論　文

A Functional Assessment of the Philippine English Vowel System

Leah GILNER

要　旨

本論文は，フィリピン英語の母音体系を機能的負荷の点から分析し，その結果を考察する。機能的負荷（FL）の枠組みを用いて，コーパスにおける生起頻度の点から言語的特徴を量的に明らかにすることができる。つまり FL により，言語の構造面の記述に対して，言語の運用面に関する記述を加えることができる。本論文で示す結果により，フィリピン英語の話しことばについて，International Corpus of English (ICE)-Philippines (Bautista, 2004) から得た生起頻度に基づき，母音の相対的な関与を量的に示すことができる。FL に基づく格付けにより，母音間で創り出される対照的な存在あるいは語彙ビルディング・ブロックとして生じる体系的関係を明らかにできる。本分析により，FL に基づく格付けに依拠した調音的ジェスチャーと特徴を包括的に記述できる。

キーワード：usage-based description／言語運用，functional load／機能的負荷，vowel system／母音体系，Philippine English／フィリピン英語，global Englishes／グローバル英語

1　Introduction

The English language is currently a global linguistic resource with an estimated 2 billion users around the world (Crystal, 2003). The broad and rapid spread of the

language is often qualified as unprecedented by linguistics scholars (Albl-Mikasa, 2013; Crystal, 2003, 2004b; Hung, 2009; Matsuda, 2017; Seidlhofer, 2005). Galloway and Heath (2014, p. 386) observe that this state of affairs has "drastically changed the sociolinguistic landscape of English" in both its local and global manifestations. It is now widely recognized that most English language users are multilingual individuals who live in plurilingual societies. It has been observed that the contexts and constellations of global English language use these days embody 'linguistics of contact' more often than 'linguistics of community' (Hülmbauer, 2011). As Mauranen (2018) points out, much of global English use involves second-order contact between linguistic systems that co-exist with others in individuals' linguistic repertoires.

English is widely used as an inter-communal link language by people with diverse linguacultural backgrounds. It is used in globalized business scenarios (Cogo, 2012; Cogo & Dewey, 2012; Ehrenreich, 2016; Firth, 2009; Louhiala-Salminen & Kankaanranta, 2011); it is increasingly chosen as the operating language of multinational companies (e.g., Neeley, 2012); it functions as a vehicle by which knowledge and know-how is imparted to younger generations (Dearden, 2014; Mauranen, 2006, 2012); it supports the dissemination of research findings as well as discussion and debate among academic and scientific communities, inherently and historically international (e.g., Ammon, 2012; Kuteeva, 2013; Mauranen, 2006; van Weijen, 2012); last but of critical importance, the omnipresence of the internet serves to promote, facilitate, and catalyze the relevance of the English language (Androutsopoulos, 2011; Baron, Rayson, & Archer, 2009; Crowston, 2010; Crystal, 2004a, 2004b; Flammia & Saunders, 2007; Mauranen & Ranta, 2009; Smokotin, Alekseyenko, & Petrova, 2014; Squires, 2010).

For many people, the English language also serves as an intra-communal colingual linguistic asset, oftentimes cohabiting with other languages in plurilingual communities of speakers whose socialization processes and communicative experiences largely overlap (Kachru, 1997; Widdowson, 2015). The world Englishes paradigm has increased the granularity of analysis of localized communicative practices and the distributed functions bestowed upon co-existing languages within a particular society.

Borlongan (2016) observes that in the Philippines, for example, English is currently embraced as a Filipino language, one of the linguistic assets that individuals use to express their identity and suggests this shift in attitudes may be an outcome of national language planning bilingual education policies. Lectal variation in Philippine English is

acknowledged and has been documented (Llamzon, 1969; Pefianco Martin, 2014; Tayao, 2004b). Gonzales (2017) takes the discussion of variation further by identifying various registers that are associated with certain social networks. These include occupation-based, socio-economic, regional, and hybrid Englishes.

One consequence of the mobility and interconnectivity of this global age is that many of the individuals may shift between local and global communicative scenarios so, depending on the situation, locally-established linguistic resources may be used to achieve "globally valid" (Mauranen, 2012, p. 32) communicative practices. The descriptive data provided here may thus yield insights into the multilingual repertoires at play in global communicative scenarios.

2 Background

The blurring of classificatory boundaries of speakers and communities has stimulated a reconfiguration of approaches to the study and description of language and communication. As the ways in which we interact and engage are transformed by new technologies so is our understanding of language, interaction, and cognition. New types of data obtained by means of innovative technologies are encouraging scholars to expand established frameworks in light of findings outside of any one specific domain. Linguistic description is becoming more sophisticated, drawing on results obtained from the analysis of massive amounts of discourse (corpora), from psycholinguistic experimentation, and from neurolinguistic research. Cumulative evidence is encouraging scholars across various subdisciplines of linguistics such as psycholinguistics, sociolinguistics, evolutionary linguistics, and cognitive linguistics to consider the role of communicative experience in the creation of mental representations and how linguistic conventions emerge from contact among individuals (Mauranen, 2018; Mufwene & Vigouroux, 2012; The Five Graces Group et al., 2009; Wedel, 2012).

The description of the English language has become more complex and nuanced with the acknowledgment of the variation, variability, and variety that accompanies the expansion of the users and uses of the language. Accounting for the full range of present-day users, uses, and usage is evidently an ambitious goal given the dispersed and nebulous nature of communicative scenarios. It is through the accumulation of observations and insights that we strive toward a comprehensive depiction of the forms

and functions of the multiple manifestations of worldwide English language use. Results reported here contribute usage-based descriptions to the pool of resources available to researchers interested in contemporary English studies.

Functional load (FL) measures bring us a step closer toward the quantification of linguistic experience by drawing on corpus-based metrics in order to assess the relative occurrence of elements of a linguistic class (Hockett, 1966; Surendran & Niyogi, 2003, 2006). Corpora have become indispensable to the task of description because they allow analysts to observe patterns and trends that language users converge upon when constructing meaningful and purposeful discourse. Within the domain of phonology, FL analyses have added resolution to the typological description of diverse languages by indicating the relative contributions that various linguistic classes make to each linguistic system.

The next section will first acquaint the reader with the structural characteristics of the vowel system of Philippine English. Subsequently, FL rankings for *phonemes as contrasts* and *phonemes as building blocks* will be presented. These rankings are described in terms of the articulatory gestures and features associated with each phoneme. This interpretation evidences the perceptuo-motoric nature of speech production (Schwartz, Moulin-Frier, & Oudeyer, 2015; Schwartz, Sato, & Fadiga, 2008) and may provide insights into phonological categorization (Eulitz & Lahiri, 2004; Kuhl et al., 2008; Wedel, 2012).

3 The Philippine English vowel system

3.1 Structural description

The model of Philippine English adopted for this investigation is comprised of nine simple monophthongs and four complex diphthongs (Tayao, 2004a, 2004b). Figure 1 reflects the distribution within the vowel quadrangle. The sounds are rather symmetrically distributed in the front and back of the mouth and a preference for articulations produced in the peripheral regions of the oral cavity is observable.

Among the simple monophthongs, five are articulated with the tongue in the anterior area of the mouth and four in the posterior. Articulatory gestures show a tendency toward the upper region of the oral cavity. Four monophthongs and all of the diphthongs involve gestures in this region. Four monophthongs are articulated with an intermediate tongue

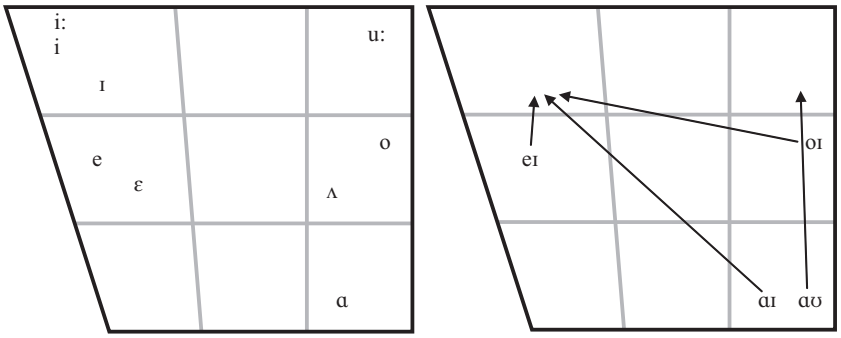

Figure 1. Philippine English vowel system

position. Two diphthongs initiate in this region. The lower region of the oral cavity is used for articulation of one simple vowel phoneme and the initiation of two complex diphthongs.

This gestural configuration can be further characterized in terms of the following distribution of features. The feature [high] is associated with eight phonemes, four simple and four complex. In the case of the diphthongs, this feature is confined to terminating targets. The feature [mid] is associated with six phonemes. The simple monophthongs associated with this feature are evenly distributed in the periphery of the vowel space. The associated complex diphthongs are also found in the periphery of the vowel space. The feature [low] is associated with three phonemes and is confined to sounds produced in the posterior region of the oral cavity. The feature [front] is associated with eight phonemes, five simple and three complex. Phonemes associated with this feature tend to be concentrated in the upper region of the mouth. The feature [back] is associated with seven phonemes. The associated phonemes span the height of the vowel space. Five phonemes in this system are characterized by the feature [tense] and two by the feature [long].

3.2 Usage-based description

In the discussion that follows, the FL computations are based on frequency measures obtained from the spoken component of ICE-Philippines corpus. This corpus contains a total of approximately 600,000 running words and samples a broad spectrum of communicative scenarios (Greenbaum, 1996; Greenbaum & Nelson, 1996; see Schmied, 1990 for an informative perspective on particular variables).

The FL rankings are presented as relative normalized occurrence in the corresponding corpus: a value of 1.00 indicates the phoneme that occurs most often in the words in the corpus while the other values are calculated in relation to the top ranked item. This method of presentation is favored in the literature and provides an accessible depiction of the systemic relationships among members.

3.2.1 Phonemes as building blocks

Table 1 displays the functional load ranking of the 13 phonemes in the Philippine English vowel system in their roles a building blocks. The ranking indicates the relative contribution that each phoneme makes to the formation of the words that comprise the Philippine English spoken corpus. The first two phonemes are used more than half as much the other 11 phonemes combined. The top five phonemes are used almost three times more than the remaining eight. The top six phonemes are used almost four times as much as the seven phonemes at the bottom of the ranking. These usage patterns will be described in terms of gestural configurations and articulatory features in the discussion that follows.

Table 1. Functional load ranking of the vowel phonemes as building blocks in Philippine English

Rank	Segment	FL
1	iː	1.0000
2	ɑ	0.9596
3	ɛ	0.7067
4	o	0.6810
5	uː	0.3995
6	ɪ	0.3062
7	ɑɪ	0.2772
8	eɪ	0.2733
9	ʌ	0.2317
10	i	0.0985
11	ɑʊ	0.0870
12	e	0.0631
13	oɪ	0.0120

This usage-based ranking of occurrence suggests that phonemes self-organize into

several tiers of relative occurrence in the phonemic mass of usage events. Results indicate that this system makes relatively greater use of four members in the production of the words that dominate spoken discourse. The members that contribute most to word formation are the high, front, tense, long phoneme /i:/ followed by the low, back phoneme /ɑ/. Together they serve to demarcate the upper anterior and lower posterior regions of the vowel space. The mid, front, lax /ɛ/ and the mid, back, tense, round /o/ are also relatively active in word formation. The primacy of these sounds serves to demarcate the intermediate zone of articulation and the anterior from the posterior regions. The posterior region is more thoroughly delineated by the next phoneme in this ranking. The high, back, tense, round, long /u:/ demarcates the upper posterior perimeter of the vowel space. The upper anterior region is further specified by the phoneme /ɪ/, which co-occupies this region with the highest ranked member. Two diphthongs are activated in their role as phonemic constituents with similar frequency. These are both anterior-closing diphthongs, involving shifting the tongue up and forward toward the upper anterior region of the oral cavity. The members at the bottom of the ranking make a rather small contribution to the phonemic constituents that comprise the words in the corpus. The most frequently used member in the lower tiers of the ranking, the mid, back phoneme /ʌ/, occurs less than five times in every 100 vowel segments in the data set.

This distribution of phoneme activation in word formation suggests a preference for certain articulatory gestures and corresponding features. As an aggregate, the system prefers energetic anterior articulations that involve a degree of tongue elevation. In terms of features, [high] and [mid] are primed over [low]. Phonemes associated with the feature [front] are used more often than those associated with the features [central] and [back]. The features [tense], [lax], [round], and [long] are associated with a few of the phonemes in the upper tiers of the ranking.

3.2.2 Phonemes as contrasts

Table 2 presents results of analyses which examined the contrastive role of vowel phonemes in Philippine English. The words in the dominating vocabulary form a dense network of contrasting environments. The 13 vowel phonemes, on average, form minimal pairs with 8 or 9 other members. The most active member /ɑɪ/ engages in contrastive relationships with 12 other members. It is interesting to note that in spite of this relative greater activity, this phoneme occupies a middle tier in the ranking. The members in

the upper tiers of the ranking engage between 9 and 11 other members in contrastive relationships. The least active member engages four other members.

Table 2. Functional load ranking of the vowel phonemes as contrasts in Philippine English

Rank	Segment	FL
1	iː	1.0000
2	ɑ	0.8741
3	o	0.7426
4	eɪ	0.6368
5	ɑɪ	0.5552
6	ɑʊ	0.3458
7	uː	0.3226
8	ɛ	0.2948
9	ʌ	0.2688
10	e	0.0563
11	ɪ	0.0504
12	i	0.0484
13	oɪ	0.0205

The results indicate a rather dispersed distribution of relative work among the members in this system. The tiers that emerge tend to be occupied by one or two members. The uppermost tiers are each occupied by single phonemes. Five phonemes emerge as relatively great contributors to the network of contrasts in this phonological system. The high, front, tense, long phoneme /iː/ carries the largest functional burden in terms of phonological oppositions. The low, back, unrounded phoneme /ɑ/ takes on slightly less of the contrastive functional load. As described in the previous section, these two phonemes also make the greatest contributions in terms of phonemic components used in word formation. The simple phoneme /o/ occupies the third tier of contrastive functional load. These three phonemes collaborate to establish the relevance of degree of tongue elevation, on the one hand, and tongue retraction, on the other. The complex phonemes /eɪ/ and /ɑɪ/ occupy the two tiers that follow. These are both anterior-closing diphthongs which reinforce the role of upward and forward tongue movements. The diphthong /eɪ/ establishes the function of the intermediate anterior zone of articulation as relevant to distinguishing between members in this system while the diphthong

/ɑɪ/ reinforces the role of the low posterior articulations. The next tier is occupied by two members, the complex phoneme /ɑʊ/ and the simple monophthong /u:/. These two members establish the relevance of raised, retracted tongue positions in distinguishing members of this system. Intermediate and centralized articulations are brought into play by the two members that occupy the following tier in this ranking. Anterior articulations are reinforced by the phoneme /ɛ/ and posterior articulations are reinforced by the phoneme /ʌ/. The remaining members are noticeably less active in terms of the number of members they engage in contrastive relationships, six in the case of the phonemes /e/, /i/, /oɪ/ and four in the case of the phoneme /ɪ/.

3.2.3 Interfacing contrastors

Additional analyses of the network of contrastive associations create by each phoneme revealed that certain phonemes distinguish themselves due to the intensity with which they interact with other members in this system. These phonemes are referred to here as *interfacing contrastors*. Three interfacing contrastors emerge from an analysis of *first-* and *second-order contrasts*. First-order contrasts are those contrasting pairs with the highest functional load values across each of the networks of associations established by individual members in the system. Second-order contrasts are those contrasting pairs ranked second in the functional load rankings obtained across all of the networks of association present in the data set. The phonemes /i:/ - /ɑ/ - /o/ distinguish themselves from other members by their level of engagement in the most active contrasting pairs across all the members in this system. As an aggregate, these three members participate in two-thirds of the first- and second-order contrasts across the networks formed by the phonemes in the Philippine English vowel system. In the sections that follow, the network of associations created by each of these phonemes in their function as contrastive anchors will be described in detail.

3.2.3.1 The high, front, tense, long /i:/

Table 3 displays the network of contrastive associations created by the high, front, tense, long phoneme /i:/, the most actively engaged member in the Philippine English phonological system. As a contrastive anchor, relationships are established with eight other members. Non-participating members coincide precisely with those at the lower tiers in Table 2 displaying the FL ranking of phonemes as contrasts. Each one of the

eight pairings makes a relevant contribution to the contrastive burden carried by this anchor. Preference for posterior-based monophthongs and anterior-closing diphthongs is observed. The three articulatory dimensions (viz. front-back, close-open, rounding) are at play in the organizational tendencies of this network (Schwartz, Boë, Vallée, & Abry, 1997).

Table 3. The network of contrastive associations created by the high, front, tense, long /i:/

Rank	Pair	Normalized
1	i: - ɑ	1.0000
2	i: - o	0.9670
3	i: - ɑɪ	0.4336
4	i: - eɪ	0.3699
5	i: - ʌ	0.3591
6	i: - ɑʊ	0.2977
7	i: - ɛ	0.2186
8	i: - u:	0.2180

This ranking of functional load of contrastive associations indicates that contrastive signaling is accomplished by means of an uneven distribution of activation. Several tiers of relative contribution emerge. The two top-ranked pairings distinguish themselves from the others in the contributions they make to the network of contrastive associations. These two pairings establish reciprocal relationships between these members; the phoneme /i:/ is the most activated member in the contrastive networks created by the contrastive anchors /ɑ/ and /o/. These two recruited members are both posterior-based articulations. The pairing with the phoneme /ɑ/ activates configurations associated with diametrically opposed regions in the vowel space and primes degree of tongue elevation and tongue retraction in creating distinctive phonemic constituents. The pairing with the phoneme /o/ reinforces these gestures and primes lip rounding in signaling meaningful phonemic constituents. Pairings with anterior-closing diphthongs follow in this ranking. Gestural configurations associated with the top-ranked pairing are reinforced by the initiating target of the recruited member /ɑɪ/. The pairing with the phoneme /eɪ/ augments the role of degree of tongue elevation in the initiation of the diphthong. The terminal articulatory position of these two members makes relevant the degree of energy and relative duration in creating phonemic distinctions. The pairings with the phoneme /ʌ/ strengthens the role

of tongue retraction in the configuration of distinctive articulatory gestures. The pairing that follows with the closing diphthong /ɑʊ/ also contributes to the contrastive function that tongue retraction plays in this network. Lip rounding is reinforced by the terminal target of the recruited member. The pairings at the lower tiers of this ranking demonstrate diversity in the configuration of the distinctive gestures activated by this anchor. The pairing with the phoneme /ɛ/ concentrates contrastive power in the anterior region of the vowel space and also makes relevant degree of tongue elevation as well as lengthening and tensing of articulations. The pairing with the phoneme /u:/ activates articulatory targets in two extreme points in the anterior and posterior of the vowel quadrant. The contrastive function of lip rounding is further reinforced by this pairing.

3.2.3.2 The low, back /ɑ/

Table 4 displays the network of contrastive associations created by the low, back phoneme /ɑ/. As a contrastive anchor, relationships are established with all but one other member, the phoneme /oɪ/. Eight of the 11 pairings make relevant contributions to the contrastive burden carried by this anchor. Anterior-based members are activated with relatively greater intensity. This network exploits the three articulatory dimensions in its organizational tendencies.

Table 4. The network of contrastive associations created by the low, back /ɑ/

Rank	Pair	Normalized
1	ɑ - i:	1.0000
2	ɑ - eɪ	0.6477
3	ɑ - o	0.4637
4	ɑ - u:	0.4269
5	ɑ - ɑʊ	0.3369
6	ɑ - ɛ	0.2455
7	ɑ - ʌ	0.1088
8	ɑ - ɑɪ	0.1057
9	ɑ - e	0.0352
10	ɑ - i	0.0052
11	ɑ - ɪ	0.0018

This functional load ranking indicates an uneven distribution of work across

various pairings. Several tiers emerge. Clustering at the middle and lower tiers indicate that some pairings are activated with similar intensity. The first- and second-order contrasts establish reciprocal relationships with their partner members. As mentioned in the previous section, the phoneme /ɑ/ is the most activated member in the network of contrastive associations formed by the phoneme /i:/. It is the second most active member in the network formed by the phoneme /eɪ/. The strength of association of these pairings can be described as doubly reinforced by this reciprocity. These pairings concentrate contrastive power in the anterior region of the vowel space. The relatively great activity of the first-order contrast primes degree of tongue elevation and tongue retraction along with lengthened and tensed articulations among the distinctive gestural configurations at play in this network. The second-order contrast further strengthens these associations. Pairings with the posterior-based phonemes /o/, /u:/, and /ɑʊ/ prime degree of tongue retraction and further reinforce the functional relevance of degree of tongue elevation. The pairing with the phoneme /u:/ augments the contrastive role of lengthened articulations in distinctive gestural configurations. The pairings that populate the lower tiers of this ranking collaborate to further reinforce the contrastive function of degree of tongue protrusion, primarily, and degree of tongue elevation, secondarily.

3.2.3.3　The mid, back, tense, round /o/

Table 5 displays the network of contrastive associations created by the mid, back, tense, round phoneme /o/. As a contrastive anchor, relationships are established with all but one other member, the phoneme /ɪ/. Eight of the 11 pairings make relevant contributions to the contrastive burden carried by this anchor. While anterior-based monophthongs are activated with noticeably greater intensity, a preference for posterior-based closing diphthongs emerges from this ranking. This network exploits the three articulatory dimensions in its organizational tendencies.

This functional load ranking indicates an uneven distribution of work across the pairings in the network. One particular pairing establishes the first-order contrast and dominates the contrastive relationships established by this anchor. As the values in the ranking decrease, a tendency toward clustering of pairings is observed. Contrastive pairings with complex phonemes are dispersed throughout the ranking. As discussed previously, the most active pairing formed with the phoneme /i:/ establishes a reciprocal relationship between these members. This association primes tongue retraction and lip

Table 5. The network of contrastive associations created by the mid, back, tense, round /o/

Rank	Pair	Normalized
1	o - iː	1.0000
2	o - ɑ	0.4795
3	o - ɑʊ	0.4063
4	o - ʌ	0.2577
5	o - eɪ	0.2301
6	o - ɛ	0.1687
7	o - uː	0.1443
8	o - ɑɪ	0.1166
9	o - i	0.0892
10	o - e	0.0531
11	o - oɪ	0.0218

rounding as well degree of tongue elevation, tensing, and lengthening. It is noted that the pairing with non-long counterpart /i/ occupies a much lower tier in this ranking. The cluster of pairings /ɑ/ - /ɑʊ/ that occupy the next tier activate similar gestural configurations due to the shared component that occupies the low, posterior region of the vowel space. The functional relevance of degree of tongue elevation, specifically lowering, is augmented by these pairings. The terminating target of the complex diphthong further reinforces the role of degree of tongue elevation, specifically raising. The contrastive function of lip rounding is also reinforced by the first of these pairings. The clustering pairs that follow in the ranking collaborate to reinforce relative tongue protrusion as relevant in this network of associations. The pairing with the phoneme /ʌ/ augments the role that lip rounding and tensing play in distinguishing configurations of articulatory gestures. The pairing with the complex phoneme /eɪ/ concentrates contrastive power in the intermediate zone of the vowel quadrant and makes relevant the degree of tongue retraction. Similar configurations are reinforced by the pairing with the phoneme /ɛ/. The pairing with the phoneme /uː/ strengthens the role that lengthening and degree of tongue elevation play in this network. The pairing with the phoneme /ɑɪ/ activates gestural configurations that largely overlap with those associated with the top two pairings in this ranking.

4 Closing remarks

This paper has presented results obtained from FL analyses of the vowel systems of Philippine English. Findings demonstrate how this methodology can be applied to this domain of English studies in order to provide a usage-based perspective. FL rankings have revealed patterns of usage that are otherwise not evident from a purely structuralist viewpoint. These usage patterns indicate synergistic systemic relationships among nodes of relative operationality (Pellegrino, Marsico, & Coupé, 2011). These findings thus provide additional and precise quantitative data with which to systematically document the large diversity that is evident among and within phonological systems (Oh, Pellegrino, Coupé, & Marsico, 2013).

When it comes to contemporary English studies, documentation and description are of particular relevance. The large body of referential work available on the language has traditionally been based on a limited and limiting perception of its users, uses, and usage. The adoption of a truncated view has had ramifications for subsequent theorization and speculation regarding relationships between language and the mind. Acknowledgment of the variation, variability, and variety that is inherent to language and communication is reorienting the linguistic sciences. As Sridhar and Sridhar (2018) observe, scholarship has taken several significant turns toward functional, dynamic, multilingual, instrumental orientations in order to better account for contemporary linguistic realities.

The discussion provided in this paper has described how FL rankings can be used to quantify the perceptuo-motor behaviors associated with the synergistic relationships among vowel phonemes that emerge dynamically through communicative experience. These elaborations serve to remind us that phonological representations correspond to physical and cognitive mechanisms underlying speech production and perception. Thus, it can be tentatively proposed that FL analyses have something to contribute to discussions regarding language typology (Kortmann & Schneider, 2004; Schwartz et al., 1997, 2015), language dynamics and evolution (Hruschka et al., 2009; Wedel, 2012) as well as inclusive and pluricentric approaches to the study and teaching of the English language (Canagarajah, 2013, 2018; Cook, 2017; Kirkpatrick, 2010).

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