

Cognitive Theory as a tool for teaching second language pronunciation

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Abstract

This paper starts by recognising that, in general, pronunciation is the least successfully taught of the second language skills, and suggesting this indicates a need for a better theoretical framework within which teachers can understand and facilitate learners' acquisition of L2 pronunciation. Structural-generative theory, which has been dominant in phonology for some time, has limited application in this domain. However, applying the principles of Cognitive Phonology may lead to improved results.

It then reviews the basic Cognitive Phonology principle: 'the signifier is a concept', and explains how the literacy bias (the tendency of those literate in an alphabetic script to believe that speech is a string of discrete phonemes) makes this principle more difficult to grasp than the very similar but far more widely understood principle that the signified is a concept. Discussion continues to consider implications of this idea for language teachers: phonemes, and other units of phonology, are not real things but abstract concepts. Teaching pronunciation thus involves facilitating concept formation.

The paper then moves to consider some implications for theory of the observation that the concept of phoneme is derived from prior understanding of words and other larger units of phonology. It concludes by suggesting there may be productive parallels between the arguments presented here regarding the relationship between words and phonemes, and arguments advanced by Construction Grammar in regard to the relationship between lexis and grammar, whose implications for second language teaching are explored by other papers in this volume.

Keywords: phonology; cognitive phonology principle; L2 pronunciation; teaching of pronunciation; acquisition of pronunciation; phoneme; signifier/signified

1. Introduction

For many adult learners of English as a second or foreign language (ESL/EFL), especially those from Asian language backgrounds, pronunciation is simultaneously the most difficult of the language skills and the one they most aspire to master (Fraser 2000; Willing 1993). This makes it natural to assume that pronunciation is given a great deal of attention in English language classes, and high priority in teacher education and applied linguistics research—so it sometimes comes as a surprise to those not directly involved in the ESL/EFL industry to discover how far this is from being the case. Of course, that is a generalisation with numerous exceptions: there have always been teachers who take great pains to help learners improve their speaking skills (Baker 1981; Gilbert 2000), and second language speech research has a considerable history (Bohn and Munro 2007). Nevertheless it is widely recognised that pronunciation is the macro-skill to which teachers devote least class time (Macdonald 2002), and to which least research is directed (Levis 2005).

Many factors contribute to this state of affairs (Celce-Murcia, Brinton and Goodwin 1996). The one I would like to focus on in this paper is the lack of an appropriate theoretical

framework within which researchers, teachers and indeed language learners themselves can understand and facilitate the processes of second language pronunciation acquisition.

2. Structural-generative theory

It is perhaps natural that teachers with questions about how to help second language learners with pronunciation turn for answers to the disciplines of phonetics and phonology. The problem is that for many decades these disciplines have been heavily dominated by structural-generative theories (Bloomfield 1933/1984; Chomsky and Halle 1968; Gussenhoven and Jacobs 2005). Such theories have allowed for significant advances in understanding of many aspects of speech—indeed most of our collective knowledge about speech has been acquired using structural-generative theories. However, they have had relatively little to offer the language teaching professions (Roach 1991), and phonetics and phonology have been progressively dropped from teacher education programs in recent decades (Fraser 2000).

This can be attributed to the participation of structural-generative theory in the so-called Cognitive Revolution of the 1950s and 1960s (Stillings et al. 1987). The central innovation of this movement—perhaps better termed the Computational Revolution—is the drawing of a close analogy between human cognition and computer processing. This analogy leads researchers to emphasise formal aspects of cognition (i.e. those aspects that can be modeled in terms of rules and representations), and downplay the role of meaning. For example, in considering how people recognise words in a continuous stream of speech, a computational approach starts by detecting word boundaries, and then looks up the meaning of the part between the boundaries in a lexicon. It is much more difficult to model it as a process which starts by seeking meaningful elements, then defines the parts between those as word boundaries. This is because meaning, context and point of view can be included in computational models only if they are themselves first formalised as rules and representations (Shanon 1993).

Early observations showed that the formal properties of speech needed for a computational model to access meaning (e.g. word boundaries and phoneme structure) are not directly evident in speech. The basic computer model of speech perception and production therefore sees lexical access as requiring the transformation of a phonetic representation (originally thought of as a sequence of allophones) into a phonological representation (originally thought of as a sequence of phonemes), and vice versa, via computational processes (originally thought of as a sequence of explicit rules). On this view, the task of the disciplines of phonetics and phonology is to provide detailed specifications of the phonetic and phonological representations, and the processes that relate them (Anderson 1985).

Since ordinary speakers have no awareness of carrying out computational processes on phonetic and phonological representations as they perceive and produce speech, it is assumed these processes must take place subconsciously. This means researchers cannot observe the representations and processes directly, but must infer them from speech data. This can be seen as a rather ironic situation, given that a major impetus behind the introduction of the computational metaphor was the need to avoid reference to unobservable mental entities such as meanings, concepts, beliefs, or even the mind itself (Leahey 1980). Be that as it may, the result is that development of structural-generative theory has been constrained largely by considerations of computational processing (e.g. efficiency in minimising storage and maximising rules) rather than by considerations of human cognitive capabilities (Dreyfus 1979; Weizenbaum 1984).

Unfortunately it turned out to be extraordinarily difficult to define computational relationships between the phonetic and phonological representations. Over a period of several decades views about the nature of both the phonetic and the phonological representations, and about the processes that relate them, have had to be radically revised. The result is that structural-generative theories have become highly complex and abstract (Kenstowicz 1994).

This situation could be summarised by saying that structural-generative theories have focused more on the behavior of speech sounds—“which sounds co-occur in a language, which sounds combine to form syllables and words, which contrasts between sounds remain stable vs. change over time” (Speeter Beddor 2008)—than on the behaviour of people using speech. This is particularly true in relation to second language pronunciation. Structural-generative phonology can describe learners’ speech, and offer a detailed theoretical account for their errors. However, this account serves more to explain why learners can’t learn pronunciation than to offer them practical help with the errors.

According to structural-generative theory, acquisition of second language pronunciation involves changing the representations and processes that drive speech output. Since such changes are assumed to take place subconsciously, explicit teaching is expected to be relatively ineffective, giving a ready explanation for poor student performance, and ensuring the prediction of the ‘Critical Age Hypothesis’ (Lenneberg 1967) that adults cannot learn pronunciation became a self-fulfilling prophecy.

Until recently, then, most research on second language pronunciation was driven by theoretical questions arising within structural-generative theory, rather than by the quest for improved teaching methods. Such theory-driven research has of course provided useful generalisations about the acquisition of pronunciation (Archibald 1995), and the factors that affect success or otherwise of pronunciation learning (Flege, Munro and Mackay 1995). However, these have generally taken the form of detached statistical analyses rather than direct engagement with teachers and learners in the process of acquiring a new language.

Over the last decade, this has started to change, with valuable evidence being accumulated to demonstrate that ESL/EFL pronunciation can indeed be improved through explicit teaching, and significant advances in discovering the factors that make teaching effective (Couper 2006; Derwing, Munro and Wiebe 1998; Levis 2005). In particular, there has been growing recognition of the limitations of pronunciation teaching that focuses mainly on phonemes (Hahn 2004). However, it is perhaps fair to say there is not yet a unifying theoretical approach to provide a framework within which to advance this research. The aim of this paper is to suggest that Cognitive Phonology, a branch of Cognitive Grammar, may be able to fill this role.

3. Cognitive Grammar

Cognitive Grammar (Langacker 1987; Taylor 2002) developed in explicit opposition to structural-generative theories. Determined to avoid the kind of abstractness that characterises computational theories, it is consciously and insistently usage-based. Eschewing the computer analogy, it explicitly puts meaning at the centre of theory. In fact, Cognitive Grammar can be seen as part of a ‘New Cognitive Revolution’ (Pink 2005), which, recognising the many limitations of the computer model, prefers to focus directly on the essentially meaning-based cognitive processes, such as analogy, metaphor, and contextual reasoning, that are most characteristic of human cognition. One such process, to which Cognitive Grammar pays special attention, is categorisation. Since categorisation depends crucially on meaning, context and point of view (Murphy 2002), it is particularly resistant to the formalisation necessary for computer modeling. Cognitive Grammar, with its non-computational approach, has been able to make major progress in understanding categories and categorisation of all kinds (Taylor 2003).

The theoretical framework of Cognitive Grammar has developed through revival and refinement of Saussure’s ‘symbolic thesis’ (Taylor 2002), according to which language is seen as a system of signs, in which a *signified* (the ‘meaning’, or ‘semantic pole’, of the sign) and a *signifier* (the ‘form’, or ‘phonological pole’, of the sign) are bound together, through their use as part of a language, in a symbolic relationship.

One of Saussure's key insights is that the signified is not a thing but a concept (Saussure 1916/1986). Thus in the word *tree*, to take a famous example, the signifier [tri:] relates not to a physical tree in the external world, but to the concept [TREE] in the minds of English speakers.

'To have the concept [TREE] means to know what a tree is. In virtue of having the concept you are able to recognise a tree when you see one, you know what counts as a tree, and are therefore able to use the word appropriately of the object.' (Taylor 2002: 43)

While the Saussurean idea that the signified is a concept is now very well accepted by linguistic theorists of all persuasions (Fromkin et al. 2005), it is somewhat counter-intuitive. Thus, it has to be taught afresh to each generation of students, who tend naturally to adopt the *naive realism* of everyday reasoning, by showing them that the concept [TREE] relates not directly to an actual tree, or an image of a tree, but to a *category* of many physical and imaginary trees. In fact, a concept is defined, in Cognitive Grammar, as the organising principle that relates the various members of a category to one another (Taylor 2002: 43).

The importance of this Saussurean insight is its recognition that any one 'bit of reality' can be categorised, or conceptualised, in a range of different ways, depending on the context, culture, point of view, and, importantly, the language, in which it is observed. Thus the bit of reality that in one context is conceptualised as [TREE], in other contexts can be conceptualised as [PLANT], or [TIMBER] or [EUCALYPT] or [SHADE] or [BRANCHES + TRUNK + LEAVES], or in a range of similar but significantly different ways in a range of different languages (Baker 2007). In each case, the reality is the same; it is just conceptualised differently.

Through exploration of the principle that the signified is a concept, Cognitive Grammar has added greatly to our understanding of the processes of categorisation and conceptualisation, and the role of language and culture in them (see for example Geeraerts and Cuyckens 2007 and many references therein).

Cognitive Grammar has also established the crucial role of categorisation in the use of language itself (Taylor 2003), with the insight that units of language (such as words, phrases or morphemes) must themselves be categorised in order to be understood and used as part of a linguistic system. Different languages divide up the many units of language into categories in different ways, so that even seemingly straightforward concepts such as 'possessive' turn out to be highly variable from context to context, or language to language (Taylor 2000)—a strong indication that they are indeed concepts, rather than direct reflections of linguistic reality.

This insight has started to have a valuable impact on language teaching, through the development of Applied Cognitive Linguistics (Putz, Niemeier and Dirven 2001). This is based on recognition that L2 learners' concepts of which words or constructions fall together into the same category can be quite different from those of L1 speakers (Tyler et al. 2005). To date this important application of Cognitive Grammar has had a valuable influence on the teaching not just of grammar but also of morphology (De Knop and Dirven 2008), and vocabulary (Boers and Lindstromberg 2008), but so far rather little on pronunciation. However it may have a greater potential to extend this influence to pronunciation teaching than has so far been realised—by applying the principles of Cognitive Phonology in ways very similar to these applications of other branches of Cognitive Grammar.

4. Cognitive Phonology: the signifier as a concept

It is commonplace, even in structural-generative phonology, to recognise that the task facing the learner of second language pronunciation is one of acquiring new phonological categories (James and Leather 1997). However, as already seen, computational theories are ill-equipped for detailed study of the meaning-based processes by which categories are formed or changed. For example, their basic assumption that phonological categories can be defined by reference to a set of Distinctive Features invokes a thoroughly outdated view of the nature of categories

(Nathan 2007; Taylor 2002: 159-60). Thus structural-generative theory offers little insight into how to help L2 learners learn new phonological categories.

Cognitive Phonology, as part of Cognitive Grammar, operates with a much more sophisticated notion of categories (Mompeán 2004; Nathan 1996; Tuggy 2005). It partakes of the same Saussurean ‘symbolic thesis’ as Cognitive Grammar: the view of a linguistic sign comprising a signifier and a signified held together in a symbolic relationship. However, whereas Cognitive Grammar in general focuses on the signified, Cognitive Phonology pays more attention to the signifier (or *acoustic image*).

We have discussed above the key insight of Cognitive Grammar that the signified is not a ‘bit of reality’, but a concept, defined as a principle of categorisation. The situation in Cognitive Phonology is very similar: the signifier also is a concept, also defined as a principle of categorisation according to which a range of physically different sounds can be categorised together as the signifier of a particular signified.

‘Just as the concept [TREE] cannot be a little picture in the head, so the acoustic image cannot be a tape recording in the head. Just as each tree, the more closely we observe it, is uniquely different from every other, so too each utterance of the word *tree*, if we examine it in sufficient detail, turns out to be phonetically different from every other utterance of the word. [...] To ‘have’ the acoustic image [tri:] is to know what the word sounds like and how it can be pronounced. The acoustic image is therefore also a principle of categorisation [...]. In a way, it is also a kind of concept.’ (Taylor 2002:44)

We have seen above that the idea that the signified is a concept, though counter-intuitive to those without training in linguistics, is now commonplace among professional linguists. However, the idea that the signifier is a concept, though it is the foundation of Cognitive Phonology, can be difficult even for those with training in linguistics to fully grasp. This is unfortunate, because recognition that the signifier is a concept in exactly the same way as the signified is a concept, with exactly the same implications (the same ‘bit of phonetic reality’ can be conceptualised in very different ways in different contexts) has valuable implications for the teaching of pronunciation. In particular, it opens analogies, not with computer programs, but with human acquisition of categories and concepts in a wide range of contexts, allowing the learner to be seen, not as a black box within which a lot of complex subconscious computation takes place, but as a conscious, situated human being actively learning a new skill.

Why is it so much more difficult for people to understand the idea that the signifier is a concept than it is to understand the very similar idea that the signified is a concept? One reason may be that the former idea tends to be obscured by the *literacy bias*.

5. The literacy bias

The phonetic reality of speech is a continuous stream of sound (Ladefoged 2005). This continuous stream can be conceptualised as a sequence of discrete units of many different kinds: words, phrases, sentences, intonation units, utterances, to name just a few. It is well documented that it is only through the acquisition of alphabetic literacy that it becomes possible to conceptualise the continuous stream as a sequence of individual ‘sounds’ or phonemes (Olson 1994). Also well known is the extraordinary degree to which this role of alphabetic literacy in creating the concept of [PHONEME] can be ignored or overlooked by those who have mastered it (Port 2006). Thus literate adults are heavily biased to believe speech *really is* a sequence of phonemes grouped into a sequence of words, much like the letters on a printed page—to the extent they find it very hard to hear speech ‘as it really is’, a continuous stream of sound (Fraser 2003). For example, English speakers often have difficulty hearing the word *tree* as a unitary sound, rather than as a sequence of phonemes /t-r-i/. This is the literacy bias.

Though the principle of the literacy bias is familiar to most linguists, it is such an important factor in pronunciation teaching that it is worth focusing briefly on some relevant aspects in more detail, to enable its extent, and its implications, to be appreciated more fully.

For a baby, speech, though meaningful as an indicator of the presence, identity or emotional state of the person talking, is not composed of the linguistic units that are so evident to adults (Jusczyk 2003). Even as it develops a communicative function, with the baby participating in ‘conversations’ by babbling in ways that increasingly mimic the form of sentences and larger intonational units of the adult language, it is generally agreed that until the ‘first word’ appears, around 12 months of age, the child is ‘pre-linguistic’ (Berko Gleason 2005). From the prelinguistic baby’s point of view, speech does not consist of linguistic units.

Over the next three or four years, the child’s language skills develop enormously, with acquisition of many thousands of words and constructions. It is clear that for this development to take place, the child must be conceptualising the sound of speech in some way, and it is tempting for literate adults to assume that the child is operating with essentially the same units of phonological structure as adults do. For example, it can seem obvious that if a child can distinguish minimal pairs like ‘cat’ and ‘mat’, it must be aware ‘at some level’ of the phonemes /k/ and /m/. However, careful diary studies documenting the stages through which very small children come to recognise and form patterns and categories of sounds (Vihman 1996) give reason to doubt this assumption.

Another way to gain insight into the development of phonological concepts is through observation of children’s metalinguistic development, i.e. their ability to talk about language (Gombert 1992). Metalanguage develops much later than language itself, but paying attention to the stages of its development shows that the concept of phoneme depends on many prior phonological concepts, most notably, on the prior concept of [WORD].

The extremely limited extent of a child’s metalinguistic awareness is usually not fully appreciated by adults, who tend to assume children have similar phonological concepts to their own. For example, below the age of about four years, children—though clearly able to use words with considerable skill—are generally not able to consciously identify words, e.g. to count the words in a rhyme.

Even when they learn to identify words, children are generally not able to clearly differentiate the meaning of a word (the signified) from its sound (the signifier or ‘acoustic image’). This is attested by their difficulty in playing games like ‘I spy’ (cf. ‘I spy something beginning with /si/’ being used not for ‘cup’ or ‘coat’ but for ‘ocean’). When children do, gradually, develop the ability to think about a word’s meaning as distinct from its sound, their focus is generally much more on the meaning than on the sound, with children gaining sophistication in discussing meanings much more rapidly than they develop the ability to talk about sounds (Berko Gleason 2005; Bloom 2000).

Again, adults are often unaware how little awareness children have of phonological units, especially phonemes. For example, preliterate children fail even the simplest phonemic tests, such as that of identifying words which begin with the same sound (Byrne 1998; Hannam, Fraser and Byrne 2006). Only after the explicit concept [SOUND OF A WORD] is mastered, can children develop, through play with rhyme, assonance and rhythm, concepts for sublexical units, such as syllables, rhymes, onsets, etc. (Hill 2006).

Even this skill, however, advanced as it is, is still far from the so-called ‘phonemic awareness’ necessary for understanding the *alphabetic principle*—the idea that letters representing phonemes can be put together, or sounded out, to form words (Byrne 1998). As discussed at the beginning of this section, it is generally agreed that such ‘phonemic awareness’ develops in tandem with, rather than as a precursor to, alphabetic literacy. Thus, those literate in non-alphabetic scripts apparently lack a similar kind of awareness (Morais, Alegria and Content 1987; Read et al. 1986). Even in alphabetic societies, attaining ‘phonemic awareness’ is difficult, usually requiring intensive tuition over a significant period of time—to the extent that many people, even after years of schooling, attain only limited literacy skills (Wickert 1989).

This sequence of development is very well accounted for by the Cognitive Phonology insight that the signifier is a concept. Literacy education does not simply teach children to ‘access’ phonological units of which they previously had only subconscious knowledge, any more than science education teaches children to access subconscious knowledge of atoms and molecules. Rather, it facilitates the formation, through a series of stages, of new concepts, beginning with the holistic concept [ACOUSTIC IMAGE], or [SOUND OF A WORD], clearly derived from a prior concept of [WORD], and continuing through to the much more abstract concept [PHONEME].

Interestingly, however, as soon as the alphabetic principle has been mastered, the effort of achieving it is forgotten, and it comes to be considered ‘as easy as A-B-C’. Young readers come to truly believe the ‘convenient fiction’ provided by their teachers, that sounds are the basic units of language, to be individually represented by letters, which can be put together to form words. Unless they go on to study phonology, they are likely to retain this belief throughout their lives.

Thus, most adults literate in English regard it as unquestionably obvious that the word ‘cat’ is formed by putting together ‘three sounds’. To overcome this naive realism, they require demonstration, for example, that in fact splicing together recordings of ‘c’, ‘a’ and ‘t’ produces something unrecognisable as the word ‘cat’ (see Fraser 2004a for this and other demonstrations), and explanation that, conversely, there are no purely acoustic criteria according to which the ‘acoustic image’ of the word ‘cat’ can be divided into just these three units. To be able to conceptualise the word ‘cat’ as ‘c-a-t’ requires extended guided comparison with many other similar sounds with different meanings, such as ‘mat’, ‘cot’, ‘man’, etc (Byrne 1998).

It is noteworthy that even after all the hard work of attaining the so-called ‘phonemic awareness’ required for literacy acquisition, it still falls far short of the real phonemic awareness required for phonemic transcription. All that is needed for alphabetic literacy is a general concept of [PHONEME], with a few examples, and the general idea that words are sequences of phonemes which can be represented with letters. There is no necessity to develop a full concept of each individual phoneme of each individual word—since alphabetic writing, despite the illusion of the literacy bias, is not in fact phonemic, but morphophonological, in nature (Just and Carpenter 1987).

Nevertheless, the literacy bias ensures that literate people *believe* that the true nature of speech is a sequence of discrete phonemes, to the extent that many expect phonemic transcription should be easier to decipher than standard, irregular orthography (Fraser 1996).

The difference between ‘so-called phonemic awareness’ and real phonemic awareness becomes evident when an already-literate adult has to learn phonemic transcription. While the principle of such a transcript (one symbol for one phoneme) seems simple, the process of actually doing phonemic transcription is found to be unexpectedly difficult (Scarborough et al. 1998). However, even this does little to shake the literacy bias, as the difficulty is often ascribed to faults in the transcriber (Stainthorpe 2003).

Overcoming the naive realism of the literacy bias is not hard if the right steps are taken. However, if these steps are not taken, it can have detrimental effects on the learning and teaching of pronunciation. Cognitive Phonology can do more than account for the sequence of development described above. Applying its principles can help, not just in overcoming the literacy bias, but in suggesting methods of teaching pronunciation which turn out to be rather effective.

6. Applying Cognitive Phonology principles in pronunciation teaching

If, as Cognitive Phonology states, the signifier is a concept, learning a first language requires learning to conceptualise the signifiers of that language in a range of different ways, such as [THE SOUND OF A WORD], [SYLLABLE], [RHYME] or [PHONEME]. Each language requires its

own set of these phonological concepts. Becoming literate involves learning to represent some of these concepts with special symbols appropriate to the language (DeFrancis 1989). The literacy bias encourages a kind of naive realism according to which speakers believe the symbols of their writing system represent real sounds, rather than concepts of sounds.

On this view, learning the pronunciation of a second language requires learning and using new signifiers, in other words, learning new ways of conceptualising the sound of speech. Learning these new concepts can be expected to be challenging, especially with heavily entrenched concepts of the native language already in existence. However, it is made much more difficult than it would otherwise be by the literacy bias, which makes it hard for learners to conceive of any other way of conceptualising speech than that given by their writing system.

Most learners require the help of a teacher to overcome this difficulty. However, it is hard for teachers to provide such help unless they have themselves overcome their own literacy bias. As we have seen, this need not be difficult but does require some exposure to the facts of phonology. Unfortunately, within a traditional structural-generative phonology course, it can take several semesters for students to gain a full appreciation of the continuous nature of speech and the abstract nature of phonemes and other phonological units. This amount of time is rarely available in teacher education programs. By taking an Applied Cognitive Phonology approach, however, teachers can be fast-tracked to an understanding that phonemes and other phonological units are concepts, not things, and move on rapidly to consider the implications for teaching pronunciation.

One way the notion that the signifier is a concept can sometimes be made clearer to student teachers is by considering the other common term for the signifier—*acoustic image*. Using this term highlights the analogy between the signifier and a visual image. For most people, it is quite easy to distinguish two ways of seeing (or conceptualising) the marks that make up a picture: first, as an image and second, as a pattern of marks on a surface. Further, most people are familiar with situations in which exactly the same pattern of marks can be conceptualised in very different ways—as in, for a famous example, the duck/rabbit illusion (Wittgenstein 1958/1974). This makes it relatively easy to recognise that what makes the marks an image of a dog is the fact they are conceptualised as an image of a dog: the signifier is a concept.

Making the equivalent distinctions with respect to an acoustic image involves distinguishing between the sound of a word, say the word *tree*, heard as the signifier of the concept [TREE], and the very same sound heard just as a pattern of sound. This can be quite hard, partly because it is often difficult to think of the sound of the word *tree* without thinking of a tree—though repeating the word several times rapidly can help. A more important reason it can be hard, though, is the literacy bias, which makes it difficult for a literate English speaker to hear the sound of a word in any way other than as a string of English phonemes. However, with guidance and examples (Fraser 2004a), it can be recognised that the acoustic image is a single continuous sound, rather than a sequence of discrete units. Once this is understood, the image analogy can be followed to the same conclusion: the signifier, or acoustic image, is a concept.

Teaching pronunciation, then, can be likened to teaching drawing (Fraser 2008). This analogy can be useful in a number of ways. Most importantly, it makes clear that pronunciation is a complex skill whose mastery, for most people, takes time and guidance, or coaching (Morley 1991). Thus, when learners find it difficult to imitate an apparently clear model, a teacher is not left to wonder whether there is a physical problem with articulation, perhaps even requiring speech therapy, but to seek a way of offering such coaching.

Having noted the similarity between words and pictures, it is important to follow through to some crucial differences. First, a language is not like a collection of pictures. So learning pronunciation involves more than just learning the general concept [ACOUSTIC IMAGE]. A separate concept must be learned for the particular acoustic image of each of the many thousands of words in the language. This involves the learner paying attention to aspects of

speech that, since they are not contrastive in the L1, are initially difficult to perceive. Again, the drawing analogy offers guidance.

There are various methods of teaching drawing, but one of the most effective, especially in early stages, is to focus, not on mechanics such as perspective and shading, but on encouraging the student to 'see' (or really 'conceptualise') objects in terms of lines, shapes and colours, rather than, as is usual in everyday life, in terms of their meaning or significance (Edwards 1989). A cognitive approach to teaching pronunciation similarly involves moving away, at least in early stages, from traditional methods of giving information about articulation and grammar, and encouraging learners to 'hear' (or really 'conceptualise') speech in new ways (Fraser 2001; 2004a; in press).

In drawing, students do not learn 'new ways of seeing' on the basis of a brief glimpse at a model picture. Similarly language learners do not learn 'new ways of hearing' on the basis of a few repetitions of model sentences. Rather they need extended exposure, with explicit coaching on which features of the sentence are salient to native speakers.

Second, unfortunately, there is no ready equivalent in pronunciation teaching for the drawing teacher's ability to point out features of an image and describe them in terms of lines, shapes and colours. For the uninitiated, it is tempting to use everyday metalanguage based on the English alphabet, or technical linguistic metalanguage for this purpose, and it can be surprising to find how ineffective these are in helping learners, especially those from a very different language and literacy background, recognise important aspects of pronunciation. However, with a little training, teachers come to expect this, and recognise the need to build up an appropriate set of phonological concepts, and metalinguistic terminology to represent them, with their learners (Couper forthcoming).

In closing this very brief indication of how Cognitive Phonology principles can be applied in pronunciation teaching, it is important to emphasise two points that sometimes cause misunderstanding. First, nothing about the literacy bias suggests that phonemes are not important in teaching ESL/EFL pronunciation, or that teachers should somehow try to avoid reference to phonemes. On the contrary, having a clear understanding of the phonemes of English is essential to the acquisition of both pronunciation and literacy. The point is that phonemes are abstract concepts. Learners of second language pronunciation need to be taught 'phonemic awareness' in much the same way as learners of first language literacy do, through observation of patterns of rhyme, alliteration, and so on (Fraser 2001).

Second, taking an Applied Cognitive Phonology approach to teaching pronunciation does not necessarily mean radical changes to the way pronunciation is taught. Many teachers, having found structural-generative theory of little value to them, have developed effective methods for teaching pronunciation. The point is that the effectiveness of such methods can often be well accounted for in terms of Cognitive Phonology principles. This means that, rather than preferring to avoid 'theory' in favour of 'practice', teachers can use the more appropriate theory of Cognitive Phonology to help them understand and extend their successful practice (Fraser 2006).

7. Implications for Cognitive theory

The aim of this paper has been to explore the implications of cognitive theory for teaching pronunciation. As often happens, however, consideration of the applications of Cognitive Phonology also raises implications for the theory.

Cognitive phonologists (Nathan 2007; Taylor 2006) have put forward cogent arguments why the phoneme should be considered a more basic unit of phonology than the highly abstract units of structural-generative phonology (Distinctive Features, syllable templates, etc). It is tempting to follow these arguments to a conclusion that the phoneme is the basic unit of speech. However, this additional step may have some undesirable consequences.

Consider first that structural-generative phonology itself started with the assumption that the phoneme was the basic unit of speech, and only rejected this in the face of compelling counter-evidence. If the phoneme really were the basic unit of speech, reading machines for the blind could have been developed decades ago (Cooper 1950); specifying and comparing the phoneme inventories of languages would be simple (Maddieson 1984); alphabetic scripts would likely have developed before, rather than after, other writing systems (Daniels and Bright 1996); specifying a computational process by which human speech perception retrieves phonemes from the continuous stream of speech would cause no theoretical contention (Perkell and Klatt 1986). More importantly, literacy acquisition would be easy, and pronunciation could be taught by simply drilling an appropriate set of phonemes, and letting learners combine them into words.

The problem is that *phoneme* cannot be defined without reference to words. The reason structural-generative phonology has developed the highly abstract representations and processes it has is that reference to words requires reference to meaning. The difficulties of addressing meaning in the computational model have forced structural-generative theory to resort to more and more abstract ‘basic units’ (Archangeli and Langendoen 1997, Goldsmith 1989; Kenstowicz 1994).

Cognitive Grammar, on the other hand, since it does not subscribe to the computational metaphor, need have no qualms about putting meaning at the heart of phonology, and no difficulty recognising that the phoneme itself is derived by processes of abstraction and categorisation from prior concepts including [WORD], [ACOUSTIC IMAGE] and others. Recognition that the signifier is a concept surely makes it possible to conceptualise the signifier differently in different theoretical contexts (cf. Taylor 2002: 83-90 and passim), just as it does in relation to the signified (Fraser 2004b; 2007), and move beyond the need to specify a single ‘basic unit’, to develop a more nuanced phonological theory incorporating a range of different phonological units for use in a range of applications.

It may be useful here to recognise a distinction between a basic unit of phonology and a basic unit of speech. The phoneme is undoubtedly an excellent unit for some kinds of phonological analysis, for communication about languages among phonologists, and for developing various kinds of phonological theory. However, consideration of the stages of first language and literacy acquisition outlined above makes clear that, from the point of view of the speaker, the phoneme, though certainly far less abstract than the Distinctive Feature and related units of structural-generative theory, is itself a highly abstract unit of speech. The convenient fiction that words are created by putting together phonemes is just that: a fiction. Much more realistic is the view that phonemes are abstracted from comparison of words.

The shift in understanding of the relationship between phoneme and word advocated here for pronunciation teaching has clear parallels with the shift in the understanding of the relationship between word and phrase advocated by Construction Grammar (Goldberg 1995). The implications of Construction Grammar for language pedagogy have been extensively explored in the present volume.

While it is beyond the scope of this paper to pursue the implications of Construction Grammar for pronunciation teaching, it can be suggested that there is significant scope for development of a Construction Phonology as part of a pedagogical grammar (cf. Broccias 2008). Indeed an impressive start has already begun on the development of Radical Construction Phonology (Vihman and Croft 2007). It is hoped that future work can explore the applications of this approach as a framework for teachers, researchers and learners of language and literacy:

‘It may be unlikely that cognitive linguistics will result in a radically new teaching methodology both in the specific case of pedagogical grammar and in language teaching in general. Rather, cognitive models of language highlight certain aspects of already existing language teaching methodologies which deserve further attention ...’ (Broccias 2008)

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