TEACHING PSYCHOLINGUISTICS

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1. Introduction

The first use of the term *psycholinguistics* to refer to the study of the psychology of language appears to have been in the 1920s, although a seminar at Cornell University in 1951 is often claimed to be the birthplace for psycholinguistics as a field of study. Interestingly, the report of that seminar was published both in a linguistics journal (*International Journal of American Linguistics*) and in a psychological one (*Journal of Abnormal and Social Psychology*), double-dipping that would probably get academics into trouble nowadays, but which nevertheless acknowledges that the field was (as it still is) influenced by research and teaching practices and methodologies in both psychology and linguistics. Psycholinguistics is still taught in both those disciplines, as well as in multidisciplinary cognitive science units throughout the world, though the particular emphases in what is taught and how it is taught tend to vary depending on the disciplinary backgrounds of teachers and their students.

In this paper I present a personal view of the teaching of psycholinguistics, a view which will inevitably be influenced by how I currently teach the subject, as well as by my personal history as a researcher and teacher working predominantly in linguistics, but with forays as a post-doctoral researcher into psychology, forays that were particularly instructive for my understanding of experimental methodology and data analysis. My approach centres on experimental psycholinguistics, involving the presentation and discussion of empirical evidence for the structures, representations and processes involved

in language production and comprehension. In my psycholinguistics courses I devote relatively little time to developmental aspects of language (which are introduced to students in courses on language learning and teaching), or to language impairment (which my colleagues in the School of Psychology make a much better job of teaching, and aspects of which they kindly summarise for my students in guest appearances in my courses). My primary focus, then, is on so-called 'normal' adult language production and comprehension, and on what studying this can tell us about what language is and how we use it.

2. Goals/objectives

There are a number of both general and specific goals or objectives that I think are important factors in the teaching of this subject area. On the general side, in addition to imparting enthusiasm for the subject (which must be one of the most crucial motivating factors in teaching anything), I think it is important that we help students see the relevance of psycholinguistics. This might be the relevance it has to their other studies, to their intended vocations, to their interactions with others, but also of course to their understanding of both psychology (if this is one of their majors) and of linguistics (which tends to be the major of most of my students). It is impractical if not impossible to tailor a psycholinguistics course to the disparate interests and vocational needs of a whole class, but one of the great appeals of much of the psycholinguistic data is that it can be found in everyday language use, and even the experimental data can generally be related to language experience outside of the laboratory. The challenge, then, is to link this experience back to the potentially dry theoretical positions propounded in the psycholinguistic literature.

More specifically, a course in psycholinguistics, I believe, should aim to help students better understand the psychological processes involved in language production and comprehension, and the relationship of linguistic theory to psycholinguistic experimentation and modelling. By the end of such a course, students should be able to understand some of the basic psychological processes of language production and comprehension and some of the claims made about the mental representation of language; they should be able to apply such understanding to the analysis of data; they should be able to evaluate the role of linguistic theory in the psychological examination of language use and also the theoretical positions taken in psycholinguistic research; and they

should understand and be able to evaluate a range of experimental approaches, as well as being able to apply experimental and analytical tools in completing their own assignments and exercises.

3. Subject matter and methods

As indicated in the Introduction, the focus here is on psycholinguistics as the study of 'normal' adult language use. In the context of the communicative act, we can see such language use as involving a speaker and a listener. (Note that this could equally be a writer and a reader. The selection of speaker and listener betrays another of the biases in my own teaching of the subject, reflecting my research interests in speech production and comprehension. This bias does not mean that issues involving written language — and indeed other non-spoken forms of language such as sign language — do not form part of what is and should be taught in a course on psycholinguistics.) Taking an interaction between a speaker and a listener as a starting point, we can divide the subject matter of psycholinguistics into two main areas: the development of a spoken output from an underlying intention (production), and the retrieval of an interpretation from a heard input (comprehension). Using an appropriately developed modular course, this subject matter can be taught in two main orders — production then comprehension, or vice versa, depending on the overall emphasis of the course, as well as perhaps on constraints imposed by covering particular material before project work is started. In addition, material can be included in a module that deals with issues such as the overall architecture of the language processing system, the relationship of production and comprehension, and the links between language and other cognitive skills (covering issues such as modularity of mind, etc.). Along the way, students get to consider what kinds of things language users might carry around in their heads as part of their linguistic knowledge (what information we store for words, what rule systems we have for generating word and sentence structures, and so forth), and whether this stored knowledge bears any resemblance to the structures and rules propounded in theoretical linguistics.

For teaching purposes, each of the larger subject areas of language production and language comprehension can usefully be broken down into stages of the production or comprehension process (putting together sentences, finding words, producing articulatory schema, etc.), or they can be considered

from the point-of-view of the relevant levels of linguistic analysis (syntax, morphology, phonology, etc.). To an extent these may coincide, but an important lesson for students is that the levels of linguistic analysis do not overlap neatly with stages of processing. Therefore, as students investigate these levels and processes, they also explore the interactions between them.

3.1 Production

A possible starting point for the study of language production is that a speaker needs to find linguistic expression for an idea. So we can pose a general research question, concerning the evidence for how the speaker goes about this task, and look for evidence for this from a combination of observation and experiment. Using observational data as the first source of evidence has the advantage that students can monitor what is going on around them and start to gain an appreciation for the processes involved in speaking, without becoming bogged down in experimental control and other methodological issues. This may be a compelling reason for teaching production before comprehension, since the evidence for the processes of comprehension is much less tangible and generally emerges best with experimental intervention.

The two main areas of observational evidence for speech production are hesitation phenomena (pauses, repetitions, false starts) and speech errors. Students learn that hesitations — in particular filled and empty pauses — can reflect planning processes, as well as indicating sentence structure to the listener. Choices need to be made about content and form, but these choices take time and may interfere with the actual process of production, resulting in hesitation. Students typically gain an appreciation of this by looking at a transcribed and annotated sample of spontaneous speech (and listening to this if possible), and comparing this with a tidied-up written-language version of the same sample. This general overview prepares students for looking at more detailed studies that manipulate task type (prepared vs. unprepared exposition, for instance) and which investigate consequent differences in the number and distribution of hesitations.

But perhaps one of the most entertaining sources of evidence for language planning processes, and therefore one that frequently and understandably gets exploited in the teaching of psycholinguistics, is the speech error. Most students are aware of speech errors, and can bring their own illustrative examples to classes. But almost inevitably they will not previously have noticed the ways in which errors form patterns, and that these patterns can inform us about the processes of selecting and ordering linguistic material

during speech production. Most likely, students' interest will also have been in the underlying causes of speech errors (including 'Freudian' interpretations of errors), rather than in what really concerns the psycholinguist, namely the mechanisms by which errors occur. A joke attributed to American comedian Henny Youngman goes something like this: a man checking in at an airport notices that the female check-in clerk is particularly well endowed, and to his shame he finds himself asking for a 'picket to Titsburgh'. When he relates this episode later to a colleague, the latter explains that this is known as a Freudian slip, and that everyone does this. 'Why,' he says, 'just the other day I was having coffee with my wife and I meant to ask her to pass me the sugar, and instead I said "you bitch, you've ruined my life!"' We point out to our students that rather than the underlying causes of errors, what interests psycholinguists is that this kind of error, involving the exchange of syllable-initial consonants, is fairly common and tells us something about planning frames involved in speech production. Students will undoubtedly be able recount their own examples of slips of the tongue in which the initial consonants or consonant clusters of two words in the same sentence get exchanged. They may even know that this particular error type is typically referred to as a spoonerism (after the Reverend William A. Spooner, 1844–1930, Dean and Warden of New College, Oxford). But they will rarely have reflected on why the initial consonants of one word exchange with the initial consonants of another, rather than — for instance — with the final consonants of that other word (which happens, but is a vanishingly rare occurrence). Such patterns can be made sense of in the context of particular theories of language production. In this case a slots-and-fillers model, which argues that the speaker selects a set of words to express the intended idea in a sentence. As these words join the queue of words waiting to be uttered, structural information about them becomes available, such as which are the initial consonants of the words. An articulatory plan is generated for the production of the queued-up words, but then consonants with the right general properties but from the wrong word in the queue are inserted into that plan. Students can also be asked to focus on other error patterns which should reveal different aspects of the speech production process, such as the tendency for word blends to involve words of similar meaning (such as *smever* for *smart* and *clever*). It is not difficult for them to realise that for such errors to occur it is likely that in the process of planning an utterance more than one candidate word is often available for expressing the same meaning, and that if the speaker is unable to select between these candidates then they both get produced, in a blend.

Incidentally, one of the most difficult things to achieve in lecturing on speech errors is to totally avoid making any yourself. But then it is always good practice to illustrate the phenomena being discussed.

Data from hesitation studies and speech error studies in fact allow the psycholinguistics teacher to cover most major issues in speech production, including: the planning of sentence structure; the selection of words and their insertion into sentence frames; the question of whether morphologically regular forms are generated from the lexicon or by rule; the development and execution of a plan for articulation; the nature of the production lexicon, including its internal structure and the types of information associated with the representations of words. These data sources can be supplemented by other observational and experimental data, including the tip-of-the-tongue phenomenon (looking at what we can remember about a word that we can't quite recall), speaker performance in tongue twisters and in other experimentally induced speech errors, and a range of other laboratory tasks, such as picture naming, picture-word matching and so on, each of which may be looking in more detail at particular aspects of the production process.

3.2 Comprehension

Because the outcomes of comprehension processes are not as easily observable (except perhaps the overall outcome of seeing that someone has understood the message), the psycholinguistics of language comprehension has to be taught more indirectly. However, excessive reference to experimental data on the one hand or the overuse of abstract illustrations of theories and models of the comprehension process on the other can leave students rather too distanced from the subject matter. One successful strategy has been to intersperse lecture sessions on language comprehension with laboratory sessions in which students can experience the types of methodology that are used in the investigation of comprehension, and further classes (e.g. small group tutorials) in which the outcomes of these laboratory sessions are discussed. This works well for experimental tasks and designs that produce reliable and replicable outcomes — uncertainty in the outcomes can make these sessions less useful, except perhaps as a mechanism to get more advanced students thinking about shortcomings in experimental design and methodology, or to think about alternative explanations.

Using such a combination of lecture-based presentation of psycholinguistic theory and laboratory-based demonstration tasks, teachers can trace the course of language comprehension from a listener's/reader's first exposure

to the input signal through to their arrival at an interpretation. Since words are typically (though perhaps naively) perceived to be the basic building blocks of language, a good starting point is to explore the processes of word recognition. This should deal with both the spoken and visual domains, and lends itself to discussion of issues to do with pre-lexical analysis and the role in such analysis of linguistic units such as phonemes. A neat theoretical framework for exploring word recognition, not least because it makes testable claims that can be explored in laboratory sessions, is the Cohort Theory put forward in various places over the years by William Marslen-Wilson and his colleagues. In essence, this theory claims that spoken words are activated on the basis of the acoustic-phonetic input, following which access can be made to information about these words in the mental lexicon (such as meaning, grammatical information, etc.). This information is matched against the developing interpretation of the utterance, allowing the selection and recognition of the most appropriate word. This model opens up issues to do with the nature of the processing of the input signal, the role of phoneme-type representations in word recognition, the idea that there is competition between rival word candidates, the role of lexical frequency in the activation of these candidates, the nature of the information that is accessed when a word is activated, the interaction of word-level and sentence-level information in processing, and so on.

Exploration of the recognition of morphologically complex forms is also important, and connects the student to questions such as the distinction between inflection and derivation, whether morphologically complex forms are recognised on the basis of a holistic stored representation or via a rule system, the role in processing of morphological productivity, and so forth.

Another key area is sentence parsing, the construction of a sentence structure (and interpretation) based on the words the listener or reader has encountered. Generally, this requires a certain understanding of phrase-structure grammar and of tree-building operations, but most relevant issues in sentence processing can be investigated without presupposing more advanced understanding of complex syntactic theory. The relationship between word recognition and sentence parsing can in turn lead to discussion of bottom-up (signal driven) and top-down (concept driven) processing. When spoken language processing is included, then the role of intonation and prosody can be explored in the disambiguation of potentially ambiguous sentences (such as prepositional phrase ambiguities like *The man saw the spy with the binoculars*).

3.3 Demonstration of experimental techniques

A number of resources are available for use in the demonstration of experimental techniques, including freely downloadable psycholinguistic software. These resources are somewhat variable with respect to the programming experience and expertise required to tailor them to specific teaching needs, but for basic experimental techniques there are often examples available on websites that can be downloaded and adapted to suit the course being taught. Examples of such software packages are the DMASTR system developed by Ken and Jonathan Forster at the University of Arizona (available for free from http://www.u.arizona.edu/~kforster/dmastr/dmastr.htm) and the commercially available E-Prime package from Psychology Software Tools, Inc. (http://www.pstnet.com/products/e-prime/). Both of these packages have an active community of researchers and teachers who are developing routines and scripts that can be used to run both basic and more sophisticated experiments, including close replications of published experiments. Other resources can be found via the Psychology of Language page of links maintained by Roger Kreuz at the University of Memphis (http://www.psyc.memphis.edu:88/POL/POL.htm).

On the whole, it is advisable to use fairly simple experimental techniques to illustrate some of the more reliable basic phenomena in language processing. For instance, either of the packages mentioned above can be easily configured to present sequences of letter strings that correspond either to existing words or to non-words (e.g. DOG and HIG respectively) for a timed lexical decision response (i.e. pressing one of two keyboard keys to indicate whether or not the string forms a word of English). One of the most robust findings in psycholinguistic research is the frequency effect — the finding that high frequency words are recognised more rapidly than low frequency words. Controlling for other factors such as word length (since longer words take longer to read), and using as a source one of the published sets of frequency norms (available again via the Psychology of Language link above), the teacher can make appropriate selections of high and low frequency words (DOG vs. BOG, for instance) for presentation in a lexical decision task. The software routines can be set up to provide individual feedback to students as the demonstration unfolds, or to save response times to disk for the teacher to collate and discuss in a subsequent class.

4. Assessment

An unavoidable aspect of university teaching is assessment. Like many areas of linguistics, psycholinguistics lends itself to assignment topics with a practical, data-oriented component. So for instance, assessment of students' understanding of issues in language production can involve them in measuring, cataloguing and interpreting hesitation phenomena, using recordings provided from existing corpora or to be collected by the students themselves. Alternatively, they can be asked to provide interpretations of speech errors and the patterns they demonstrate, using materials taken from error corpora. Or they might use recordings of speakers giving spatial descriptions such as route directions, in order to investigate the processes of repair or the sequencing of instructions.

Practical comprehension tasks are somewhat more difficult to include in assignments, since most involve an understanding of how to write scripts for the experimental software. It is possible, however, to guide students in running simple listening tasks with a pool of their friends or fellow students (preferably from other courses), such as judging the well-formedness of a sentence, or determining whether a recording of *The man saw the spy with the binoculars* is best interpreted as indicating that the man had the binoculars or the spy had the binoculars. The general idea is to involve students in the research process. One alternative is to provide them with data already collected in a comprehension or listening experiment, but in my experience this is less satisfying for most students, and provides a less enriching learning experience, although such material might be suitable as part of an exam question.

One issue to be aware of in getting students to do assignments with a research component is that most will have little experience with statistical analysis of results. While some students, especially those with a psychology background, will have completed at least an introductory course in statistics, for the majority of students taking a linguistics major, this will not be the case. It is therefore important to emphasise that an undergraduate linguistics research project, worth perhaps 15-25% of the course marks for a psycholinguistics paper, should not require detailed statistical analysis — often averages or percentage counts of the dependent variable are enough to illustrate the pattern that can be found in the data. Appropriately designed tests for significance should be accepted by the teacher but not required.

5. Conclusion

This paper has given a somewhat personal and biased view of the teaching of psycholinguistics. There will be many areas that other teachers will choose not to cover, and further areas that they would include but that I have not. There is no fixed menu for teaching in this field. There are few essentials that simply must be covered otherwise a course cannot be held up as an example of psycholinguistics. What is key, I believe, is to engage students in considering the relevance of linguistic analysis and constructs to the observable and testable phenomena of language production and comprehension, but above all to cause them to marvel at the intricacies of language processing and the sheer power of the human language faculty.