms. By contrast, in abbreviations consisting of three segments, CVC and CCV, pronunciation as acronym or initialism is more evenly distributed, with a slight preference for CVC acronyms.[8] Hence, some sort of minimality condition seems to be active in the realization of Spanish acronyms. In

[7] This result is so marginal that a χ^2 test cannot take it into account. The pattern, excluding the category "antepenult," obviously follows a non-random distribution (χ^2, $N = 478$, $p = 0$).

[8] The preference for either initialism or acronym was constant across all the forms within the same category (e.g., PA, PE, PI, PO, PU), except for FRI, which was slightly preferred as an initialism rather than

Table 6 Pronunciation of single-vowel abbreviations

Shape	Acronym	Initialism	No.
CV (e.g., PA)	21% (63)	**79%** (237)	300
VC (e.g., AL)	21% (63)	**79%** (237)	300
CVC (e.g., PAL)	**57.5%** (172)	42.5% (127)	299
CCV (e.g., FRA)	**53.2%** (159)	46.8% (140)	299

order to test the nature of this minimality restriction, a follow-up perception test was carried out. The results of this test will be provided in Sect. 3.3.

3.2.3 Task 3

The third and last task in our questionnaire was aimed at determining the behavior of sequences of vowels in small acronyms. Studying the behavior of high vowels in acronyms was of interest for two reasons. First, we wanted to test whether the presence of a high vowel adjacent to another vowel favored the realization of acronyms as monosyllables (with gliding, e.g., PAU [ˈpaw], FIE [ˈfje]) or disyllables (without gliding, e.g., PAU [ˈpa.u], FIE [ˈfi.e]). Second, exploring the behavior of onglides and offglides in small acronyms might shed light on their particular moraic contribution. As we saw in Sect. 2.2.3, some scholars have proposed different moraic structures for onglides and offglides in a word-final diphthong: whereas onglides have been argued to share a mora with the next vowel in the nucleus ($C[GV]_{\mu}$, e.g., $f[je_{\mu}]$),[9] final offglides have been claimed to project their own mora as codas ($CV_{\mu}G_{\mu}$, $p[a_{\mu}w_{\mu}]$). Therefore, we wanted to test whether the specific position of the high vowel within the diphthong would have any influence on the realization of the abbreviations as acronyms or initialisms.

To test these ideas, we presented our informants with a randomized list of 14 nonce acronyms containing sequences of vowels and asked them to indicate how they would pronounce each acronym (i.e., as an acronym—monosyllabic or disyllabic—or as an initialism). As in the previous tasks, informants were required to select a single form from a questionnaire with multiple options. Six forms contained a vowel sequence of falling sonority, three for each of the two high vowels (PAU, TEU, POU, PAI, TEI, POI); six forms contained a vowel sequence of rising sonority, three for each of the two high vowels (FUA, PUE, TUO, FIE, PIO, PIA); and two forms contained a sequence of two high vowels (PUI, PIU). 360 responses were expected for each category (6 types × 60 participants), except for the forms containing a sequence of

as an acronym, as opposed to FRA, FRE, FRO and FRU; and PEL, which was also slightly preferred as an initialism, as opposed to PAL, PIL, POL and PUL. For two-letter forms (e.g., PA, AL), the preference for either initialism or acronym across the five forms within the same category was constant. Furthermore, individuals showed an overall preference for initialisms or acronyms regardless of syllable shape. Forty-one participants preferred initialisms, whereas only nineteen participants preferred acronyms. The latter group showed a more even distribution of responses. Overall, initialisms were preferred over acronyms: initialisms were chosen 751 times, whereas acronyms were chosen 447 times (the total number of responses was 1198 (20 items × 60 participants—2 missing responses)), as broken down in Table 6.

[9] There are strong phonological arguments for considering this onglide to be part of a complex nucleus and not a complex onset (Harris 1983; Martínez-Paricio 2013b; Hualde 2014). We come back to this issue in the discussion.

Table 7 Pronunciation of abbreviations containing a sequence of vowels (H = high vowel, V = non-high vowel) as acronym or initialism

Shape	Acronym	Initialism	No.
CVH (e.g., PAU)	**78.65%** (283)	21.35% (77)	360
CHH (e.g., PUI)	**77.5%** (93)	22.5% (27)	120
CHV (e.g., FIE)	**69%** (247)	31% (111)	358

Table 8 Pronunciation of acronyms containing a sequence of vowels (H = high vowel, V = non-high vowel)

Shape	Monosyllable	Disyllable	No.
CVH (e.g., PAU)	**71%** (201)	29% (82)	283
CHH (e.g., PUI)	44.1% (41)	**55.9%** (52)	93
CHV (e.g., FIE)	30.8% (76)	**69.2%** (171)	247

two high vowels, for which 120 responses were expected (2 types × 60 participants). Again, in two cases, no response was given or both options were selected. These were not counted. The results in Table 7 show that, overall, the pronunciation as acronyms of these small forms with sequences of vowels is clearly favored over their pronunciation as initialisms. Although the results reveal a certain degree of variability, the relation between pronunciation and syllable shape is significant (χ^2 test, $N = 838$, $p < 0.001$).

Next, Table 8 shows the distribution of monosyllables (with gliding) and disyllables (without gliding) within acronyms containing a sequence of vowels.

Within the set of items pronounced as acronyms, forms that contain a sequence of vowels falling in sonority (CVH, e.g., PAU) are preferably produced as monosyllables—hence, they favor gliding (e.g., PAU [ˈpaw])—whereas forms containing a vowel sequence displaying a rising sonority profile (CHH, CHV, e.g., FIE, PUI) are produced to a greater extent as disyllables with penultimate stress—without gliding (e.g., [ˈfi.e], [ˈpu.i]). The relation between pronunciation and syllable shape is again significant (χ^2 test, $N = 623$, $p < 0.001$). This means that forms like FIE pronounced as [ˈfje], with a rising diphthong and an onglide, are dispreferred as acronyms, just like CV forms in the previous task. In the contexts where vowel sequences display a rising or flat sonority profile (CHV, CHH) these are preferentially broken up into a hiatus to make them disyllabic. By contrast, when the sonority profile in the sequence of vowels is falling, the forms remain monosyllabic, behaving more like other CVC forms in Task 2. In Sect. 4 we suggest that the different parsing of rising and falling sonority vocalic sequences can be attributed to a difference in the prosodic structure of onglides and offglides in Spanish.

3.3 Results of the perception test

As noted above, a follow-up perception test was designed in order to more carefully investigate the minimality effects in acronym formation already observed in Task 2. This perception test was designed using PsychoPy® (Peirce et al. 2019), a free open-source application for creating behavioral experiments. The experiment was uploaded into the open-source online experiment repository Pavlovia.org and shared with the participants. All participants were native speakers of Peninsular Spanish. A total of 35 participants completed the experiment by March 2023.

The participants were presented with short auditory stimuli consisting of non-existent abbreviations inserted in a carrier sentence (e.g., *La medida está incluida en*

Table 9 Experimental items with the vowel [a]

Shape	Transcription	Acronym	Initialism
CV	PA	[pa]	[pe a]
	TA	[ta]	[te a]
	CA	[ka]	[θe a]
VC	AL	[al]	[a ele]
	AS	[as]	[a ese]
CVC	PAL	[pal]	[pe a ele]
	TAL	[tal]	[te a ele]
	CAL	[kal]	[θe a ele]
CCV	PRA	[pra]	[pe ere a]
	TRA	[tra]	[te ere a]
	CRA	[kra]	[θe ere a]
CCVC	PRAL	[pral]	[pe ere a ele]
	TRAL	[tral]	[te ere a ele]
	CRAL	[kral]	[θe ere a ele]

el PRA 'The measure is included in the PRA'). The auditory stimuli were read by one of the authors of this paper in a sound-attenuated booth with the help of a technician at the Autonomous University of Barcelona. The recording was made using an Audio-Technica AT2050 microphone configured with a cardioid polar pattern (without activating filter or attenuator). The signal passed through a Solid State Logic 500-Series SiX Channel preamplifier (without activating EQ or compression). Finally, the sound was digitized using a Focusrite Scarlett 18i20 interface with a sampling rate of 48,000 Hz and a depth of 24 bits. The auditory stimuli were accompanied in the online experiment with the visual orthographic transcription of the abbreviation in upper-case and the phrase from which they ostensibly derived in parentheses (e.g., PRA (*Plan de Recuperación Agraria*) 'Agrarian Recovery Plan'). All items were uttered both as acronyms and initialisms using the same carrier sentence, and were presented in randomized order. The oralizations as either acronyms or initialisms of the items were also subjected to randomization. Stimuli conformed to the shapes CV, VC, CVC, CCV and CCVC, and included different onsets, codas and vowels. A total of 140 stimuli were included in the experiment (14 shapes × 2 types of oralization (acronym vs. initialism) × 5 vowels = 140). Table 9 illustrates all 28 experimental items (14 shapes × 2 types of oralization) for the vowel [a] as an illustration.

After hearing each stimulus, participants were asked to evaluate their degree of acceptability as an abbreviation on a 5-point Likert scale, where 1 = not at all acceptable, 2 = unacceptable, 3 = neither unacceptable nor acceptable, 4 = acceptable, and 5 = very acceptable. A total of 4,900 responses (140 stimuli × 35 participants) were obtained and analyzed using the open-source interactive computational environment Jupyter Notebook, which supports Python. Non-parametric Mann-Whitney U tests were performed to understand whether acceptability (the dependent variable), measured on a continuous scale from 1 to 5, differed based on the two independent variables: shape (CV, VC, CVC, CCV, CCVC) and oralization type (acronym, initialism).

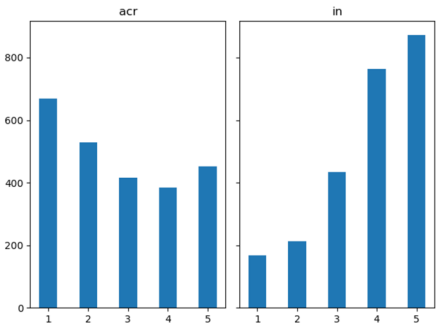


Fig. 1 All responses for acronym (left) and initialism (right). The y-axis displays the number of responses, and the x-axis represents acceptability values on the Likert scale

Table 10 Mean responses ($p < 0.001$: *, non-significant: ns)

Shape	Acronym	Initialism	Significance of difference
CV	2.01	3.92	*
VC	2.08	3.93	*
CVC	3.14	3.70	*
CCV	2.96	4.08	*
CCVC	3.39	3.40	ns

The results showed that initialisms were overall preferred to acronyms, as can be seen in Fig. 1. The same preference was actually observed in Task 2. Recall that the majority of existing acronyms in Spanish are actually disyllabic (see Table 2); all acronyms included in this test were monosyllabic.

Table 10 shows the mean responses for each shape when pronounced as either acronym or initialism. As already shown in Fig. 1, mean responses for initialisms were always higher (ranging from 3.40 to 4.08) than corresponding mean responses for acronyms (ranging from 2.01 to 3.14). For acronyms, however, scores were lower for both CV and VC (2.01 and 2.08, respectively) than for both CVC and CCV (3.14 and 2.96, respectively). Finally, CCVC received pretty much the same relatively positive scores for both acronym and initialism (3.39 and 3.40, respectively).

The distribution of responses by oralization type for each shape will now be examined. For all shapes except CCVC, there was a preference in pronunciation. On the one hand, both CV and VC were strongly rejected as acronyms, and strongly accepted as initialisms, as illustrated in Figs. 2 and 3, respectively. On the other hand, CVC and CCV were sometimes accepted as acronyms and sometimes were not, as responses were much more evenly distributed across the values of the Likert scale. Yet, they were also strongly accepted as initialisms, as illustrated in Figs. 4 and 5, respectively. All these preferences in oralization type are statistically significant according to Mann-Whitney U tests ($p < 0.001$). Finally, there was no preference for CCVC, illustrated in Fig. 6. Those forms were similarly accepted as either acronyms or initialisms, with a Mann-Whitney U test showing no significant difference ($p = 0.08$) between the two options.

The results from this additional test confirm the previous findings as reported in Sect. 3.2.2, demonstrating that CV and VC, on the one hand, as well as CVC and CCV, on the other hand, exhibit similar behavior. Hence, this test provides strong

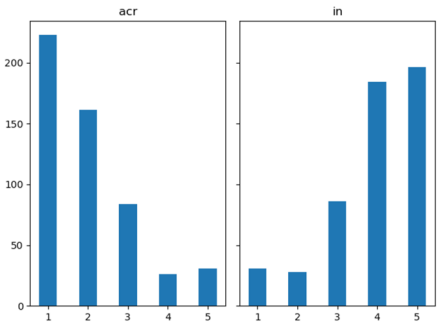


Fig. 2 CV responses for acronym (left) and initialism (right)

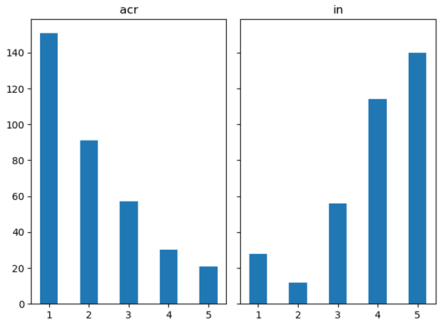


Fig. 3 VC responses for acronym (left) and initialism (right)

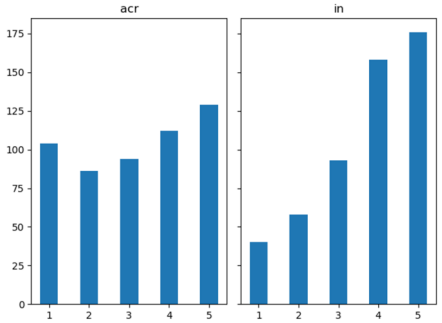


Fig. 4 CVC responses for acronym (left) and initialism (right)

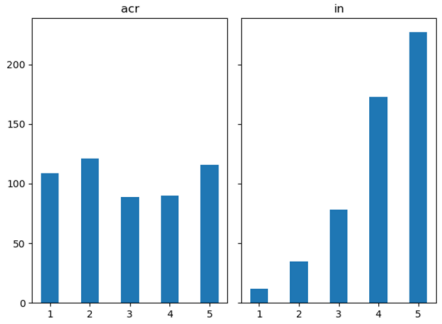


Fig. 5 CCV responses for acronym (left) and initialism (right)

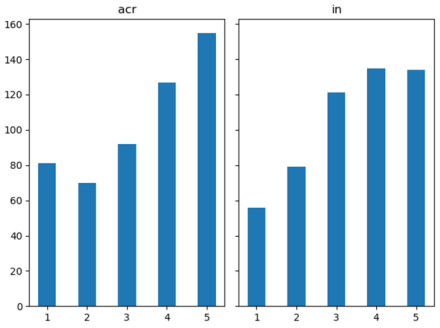


Fig. 6 CCVC responses for acronym (left) and initialism (right)

support for the hypothesis that minimality effects in acronym formation are primarily determined by the number of segments rather than the number of moras. Interestingly, the tendency to avoid acronyms of two segments has been previously reported for other languages like European Portuguese (Veloso 2017) and English (Ungerer 1991, citing McCully and Holmes 1988 and Cannon 1989). Specifically, the results suggest that an acceptable acronym must consist of at least three segments. If the number of moras were a significant factor in determining the actual pronunciation of these small forms as acronyms or initialisms, we would expect similar behavior between CV and CCV, as well as between CVC and VC.

4 Prosodic structures of Spanish acronyms

4.1 Minimal and maximal size of acronyms

Acronyms in Spanish very rarely have more than three syllables (Table 2).[10] In a metrical model that allows ILT feet, the upper bound of three syllables can be easily formalized if we assume first that acronyms in Spanish must correspond to a word of exactly one foot and second final consonants project a mora. Just as has been proposed for hypocoristics (see Sect. 2.1), we propose that acronyms are exhaustively parsed by the maximal projection of a foot, i.e., a foot directly dominated by a prosodic word. Therefore, acronyms can be instantiated either by a bimoraic foot (7a), a disyllabic foot (7b) or an ILT foot (7c). In the OT analysis, we will see that the structural distinction between maximal (a foot not dominated by a foot, a or b) and minimal (a foot not dominating a foot, c) is crucial in the definition of some constraints.[11] Furthermore, this contrast has been claimed to be phonologically relevant in other languages (see Bennett 2012 and Martínez-Paricio 2013a, among others).[12]

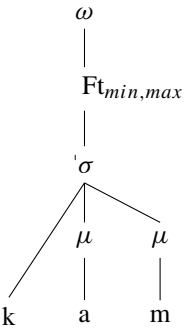
[10]The very few quadrisyllabic forms attested in our corpus seem to display the structure of blends (see Sect. 3.2.1).

[11]As shown in Sect. 3, there is of course inter- and intraspeaker variation in the pronunciation of abbreviations as either acronyms or initialisms. In this analysis we focus on acronyms.

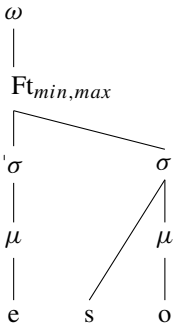
[12]Ito and Mester (2007) and Ito and Mester (2013) show that the structural contrast between minimal and maximal prosodic categories is equally relevant in other domains.

(7) Monosyllabic (bimoraic), disyllabic and layered feet

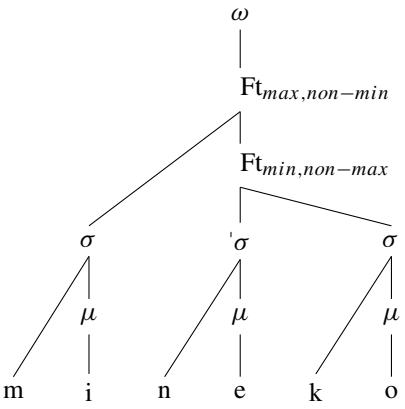
a. Monosyllabic foot



b. Disyllabic foot



c. ILT foot



The acronym data provide evidence not for layering as such, just for ternary footing. Yet, based on multiple independent crosslinguistic evidence in favor of ILT feet as opposed to flat ternary feet (see Martínez-Paricio and Kager 2021 for references), we adopt layering in our metrical representations and the analysis of stress in acronyms presented in Sect. 4. This proposal is in line not only with recent analyses of Spanish hypocoristic truncation (Martínez-Paricio and Torres-Tamarit 2019), but also with the account of irregular antepenultimate stress and the three-syllable stress window (see Sect. 2.2).

With respect to the minimal size of Spanish acronyms, we observe that CVC is, overall, the preferred shortest acronym both in our database (73.2% of monosyllabic abbreviations have the CVC shape) and in the questionnaire (Table 6). This is compatible with the idea that acronyms in Spanish must correspond to a foot: if final codas project their own mora (4), CVC can be said to be the optimal minimal acronym because it consists of a foot, and it has an onset, which is an unmarked option. Minimality restrictions applying to Spanish core vocabulary have traditionally been formulated in a similar way, given that minimal lexical words contain a coda (e.g., Dunlap 1991; Elordieta 2014).

We have also observed a word-minimality restriction which applies exclusively to acronyms: acronyms consisting of two segments (CV and VC) were strongly dispreferred and pronounced as initialisms, whereas those with three segments (CVC, CCV) were preferentially oralized as acronyms, although they also admitted pronunciations as initialisms. As a consequence, according to our data and the results of our experiments, the minimality restriction in Spanish acronyms needs to be formulated in terms of segments and therefore it differs from the minimality restriction applying to the core vocabulary, which is foot-based (i.e., minimal words must contain two moras, Sect. 2.2).

First of all, the fact that it is the number of segments, not the number of moras, that matters to create a valid acronym—note that in moraic models, VC would be bimoraic and it is predicted to pattern like CVC—does not contradict our proposed metrical account of the prosodic structure of acronyms. Note that reference to the foot is independently needed to account for the restriction on the maximum number of syllables in Spanish acronyms. Second, the scarcity of existing monosyllabic abbreviations with the shape CV (n = 15) and CCV (n = 1) compared with VC (n = 23) and CVC (n = 112) in our corpus of 578 abbreviations reveals that monosyllabic abbreviations are by far more common when they have a coda and, hence, the foot seems to play an important role in shaping the emergence of acronyms. Finally, we know that crosslinguistically acronyms constitute a particular subset of the vocabulary and, as such, sometimes display phonological differences compared to the core vocabulary. That is precisely why some authors have situated the study of acronyms at the boundaries of grammar.

Thus, independently of how preferences in the oralization of short abbreviations in Spanish are explained, we believe it is still reasonable to assume a metrical account of the facts. Furthermore, the robustness of the stress patterns obtained in Task 1 of the questionnaire, in which C-final acronyms (except those ending in *-s*) clearly display final stress as opposed to those ending in a vowel, seems to support a metrical analysis of default stress in acronyms based on the weight-sensitivity of their final coda.

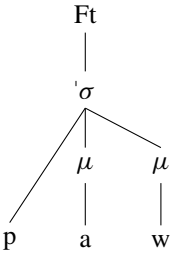
4.2 Sequences of vowels in short acronyms

We showed that short abbreviations with a sequence of vowels, where at least one of them is a high vowel (e.g., CVH, CHH, CHV), are preferentially pronounced as acronyms, not initialisms (Table 7). In that respect, they behave like other acronyms containing three segments. Interestingly, the sonority profile of the sequences of vowels (in particular, the position of the high vowel within the sequence of vowels) seems to condition the pronunciation of the acronym as a monosyllable or a disyllable. Specifically, our results revealed that forms with a falling sonority profile (e.g., PAU) were pronounced to a greater extent as monosyllables and thus displayed gliding of the final high vowel (CVH → CVG, e.g., PAU → [ˈpaw]). By contrast, sequences of rising sonority (e.g., FIE, PUI, see footnote 3) tended to favor a disyllabic pronunciation, hence, without a diphthong (e.g., CHV → CH.V, e.g, FIE → [ˈfi.e]; CHH → CH.H, e.g., PUI → [ˈpu.i]), even though rising diphthongs and gliding are frequent in the core vocabulary of Spanish.

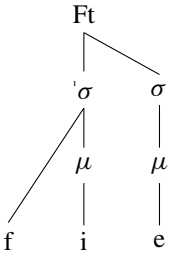
This difference can be attributed to the different prosodic structures of rising and falling diphthongs in word-final position in Spanish and seems to provide support for the idea that only word-final offglides project a mora, just as do consonants in the final coda, but not onglides. Recall that whereas word-final offglides have been claimed to project their own independent mora (e.g., CVH → $CV_{\mu}G_{\mu}$)—just like other word-final codas—onglides have been claimed to be located in the nucleus, sharing a mora with the next vowel (e.g., CHV → $C[GV]_{\mu}$). Crucially, if final offglides project their own independent mora as in (8a), monosyllables satisfy the bimoraic minimality requirement active in the core vocabulary. This would explain why falling sonority sequences are produced to a greater extent as monosyllabic rather than as disyllabic acronyms. By contrast, if onglides in rising diphthongs share their mora with the following vowel (8c), such acronyms would surface as monomoraic when produced as monosyllables. To avoid acronyms with only one mora, a possible solution is to parse such acronyms as disyllables (without gliding), with each vowel projecting its own mora (8b). This is in fact the option preferred by speakers. Therefore, this exceptional hiatus could be attributed to the minimality condition on Spanish acronyms.

(8) Preferred solutions to underlying vowel sequences containing a high vowel

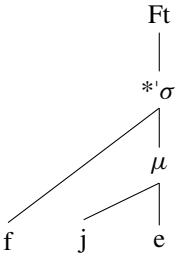
a. Falling sonority



b. Rising sonority



c. Rising sonority



5 Analysis

5.1 Default stress and maximal prosodic size in acronyms

The literature on Spanish stress in non-verbal forms is too extensive to be summarized here and several fundamental issues are still a matter of debate, namely those related to the domain of stress (i.e., whether it is the word or the stem), weight sensitivity and the specific account of irregular stress (see Baković 2016; Piñeros 2016; Roca 2006, 2020; Martínez-Paricio 2021; and references in these works). Two broad trends can be distinguished which differ in their specific account of unmarked stress. On the one hand, default stress (final in C-final words, penultimate in V/s-final words) has been taken as evidence that the domain of stress assignment in Spanish is the morphosyntactic word (Harris 1983; Lipski 1997; Piñeros 2016; and others). Some of these authors assume that stress is weight-sensitive, and propose a moraic trochee

at the right edge of the word (e.g., *ca(mí$_{\mu}$no$_{\mu}$)* 'path,' *meloco(tó$_{\mu}$n$_{\mu}$)* 'peach'). This representational approach would derive the most frequent stress patterns reported in acronyms as well. According to this sort of analysis, three irregular stress patterns are found in Spanish: final stress in V-final words (e.g., *menú* 'menu'), penultimate stress in C-final words (e.g., *caníbal* 'canibal'), and antepenultimate stress in C- and V-final words (e.g., *sábana* 'sheet,' *régimen* 'diet, regime').

On the other hand, a second group of researchers has proposed that the domain of stress in Spanish is the morphological stem and that regular stress is stem-final (e.g., *camín-o* 'path,' *melocotón-* 'peach,' *menú-* 'menu,' where the hyphen is used to indicate the end of the stem, which does not include the nominal class marker) (Hooper and Terrell 1976; Baković 2006; Roca 2006; Hualde 2012; among others).[13] Note that in V-final words that are stressed (e.g., *menú-*), the stressed vowel is the last in the stem; so this stress pattern is not considered exceptional under this account. Hence, such analyses have the advantage of reducing irregular stress to two patterns, instead of three: penultimate stress in C-final words (e.g., *caníbal-* 'canibal') and antepenultimate stress in C- and V-final words (e.g., *sában-a* 'sheet,' *régimen-* 'diet, regime'). Furthermore, if the domain of stress assignment in Spanish is taken to be the stem, there is no need to assume weight-sensitivity, although this is still a contested issue (Bárkányi 2002; Face 2004; Meinschaefer 2015; Fuchs 2018; Tetzloff 2022).

In principle, both types of analyses of default stress would account for the regular location of stress in Spanish acronyms. Hence, either of them could be adopted. The maximality facts (Sect. 4.1) seem to suggest that reference to a foot is independently needed to derive the restrictions on the maximal size of acronyms. Therefore, a purely metrical account without reference to the morphological structure of words is here preferred over a stem-based account.[14]

Our data do not contain acronyms with antepenultimate stress (only two responses out of 480 surfaced with antepenultimate stress, Table 5), and we are therefore not in a position to shed light on the possible effects of weight on antepenultimate stress, another long-standing debate in the literature (Harris 1983; Roca 2006). However, our experimental results clearly show that the weight of the final syllable, and not the penultimate one, has an influence on the location of stress, and that antepenultimate stress, being absent, is undoubtedly marked. In Table 11 all metrical parsings of one- to three-syllable acronyms are illustrated. We assume that ILT feet can constitute possible metrical parsings not only in three-syllable forms (e.g., Table 11, f–i), but also in disyllabic forms that end with a heavy syllable (e.g., Table 11, d, e). In our proposal, only word-final consonants project a mora.

In what follows, we present the crucial constraint rankings by which to derive the prosodic size of acronyms in Spanish and their default stress as illustrated in Table 11. First, all constraints used in this analysis are defined in (9).

[13] See Bermúdez-Otero (2013) for an alternative morphological analysis of Spanish nominals in which nominal class markers are analyzed as part of the stem.

[14] Note, however, that a foot-based analysis that makes reference to the edge of stems would also correctly derive stress in acronyms. Under this view, the final vowel of acronyms would be interpreted as a nominal class marker outside of the stem, given that V-final acronyms are overwhelmingly realized with penultimate stress (97.6%, Table 4); they behave like *camín-o* 'path' and not like *menú-* 'menu.'

Table 11 Metrical parsings

	Strings	Parsed example
a.	CVC	($'CA_{\mu}M_{\mu}$)
b.	CV.CV	($'CE_{\mu}.CA_{\mu}$)
c.	CVC.CV	($'CE_{\mu}R.MI_{\mu}$)
d.	CV.CVC	($CE_{\mu}('SI_{\mu}D_{\mu})$)
e.	CVC.CVC	($SE_{\mu}C('TU_{\mu}R_{\mu})$)
f.	CV.CV.CV	($CO_{\mu}('PY_{\mu}.ME_{\mu})$)
g.	CV.CV.CVC	($CO_{\mu}(NA_{\mu}.'TE_{\mu}L_{\mu})$)
h.	CV.CVC.CV	($U_{\mu}('NE_{\mu}S.CO_{\mu})$)
i.	CV.CVC.CVC	($SE_{\mu}(MA_{\mu}R.'NA_{\mu}T_{\mu})$)

(9) Constraint definition

a. FOOT-BINARITY (FT-BIN): Assign one violation mark for every foot that does not contain at least two moras or syllables. (McCarthy 2008: 226)

b. PARSE-σ (PRS-σ): Assign one violation mark for every unparsed syllable. (McCarthy 2008: 227)

c. IAMB: Assign one violation mark for every foot whose head is not final. (McCarthy 2008: 227)

d. TROCHEE (TROCH): Assign one violation mark for every foot whose head is not initial. (McCarthy 2008: 227)

e. *C_{μ}: Assign one violation mark for every consonant associated with a unique mora. (Rosenthall and van der Hulst 1999; Bennett 2012: 87)

f. WEIGHT-BY-POSITION (WBP): Assign one violation mark for every coda consonant that is not associated with a unique (i.e., non-nuclear) mora. (Hayes 1989; Bennett 2012: 87)

g. FINAL-MORA (FIN(μ)): Assign one violation mark for every word-final segment that is not uniquely associated with a mora (i.e., final codas are associated with a non-nuclear mora). (Bennett 2012: 87)

h. NO-RECURSIVITY (NO-REC): Assign one violation mark for every constituent of type *X* that is dominated by a constituent of type *X*. (Selkirk 1995; McCarthy 2008)

i. ALIGN-L(FT_{min}, σ, FT_{nonmin}) (BIG-TROCH): For every minimal foot Ft_{min}, assign one violation mark if some footed syllable intervenes between Ft_{min} and the left edge of its containing Ft. (Martínez-Paricio and Kager 2015: 473)

j. ALIGN-R(FT_{min}, σ, FT_{nonmin}) (BIG-IAMB): For every minimal foot Ft_{min}, assign one violation mark if some footed syllable intervenes between Ft_{min} and the right edge of its containing Ft. (Martínez-Paricio and Kager 2015: 473)

k. MAX: Assign one violation mark for every syllable in the input that has no correspondent in the output. (We refer to input syllables for the sake of simplicity, but we assume no underlying syllables.)

l. ALIGN-R(FT_{max}, WORD): Assign one violation mark for every maximal foot that does not stand in final position in the prosodic word. (This con-

straint is based on McCarthy 2008: 228. It is reformulated to refer to maximal feet, which include both binary feet and ILT feet.)

All acronym strings must satisfy both FOOT-BINARITY, a constraint against monomoraic feet, and PARSE-σ, against unparsed syllables. PARSE-σ is responsible for deriving the maximality word requirement, in the sense that acronyms are always exhaustively footed into a maximal foot. Recall that a maximal foot can be instantiated by an ILT foot or a traditional binary foot, since "maximal" refers to the (topmost) projection of the foot that is directly dominated by the prosodic word. ILT feet violate NON-REC, as opposed to standard feet. Second, word-final codas project their own mora, whereas closed syllables in a non-final position will surface as monomoraic. This is the result of the ranking FINAL-MORA (against non-moraic final codas) $\gg$ *C_{μ} (against moraic consonants) $\gg$ WEIGHT-BY-POSITION (against non-moraic codas). Since Spanish is trochaic, the ranking TROCHEE $\gg$ IAMB enforces penultimate stress in V-final acronyms.

We assume that TROCHEE and IAMB only affect minimal projections of feet, i.e., feet not dominating feet. The position of the adjunct and of the minimal foot within the ILT foot is determined by the relative ranking of ALIGN-L(FT_{min}, σ, FT_{nonmin}) (BIG-TROCH) and ALIGN-R(FT_{min}, σ, FT_{nonmin}) (BIG-IAMB). If BIG-IAMB dominates BIG-TROCH, as is the case in Spanish acronyms, the minimal foot is right-aligned within the ILT foot: $(\sigma(\sigma\sigma))$. The opposite ranking, BIG-TROCH $\gg$ BIG-IAMB, gives $((\sigma\sigma)\sigma)$. Together with TROCH, the ranking BIG-IAMB $\gg$ BIG-TROCH derives an amphibrach rhythm (weak-strong-weak), instead of a dactylic rhythm (strong-weak-weak), which would otherwise be necessary to derive antepenultimate stress.

In the succeeding paragraphs we proceed to illustrate each ranking argument. The tableaux only include candidates that enter into ranking arguments. H and L stand for heavy and light syllables, respectively, and boldface indicates stress. We use H and L in the inputs for ease of reference, but we assume no input syllables.[15]

In the presence of two light syllables, a bimoraic trochee is built and penultimate stress is derived.

(10) Tableau 1: CECA /θeka/ → ('θe$_{\mu}$.ka$_{\mu}$)

LL, CECA	TROCH	IAMB
a. ☞ (**LL**)		*
b. (L**L**)	*W	L

When a closed syllable appears in penultimate position, it counts as light and a bimoraic trochee is built (Table 11, c, h). This is derived by ranking *C_{μ} above WBP.

[15]Tableaux combine violation marks with W and L. In a loser cell, W represents a winner-favoring constraints, whereas L represents a loser-favoring constraint. Each L has to be preceded by at least one W, indicating that all loser-favoring constraints are dominated by at least one winner-favoring constraint.

(11) Tableau 2: CERMI /θermi/ → ('θe$_\mu$ɾ.mi$_\mu$)

HL, CERMI		*C$_\mu$	WBP
a. ☞	(**L**L)		*
b.	(**H**L)	*$_W$	$_L$

However, if a closed syllable occupies the final position, a layered foot (CV$_\mu$('CV$_\mu$C$_\mu$)$_{Ftmin}$)$_{Ftmax}$ is preferred over a disyllabic uneven iamb *(CV$_\mu$'.CV$_\mu$C$_\mu$). This result obtains because Spanish is a trochaic language. Although stress is final in (CV$_\mu$('CV$_\mu$C$_\mu$)$_{Ftmin}$)$_{Ftmax}$, the minimal foot is still a moraic trochee. As previously mentioned, TROCHEE and IAMB only apply to minimal feet. Candidate (e) in Tableau 3 is ruled out because it fatally violates PRS-σ. Candidate (d) is also ruled out because the word-final consonant does not project a mora, an instance of a violation of FIN(μ) violation. The remaining candidates violate *C$_\mu$. Only candidate (a), with an ILT foot, is able to avoid a violation of the foot-form constraints TROCH and IAMB.

(12) Tableau 3: CESID /θesið/ → (θe$_\mu$('si$_\mu$ð$_\mu$))

LH, CESID		PRS-σ	FIN(μ)	*C$_\mu$	TROCH	IAMB	NON-REC
a. ☞	(L(**H**))			*			*
b.	(**L**H)			*		*$_W$	$_L$
c.	(L**H**)			*	*$_W$		$_L$
d.	(**L**L)		*$_W$	$_L$			$_L$
e.	L(**H**)	*$_W$		*			$_L$

As shown in the previous tableau, unmarked ILT feet present a left adjunct. This actually obtains by ranking BIG-IAMB (against right adjuncts) above BIG-TROCHEE (against left adjuncts).

(13) Tableau 4: COPYME /kopime/ → (ko$_\mu$('pi$_\mu$.me$_\mu$))

LLL, COPYME		PRS-σ	BIG-IAMB	BIG-TROCH	NON-REC
a. ☞	(L(**L**L))			*	*
b.	((**L**L)L)		*$_W$	$_L$	*
c.	L(**L**L)	*$_W$		$_L$	$_L$

Only in three-syllable strings does a disyllabic uneven iamb emerge, (CV$_\mu$(CV$_\mu$.'CV$_\mu$C$_\mu$)$_{Ftmin}$)$_{Ftmax}$. This candidate, (a) in the next tableau, complies with exhaustive parsing, and thus avoids a violation of PRS-σ, and also of FIN(μ), at the expense of violating *C$_\mu$ and TROCH (11h).

(14) Tableau 5: CONATEL /konatel/ → (ko$_\mu$(na$_\mu$.'te$_\mu$l$_\mu$))

LLH, CONATEL		PRS-σ	FIN(μ)	*C$_\mu$	TROCH
a. ☞	(L(L**H**))			*	*
b.	(L(**L**L))		*$_W$	$_L$	$_L$
c.	L(L(**H**))	*$_W$		$_L$	$_L$

The same parsing is obtained with /LHH/ inputs, the only difference being the mapping of the non-final H input syllable onto a L syllable. Comparing candidates (a) and (b) in the next tableau shows that *C_μ also dominates TROCH.

(15) Tableau 6: SEMARNAT /semarnat/ → (se_μ(ma_μr.ˈ$na_\mu$$t_\mu$))

LHH, SEMARNAT		*C_μ	TROCH	WBP
a. ☞	(L(L**H**))	*	*	*
b.	(L(**H**H))	**W	L	L

Finally, the upper size of three syllables observed in acronyms can be derived by ranking both PARSE-σ and AL-R(FT$_{max}$, WORD) above MAX.[16] The size of acronyms, or truncated hypocoristics for that matter, is actually derived from the effects of undominated FT-BIN, PRS-σ and AL-R(FT$_{max}$, WORD), subsumed under the cover label prosodic word restrictor constraints (McCarthy and Prince 1994; Piñeros 2000a,b). Obtaining a minimal word, which is a prosodic word equivalent to a single foot, correlates with the satisfaction of all three constraints. However, the regular core vocabulary of Spanish has longer words. This means that general MAX is not dominated by the prosodic word restrictor constraints. As for truncated hypocoristics, we are dealing here with a specific grammar that applies to acronyms.

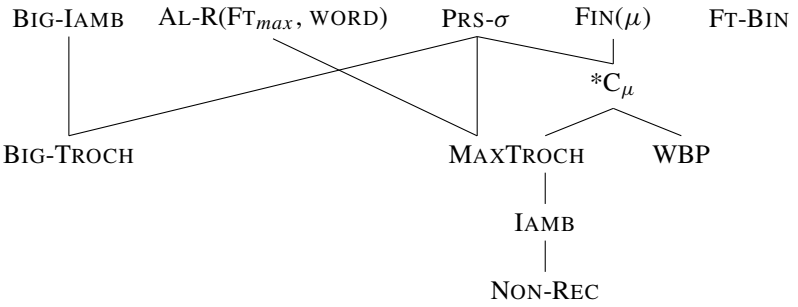
(16) Tableau 7: /LLLL/ → [(L(**L**L))]

LLLL		PRS-σ	AL-R(FT$_{max}$, WORD)	MAX
a. ☞	(L(**L**L))			*
b.	(**L**L)(**L**L)		*W	L
c.	L(L(**L**L))	*W		L

[16]The process of constructing acronyms involves extracting the initial portion of a multi-word base, which typically corresponds to the initial letters of each lexical word, but may also encompass syllables or sequences that do not precisely match a syllable. Michael Kenstowicz has drawn our attention to the strong left-edge bias observed in acronyms, which distinguishes them from hypocoristics, where stress anchoring is frequently observed (Alber and Arndt-Lappe 2023). We propose that this difference is not attributable to the fact that acronyms are derived from phrases, as one might think, but rather to the fact that the building blocks of acronyms are not sounds, but letters. Initial letters are likely the most prominent symbol in any alphabetic orthographic system. At least in the case of Spanish, the new form of an acronym is read according to the orthographic conventions of the language. This can sometimes create a discrepancy between the sound of the initial letter in the base and the sound of the same letter in the acronym. This is true in other languages too (see Thornton 2004: 559–560 for parallel examples in Italian). For example, CAP is pronounced [ˈkap], but the letter "C" in this acronym, pronounced as a voiceless velar stop, corresponds to a voiceless interdental or alveolar fricative, [θ] or [s], depending on the variety, in the base *Certificado de Aptitud Pedagógica* 'Certificate of pedagogical attainment.' The primary focus of this paper has been on the outputs of acronyms, with less emphasis on the process of their derivation from the full form. As previously noted, acronyms are created by combining the initial letters of a phrase, resulting in highly conventionalized, "lab"-made forms. These acronyms may serve specific communicative purposes, such as establishing semantic links between the base phrase and the acronym (metonymic links, as in PEN, which stands for Poets, Playwrights, Editors, Essayists, Novelists, or metaphorical links, as in WAR, which stands for Women Against Rape), or displaying sound qualities characteristic of playful language related to sound symbolism (e.g., Kodak) (see Ungerer 1991). In Sect. 5, we have demonstrated that, once an array of phonotactically well-formed syllables is assembled, a grammar assigns default stress and imposes a limit of three syllables on the maximum size of the acronym. The precise mechanisms involved in the initial process of assembling letters are beyond the scope of this paper.

All constraint rankings presented so far are illustrated as a Hasse diagram in (17).

(17) Hasse diagram



5.2 The minimality requirement on acronyms

We have seen in Sect. 3.3 that whereas CCV and CVC abbreviations allow an oralization as acronyms, CV and VC abbreviations are dispreferred as such. Therefore, the minimality condition displayed by acronyms is not driven by syllable weight, but rather by the number of segments. But the consensus in the literature is that phonology does not count, and so no constraints should differentiate between three-segment words and two-segment words. However, the observed differences between CV/VC and CCV/CVC can be explained by considering higher prosodic units. If we consider that each letter in an initialism is parsed by its own separate minimal prosodic word, which is then dominated by a maximal prosodic word, there can be constraints that discourage excessively long maximal words. We suggest that a binarity constraint targeting maximal prosodic words, as defined in (18), is at play. This constraint penalizes prosodic compounds that do not consist of exactly two members, two minimal prosodic words. A prosodic compound comprising three members violates this constraint: *[$[X]_\omega$ $[Y]_\omega$ $[Z]_\omega$ $]_\omega$, and hence will penalize an initialism based on three letters/segments.

(18) PWd$_{max}$-BIN: Assign one violation mark for every PWd$_{max}$ that does not contain exactly two PWd$_{min}$. (This constraint collapses BINARITY-MIN and BINARITY-MAX, McCarthy 2008: 226.)

We propose that this constraint is ranked above a markedness constraint that disfavors monosyllabic acronyms, as demonstrated by our perception test. The constraint PWd$_{min,max}$-BIN is based on FOOT-BINARITY(syllable), and is relativized to apply to simultaneously minimal and maximal prosodic words, that is, acronyms; it is vacuously satisfied by initialisms, which are maximal words.

(19) PWd$_{min,max}$-BIN: Assign one violation mark for every PWd$_{min,max}$ that does not contain exactly two syllables. (Based on FOOT-BINARITY(syllable), McCarthy 2008: 226.)

In the previous section, we made the assumption, for the sake of simplicity, that the input to the grammar is comprised of segments. We were specifically addressing

long acronyms, which are typically at least disyllabic. Such forms are never pronounced as initialisms because they would require too much structure, for example, [[u]$_\omega$ [ene]$_\omega$ [e]$_\omega$ [ese]$_\omega$ [θe]$_\omega$ [o]$_\omega$]$_\omega$ for UNESCO. However, if our goal is to formalize the process of oralizing an abbreviation, we must assume that the input to the grammar is a string of letters. Consequently, the candidate set includes both initialisms, which are always prosodic compounds, and acronyms, which are single noncompound prosodic words. As illustrated in (20) and (21), initialisms derived from two-letter inputs satisfy PWd$_{max}$-BIN. However, two-segment acronyms violate the constraint PWd$_{min,max}$-BIN. In this case, initialisms are more harmonic than acronyms. These tableaux demonstrate that PWd$_{min,max}$-BIN must outrank FT-BIN. An initialism like [[pe]$_\omega$ [a]$_\omega$]$_\omega$ incurs one additional violation of FT-BIN compared to a single-word acronym like [pa]$_\omega$.

(20) Tableau 8: <PA> → [[pe]$_\omega$ [a]$_\omega$]$_\omega$

<PA>	PWd$_{max}$-BIN	PWd$_{min,max}$-BIN	FT-BIN
a. ☞ [[pe]$_\omega$ [a]$_\omega$]$_\omega$			**
b. [pa]$_\omega$		*W	*L

(21) Tableau 9: <AL> → [[a]$_\omega$ [ele]$_\omega$]$_\omega$

<AL>	PWd$_{max}$-BIN	PWd$_{min,max}$-BIN	FT-BIN
a. ☞ [[a]$_\omega$ [ele]$_\omega$]$_\omega$			*
b. [al]$_\omega$		*W	L

However, when the input consists of a string of three letters (22), (23), the initialism candidates violate the highly ranked constraint PWd$_{max}$-BIN. In this scenario, the most harmonic candidate is the acronym, even though it violates PWd$_{min,max}$-BIN and, in the absence of a coda consonant, FT-BIN.

(22) Tableau 10: <PRA> → [pra]$_\omega$

<PRA>	PWd$_{max}$-BIN	PWd$_{min,max}$-BIN	FT-BIN
a. [[pe]$_\omega$ [ere]$_\omega$ [a]$_\omega$]$_\omega$	*W	L	**W
b. ☞ [pra]$_\omega$		*	*

(23) Tableau 11: <PAL> → [pal]$_\omega$

<PAL>	PWd$_{max}$-BIN	PWd$_{min,max}$-BIN	FT-BIN
a. [[pe]$_\omega$ [a]$_\omega$ [ele]$_\omega$]$_\omega$	*W	L	*W*
b. ☞ [pal]$_\omega$		*	

The rankings exemplified in this section do not affect the rankings established in the previous section regarding stress assignment and the maximum size of acronyms.

5.3 The syllabification of high vocoids in acronyms

Before concluding, we briefly demonstrate how we can derive the monosyllabic parsing of an acronym like PAU, where the high vocoid follows the non-high vowel, and the disyllabic parsing of an acronym like FIE, where the high vocoid precedes the non-high vowel.

We follow Martínez-Paricio's (2013b) analysis of the syllabification of high vocoids and stress. Rising diphthongs share a mora in Spanish (8c). This configuration violates a markedness constraint *[XX]$_\mu$, which prohibits two root nodes being dominated by the same mora. This constraint, which prohibits rising diphthongs, dominates ONSET, as illustrated in (24).

(24) Tableau 12: /teatro/ → [te('a.tro)] 'theater' (Martínez-Paricio 2013b: 181)

teatro		*[XX]$_\mu$	ONSET
a. ☞	te$_\mu$('a$_\mu$.tro$_\mu$)		*
b.	('t[e͡a]$_\mu$.tro$_\mu$)	*W	L

However, in the presence of a high vocoid, diphthongization typically occurs. A constraint that disallows low sonority vowels, such as [i] or [u], from occupying the head of a syllable, *HEADσ/i,u, dominates the constraint *[XX]$_\mu$.

(25) Tableau 13: /miedo/ → [('mje.ðo)] 'fear' (Martínez-Paricio 2013b: 183)

miedo		*HEADσ/i,u	*[XX]$_\mu$
a. ☞	('m[je]$_\mu$.ðo$_\mu$)		*
b.	mi$_\mu$('e$_\mu$.ðo$_\mu$)	*W	L

Unlike rising diphthongs, word-final falling diphthongs in Spanish are bimoraic (8a) because they attract stress. This follows from the ranking of both FINμ (9g) and *HEADσ/i,u above *C$_\mu$. In the following tableau, we present the syllabification of an abbreviation like PAU, which is pronounced as a monosyllabic, bimoraic acronym. Candidate (c) in (26) is discarded because it violates both FIN(μ) and FT-BIN. Candidate (b), with a hiatus, violates *HEADσ/i,u. The most harmonic candidate is candidate (a), which only violates *C$_\mu$.

(26) Tableau 14: PAU → [('pa$_\mu$w$_\mu$)]

PAU		FIN(μ)	FT-BIN	*HEADσ/i,u	*C$_\mu$	*[XX]$_\mu$
a. ☞	('pa$_\mu$w$_\mu$)				*	
b.	('pa$_\mu$.u$_\mu$)			*W	L	
c.	('p[aw]$_\mu$)	*W	*W		L	*W

However, when a high vocoid precedes a non-high vowel, syllabifying the sequence as a rising, monomoraic diphthong results in a fatal violation of FT-BIN. Therefore, the most harmonic candidate is candidate (a) in (27), which is a disyllabic form with a hiatus and therefore bimoraic. The winning candidate, although optimal, incurs a violation of *HEADσ/i,u.

(27) Tableau 15: FIE → [('fi.e)]

FIE		FT-BIN	*HEADσ/i,u	*[XX]$_\mu$
a. ☞	('fi$_\mu$.e$_\mu$)		*	
b.	('f[je]$_\mu$)	*W	L	*W

6 Discussion and conclusions

In this investigation, we have demonstrated that Spanish acronyms conform to the default stress pattern of the language, which is characterized by final stress in words that end in a consonant and penultimate stress in words that end in a vowel. The observation that acronyms exhibit unmarked stress in a given language has been used to support claims of productivity, such as in studies of Portuguese (Wetzels 2007) and Italian (Krämer 2009). It should be noted that some participants in this study reported unfamiliarity with certain acronyms presented in the questionnaire, and that Tasks 2 and 3, as well as the perception experiment, featured acronyms that do not actually exist.

In our study, we have demonstrated that acronyms in Spanish can consist of one, two, or three syllables. In order to establish the maximum size of acronyms, we have proposed that their form should not exceed that of a metrical foot. By assuming that ILT feet are potential metrical representations, we have determined that the size of acronyms is limited to three syllables, given that acronyms must contain at least one foot. This upper limit of three syllables has been independently reported in Spanish hypocoristic truncation. Furthermore, it is consistent with recent analyses of the three-syllable window restriction and exceptional antepenultimate stress, which have also made use of ILT feet to model stress location and constrain stress position within a word.

An alternative explanation for the maximality restriction in acronyms, which does not rely on the assumption of ILT feet, could be derived by reference to standard trochees and iambs. As suggested by an anonymous reviewer, a single foot that is right-aligned could be postulated, and there could be a constraint against having more than one unparsed syllable at the left edge of the acronym to produce the same maximality condition. Under this approach, trisyllabic parses would be $[\sigma(\text{'}\sigma\sigma)_{Ft}]_{\omega}$ in vowel-final words and $[\sigma(\sigma\text{'}\sigma)_{Ft}]_{\omega}$ in consonant-final words. However, there are several drawbacks to this account. Firstly, it would necessitate the stipulation of two different foot types, trochees and iambs, to derive the default stress in the language, despite the fact that it is generally accepted that the unmarked foot consistently appears in words with regular stress (Hayes 1995). In this sense, postulating a moraic trochee in minimal feet along with ILT feet provides a more uniform explanation for the observed facts. In our analysis, iambs also arise in forms like (CO(NATÉL)), but only as a last resort to satisfy PRS-σ, and not in forms like (CE(SÍD)). Furthermore, there is independent evidence to support the unmarkedness of the trochee in Spanish, but not the iamb. The truncation patterns, in both common nouns and hypocoristics, reveal a clear preference for trochees (Prieto 1992; Piñeros 2000a,b). On the other hand, the constraint against having more than one unparsed syllable at the left edge of the acronym would be an arbitrary stipulation. This restriction would undermine the generalization that both acronyms and truncated forms are in fact minimal words, that is, prosodic words that are equivalent in size to a metrical foot.

In our study, we have also demonstrated that the preferred form for short Spanish acronyms is CVC. Moreover, we have discovered a unique minimality restriction that applies solely to acronyms, whereby two-segment abbreviations (CV, VC) are consistently preferred as initialisms and strongly avoided as acronyms, while three-segment

abbreviations (CVC, CCV, and also longer forms like CCVC) can be pronounced as either acronyms or initialisms. This observation provides evidence for a segment-based minimality restriction that operates in the formation of Spanish acronyms. Notably, this finding does not negate the existence of moras in Spanish, which are necessary to explain the bimoraic minimality restriction in lexical words and truncated forms, as well as the default stress pattern. Interestingly, other languages such as European Portuguese and English have a similar segment-based minimality restriction for their acronyms (Ungerer 1991; Veloso 2017). An alternative formulation in terms of moras cannot account for the specific minimality restriction found in acronyms. Although the fact that CCV and CVC acronyms exhibit similar patterns might seem to suggest that complex onsets can contribute to weight, even when simple onsets do not (Smith and Lubera 2021; Topintzi 2022; see also Ryan 2014), such a moraic account cannot explain why VC and CV abbreviations are equally disallowed as acronyms. Also, VC and CVC would still have the same moraic structure, yet they exhibit different behavior. Therefore, a formulation of the minimality restriction in terms of segments, rather than moras, is more appropriate for acronyms. We have considered an analysis that explains these observations without relying on the number 3 but rather on constraints related to binarity requirements at different prosodic levels.

In the context of short acronyms containing vowel sequences, with at least one being a high vowel (CVH, CHV, CHH, e.g., PAU, FIE, PUI), this study provides evidence that onglides in Spanish do not project their own mora, unlike word-final offglides, which do. Instead, onglides share a mora with the following vowel. This different weight contribution of onglides and offglides explains the higher preference for monosyllabic CVG acronyms, which can be analyzed as bimoraic (e.g., PAU [ˈpa$_{\mu}$w$_{\mu}$]), as compared to CGV monosyllables, which are monomoraic (e.g., FIE *[ˈf[je]$_{\mu}$]), and therefore more likely to be realized as initialisms or disyllabic acronyms (e.g., [ˈefe i ˈe] ∼ [ˈfi$_{\mu}$.e$_{\mu}$]). This observation aligns with the analysis of stress in the core vocabulary, where only offglides in word-final position attract stress and project an independent mora (e.g., [ka.ˈra$_{\mu}$j$_{\mu}$] ‘jeez!’ vs. [ˈra$_{\mu}$.ðjo$_{\mu}$] ‘radio’). Furthermore, the stronger prohibition against CHV monosyllabic acronyms can be interpreted as providing additional support for the claim that postconsonantal onglides are part of a complex nucleus in a mora-sharing configuration in Spanish.[17] This is because CHV forms pattern more like CV forms in their high degree of dispreference for being oralized as monosyllabic acronyms, which contrast with CCV forms.

Beyond our descriptive contribution to the formal study of Spanish acronyms, this investigation has shed light on our general understanding of the phonological properties of acronyms. Even though we have confirmed that acronyms may display instances of unmarked patterns (i.e., default stress), they can be subject to specific maximality and minimality restrictions. This is not surprising since acronyms are special words whose written origin places them at the intersection of conventionalization and grammar. As such, they can exhibit both specific and more general, unmarked patterns.

[17] See Harris (1983), Hualde (2014) and Martínez-Paricio (2013b) for additional arguments in support of the syllabification of postconsonantal glides as part of a complex nucleus, rather than as a complex onset. Most of these arguments are based on the upper number of segments that can occupy the syllabic rhyme and the onset, and the absence of co-occurrence sonority restrictions between the consonant(s) in the onset and the onglide.

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Declarations

Competing Interests The authors declare no competing interests.

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