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The concept of functional load and its relevance for pronunciation teaching

What are the most important things to include in a pronunciation teaching syllabus? Which features should be prioritized in the design of language tests? The answers to these questions are never easy, but one approach that has been tried over the years involves the concept of *functional load* (or FL for short).

In brief, FL compares the amount of 'work' performed by different segmental features by comparing the number of minimal pairs that any two phonemes serve to keep apart. Measuring FL means comparing the sound contrasts of a language in terms of the number of minimal pairs that they serve to keep apart. For example, in English the contrast between /ɪ/ and /i/ distinguishes a large number of minimal pairs such as *ship/sheep* and *bid/bead.* The contrast between /ð/ and /θ/, on the other hand, distinguishes very few minimal pairs (*thy/thigh* being one of the few, rather contrived, examples). We can say that the /ɪ/ /i/ contrast has a higher FL than the /ð, θ/ contrast. Applied linguists such as Catford (1988) and Brown (1991) drew up rankings of phonemes in order to provide a guide for teachers. Those of Brown (1991) take the form of a ten-point scale. Highly-ranked oppositions with high FL include /æ/ and /ɛ/ and /p/ and /b/. Illustrating the way that FL can be used to direct pedagogical attention, Brown (1991, p. 113) suggests that vowel contrasts below rank 4 can usually be dispensed with; these contrasts include /ɑ/ and /aʊ/ and /ʊ/ and /u/. Consonantal contrasts with a ranking of around 3, 4, or 5 can also be ignored or at least given low priority; these contrasts include /θ/ with /t/ and /ʧ/ with /ʤ/.

The word 'around' in the previous sentence signals the fact that the measurement of FL is neither precise nor simple. Although the number of minimal pairs is a core component of FL, other factors are also taken into account in more sophisticated measures. These include the relative frequency of each member of the pair (obscure pairs such as *thy/thigh* or *look/Luke* should not be allowed to exert undue influence on the calculations) and their word class. In principle, minimal pairs from the same word class are more likely to cause confusion if not distinguished: *live/leave* (verbs; /ɪ/ and /i/ again), *pedal/paddle* (nouns; /ɛ/ and /æ/) and *three/free* (premodifiers; /θ/ and /f/) are problematic examples from my recent experience. The lists of Brown (1991) take these and other factors into account; (see also Levis and Cortes, 2008). More recently, computer modeling has enabled more sophisticated rankings of FL to be drawn up (see, e.g., Gilner and Morales 2010).

FL may be an attractive concept in theory, but how about in practice? We might expect errors in areas of high FL to trigger more misunderstandings and generally cause more problems in communication, but very few studies have investigated this 'functional load hypothesis' under experimental conditions. Munro and Derwing (2006) set out to compare the effects of speaker errors

involving high FL segments with those involving low FL segments. The findings supported the FL hypothesis: high-FL errors had a greater impact on listeners' perceptions of the accentedness and comprehensibility of L2 speech (Munro & Derwing 2006, 529). The researchers' explanation of the findings was as follows: compared with low-FL errors, high-FL errors (such as *shoe* pronounced with initial /s/) were thought to be more noticeable (thus affecting perceptions of accentedness) and to increase processing difficulties (thus affecting perceptions of comprehensibility).

It is possible to find further, indirect support for the FL hypothesis by comparing patterns of variation in present-day accents of English. For example, British English accents vary in terms of whether they make the /ʊ/ /u/ contrast, as in *pull/pool.* Speakers from the north of England generally do not make this contrast, while those from the south of England do. But this does not seem to affect the mutual intelligibility or comprehensibility of speakers from the two places, and both this fact and the very existence of variation may be related to the low FL of the contrast. On the other hand, the /æ/ /ɛ/ contrast has a high FL in English, and no native-speaker accents fail to distinguish the two sounds. But it would be unwise to claim too much explanatory power for FL, given the complexities of measurement and the difficulty of establishing relationships. A counter-example is provided by a comparison of variation across so-called 'new' varieties of English: speakers from many parts of the world, including Singapore, now show little evidence of making the distinction between /ɪ/ and /i/ even though this has consistently been classified as a high-FL contrast.

Indeed, this aspect of FL points to a limitation of the concept, as it was originally framed during the 1930s. For the Prague School linguists to define FL in terms of 'a given language', it was necessary to think of languages as more or less static entities with clear geographical boundaries. But the diversity of English in the world suggests that a more dynamic view is needed, one that acknowledges change over time and regional differences – while still trying to keep sight of the fact that intelligibility and comprehensibility need to be, and generally are, maintained across boundaries. In a recent publication (Sewell, 2017) I have suggested that FL can take such a dynamic view, even if this means losing some of the apparent certainties of statistical computation. For example, going back to the case of the /ɪ/ /i/ contrast mentioned above – if so many users of English in different parts of the world apparently 'fail' to make this distinction, regardless of proficiency level, we must ask ourselves whether it is worth insisting on it (despite it being ranked as a high-FL contrast). Perhaps speakers and listeners find ways to deal with occasional misunderstandings, and perhaps the effort of doing so is less than that required to acquire the contrast. We should avoid taking an overly static view of FL, then. It is not only that human beings adapt to languages by learning their features; language, in its glorious diversity and complexity, also adapts to human beings (Deacon, 1997).

Another limitation of the FL concept in its original formulation is that it only applies to segmental contrasts. In the same article (Sewell 2017) I have also argued for a broad view of FL, one that takes account of more recent statistical studies and other research evidence. The data collected by Gilner

and Morales (2010) enable comparisons of entire classes of features, and in comparing consonants and vowels the researchers conclude that 'consonants do significantly more work in both word formation and language use' (Gilner & Morales, 2010, 141; see also Surendran & Niyogi, 2006). Consonantal contrasts thus appear to have a higher FL. There is some support for this from studies of intelligibility in international English (e.g., Deterding, 2013), in which consonantal modifications – the deletion, substitution, or addition of consonants – caused the majority of misunderstandings. Deterding also found that modifications to initial consonant clusters, such as pronouncing *black* with an /ɹ/ sound instead of an [l], were more likely to cause problems than modifications of final clusters (see also Jenkins, 2000). The higher FL of initial clusters is suggested by psycholinguistic studies, several of which indicate that the beginnings of words play an important role in lexical access (e.g., Bent, Bradlow, & Smith, 2007; Marslen-Wilson & Zwitserlood, 1989).

But once again, it would be dangerous to over-apply these findings as patterns of feature use may vary across different levels of proficiency, different language backgrounds, and so on. FL affects learning, as well as interaction. If research studies show that vowel modifications cause relatively few problems, this may indicate that the participants have already acquired them – in other words, vowels may have a high FL at some stages of learning, and this partly what prompts their acquisition. Similarly, if such studies show that consonantal modifications caused more problems, this may be because the participants made more of them – perhaps their first language makes certain sounds or combinations of sounds difficult to acquire. Learners from other language backgrounds may find consonants easier to acquire than vowels, in which case vowel modifications may require more attention from teachers. It would be unwise, therefore, to make universal pronouncements about FL, whether in a narrow or a broad sense.

It might seem that FL is too complex or too uncertain to have any relevance for pronunciation teaching and testing. More research is certainly needed, and large-scale computational studies with 'big data' may be illuminating in time. In conclusion, although the factors affecting both learning and interaction are, of course, highly complex, it is possible that the various senses of FL may assist in characterizing and explaining their importance in any given situation, and may thus contribute to course design and teaching priorities. With my own students in Hong Kong, I have found that the areas I usually prioritize – consonantal contrasts such as /n/ and /l/ and /v/ and /w/, vowel contrasts such as /æ/ and /ɛ/, initial consonant clusters, and single final consonants – are in fact supported by FL considerations. Other factors also need to be taken into account, and this is in fact what was proposed by Brown (1991, 113) in his FL-influenced proposal for syllabus design: "it does not propose one model for all English language learners. Instead, it is a polymodel approach, allowing the teacher to suit the model to the needs and background of the students."

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