Exploring Computer-based browsing systems in the teaching of Chinese pronunciation

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Introduction:

Learners of Chinese have always experienced difficulties in the production of appropriate rhythmic, intonative, vocalic and consonantic structures often resulting in the production of unintelligible speech. While students were taught how to pronounce these sounds using the traditional articulatory approach, this writer believes that simply demonstrating which muscles are involved in pronouncing certain sounds in Mandarin does not necessarily lead to the ability to pronounce the same sounds in natural speech correctly.

In this paper, I shall limit my discussion to the contribution made by a piece of computer software which has been designed to solve difficulties in mastering the pronunciation of Mandarin Chinese as experienced by learners of Chinese. It will be evaluated in terms of learner improvement in pronunciation of Mandarin.

Producing a meaningful utterance requires microsystems such as phonetics, syntax, semantics and pragmatics to come together in concert. Traditional and modern approaches have all acknowledged that pronunciation as being very important in learning a L2. As perception is intricately connected to pronunciation, training to perceive sounds necessarily becomes an important part of language acquisition. However, in the history of foreign language instruction, pronunciation has been accorded different positions within a number of approaches. The grammar translation based approach has always considered pronunciation irrelevant. The direct method has claimed that pronunciation is very important and presents it via teacher modeling. This methodology assumes that sounds practised in chorus or even individually will automatically transform into 'correct' production by the learners instantly. In the audio-lingual approach pronunciation is also very important. In this approach, the teacher models and the students repeat usually with the help of minimal pair drills. By making learners 'improve'

their pronunciation through a set of minimal pair drills suggests every learner will make a particular error through a particular trajectory. For example, if an EFL learner makes an error with the word 'beach', it will inevitably be that she/he will say it as 'bitch'. This pre-determination of what kind of errors learners will make when learning a L2, not only denies learners individuality, it also excludes many other possible causes that may lead a learner making that particular error. The cognitive code approach de-emphasized pronunciation in favour of grammar and vocabulary because it was thought in the late 1960's and early 1970's(see Scovel, 1969) that native like pronunciation could not be taught.

In recent years, Hinofotis and Bailey(1980) have demonstrated that there is a threshold level of pronunciation in English such that if a given non-native speaker's pronunciation falls below this level, he or she will not be able to communicate orally no matter how good his or her control of English grammar and vocabulary might be.

This has lead to a reaffirmation that teaching pronunciation is important within the communicative approach. It is then reasonable to assume that there might also be a similar threshold level of pronunciation in Mandarin for non-native speakers of Mandarin.

Having recognised the importance of having good pronunciation, the next question is how can pronunciation be learnt? And 'how can teachers assist in enabling learners master the sounds of a particular language?(ref?)'. To answer this question, one has to investigate what happens in one's brain when one learns a foreign language as well as the link between perception and production in learning a foreign language.

What happens when one learns a language?

Let's focus on the 'learning', here I shall include acquisition, of a language. How does the external exhibition of such learning tie in with what happens to a person's sensory, neurological systems? Language learning is a part of the general pattern recognition process that one's body is involved in. As the body receives millions of signals from the environment every second (S. Bekesy, 1967), one's brain cannot possibly process all the signals. In order to enable one's brain to cope, selection is necessary. In other words learning a language involves a structuring activity both at the level of production and at the level of perception. When learning our first language (L1), the brain builds its own structure by re-ordering in a **unconscious manner**, and by selectively filtering out redundant data present in the environment through perception. So the learning of L1 is carried out through setting up of a hierarchy of successive structures in L1 based on actual behaviour. In producing in L1, the subject must structure the non-linguistic experience

he/she wants to express so that the available extra-linguistic and linguistic means can be applied to it (Lian, 1997).

In learning a second language (L2), the subject will be involved in enlarging or re-building the hierarchy of structures based on L1 in his/her brain. The [re]-structuring activity will necessarily involve incorporating some of the structures previously deemed unnecessary in L1 into a new hierarchy of structures. This happens at the level of phonetics, phonology, syntax, semantics and pragmatics. However, as Lian(1987)points out, L2 learners lack a range of awarenessess that need to be developed in order to select the appropriate structures at appropriate times, in other words, to be operational in L2. Verbo-tonal theorists postulate that the ability to detect the critical elements i.e. elements which matter to native speakers of a language, within the rich and complex whole in which they are found is the basis of perception (Lian, 1987)). So when L2 students are confronted with an enormous mass of information in L2, are unable to select the pertinent elements, the teacher's job is not to provide the answers but to find ways of making students aware of what it is that matters, i.e. to perceive what matters when they are confronted with the complexities first of understanding and then of producing language for the purpose of communication.

To speak in L2 is to produce in that language. However, before we can confidently produce in a L2, the learner's brain has to decide **what sounds matter** in L2 to him/her. This means he/she has to be able to perceive the sounds of L2 first before producing them. These L2 sounds might include sounds with coincide with some sounds in his/her L1 and sounds which do not belong in the learner's L1.

The computer programs MMBrowse provides both the perception and articulation training training.

MMBrowse:

MMBrowse is a multimedia browser designed to develop listening comprehension skills through a self-study approach based on the exploration of authentic audio and/or video text which leads to the development of an awareness of the critical features of authentic text.

For example, an audio file of a Chinese nursery rhyme is recorded in digital form onto a computer's hard disk. Students are then provided with a written transcript of the passage in Chinese characters. On screen, each Chinese character is replaced with two asterisks(* *). The learner's task is to discover the words underneath the asterisks, to gain an understanding of the passage and to come to grips with the features of the text and authentic speech.

The system allows for the interactive exploration of the text by enabling learners to:

- (a) listen to the recording in its entirety,
- (b) listen to a selection of words from any arbitrary point in the recording to any other arbitrary point, hence the notion of browsing.
- (c) Listen to any specific word in isolation,
- (d) Practise saying selected portions of the text (including comparison of their voice with the original recording),
- (e) Develop awareness of rhythm and intonation structures of authentic text through forward build-up and backward build-up exercises.
- (f) Listen to a filtered version (low-pass filter set at 320 Hz) of any part of the recording to facilitate the perception of intonation and rhythm.
- (g) Listen to an accelerated version of the text in order to give learners practice in the rapid recognition of the language being learned(learners often believe that the target language speakers speak very quickly whereas a more accurate explanation is that learners are processing too slowly) (Lian, 1997).

All functions are under the learner's control. They choose the material which they wish to study (e.g. an interview, a news broadcast, nursery rhymes, a radio program) and they then choose those aspects of that material on which they wish to focus (e.g. words, the entire text, chunks, intonation patterns, gesture and pronunciation etc.). So far with the Chinese MMBrowse, students cannot guess or verify individual words nor can they access any information consisting of word definition or grammar explanation. This is because the template was written for an alphabetic language, such as French. For an alphabetic language, every letter is stored in the computer as one byte. So the program has been written to count each byte as a single *. However, for a character-based language, each character is stored in the computer as two bytes, therefore two **. As a result what is seen on the screen does not correspond with what the computer is counting. This makes guessing the words difficult. This aspect of the program is still under development.

The materials used in MMbrowse programs have not been adapted or simplified for foreign language teaching. They have been chosen from various sources such as the internet, video tapes of television programs and audio-tapes. For instance the nursery rhymes used in Beginning Chinese contain all the sounds of Chinese without grading the sounds in term of difficulty. The texts are displayed in Chinese characters rather than pinyin, the romanization of Chinese. There is a lot to be said about not pointing out the difficulties in Mandarin sounds. Just an anecdote. My daughter's name is Xin1xin. If people have not seen how the name is spelt, they have no difficulty pronouncing the name. My husband Chris, an Australian who

speaks no second language and 90% of Xinxin's carers and playmates at Childcare all pronounce her name perfectly. However, once one gets hooked on how 'X' should sound like according to the rules of English, things go awry. This phenonmenon has been observed too in learners of other alphabet based languages.

Another reason for MMbrowse based programs to be authentic and unsimplified is that there is ample evidence from child L2 acquisition that in acquiring L2 phonology, children in fact do use sequences far in advance of normal development such as complicated CCV(Consonant Consonant Vowel) syllable structures before simpler ones (CV or reduplicated CVCV) (Cruttenden, 1981). Children learn these as unanalysed chunks which, when encountered later on, are re-analysed these phonological units and thus learns to segment and reconstruct them according to phonemic principles. Adult L2 learners feel the pressure to produce in L2 even more than children as they become quickly discouraged when they are able to express little of what they wish. Prefabricated chunks will enable them to produce more in L2. The nursery rhymes used by the beginning students in the MMbrowse programs contain all the sounds in Mandarin, many previously perceived(by teachers) to be difficult grammatical structures, as well as other useful chunks of Mandarin such as 'come quickly', please sit down, open the door, I want to come in, I have finished and so on.

Thirdly, by using authentic materials in such focussed activities, students can observe, at close range, how the microsystems of the Chinese language come together in real communication.

MMbrowse is also capable of providing articulatory training. The provision for this comes in the form of the 'student record, play and compare' function. Video footage can already be included in MMbrowse as a tool to allow the learners to observe native speakers' gestures and body language when operating in the target language.

Experiment in Beginning Chinese, at James Cook University

Methodology:
There were 6 students in the experimental group of learners. This group of learners were required to complete several songs per week outside class contact hours and were asked to write them down in pinyin as homework to hand in. From the pinyin script, it has been found that if students can perceive a sound by writing it down clearly in pinyin, it is reasonable to

assume that they have that sound under control. Most of the pinyin mistakes were made with words starting with the palatals [x], [j], and[q] and the dental-alveolars [z], [c] and [s]. These students' spoken ability were also assessed by videos performed by students in pairs. These video segments were self-generated. In other words, students wrote and prepared the script and had them checked by another Chinese student or native speaker other than myself, the examiner.

The videos of the experimental group were compared with two groups of students from the previous years. From these videos, the most troublesome consonants(initials) and vowels (finals) were identified.

Group 1: the experimental group consisted of total beginners who started Chinese only in semester 1 1997. Only this group of students had been specifically exposed to a large amount of authentic data aimed at training them to perceive sounds correctly through MMBrowse programs.

Group 2 consisted of total beginners who started Chinese in 1995. Their video data consisted of the videos done in 1995 (3 tapes for each learners).

Group 3 consisted of total beginners who started Chinese in 1996. Only the video data for 1996 has been analysed.

Results:
Initials(consonants) in Mandarin:

Group 1:

This group of students had only started learning Chinese at the beginning of the year. There were only two sets of videotaped data from the group. Analysis of the data revealed that in terms of initials, there was a general tendency of mixing up [j] and [x] in the group of palatal sounds and mispronouncing [x] as the dental-alveolar [s], and mispronouncing [c] as [k] by a few students. But the expected problem with the retroflexes [zh],[ch] , [sh] and[ri], did not appear. **(Table 1)**

In terms of finals, the pattern of errors were very similar with the previous groups, as with the most frequent examples of errors. (Table 2)

Group 2 students: 1995 total beginners:

Initials(consonants):

From the two video taped data, it was obvious that initials such as palatal [x,] and retroflexes [zh], [ch] and [sh] were the most troublesome for the students concerned. This trend persisted for the first semester. Other

frequent errors all belong to the groups of dental-alveolar (zi, ci, and si) and palatals (ji, qi, and xi).

Finals(vowels):

Learners had many problems with some monophthongs and many diphthongs. See Table 2 in the Appendix.

Group 3 students:

Initials and finals:

The data revealed very similar patterns of troublesome sounds as the previous group's students in their beginner Chinese year.

Discussion:
In the absence of a control group, it is very difficult to attribute any improvement in student pronunciation to the use of MMBrowse. Furthermore, as the number of students involved in all the groups are fairly small, any quantitative results are unlikely to be statistically significant. As the final semester examination did not have a section on testing pronunciation per se, it is difficult to predict that any improvement in learner pronunciation is a result of using this computer program.

However, while it is difficult to quantify the changes in learner pronunciation, it is nevertheless possible to comment on the rate of Chinese pronunciation acquisition. In the Mandarin consonant system, the three groups of sounds highlighted in the table below are acknowledged as the most difficult sounds for mastery for learners of Mandarin as a foreign language. Therefore, the absence of errors with the retroflexes [zh], [ch], [sh], and [ri] in the experimental group of students' data is significant as it shows that if students are exposed to authentic oral materials early enough, the usual (according to the other two groups' data) problem with these consonants can be avoided.

Table: Chinese initials(Consonants)

Bilabials	Bo	Po	Mo	
Labio-dentals	Fo			
Dental-alveolars 1	De	Te	Ne	Le
Dental-alveolars 2	Zi	Ci	Si	
Retroflex	Zhi	Chi	Shi	Ri
Palatals	Ji	Qi	Xi	
Velars	Ge	Ke	He	

The above results on consonants seem to lend support to the findings in first language acquisition by Chinese children that there seems to be a back-front-middle tendency in terms of the position of articulation (X.C. Miao & M. S. Zhu, 1992). Indeed the three troublesome groups of sounds are all in the middleparts of the mouth , the alveolar ridge, and the palate.

It is difficult to tell what might be causing the persistence of some of the errors, for instance, the sound [x]. Is it a pinyin script interference? In other words, people seeing [x] and try to pronounce the way [x] should sound in English? Indeed, the majority of the errors in Chinese initials may be attributed to first language interference.

Even if L1 interference is the cause of errors in pronunciation, does it justify getting rid of the romanization system and from the beginning, only expose students to characters? I am yet to be convinced that only exposing adult learners to characters from the very beginning is the answer. However, I am happy to report that some of my second and third year students are mainly relying on high level processing skills of predicting, formulating hypothesis as well as trying to recall characters using visualization.

As far as the method of collection for this particular experiment is concerned, it could be vastly improved by using teacher controlled reading passages which contain all the problematic consonant sounds.

How can we build the teaching of pronunciation into a communicative Mandarin classroom?

Many researchers have provided us with evidence that for gains attained through perception training to translate into production, the body needs to be necessarily incorporated into the learning process. In the literature concerning the acquisition of Mandarin tones and sounds, the role of the body has been recognised but not well researched (see Shen, 1989; and Chen, G.T. 1974).

Weiss (1992)'s experiment in perception and production training in detecting and producing accents in English and French by second language learners of English and French suggests that perception training alone is not sufficient in producing any changes in production. Improvement in producing L2 requires a combination of perception training, active articulation training as well as physical exercises which are designed to further develop existing speech gestures such as jaw and tongue movements, vocal range and breathing patterns (this is a usual part of voice and speech

training given to actors to enlarge the speech motor flexibility of the speaker).

One could see that some drama techniques can be extremely useful in the foreign language classroom for incorporating the body into the learning process especially when combined with perception training programs such as MMBrowse.

As far as how to incorporate the teaching of pronunciation communicatively, Morley's volume on how to teach English pronunciation provides many useful ideas for the classroom.

Conclusion:

The results of the experiment of learners using MMBrowse programs carried out at JCU has demonstrated how computer technology can be usefully and successfully incorporated into a teaching curriculum. Technology of this kind enables learners to take risks and follow their own path without the scrutiny of the teacher. It also allows the native speaker model to be readily available in proper contexts at any time. However, this is not to say that computer technology alone will be sufficient in enabling learners to acquire Mandarin pronunciation. Needless to say, it is only a part of a whole array of activities that are used in the present course. Though I am no drama expert, I have nevertheless tried to incorporate the body in the learning of Chinese in general. Indeed more research should be conducted in the role of the body in the acquisition of a foreign language.

Bibliography

Bekesy, G. Von(1967)Sensory Inhibition, Princeton University Press, 1967. Princeton New Jersey, USA.

Chen, G. T.(19?) The Pitch Range of English and Chinese Speakers. *Journal of Chinese Linguistics*, Vol. 2 Number 2, pp 159-171.

Cruttenden, A. (1981) Item-learning and system learning. *Journal of Psycholinguistic Research* 10: 79-88.

Celce-Murcia, M.(1994)Teaching Pronunciation as Communication. In J. Morely(ed) *Pronunciation Pedagogy and Theory: New Views, New Directions*, pp. 5-12. Alexandria, VA:TESOL, 1994.

Guberina, Petar(1972) *Case Studies in the Use of Restricted Bands of Frequencies in Auditory Rehabilitation of Deaf*. Institute of Phonetics, Faculty of Arts Zagreb.

Hinofotis, F., & Bailey, K (1980) American undergraduates' reactions to the communication skills of foreign teaching assistants. In J. C. Fisher, M. A. Clarke, & J. Schacter (Eds.), On TESOL '80 (pp. 120-133). Washington, DC: Teachers of English to Speakers of other languages.

Lian, A-P & A. B. Lian (1997) The Secret of the Shao-Lin Monk: Contribution to an intellectual framework for language-learning. *On-Call*, May 1997, pp. 2-19. Centre for Language Teaching and Research, University of Queensland.

Lian, A-P, & Mestre, M-C.(1983) 'Goal-directed Communicative Interaction and Macrosimulation', in *Revue de Phonetique Appliquee*, 73-74-75, 1985, pp. 185-210.

Scovel, T. (1969). Foreign Accents: Language acquisition and cerebral dominance. *Language Learning*, 19(3 & 4), 245-254.

Seidlhofer, B. and C. Dalton-Puffer(1995) Appropriate units in pronunciation teaching:some programmatic pointers. In *International Journal of Applied Linguistics*, Vol. 5, No. 1, 1995, p. 135-147.

Shen Xiaonan(1989) Toward a Register Approach in Teaching Mandarin Tones. *Journal of Chinese Language Teachers Association*, Vol. XXIV: No. 3, October, 1989, pp. 27-47.

Xiaochun Miao & Manshu Zhu (1992) Language Development in Chinese Children. In H.C. Chen & O.J.L. Tzeng(Eds) *Language Processing in Chinese*, 1992, pp. 237-276. Elsevier Science Publishers B. V.

Weiss, W(1992)Perception and Production in Accent Training. *Revue de Phonetique Appliquee*, 102, pp.69-81.

Appendix:

Table 1: Error distribution with initials (consonants)

1997(n=8)(Group1)	1997(n=6)(Group 1)	1995(n=6)(Group 2)	1996(n=17)(Group 3)

(first oral)	(second oral)		
[x]=7	[x]=9	[x]=18	[x]=77
[j]=4	[j]=[q]=2	[q]=6	[q]=10
[c]=[s]=3		[zh]=3	[zh]=9
[z]=[q]=1		[t]=[h]=3	[ch]=8
		[sh]=[c]=2	[shi]=5
		[b]=[d]=[l]=[z]=[k]=1	[c]=5
			[j]=3
			[z]=[h]=2
			[s]=1
2.375	2.166	2.2	20

Table 2: Error distribution with finals

1997 (1st oral=8 students) (Group 1)	1997 (2nd oral=6 students)(Group 1)	1995 (6 students)(Group 2)	1996(17 students)(Group 3)
[i]=[ian]=9	[u]=5	[e]=7 errors	[uo]=18
[e]=6	[ian]=3	[u]=6	[e]=13
[u]=5	[uo]=2	[uo]= [un]= [ie]=3	[ai]=9
[ao]=[ei]=3	[ia]=2	[ui]= [an]=2	[i]=8
[ou]=[ai]=2	[ou]=2	[ian]=[iang]=[iu]=[u]=[ia]=[uan]=[ou]=[i]=1	[u]=[u]=7
[uo]=[iong]=1	[e][ui][ue][uan][ai][ie][i]=1		[ou]=6
			[ao]= [an]= [un]=5
			[ie]=[ui]=[ei]=[ia]=4
			[ua]= [ue]=3
			[ian]=[iao]=[ong]=2
			[iang]=[ang]=[en]=[iu]=[ing]=[uan]=1
5.125	3.5	Average: 5.6	6.88