
Cantonese Speakers' Memory for English Sentences with Prosodic Cues

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The nature and functions of prosody are reviewed, and English and Cantonese are contrasted for this feature of language, as background for two experimental studies. In the experiments, 30 Cantonese speakers with advanced competence in English were tested for their recognition memory of English sentences in which prosody cued meaning contrasts in otherwise identical sentence pairs. The Cantonese speakers' memory for the English sentences based on prosodic information was generally poor, both when the contrastive focus was implicit in the experimental task (Experiment 1) and when it was the explicit focus of attention (Experiment 2). The only significant improvement in performance after participants' attention was explicitly directed to intonation was on sentences in which prosody cued a marked informational focus ("contrastive stress") versus an unmarked one ("neutral" sentence intonation). The investigation leads to suggestions for raising learners' awareness of prosody in a second language.

INTRODUCTION

In addition to the resource of phonemic contrast, the semiotic resources of all languages include a level of sound structure generally referred to as prosody. Prosodic patterning built on parameters of pitch (fundamental frequency), length (duration), and loudness (intensity) functioning individually or jointly is exploited in different ways in different languages to organize linguistic strings and the information they contain in terms of (a) the structure of units (syntagmatic function), (b) the relative salience of units (deictic function), (c) the interactional significance of units (pragmatic function), (d) the grammatical/discourse type of units (emblematic function), and (e) the speaker's emotion or attitude in relation to units (affective function) (Pennington, in press).

In processing spoken language, "the prosodic structure of a heard utterance forms part of the memory representation which listeners form of the input" (Cutler, Dahan, & van Donselaar, 1997,

p. 143). However, the phonetic realization of prosodic structure, the type of meaning associated with a specific type of prosody, the contrastive value of prosodic cues, and the level at which such cues are realized vary considerably across languages. Because of the differential importance, specific realizations, and conventionalized functions of the prosodic parameters of pitch, length, and loudness in different languages, these parameters are not perceived nor interpreted in the same way in relation to utterance meaning by speakers of different languages (Pennington, in press). Cues may vary across languages in terms of their relative salience (Dupoux, Pallier, Sebastian, & Mehler, 1997; Gandour, 1983; Gandour & Harshman, 1978) and their relation to lexical and grammatical units (Cutler, Dahan, & van Donselaar, 1997). Moreover, in second language (L2) learning, the relative weight given to prosody in utterance interpretation may be different from its relative importance either in the learner's first language (L1) or in the language use of native speakers of the L2 (Pennington, in press).

The details of the prosodic system of a L2 may not be acquired until an advanced stage of language acquisition (Ioup & Tansomboon, 1987;

Pennington, in press). Until that advanced level of competence in the L2 is attained, for utterance interpretation the learner may rely instead on the gross and universal features of prosody or may ignore prosody in favor of other cues to meaning. For those individuals who have learned a L2 largely from school textbooks, it is likely that lexis and syntax will assume a comparatively greater role in sentence processing than prosody. Given the reality of L1 transfer in all areas of language (Odlin, 1989), including phonology (Pennington, 1999; in press) and general utterance pragmatics (Zegarac & Pennington, in press), it can be further predicted that those learners who have not achieved full competence in a L2 by adulthood will transfer knowledge of the prosodic patterns of the L1 to their receptive performance in the L2. These facts are likely to affect any task that requires processing of L2 utterances.

Speer, Crowder, and Thomas (1993) have demonstrated that native speakers of English use prosody to guide the interpretation of spoken sentences. Furthermore, they found that recognition memory is better for sentences spoken with the same prosody, when first presented and then later tested, than if different prosodic versions are used on these two occasions, and that this effect occurs equally for prosody whether it cues syntactic analysis or change in focus. Techniques for investigating prosody in native English speakers' memory for sentences can be used to investigate the role of prosody in sentence recognition of L2 learners. For these speakers, recognition should be aided in three types of cases: (a) where prosody performs a role similar to that in the L1, (b) where prosody performs relatively "transparent" and universal functions (which are also likely to be performed in L1), and (c) where prosody has been the explicit focus of attention or instruction. It can therefore be predicted that L2 speakers' memory for sentences spoken with the same prosody at first presentation and in a subsequent recognition test may be higher for prosody that cues change in focus than for prosody that cues syntactic analysis, except in those cases in which syntactic and prosodic patterns are similar in L1 and L2.

The present investigation examined the performance of Cantonese L1 speakers who were relatively advanced L2 speakers of English on their recognition memory for English sentences in which prosody was the feature discriminating otherwise identical sentence pairs. The performance of this group is especially interesting because of its relatively advanced proficiency and because English and Cantonese represent con-

trasting types of languages in terms of prosodic characteristics. For both these reasons, this group is a potentially rich source of insights in this first exploration of the influence of prosody on L2 speakers' sentence recognition memory. The exploration is based on a contrastive review of English and Cantonese prosody, from which hypotheses were derived. The investigation consisted of two experimental treatments testing participants' recognition memory for sentences with prosodic contrasts that signaled consistent meaning differences, in the first case as the implicit focus of a sentence recognition task and in the second case as the explicit focus of the recognition task. The results of the experiments offer directions for raising learners' awareness of prosodic patterns in the L2.

PROSODY IN ENGLISH AND CANTONESE

Cantonese and English differ substantially in their prosodic characteristics and in the ways in which these characteristics are linked to meaning. The principal difference in prosody between Cantonese and English is that between a tone language and an intonation language, respectively. As a generalization related to this distinction of language type, it can be said that prosody functions as a primary cue to meaning at the lexical level to a much greater extent in Cantonese than in English, whereas prosody functions as a primary cue to meaning at higher (phrase, clause, and discourse) levels to a much greater extent in English than in Cantonese.

Prosody at the Lexical Level

Otherwise homophonous words are differentiated in Cantonese by lexical tone, with tone being a salient focus of attention in speech perception (Cutler & Chen, 1997). Six tones are differentiated in Cantonese as spoken in Hong Kong, indicated in the Yale system roman notation by diacritic tone marks over the vowel nucleus and a following letter *h* for low register, shown in Example 1.

Example 1

- High level: *yāu* 'worry', 'rest' (in compounds)
- High rising: *yáu* 'paint' (noun)
- Mid level: *yau* 'thin'
- Low falling: *yàuh* 'oil', 'swim' (verb)
- Low rising: *yáuh* 'have', 'friend'
- Low level: *yah* 'again', 'right (hand)'

(Matthews & Yip, 1994, p. 21)

In lexically conventionalized phrases (idioms) and compounds, semantic and grammatical linkage is often cued by tone sandhi or tone change (Bauer & Benedict, 1997; Matthews & Yip, 1994), as in Example 2.

Example 2

<i>fèih fèih dèi</i> fat fat rather	→ <i>fèih-fèi-dèi</i> 'rather chubby'
<i>mìhng mìhng dèi</i> understand understand rather	→ <i>mìhng-míng-dèi</i> 'understand roughly'
<i>tàih yāt tàih</i> mention one mention	→ <i>tái-tàih</i> 'mention a bit'
<i>mahn yāt mahn</i> ask one ask	→ <i>mán-mahn</i> 'ask'
<i>ngúahn gèng</i> eye glasses	→ <i>ngúahn-géng</i> 'glasses'
<i>hàahm yuh</i> salt fish	→ <i>hàahm-yú</i> 'salted fish' (also slang, 'dead body')

(Adapted from Matthews & Yip, 1994, pp. 23–24)

An example of a two-unit (bimorphemic) minimal pair differentiated (only) by tone is given in Example 3.

Example 3

<i>fáan-mín</i> turn-face 'change countenance', 'turn against someone' (verb)	<i>fáan-míhn</i> opposite-side 'opposite side', 'reverse' (noun)
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(Matthews & Yip, 1994, p. 32)

Other bimorphemic minimal pairs are differentiated by word order, as in Example 4.¹

Example 4a

<i>yàhn gùng</i> people work 'income, wages'	<i>gùng yàhn</i> work people 'servant, worker'
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Example 4b

<i>jáu máih</i> wine rice 'pimple(s)'	<i>máih jáu</i> rice wine 'rice wine'
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In nontonal languages, syllables and larger units are highlighted prosodically by extremes of one of the following parameters: pitch, length, or loudness. In English, pitch is the most robust of these parameters and loudness the least (Cruttenden, 1986, p. 16), although prosodic highlighting—accentuation or “stress”—is generally accomplished by means of a co-occurrence of relatively extreme values of all three parameters. Specific prosodic contours are associated with specific patterns of morphological derivation within grammatical categories, but are rarely contrastive at the level of individual lexical items. For example, *nominate*, *legislate*, and *contemplate*—and many other verbs of the same type—have the same stress pattern related to their grammatical derivation as verbs formed with the suffix *-ate*, the nouns *nomination*, *legislation*, and *contemplation*—and all like cases—exhibit a different, but regular, stress pattern as part of their common derivational pattern. In English, word level prosody in the way of lexical stress plays a minor role as a cue for disambiguating otherwise homophonous pairs such as *desert* (verb) / *desert* (noun) or *decent* / *descent*. There are few such pairs, and in those that exist, stress difference is redundant with vowel quality (Fear, Cutler, & Butterfield, 1995). However, because stress is related to morphological derivation, it plays a comparatively greater role in disambiguating derived compounds made up of the same lexical items, such as *light housekeeper* / *lighthouse keeper* (Chomsky & Halle, 1968).

Prosody at Higher Levels

In Cantonese, linked tone patterns (multiword tone contours) occur primarily, though rather unpredictably, in idioms and compounds, with or without tone change as in the items in Example 2 above. There is possibly some degree of interitem influence of tone (and other phonological features) within grammatical phrases as well, as a result of natural assimilatory effects of neighboring words. Yue-Hashimoto (1972) reported for Cantonese that “in normal speech, the chain of individual tones is observed to be linked together by regions of transitions, where the onset and coda of the tones are modified, each according to its immediately preceding and following tones” (p. 93). Beyond the mere fact of linkage shown by tone change or sandhi, the tone pattern of a string does not provide much information about its internal structure, grammatical constituency, or meaning.

In English, regular stress patterns co-occur with phrasal and clausal groupings² and so aid the listener in parsing the stream of speech into hier-

archically organized grammatical units. The general rule is that grammatically cohesive units also form prosodically cohesive units, in which the internal prosodic structure of the unit models—and is therefore a cue for—its internal grammatical structure (Pennington, in press). In the unmarked case, degree of prosodic prominence within the unit parallels degree of grammatical prominence, with the most prominent element generally occurring last in an English phrase, as in Examples 5a through 5d, where grammatical/prosodic prominence is indicated by higher numbers and (+) indicates an extra degree of prosodic prominence.

Example 5a

big box [unmarked focus]
2 1

Example 5b

a big box [unmarked focus]
4 2 1

Example 5c

with a big box [unmarked focus]
3 4 2 1

Example 5d

a man with a big box [unmarked focus - final position]
4 1 3 4 2 1+

In the marked cases of Examples 5e and 5f, the natural grammatical relations of prominence are overlain by emphasis or contrast displayed by an extra degree of prosodic highlighting (an extra degree of stress). In such cases, prosody performs an iconic function of signaling marked (emphatic or contrastive) meaning in relation to a specific item (e.g., *MAN* in Example 5e), unit (e.g., *SMALL MAN* or *BIG BOX* in Example 5f), or series of items or units (e.g., the parallel and co-occurring units *SMALL MAN* – *BIG BOX* in Example 5f). In this way, grammatically tied prosody is altered by special utterance pragmatics or semantics that create a marked information focus or contrast.

Example 5e

a MAN with a big box [marked focus - nonfinal position]
4 1+ 3 4 2 1

Example 5f

a SMALL MAN with a BIG BOX [marked reciprocal focus]
4 2+ 1+ 3 4 2+1++

Specific prosodic patterns are also associated pragmatically and emblematically with different clause types in English. Although a yes/no question is generally cued by the specific grammatical device of SUBJECT-AUX inversion in combination with rising intonation, intonation alone is sufficient to signal a question. This can be seen in the contrast of high falling intonation in Example 6a, indicating a declarative statement, versus high rising intonation in Example 6b, indicating an interrogative.

Example 6a

John's here. (statement)

Example 6b

John's here? (question)

In general, questions marked only by intonation are those that echo the structure of a preceding declarative, as in the sequence of one person uttering Example 6a followed by another person uttering Example 6b as a way to question the statement of Example 6a. Hence, questions marked only by rising intonation are of a special contrastive sort.

In the view of Matthews and Yip (1994):

As Cantonese is a tonal language where pitch is used to differentiate words, intonation at the level of the sentence is restricted, at least by comparison with English. The lack of sentence intonation patterns is of crucial importance to the pronunciation of Cantonese tones. If an English intonation pattern is superimposed on a Cantonese sentence, the tone of individual words may be obscured or even changed completely and may result in incomprehensibility. (p. 27)

The functions of intonation in English are fulfilled to a large extent in Cantonese by final particles (Cheung, 1986) and to a lesser extent by pragmatic word order (e.g., front-of-sentence placement of focal element or topic). A final particle adds a certain modal or interactive meaning (such as referring the addressee's attention to given information or proclaiming new information; Brazil, 1997) to the proposition to which it is appended, as can be seen by a consideration of

the English equivalents of the particles given in Table 1.

Example 7 illustrates the use of particles (PRTs)³ in context.

Example 7a

Léih sek-ình-sek léih mamih a
you love-not-love your mummy PRT
'Do you love your mummy?'
(Matthews & Yip, 1994, p. 28)

Example 7b

Bīngō wán ngóh a?
who seek me PRT
'Who is looking for me?'
(Matthews & Yip, 1994, p. 323)

Example 7c

Chín ngóh bīng léih ình dóu laak. (film caption)
money I help you not V-PRT PRT
'As far as money's concerned I can't help you.'
(Matthews & Yip, 1994, p. 73)

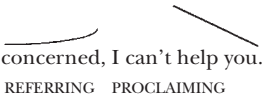
Example 7d

Sihk dāk ge la.
eat can PRT PRT
'Dinner's ready.'
(Matthews & Yip, 1994, p. 344)

As illustrated in Example 7a, the usual pattern for a yes/no question in Cantonese is VERB-ình 'not'-VERB plus final question particle <a> with neutral (mid-level) tone. The usual pattern for a wh- question employs a question word meaning 'who', 'where', 'when', and so forth, together with the same question particle <a>, as in Example 7b. As in Cantonese, in English these two question types have distinctive grammar; but unlike Cantonese, in English they also have distinc-

tive intonation—most commonly rising for the yes/no type and falling for the wh- type, though there is variation in the pattern according to context (Brazil, 1997; Cruttenden, 1986) and across varieties of English (Pennington, 1996, p. 154). In Example 7c, the sentence includes a focus or topic separate from the grammatical subject and placed in initial position (i.e., <chín> 'money'). The sentence-final particle <laak> signifies 'current relevance + finality' (Matthews & Yip, 1994, p. 340). This combination of meanings is commonly rendered in English wholly or primarily by intonation, as a combination of a low rising contour to refer to the topic of money and a high falling contour to proclaim the proposition "I can't help you," as shown in Example 8.

Example 8

As far as money's  concerned, I can't help you.
REFERRING PROCLAIMING

Thus, a complex of meaning realized in English by the combined effects of referring and proclaiming intonation (Brazil, 1997), as illustrated in Example 8, is realized in Cantonese by a sentence-final particle with a specific lexical meaning and with neutral (mid-level) tone, as illustrated in Example 7c. In Example 7d, the particle <ge> asserts the factuality of the preceding proposition and <la> suggests its "current relevance." In English, this might be rendered as a combination of proclaiming and referring intonation, as in Example 9a or 9b.

Example 9a

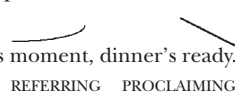
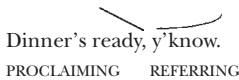
 At this moment, dinner's ready.
REFERRING PROCLAIMING

TABLE 1
English Equivalents of Some Cantonese Utterance Particles

Cantonese		English Equivalents	
Particle	Function	Intonation	Discourse marker (in final position)/Tag
<a>	referring to given information	fall-rise	<i>you know</i>
<áh>	proclaiming new information	fall (statement)	AUX-tag (falling)
<a>	questioning	rise (question)	AUX-tag (rising)
<ā>	emphasis	rise-fall (emphatic)	<i>for sure</i>

Example 9b




It is a characteristic difference between these two languages (and probably other similar pairs of languages) that the type of meaning associated with an intonational pattern distributed throughout the domain of an entire clause or multiclausal unit (sentence) in English is concentrated instead within the much smaller and more focused domain of end-of-sentence position and codified in an independent morpheme in Cantonese.

In addition to these language-specific characteristics, gross (universal) characteristics of intonation that occur in all languages also occur in Cantonese, including declination of baseline as a function of time (Bauer & Benedict, 1997, pp. 148–150; Matthews & Yip, 1994, p. 27; Vance, 1976) and shifts of baseline as an indicator of affect (Cheung, 1986; Fok, 1975). Cheung observed that some Cantonese speakers (but not all) manipulate overall pitch level to signify affective or pragmatic meaning:

For those who do exploit pitch level of utterance, raised pitch level may signify emphasis, surprise, etc. . . . Lowered pitch level, on the other hand, is typical of grumbling but may also suggest hesitation and/or lack of confidence. The uncertainty of signification suggested here can be eliminated by the appropriate use of [sentence-final particles]. (p. 253)

In addition, Cantonese speakers make some use of relatively universal and iconic features of intonation for prosodic highlighting, such as a rise-fall pattern used as a deictic signal of contrast or emphasis (Bolinger, 1985). Matthews and Yip (1994, p. 28; p. 403, footnote 11) stated that emphatic meaning, as in the response in Example 10, is indicated by a sharp rise-fall and lengthened vowel (both measured instrumentally).

Example 10



A: Léih sek-ình-sek leéih mamih a? B: Se-ek!
 you love-not-love your mummy a? I-o-o-ve
 'Do you love your mummy?' 'Sure I do!'
 (p. 28)

Vance and Walker (1976, p. 651) found that increased length and loudness, but not pitch change, were associated in Cantonese with contrastive contexts. Cheung (1986) likewise main-

tained that length is a key variable in Cantonese for manipulating utterance pragmatics:

[T]he possibility exists for the speaker to manipulate syllable length by departing from [its] neutral value to achieve special effects both in natural speech and in verse recitation In particular lengthening signifies emphasis and shortening signifies insignificance. (pp. 133–134)

There is also some evidence for Cantonese (Fok, 1975; Kwok & Luke, 1986; Wu, 1989) of rising intonation being used to signal “open” meaning (Cruttenden, 1986) or incompleteness in questions. According to Matthews and Yip (1994): “This intonation pattern affects the last word of the sentence, modifying or exaggerating its basic tone” and occurs in Cantonese, as in English, primarily in so-called “echo questions,” “where the questioner is repeating a statement out of surprise or incredulity” (p. 318), as in the response in Example 11.

Example 11

A: Ngóh mgin-jó tìuh sósìh a.
 I lose-PFV CL⁴ key PRT
 ‘I’ve lost the key.’

B: Mātyéh wá? Léih mgin-jó tìuh sósìh?
 what words you lose-PFV CL key
 ‘What? You’ve lost the key?’

(p. 318)

As in English, such cases represent a type of contrast-marking and are in this respect distinguished from unmarked questions, which in Cantonese have a final question particle and do not end in rising intonation, as illustrated above. It can also be noted that in the contrastive (echo) questions of Cantonese, although final particles are absent, the intonation of the sentence is mainly carried on the final word.⁵

Review of Prosodic Contrasts

In sum, Cantonese is generally distinguished from English in focusing the use of prosody on a narrow domain and in locating modality and interactive meaning at final position in a sentence—especially on final particles, which function rather like tags and discourse markers in English. Cantonese employs prosodic contrasts primarily at the lexical level, as different tones (pitch patterns) that distinguish different monomorphemic (monosyllabic) words and final particles,

which also have the grammatical/pragmatic function of adding specific modality or interactive meaning to an utterance. In the final particles, lexical and grammatical/pragmatic functions of pitch converge to a certain degree, as there are several subsets of particles that consist of the same phonetic segments but differ both in tone and in the modality they contribute to sentence meaning. Cantonese employs rising pitch to a limited extent in a relatively universal grammatical function, that of contrasting an echo question with a preceding statement, as is done in English.

In both English and Cantonese, prosody is one of the cues as to which elements group together paradigmatically or syntagmatically. Stress pattern in English and tone pattern in Cantonese are each a cue to derivation, grammatical category, and the grouping of words into compounds and grammatical phrases in the respective languages. However, English employs prosodic contrast at levels above that of individual lexical items to a far greater extent than does Cantonese. As compared with Cantonese, English is much more likely to use prosody—stress or intonation—to distinguish meaning in the larger domains of complex compounds, clauses, and multiclausal units.

Cantonese employs prosody iconically to signal differences in affect, especially by overall pitch level, and emphasis or contrast, especially by lengthening of the relevant word or unit. In the latter function, Cantonese is similar to English, although in English, such prosodic highlighting tends to be marked in multiple ways, that is, by a combination of pitch, length, and loudness features. It is tempting to conclude that prosodic highlighting in English would therefore be more salient to a listener than prosodic highlighting in Cantonese. Such a conclusion may not be warranted, however. It is possible that lengthening of syllables has as much information value in Cantonese—a language with highly variable and unpredictable patterns of pitch resulting from lexical tone but with limited variation in length—as triply marked prosodic highlighting in English—a language with highly variable and unpredictable patterns of all three parameters resulting from lexical stress.

HYPOTHESES

On the basis of the foregoing discussion of Cantonese and English prosody, the following hypotheses were derived regarding Cantonese speakers' recognition memory for English sentences with prosodic cues:

1. Cantonese L1 speakers will have better recognition memory for the lexical content of English sentences than for their prosody.

2. Cantonese L1 speakers will have better recognition memory for English sentences in which a prosodic contrast is represented in final position than in other positions.

3. Cantonese L1 speakers will have better recognition memory for English sentences in which prosody indicates a contrast iconically rather than syntagmatically.

4. Cantonese L1 speakers will have better recognition memory for English sentences when prosody is the explicit focus of attention.

The first hypothesis was derived based on the limited role of prosody in Cantonese above a lexical level and the fact that Cantonese L1 speakers who learned English in Hong Kong schools have a higher competence in written than in spoken language and more experience interpreting English on the basis of lexis and syntax than on the basis of prosody. The second hypothesis was derived from the fact that utterance-level prosody and the functionally related pragmatic device of discourse particles occur primarily in final position in Cantonese. The third hypothesis was derived from the fact that iconic functions of prosody should be relatively universal and transparent, and thus easier to process and learn, than syntagmatic functions, which should be more language-particular and difficult to process and learn. The fourth hypothesis follows from a general principle of instruction that focusing attention and practice in a particular direction facilitates learning in that direction (Doughty & Williams, 1998; Ellis, 1994; Ellis & LaPorte, 1997).

METHOD

Participants

Thirty Cantonese L1 speakers native to Hong Kong were recruited from City University of Hong Kong. They were all young adult (aged 20–35) advanced proficiency speakers of English who made significant use of their L2 on a daily basis, either (a) final-year majors in English courses or (b) nonteaching staff in the English or Media Services Departments.

Procedure

Participants completed two experiments conducted in sequence with a short break in between. The two experiments were sequenced in

the order of an untutored (implicit) condition (Experiment 1) followed by a tutored (explicit) condition (Experiment 2).⁶ According to the experimental design, participants heard one set of sentences and afterwards heard another set and then judged whether each sentence was the same as an original sentence or not. In each experiment, some of the sentences of the response set (which constituted the recognition test) were identical to those of the original (presentation) set, some of them differed from the originals only in prosody, and others had different lexis from any of the original sentences, but were otherwise of the same types. The research was carried out in a language laboratory with small groups of 6 to 10 participants who took part under the supervision of the first author. The procedure involved listening to audio-recorded materials using the language lab headphones and responding to them in specially prepared booklets, with spoken and identical written directions. Responses were scored and analyzed afterwards by the second author using SPSS (1995) software.

Materials

Forty-eight pairs of sentence stimuli were developed and recorded in professional studio conditions by the first author, a native speaker of American English who recorded the sentences as spoken at a normal speaking rate. The stimuli consisted of 12 paired items for each of 4 sentence types. Half of these exhibited prosodic contrast of an iconic sort, and the other half exhibited prosodic contrast of a syntagmatic sort, as follows.

Iconic Contrast: Focus. Prosody cues unmarked (neutral) focus by means of prominence on the last constituent versus marked (contrastive/emphatic) focus by means of an extra degree of prominence on an item or unit of the sentence.

Is HE driving the bus? [special attention on HE for emphasis or contrast]

Is he driving the bus? [no special emphasis or contrast]

Iconic Focus: Tag. Prosody cues a different pragmatic interpretation by means of a “closed” (falling) versus “open” (rising) contour on an utterance-final tag. This contrast signals sentence modality as relatively certain (statement) and expecting addressee agreement, or uncertain (question) and soliciting an addressee opinion.

He’s a good boy, isn’t he. (falling) [I think he’s a good boy and that you will confirm this.]

He’s a good boy, isn’t he? (rising) [I think he’s a good boy, but I am not sure.]

Syntagmatic Contrast: Boundary. Prosody cues boundary (i.e., continuity/discontinuity of unit in (final) boundary position).

The fight is over Fred. [The fight is about Fred.]

The fight is over, Fred. [I am telling you Fred that the fight is finished.]

Syntagmatic Contrast: Phrase Structure. Prosody cues internal syntactic analysis (i.e., phrase structure of unit).

She’s a lighthouse keeper. [Her job is to look after a lighthouse.]

She’s a light housekeeper. [She is a housekeeper who does light housework.]

The focus type of example was included as the most transparent and iconic form of meaning conveyed by prosody, that of signaling the presence of a marked information focus or not, in the case where such a signal is absent (unmarked focus). The tag type is an iconically derived type of pragmatic contrast, which, though not as transparent in meaning as the focus type, is potentially more salient because it occurs in final position. The boundary type exemplifies prosody functioning syntagmatically to indicate the status of a final lexical item (noun) as part of the predicate (object) or as a separate unit (vocative). The phrase structure type of item exemplifies prosody functioning syntagmatically to indicate the internal structure of a predicate that contains a noun in final position. Participants’ performance on these different sentence types would provide tests of Hypotheses 2 and 3, and their overall level of performance in the two experiments would provide tests of Hypotheses 1 and 4.

The original recordings were edited to produce two study sets (the presentation sentences) and two recognition sets (the test sentences), one each for Experiment 1 and Experiment 2. For these experiments, the sentences were arranged in a random order and placed at 10-second intervals on the edited tape. The study set for each experiment consisted of 24 sentences (different in each experiment), comprising 6 example sentences of each of the 4 types. Within type, half of the sentences were spoken with one pattern of prosodic cue, half with the other. The recognition set for each experiment consisted of 48 sentences comprising: (a) 24 *new* sentences (again 6 examples of each of the 4 sentence types above); (b) 12 *old-old* sentences (3 of each type); these were (*old*) sen-

tences that the participants had heard in study set 1 and that were repeated with the identical (*old*) intonation; (c) 12 *old-new* sentences; these were the remaining (*old*) items from study set 1, but in the recognition test they were spoken with a contrasting (*new*) intonation, thus cueing a different interpretation of the original sentence from among one of the two contrasting choices.

EXPERIMENT 1

Purpose and Method

Experiment 1 was designed to test Cantonese L1 speakers' recognition memory for prosody as distinct from lexis in English sentences. The procedure investigated whether participants could store the prosodic patterns for sentences on first encounter and then use lexical and prosodic information to help them recognize whether sentences they heard were the same as or different from those they had heard before, either in terms of prosody or lexis.

Experiment 1 required about 20 minutes in total. For Study Phase 1, participants were instructed to listen carefully while following the sentence items on the study sheet in order to be able to recognize them later. Study Sheet 1 showed the 24 study sentences written in capital letters without punctuation. This visual support was provided to ensure that the participants could properly identify the sentence lexis. At the end of Study Phase 1, after a short break, the participants were given instructions for the recognition task, which required them to listen to 48 sentences and decide whether or not each sentence they now heard was exactly the same as one of the sentences they had heard in the previous task. If the sentence was exactly the same (in lexis and prosody) as the one heard in the previous task (i.e., an *old-old* sentence), they should have marked the answer choice "I heard it before." Otherwise, for sentences of both *new* and *old-new* types, the correct response was "This is a new sentence."

Results

Participants' average performance for each sentence type was calculated. Table 2 shows group performance accuracy for each sentence type and recognition class.

A two-factor ANOVA (3 recognition classes [*new*, *old-old*, *old-new*] \times 4 Prosody Types) was used to investigate these effects. There was a significant effect of recognition class by items, $F(2, 36) = 146.0$, $p < .001$. Post hoc analysis using

TABLE 2
Mean (*SD*) Percentage Correct Response for Each Sentence Type in Each Recognition Class

Type	New	Old-Old	Old-New
Focus	87.8 (15.4)	83.3 (10.0)	22.2 (8.4)
Tag	77.8 (10.7)	77.8 (13.5)	30.0 (12.0)
Boundary	85.0 (9.6)	92.2 (5.1)	18.9 (9.6)
Phrase structure	87.8 (11.3)	94.4 (5.1)	15.6 (13.5)

Bonferroni tests indicated that although performance levels on *new* and *old-old* items did not significantly differ, $M = 86.9$ (10.5) and 84.6 (11.9), respectively, these were both significantly higher than accuracy for *old-new* items, $M = 21.7$ (11.0), $p < .0001$. There was no significant effect of prosody type, $F(3, 36) < 1$, *ns*. The interaction between recognition class and prosody type was also nonsignificant, $F(6, 36) = 1.43$, $p > .05$.

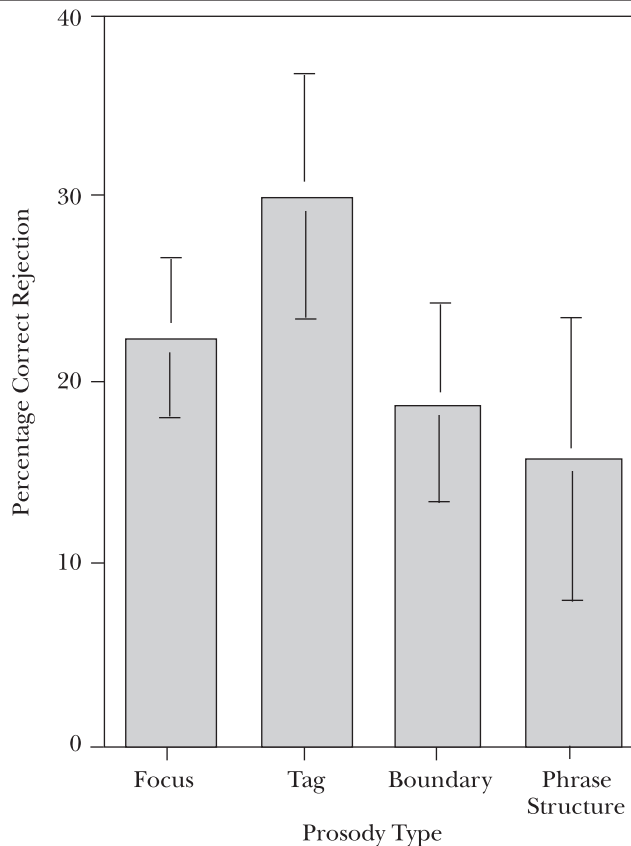
These advanced Cantonese L1 speakers were good at recognizing previously heard sentences and at rejecting entirely new ones. However, they were poor at rejecting sentences having the same lexis as in previously heard sentences but spoken with different intonation. For these reasons, we separately analyzed performance on the *old-new* recognition class items using one-way ANOVA. There was no significant effect of type by items, $F(3, 8) < 1$, *ns*, nor by subjects, $F(3, 87) = 1.80$, *ns*, although, as shown in Figure 1, scores were numerically highest for tag (mean accuracy on *old-new* rejections of tag = 30.0%) and lowest for the syntagmatic types (mean accuracy on *old-new* rejections = 18.9% for boundary type and 15.6% for phrase structure type).

EXPERIMENT 2

Purpose and Method

Could participants' poor recognition memory for sentences in Experiment 1, in which there was no explicit focus on the contrasts in prosody and meaning incorporated within the sentence stimuli, be improved by explicit priming of the relevant contrasts? Experiment 2 was designed to determine whether L2 learners would use intonation cues in sentence recognition if their attention was focused on the prosodic contrasts and the associated differences in meaning. This experiment was the same as Experiment 1 except in the respect that during the study phase, partici-

FIGURE 1
 Percentage of Correct Rejections of Items Whose Intonation Changed between Study and Test in Experiment 1



Note. Error bars reflect standard errors.

pants' attention was directed to the intonation and meaning contrasts associated with each sentence type, as they were shown the two different possible readings for each sentence they heard. This procedure was intended to give an explicit focus and training on the intonation contrasts represented in the sentence stimuli, which had been only implicit in Experiment 1. Experiment 2 was thus designed to answer the following question: If, during original presentation of the sentences (study phase), participants had to focus on prosody to select from contrasting interpretations of the sentences, would this result in better performance on a subsequent recognition test of sentences that included the same types of contrasts? The participants were the same individuals, which permitted direct evaluation of the effect of the additional contrastive information provided on the subsequent recognition of sentences.

The method was the same as that of Experiment 1 except that new exemplars were used for the 24 study sentences (6 sentences of the 4 types) and there were 24 new foils in Recognition Test 2. For the study phase, participants were shown two possible readings of each sentence on Study Sheet 2 and had to select the reading that they thought best matched the intonation of the sentence. The readings were illustrated as for the four sentence types above. For example, after the sentence "I couldn't hear Edward" was spoken (with a continuous contour between *hear* and *Edward*), participants had to choose between the following interpretations:

1. I . . . I I was not able to hear Edward.
2. I . . . I I am telling you Edward that I was not able to hear.

The correct response to this item was Answer Choice 1. In the case that the sentence "I couldn't

hear, Edward” had been spoken (i.e., with a significant prosodic break and lowered intonation on the word *Edward*), the correct response would be Answer Choice 2.

Recognition Phase 2 was identical to Recognition Phase 1 in all respects. Experiment 2 followed Experiment 1 after the participants had had a break of 5 minutes.

Results

Study Phase 2. Participants’ average performance in using intonation during Study Phase 2 to identify the correct member of each response pair was calculated for the four sentence types. Table 3 shows group performance accuracy during the study phase of Experiment 2 for each of the sentence types.

A one-factor ANOVA revealed that there was a significant effect of sentence type on performance by items, $F(3, 20) = 5.22, p < .01$, and by subjects, $F(3, 87) = 525.17, p < .0001$. Scheffé post hoc testing indicated that the respondents were much more able to recognize correctly sen-

TABLE 3
Study Phase 2: Mean (SD) Percentage Correct Response for Each Sentence Type

Type	Percentage correct
Focus	86.7 (9.9)
Tag	51.7 (12.1)
Boundary	58.9 (29.0)
Phrase Structure	48.9 (17.1)

tences with focus cues than sentences with the other types of intonational cues and that performance for these other types neither differed significantly from each other nor from chance level (50%). These data are shown in Figure 2.

Recognition Phase 2. Participants’ average performance for each sentence type was calculated. Table 4 shows group performance accuracy for each of the sentence types.

A two-factor ANOVA (3 recognition classes [*new, old-old, old-new*] × 4 Prosody Types) demonstrated a significant effect of recognition class by

FIGURE 2
Percentage of Correct Interpretation of the Four Prosody Types in Study Phase 2

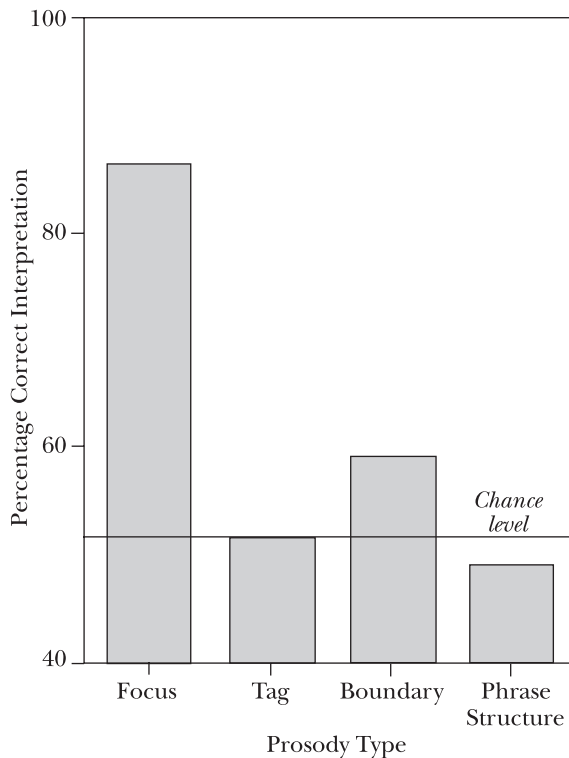


TABLE 4
Recognition Test 2: Mean (SD) Correct Response
for Each Sentence Type in Each Recognition Class

Type	New	Old-Old	Old-New
Focus	82.8 (16.1)	75.6 (23.6)	47.8 (8.4)
Tag	84.4 (6.2)	73.3 (17.6)	30.0 (5.8)
Boundary	90.6 (9.5)	77.8 (8.3)	22.2 (6.9)
Phrase Structure	87.8 (9.3)	87.8 (1.9)	13.3 (8.8)

items, $F(2, 36) = 107, p < .0001$. Post hoc analysis using Bonferroni tests revealed that although performance levels on *new* and *old-old* items did not significantly differ [$M = 78.6$ (14.3) and 86.4 (10.6), respectively], these were both significantly higher than accuracy on *old-new* items [$M = 28.3$ (14.7), $p < .0001$]. There was no significant effect of prosody type, $F(3, 36) = 1.35, ns$. The interaction between recognition class and prosody type was marginally significant, $F(6, 36) = 2.62, p < .05$.

As in Experiment 1, participants were poor at rejecting sentences that had the same lexis as in previously heard sentences, but that were spoken with different intonation. This fact, together with the significant interaction of recognition class and prosody type, which from inspection of the means appears to arise from the rather different profile in the *old-new* items, led us to analyze separately performance on the *old-new* recognition class items using one-way ANOVA. There was a significant effect of type by items, $F(3, 8) = 11.20, p < .005$, and by subjects, $F(3, 87) = 12.10, p < .0001$. Bonferroni contrasts revealed that performance on the focus type was superior to that on all other types ($p < .05$) and that accuracy on tag was superior to that on the phrase structure type.

Comparison of Recognition Phases 1 and 2. In order to assess the effects that focusing attention on prosodic cues in Study Phase 2 had on correct rejection of *old-new* items (i.e., those items whose intonation changed between study and test), a two-factor ANOVA (4 Types \times 2 Phases [Recognition Tests 1 and 2]) was performed comparing the recognition test data for the *old-new* items across the two experiments. There was a significant main effect of prosody type by items, $F(3, 16) = 5.70, p < .001$, and by subjects, $F(3, 174) = 8.48, p < .0001$. The main effect of recognition phase was not sig-

nificant, either by items, $F(1, 16) = 2.97, p = .10$, or by subjects, $F(1, 58) = 2.83, p = .10$. The prosody type by recognition phase interaction was significant by subjects, $F(3, 174) = 3.82, p < .01$, and marginally so by items, $F(3, 16) = 2.74, p = .07$. Planned contrasts indicated that there was a significant improvement across recognition phase for the focus sentences, $F(1, 16) = 10.91, p < .01$, but no significant phase difference for any of the other types. The interaction means are given in Figure 3.

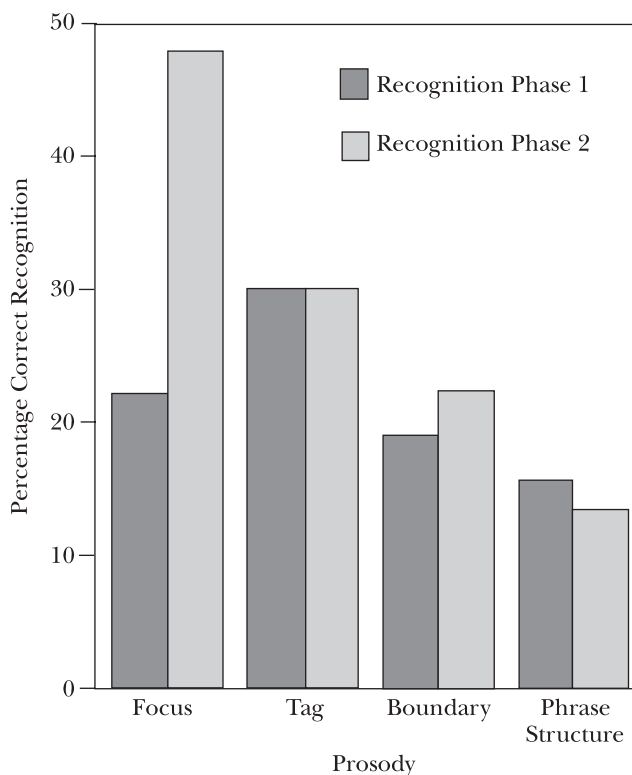
DISCUSSION

Experiment 1

In Experiment 1, Cantonese L1 speakers demonstrated a high level of lexical memory in their ability to recognize sentences that were exactly those they had heard before, as well as in their ability to reject sentences containing lexis they had not heard before. However, they were prone to judge as previously heard a sentence whose new prosody cued a very different interpretation from the original (i.e., one of *old-new* type). The Cantonese L1 speakers appear to have made little use of prosodic cues within study set 1 that could have differentiated the sentences they heard from contrasting ones that had the same words in the same order but with a different interpretation cued by different prosody. Notwithstanding their good memory for the lexical content of sentences, these advanced English L2 learners' memory for sentences whose ambiguity is resolved by prosodic cues would seem to be poor. Without explicit focus or training on the distinctions cued by the experimental materials, they were slightly better at making use of intonational cues to differences in tags than in syntactic structure. However, even their best performance was at only 30% levels.

The fact that they had a very good memory for *old-old* sentences, but were not good at recognizing *old-new* ones, suggests that the participants did not make much use of the prosodic information provided in the sentence stimuli or that they did not make effective use of this information. The prosodic contrasts exemplified in the study set were either not noticed or not processed sufficiently or effectively to extract a pattern or recognition procedure that could be used again in future performance. In this connection, it is interesting to observe the especially high *old-old* recognition scores (above 90%, with low standard deviation) versus the especially low *old-new* scores (below 20%, with higher standard deviation) for

FIGURE 3
Percentage of Correction Rejections in Experiment 1 and Experiment 2 of Items Whose Intonation Changed between Study and Test



the two sentence types in which prosody cued syntactic structure. This score pattern suggests that considerable cognitive effort was expended to process the heard sentences, which aided their later identification as *old-old* items, but that this effort did not involve extraction of either a formal (prosodic) or an associated meaningful (semantic) contrast, which could then be used to recognize an *old-new* item.

A possible explanation for the results is that the participants stored the specific sentence prosody as part of the memory representation of the sentences when they first encountered them, but did not generalize the exemplified prosodic patterns from the study set, which included multiple examples of all of the contrasting types. A tendency for speakers of tone languages to store rather than analyze prosodic patterns is supported by Archibald's (1997) observations on Chinese and Japanese learners' processing of English stress patterns and can perhaps be expected in the case of speakers of a language background in which patterns of pitch are part of the lexical repre-

sentation of words and so must be arbitrarily learned. Such a tendency might also be expected in the case of speakers brought up in a tradition of rote memorization, which is still widely practiced and revered as a learning strategy in China and other parts of Asia.

The processing of English intonation in a manner analogous to the processing of Cantonese tone could be part of a larger pattern of L1 transfer that other researchers (e.g., Bolton & Kwok, 1990; Gibbons, 1987; Juffs, 1990; Luke, 1998) have noted in the tendency of Cantonese speakers to reinterpret English stress and intonation patterns, in both perception and production, as tone patterns. Thus, it appears that L1 prosodic patterns in terms of tone may be highly influential in the learner's processing of the quite different prosodic system of intonation in the L2. As a consequence of this L1 prosodic bias, even relatively advanced learners may fail to notice or to analyze prosodic patterns in the L2, or they may misinterpret them as having a form and function that is analogous to prosody in the L1.

Experiment 2: Study Phase

The study phase of Experiment 2 revealed that participants' problems in correctly identifying old sentences spoken with new prosody could not easily be affected by explicitly drawing their attention to the presence of meaning contrasts which could be disambiguated by intonation. In this part of the research, participants' online disambiguation of prosodic cues was at chance level for the tag type and for the boundary and phrase structure types of syntactic analysis. However, when they were encouraged to attend to meaning differences cued by prosody, the Cantonese L1 speakers were able to identify correctly sentences that differed in marked or unmarked focus. This phase of the research showed that participants' awareness of prosodic contrast could be improved by explicitly focusing their attention on intonation in contrastive sentence pairs, although within the conditions of this investigation, the attentional focusing was effective only for the easiest type, that of focus.

The results of Study Phase 2 suggest that the participants in this research were not aware of the intonational patterns and contrasts exemplified and also could not process them well—other than for the focus type—when their attention was drawn to them. On the one hand, this is an interesting and perhaps surprising finding, given that these participants had achieved a relatively advanced level of proficiency in the L2, which they used on a regular daily basis in their work or studies. On the other hand, it is perhaps not surprising in the context of an overwhelmingly Cantonese-speaking community (Pennington, 1998a), where communication in the L2 might not require a knowledge of the types of intonational contrasts focused on in the present study. Tags, in general, or the contrast of the two tag types may not be a feature of L2 usage in nonintimate situations, nor may vocatives of the boundary type or the compounds and conventionalized expressions of the phrase structure type exemplified in the present study. Nevertheless, one might expect that once these forms have been pointed out—and especially after they have been exemplified within a set that includes several instances of the contrasting type—an advanced L2 speaker would begin to notice them and to decode and interpret the pattern in the examples.

Perhaps these speakers did notice the distinctive forms of intonation exemplified and nonetheless, except in the case of the marked/unmarked focus type of example, were still not able to process adequately the information available

to them within the constraints of the experiment. If so, they might do better where more time, more instances of each sentence type, more context, or a combination of these features were provided as additional support for processing.

Experiment 2: Recognition Phase

The recognition phase of Experiment 2 revealed that participants' memory for old sentences spoken with new prosody could be improved to a small extent by explicit priming of contrasting cues. Once participants' attention had been focused on intonation cues in Study Phase 2, this allowed them to identify successfully *old-new* sentences whose new intonation cued an altered focus than for any other type and to identify successfully intonationally altered tag sentences than those of the phrase structure type. However, comparing the results of Experiments 1 and 2, participants' performance after training was significantly better only for the focus type. Thus, participants' failure to use intonation effectively in resolving syntactic or modality differences in Study Phase 2 meant that focusing attention had no beneficial effect on subsequent recognition memory for sentences which were disambiguated using such cues. Rather, the pattern of response for the nonfocus sentence types persisted from the untutored to the tutored condition (as is shown in Figure 3), although in the latter case, the advantage for the tag type in comparison to the two syntagmatic types achieved statistical significance.

The drop in performance on *old-old* sentences from Recognition Phase 1 to Recognition Phase 2, although not statistically significant, may be an indication of increased processing demand or cognitive load based on the additional prosodic and semantic focus and the contrastive information provided. It might therefore be an indication of a slight shift in processing from a rote memorization strategy of storing prosody as part of a sentence representation in long-term memory to an analytical strategy of making more intensive use of working memory to decode prosodic cues, which could then be stored in a more contrastive or proceduralized form. Additional priming or training, or a different experimental procedure, might make it possible to tease out such a processing shift as a result of explicit focusing of the attention of L1 speakers of a tone language such as Cantonese on the prosodic patterns of an L2 intonation language like English.

RESOLUTION OF HYPOTHESES

Hypothesis 1, that Cantonese L1 speakers will have better recognition memory for the lexical content of English sentences than for their prosody, was supported, in that the speakers had excellent performance in recognizing entirely new sentences, that is, ones with new lexical items, as well as sentences spoken with the original words and prosody. This result was in contrast to their generally poor performance in recognizing sentences with the same words but a different prosody, which they tended to identify incorrectly as the same sentences heard before. The interpretation of English sentences by these speakers whose mother tongue is a tone language appears to be driven mainly by lexis rather than intonation. If this is a correct interpretation of the findings, it demonstrates that these advanced L2 speakers are not using all the cues to sentence interpretation that are available to them.

Hypothesis 2, that Cantonese L1 speakers will have better recognition memory for English sentences in which a prosodic contrast is represented in final position than in other positions, was generally not supported. There was some slight advantage, however, for the tag type in recognition of *old-new* sentences.

Hypothesis 3, that Cantonese L1 speakers will have better recognition memory for English sentences in which prosody indicates a contrast iconically rather than syntagmatically, was supported for the focus type, but not for the tag type, and only after training. Before training, there was a numerical advantage for the tag type, but this was not statistically significant. Moreover, the tag type was not affected by training. One reason may be that it is less directly iconic and therefore inherently more difficult than the focus type of item. This possibility is supported by the findings for correct interpretation in Study Phase 2, where participants did not perform better on tag items than on the two types of syntagmatic items. Another reason may be that tag is the one type of item that has the most transfer from L1 if, as discussed above, it is especially similar to the use of discourse particles in Cantonese. This possibility was supported by the better numerical performance for tag in Experiment 1 in comparison to the other items and the better statistical performance for tag in comparison to the syntagmatic items in Experiment 2, in the context of the lack of any improvement on tag across the two experiments. It can generally be assumed that, outside any explicit training or focusing of attention, L1 transfer will give an initial advantage in

L2 performance; but in the context of training or explicit focusing of attention on the L2, it will make the learner resistant to new learning.

Hypothesis 4, that Cantonese L1 speakers will have better recognition memory for English sentences when prosody is the explicit focus of attention, received some support. Without any specific training to focus their attention on the prosodic contrasts underlying the experimental stimuli, there was no statistically significant difference in participants' performance for any of the four sentence types within any recognition class. Whether identifying entirely new or entirely old sentences, they performed at a high level on all sentence types. This high performance was in sharp contrast to their poor performance across all sentence types in identifying old sentences spoken with different intonation. The procedure of focusing participants' attention on intonational contrasts in Study Phase 2 had some effect in differentiating their performance on the different sentence types, as participants performed better on the most universal and transparent type (that in which prosody cues focus) than on all of the others; and they performed more consistently on the tag type, although still at a low level, than on what is presumably the most difficult and language-specific type (that in which prosody cues phrase structure).

In sum, the participants had excellent lexical memory and appeared to treat prosody as an incidental or surface feature of a sentence that remained unanalyzed or minimally attended in sentence processing. In general, their recognition memory for sentences with prosodic cues to meaning contrast was poor, with training being influential only for the most universal and transparent (simple iconic) type of prosody. L1 transfer did not appear to play much of a role influencing these Cantonese speakers' memory for specific types of prosody in the L2. However, it may have played a role in another respect, that of influencing the Cantonese L1 speakers to store an English prosodic representation (if any) for sentences holistically, without analyzing its component parts or meaning.

IMPLICATIONS FOR TEACHING AND LANGUAGE AWARENESS

Advanced Cantonese L1 speakers of English as L2 have the ability to use intonation cues to identify the focus of a sentence. When they are encouraged to concentrate on these cues, they can, and do, use them to interpret spoken sentences and remember their meaning accordingly. Their

poor performance using intonation cues to resolve ambiguity does not appear to have been a result of their having the relevant knowledge and failing to apply it due to attention being diverted to other aspects of decoding. Rather, they did not seem to have the relevant knowledge of how intonation resolves ambiguity. In order to improve performance, they would need instruction in how intonation in English functions in these language-specific respects.

Adult learners may be especially able to benefit from explicit instruction in phonology (Pennington, 1996, 1998b). Indeed, the implication of the present research is that without such explicit focusing of attention, learners will not attend to key phonological information in the speech signal of the L2. Moreover, as Schmidt (1990) has argued, awareness of a new form, or of a discrepancy between a known and a new form, is crucial for acquiring the latter in learning a L2. It can therefore be suggested that an emphasis for raising L2 prosodic awareness of contrastive pairs such as those used in the present experiments might help the L2 learner to analyze English prosody as a representational system on a par with that of other systems of grammar. It seems that Hong Kong Cantonese speakers—and speakers of other languages, all of which will differ to some degree from English in their prosodic systems—could benefit by instruction to focus their attention on the criterial features of English prosody in a contrastive manner.

Research has demonstrated that L2 phonology, like other aspects of language, can be improved if training is offered “in a focused program in isolation from other skills” and if “the program involves perceptual training such as audio and video feedback” (Pennington, 1998b, p. 328). Where attention is divided or focused on meaning, such as through the need to comprehend or produce novel material or unusual information, the effects of pronunciation instruction are less beneficial (Derwing, Munro, & Wiebe, 1997). If it is true that the small “perceptual window” of the child is key to focusing on sound in L1 acquisition and thereby acquiring the sound system of the native language (Jusczyk, 1997), it can be hypothesized that techniques which “shrink” the adult’s window of perception and focus attention on prosody out of the context of other aspects of language, such as vocabulary, grammar, and pragmatics, are likely to produce the best results in reforming articulatory targets away from the L1 and towards those of the L2.

A program of instruction can be recommended that helps the learner to focus attention

on prosody, first its form and later its functions in the L2; that motivates continued and deep attention; and that allows for individual learning without distractions. A promising direction for this purpose is computer-aided instruction (Pennington & Esling, 1996; Pennington, Ellis, Lau, & Lee, 1999). The computer is also an excellent medium for training prosody by means of contrast, such as in the paired sentence items used in the present study or other types of contrast that would be especially salient or useful for a particular group of learners.

CONCLUSION

Like the native speakers in the research of Speer, Crowder, and Thomas (1993), the Cantonese L1 speakers who participated in the present research had better recognition memory for sentences spoken with the same prosody at first presentation and subsequent testing than for those spoken with different prosody on the two occasions. Also like the native speakers in the earlier study, the effect was essentially the same for prosody that cues syntactic analysis and focus, though after an awareness-raising activity designed to train participants’ attention on the prosodic contrasts exemplified in the experimental stimuli, they had better retention for prosody that cues focus than for prosody that cues syntactic analysis. This finding suggests that certain aspects of prosody—such as the relatively universal relationship of enhanced prosody and marked meaning, as contrasted with neutral prosody and unmarked meaning—can be more readily taught than some other more language-specific aspects. In particular, it may be speculated that learners of English would need more time and more explicit focusing of awareness than was available in the present study in order to acquire the specific patterns of prosody that relate to syntactic analysis in the L2.

This first study of recognition memory for prosodically cued English sentences by an adult L2 group raises the possibility that prosody plays a minimal or diminished role in the processing of the form and meaning of utterances in a L2. It raises the further possibility that when prosody does play a role in L2 processing, it is generally referenced to the L1 or to linguistic universals. Given that the L2 group studied in the present investigation is one for whom the prosody of the L1 (Cantonese) represents a near-maximal contrast with that of the particular L2 investigated (English), it is impossible to know whether the findings for any other language pair would differ from those of the present study in degree or in

kind. It is also not possible to determine the extent to which the specific findings are an artifact of the specific items or procedures used. Only further research with other groups, including native English speakers, using the same materials and procedures (see Ellis & Pennington, 1999) or altering these in controlled ways, can decide these matters.

ACKNOWLEDGMENTS

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NOTES

¹ Example 4 was provided by Lawrence Lau, a Ph.D. student in Linguistics who is supervised by the first author.

² The co-occurrence of prosodic and grammatical patterns, though not a simple matter of one-to-one-correspondence, is regular enough in English to be useful for utterance parsing (see Pennington, in press, for discussion).

³ What Matthews and Yip (1994) refer to as "verbal particles" and gloss as 'V-PRT' form a separate (aspectual) grammatical system.

⁴ PFV refers to perfective aspect; CL refers to (nominal) classifier.

⁵ The overall pitch level of questions in Cantonese was measured by Wu (1989) as slightly higher than that of statements (Matthews & Yip, 1994, p. 409, footnote 1). High overall pitch in questions is a common phenomenon in different languages (Lehiste, 1970) that presumably has a natural basis and is an aspect of intonational universals.

⁶ Order of presentation of the conditions in the two experiments could not be counterbalanced because of the large carry-over effects that would be expected if participants were exposed to the tutored condition before the untutored one.

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