Part C: Project Details

Project Title: Perceptual and acoustic characterization of Hong Kong English pronunciation errors, deviations and accent of primary school (P.5 & P. 6) students

Organization: University of Hong Kong/Faculty of Education/Centre for Communication Disorders

1. Background, needs & applicants' capability

1.1   Background & needs

Problems of Hong Kong English pronunciation

Typical Hong Kong Cantonese English (HKCE) accent, which is nurtured, perpetuated and consolidated through primary, secondary and tertiary education, contains many distortions and deviations from native English that it is not readily intelligible to the native ears. To boost our international status as the crossroad between the East and the West, and to meet greater challenges in the new, globalized millennium, it is imperative for our school leavers, graduates and professionals across different walks of life, to be linguistically more competitive. Things have to be done starting from the primary school level to reduce the disadvantageous Cantonese English accent of students at large.

Our recent acoustic and perceptual study of English pronunciation of more than 100 students from a primary school of high academic performance in her district revealed unexpectedly more serious problems than English educators would openly admit -- lack of confidence to read, reading with an inaudible volume, wild guessing with wrong pronunciation, predictable and uncommon errors and among others. It is the responsibility of our school English education system to step up English pronunciation and accent enhancement training. Speech scientists have a new role to play in helping introduce a scientific curriculum.

Vacuum of pronunciation training in English education curriculum

For decades, English has been taught and learnt in Hong Kong as if it was a dead language (Ho, 2005). Pronunciation training has been a vacuum in our English language curriculum at all levels of education. The primary and secondary English curriculum has focused on reading and writing rather than listening and speaking. The time for spoken English practice and conversation has been less than minimal. Ironically, under the examination-driven education system of Hong Kong, a student might attain very good examination results in English language, but not able to speak it intelligibly. Confronted with the complicated relationship between spelling and speech sounds they represent, most primary and secondary students are dumbfounded and forced to wrestle with the primitive problem of rendering a spelling pronounceable. Most students are bound to represent English sounds in a Cantonese and distorted way. Learning of the International Phonetic Alphabet (IPA) is non-existing in school English syllabi but highly demanded in the free market. The IPA is also minimally taught at the tertiary level.

Teachers' English accent

Teaching of English pronunciation is based on an unrealistic assumption that students can pick up a native or correct pronunciation from their teachers automatically without requiring much targeted drilling. Most local primary and secondary school teachers of the English are brought up and have been living in a highly linguistically homogeneous environment without need of communicating with native English speakers. For most of them, the classroom is the only environment where they have to speak English. Most of the time, they use it in a code-switched Cantonese environment, substituting Cantonese sounds for English pronunciation. As a matter of fact, their spoken English is heavily "cantonized" (Ho, 2005), sounding more like Cantonese than English.

Inadequate teacher training on pronunciation

Until now, higher institutes have not provided adequate training and development programmes on English pronunciation for English teachers. In fact, most local teachers of the English language, from primary up to the tertiary level, lack formal and targeted training on English pronunciation. At the secondary level, English teachers might not have studied English as a major subject in their tertiary studies. Traditionally, graduates who majored in English were too scarce to meet the huge demand for English teachers, let alone that they rarely joined or stayed in the English teaching profession. Graduates of the humanities and social sciences, as well as those who graduated from overseas institutes, were converted automatically to English teachers. Among those graduates of English major who became English teachers, they might be specializing in areas other than phonetics and phonology.

As teachers have not learnt English phonetics and pronunciation adequately, they tend not to teach it. Pronunciation correction is done minimally, within teachers' limited competency, often in a Cantonese or primitively way, or without any considerations of how Cantonese as the mother tongue influences L2 English acquisition. The English teaching circles are generally ignorant about acoustic phonetics and speech science.

Role of teachers questioned

The general deficit of teachers' English pronunciation skills is admittedly one anomalous phenomenon of the English education system in Hong Kong. Ridiculing the pronunciation problem of teachers has been a school culture and popular gossips about past school days. In the early days of 9-year free education, the majority of primary English teachers themselves could find communicating in English difficult. Traditionally, the teaching profession has not been able to attract the best English speakers of the society. Although a benchmark test was eventually enforced to boost the English standard of teachers of English and those who use English as an instruction medium, too little has been done to upgrade teachers' skills of pronunciation.

Native input

The introduction of native English teacher (NET) scheme, under which every primary and secondary school was allocated one native English teacher, was an additional measure which implicitly admitted and attested the long-standing deficiency of teachers' pronunciation and speaking skills. The scheme merely compensates for the societal decrease of native contact. In terms of the average number of contact hours and exposure each student has with a NET, the effect is bound to be inadequate. In addition, NETs come from countries around the world, whose accent may be different from the English pronunciation model which textbooks and audio materials described. Teachers and students are at a loss facing different accent varieties and a loss of a standard model. Some NETs are strictly speaking not native English speakers themselves. They are merely non-Chinese, or Chinese grown up overseas, who are *believed* to be able to speak English more fluently. Students' dissatisfaction with their teachers' and their own pronunciation problem makes them lose confidence in speaking English. However, only when students could be shown how to articulate correctly and more natively will they have confidence in speaking English and speaking up. A local English teacher is not trained and reluctant to teach pronunciation.

Loss of standard and reinforcement of Hong Kong accent

School children nowadays have more exposure to spoken English than before thanks to vacations and visits abroad. At home, children may have housemaids who communicate with them in English. Children have the opportunity of contacting different varieties of English. However, the most realistic input of English accent is that of teachers and housemaids. Children pick up deviated English accents from all origins. There lacks a standard model of pronunciation for children to follow. In the end, with the reinforcement of English learning at school and an elevation of status of their English accent at a local level, the globally accented Hong Kong Cantonese English emerges to be the mainstream and dominates.

### Lack of research on English phonetics, pronunciation and accent

In the past, English pronunciation training for teachers in Hong Kong is like a train without a

locomotive. Across our universities, among departments and research groups where phonetics and pronunciation is directly or indirectly involved, there is a severe lack of research and publications in English phonetics and pronunciation. Research efforts and resources have been channeled to matters other than this core of English linguistics. Our universities have not been able to offer more vigorous training on English phonetics and pronunciation because our universities lack native speaking experts of English pronunciation, for our phoneticians may be specialists of their own Chinese dialects, since our linguists may only be specialists of syntax and grammar rather than phonetics and phonology. And our phonologists may only be looking into our vernacular rather than a foreign tongue. Those overseas researchers on foreign accent have been trying to correlate it to a number of factors including the age of learning gender, amount of exposure and instruction, motivation of learning, language learning aptitude, and amount of L1 use during L2 learning (Piske, MacKay, & Flege, 2001; Lenneberg, 1967; Patkowski, 1990; Scovel, 1988; Long, 1990; Flege, 1988; Asher & Garcia, 1969; Tahta et al., 1981; Flege & Fletcher, 1992; Suter, 1976; Thompson, 1991; Flege et al., 1999; Thompson, 1991), rather than characterizing foreign accent itself.

1.2 Applicant's capabilities and future development

Accent identification and modification programme

Spurred by the professional drive to find a means to address the pitfall identified above, the Speech Science Laboratory, Division of Speech and Hearing Sciences of the University of Hong Kong has initiated a scientific accent identification and modification (reduction) programme to help learners of a second language (L2) scientifically, effectively and efficiently reduce undesirable accent originated from their first language (L1). By using theories in speech science, our accent identification and modification programme makes use of both scientific and traditional pedagogical methods similar to those implemented in speech therapy programme for patients with various speech problems (Ng, Gilbert, & Lerman, 2001; Ng & Wong, 2009).
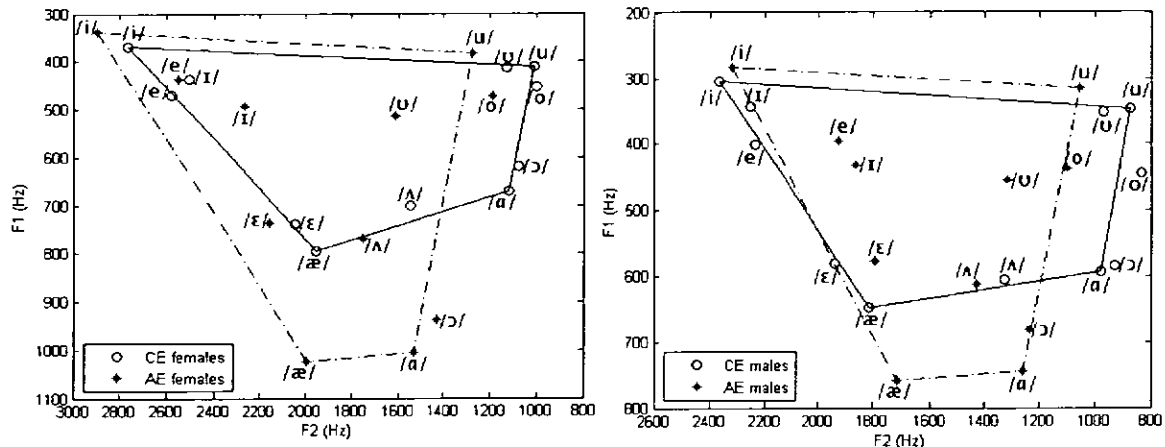
Our strengths

The Division of speech and Hearing Sciences is the only programme in Hong Kong which trains speech therapists. The Speech Science Laboratory has been involved in advanced research in accent identification, quantification and modification. Led by Dr. Manwa L. Ng, the director of the Speech Science Laboratory, the accent research team of the Speech Science Laboratory is formed by a multidisciplinary team of experts including speech scientists, computer engineers, linguists, speech therapists, and ENT doctors. The Laboratory has collaborated with renowned laboratories worldwide in instrumental research attempting to uncovering, prioritizing, and measuring the perceived accent found in the English produced by speakers of a non-English language, including Cantonese, Mandarin and Turkish (Chen & Ng, 2005, 2010; Ng & Chen, 2010; Ng, Chen, & Sadaka, 2008; Ng, Hsueh, & Leung, 2010; Sadaka & Ng, 2006, 2007). According to these studies, male and female adult Cantonese ESL speakers generally produce English vowels with deviations, as shown in the vowel spaces below. (Dotted lines represent native English speakers' productions, and solid lines represent the English vowels produced by Cantonese ESL speakers.)

What is foreign language accent?

Speech sounds are made by placing and moving different articulators including the tongue, lip, jaw, soft and hard palates during speech. Foreign accent (Munro, 1998), which is defined as the "non-pathological speech produced by second language learners", is caused by errors or deviations in the placement, speed, range and timing of movement of these articulators. An accurate control of these articulators requires motor skills beyond the conventional training of English educators. It is more of a problem of physics combined with performing arts indeed. According to theories of Motor Learning, provision of both implicit and explicit feedback information can facilitate more effective learning. It follows that, to render English learning more efficient, Cantonese ESL speakers need to train their articulators by providing implicit and explicit feedback.

Native-like pronunciation possible

Admittedly, mastering native-like foreign language pronunciation and accent without growing up in a native environment seems to be an unachievable ideal. Nevertheless, we occasionally come across speakers who manage to speak with a native-like accent without having grown up in a native environment whereas those who have spent a substantial number of years overseas are still speaking with a strong Hong Kong accent. Previous studies indicate that amount of accent depends on a number of factors including age of first exposure of L2 (e.g., Lenneberg, 1967; Flege, 1988), length of exposure to L2 (Flege, 1988), gender (Asher & Garcia, 1969; Thompson, 1991), formal L2 instruction (Suter, 1976), and motivation and aptitude of language learning (Flege, 1988; Flege, Yeni-Komshian, & Liu, 1999). In addition, ability in mastering native-like foreign language pronunciation seems not to be correlated with a learner's academic level, too. English learning should start when the learners are young, and targeted formal instructions regarding how to correctly produce L2 English sounds are necessary. In fact, Flege (1988) reported that age of L2 learning can explain for as much as 59% of variance in accent. Ideal accent reduction pedagogy must include a comparative analysis of L1 Cantonese and L2 English.

Previous studies have reported that pronunciation and accent can be improved with drilling. This is similar to practicing performing arts or sports, which requires both musical aptitude and motor skills, in which the motor skills of mastering native-like accent goes beyond the conventional training of English educators. If mastering a native-like foreign language accent is achievable, it should be a natural target for a language education system to include a training programme and to train foreign language teachers to help students get nearer to this ideal.

Our goal

To make the training of native-like English teachable and learnable, we endeavour to analyse and decompose the skills of a successful learner to develop a smart curriculum. If a fully L1-like accent of L2 and an entirely native-like L2 accent can be parameterized by n variables, they can be represented by an initial and a final point respectively in an n-dimensional space whereas an ideal learning process can be represented by a trajectory of movement from the initial to the final point. Reduction and enhancement refer to the same movement but different points of view. Whereas reduction focuses on the departure from the initial point, enhancement focuses on the approach towards the destination. The curriculum would consist of different modules of training which aim at pushing a learner along different parts of the trajectory. Movement along the trajectory could be discrete or continuous. As the accented English of the majority of Hong Kong people is located near the departure end, we may call our first series of programmes accent reduction programmes. Accent reduction, as the beginning stages of the entire path, tends to be discrete whereas enhancement towards the destiny, during the latest stages, tends to be more continuous.

Reduction of obvious errors (within a Cantonese framework)

The initial stages of accent reduction usually do not come in a continuous way. In the very first stage of development, when speakers of an L1 have their first and minimal contact with an L2, a total substitution of the sounds of L2 by those of L1 is usually the very first approximation they resort to and what actually happens (Lado, 1957; Eckman, 1987; James, 1985; Trubetzkoy, 1939). In the case

of Hong Kong Cantonese English, all sounds of English are syllabified and substituted by Cantonese syllables. This most Cantonese, pidgin-like, first approximation of native English, containing the maximum distortion of pronunciation, is too rough to be intelligible. The word 'girl', which is pronounced with two syllables instead of one, is a classical example. The letter 's' is pronounced with an additional vowel after the ending 's' sound. Slowly and gradually, the collective accent moved on to the second approximation where most people manage to articulate units of Cantonese sounds smaller than the syllabic level, like the initial and final 's' sound in 'sky' or 'cats', without adding an /i/ sound after /s/. This second approximation of English accent, still overwhelmingly Cantonese accented, belongs to the collective stage of most people in Hong Kong nowadays, including most teachers. However, in the environment of Cantonese-English code-switching, which is a commonplace in daily conversation and classroom teaching, most features of the first-generation pronunciation are preserved, conforming to the Cantonese environment they are embedded. The most popular practice of correcting pronunciation mistakes such as the failure of release of word-final plosives and fricatives, which is what most primary school English teachers are doing, can be seen as accent reduction at the most primitive level. The first and second approximation of English accent deviates significantly from the target native pronunciation that they are simply regarded as errors or mistakes, discernible even by some smart learners.

Reduction of less obvious errors arising from the problem of phonics (within a Cantonese framework)

As students grow up and meet more new words, their mistakes or errors arise out of the more primitive problem of phonics rather than pronunciation problem itself. Since most teachers have not systematically learnt to analyze the complex and confusing mapping between spelling and underlying sounds, they correct students' mistakes without recourse to phonetics symbols. Hence, teachers may sometimes correct students' pronunciation wrongly. Hence, there is a need for English-using teachers to learn IPA. English pronunciation correction practised by most secondary school English teachers operates within a Cantonese framework, replacing students' use of certain Cantonese sounds by others.

Reading IPA (within a Cantonese framework)

L1 speakers learning an L2 may easily fall into the trap of interpreting phonetic symbols representing L2 sound by those of L1. Some English teachers may have learnt to read the English IPA. The extent to which they utilize it is different. Some use it to clarify uncertain mapping between spelling and pronunciation. Unaware of the Cantonese IPA, however, they may be consistently

reading English IPA with Cantonese substitution, e.g. English /ʌ/ substituted by Cantonese /ɐ/. Other

may know conceptually that some sounds are distinct, e.g. English /æ/ different from /e/. However, there is always a gap between perception and production. Most teachers may know English /z/ is distinguished from /s/ and English /v/ is distinguished from /f/. But they may not manage to produce them correctly or consistently in natural speech, hence substituting /z/ by /s/ and /v/ by /f/.

Reading IPA (within a native English framework)

To further enhance an accent, in the first place, he has to overcome his L1 framework with which he perceives L2 sounds and be able to perceive all the features as native speakers do. To be able to articulate in a native way, advanced knowledge of phonetics and pronunciation have to be mastered not merely as passive perceptive skills but as active productive skills.

Reduction of deviations to achieve more native-like pronunciation (beyond the IPA framework)

Simply learning the IPA does not allow one to sound native-like. Representation of speech sounds by the IPA is merely qualitative. A native-like manifestation of phonetic symbols consists of more elaborate and dynamic features which description in terms of discrete symbols cannot resolve. Comparing the English and Cantonese phonemic inventory represented by the IPA, there are sounds which are represented by the same symbols. However, they are quantitatively different in their acoustic manifestation. For instance, the native English sound represented by /s/ differs significantly in duration from that appearing in a Cantonese syllable transcribed using the same symbol. If the /s/

produced by Cantonese speakers is so short that it does not meet the threshold of native English norm, it is not heard as a /s/. Or it is heard by a native speaker as if a /s/ is missing, although a Cantonese speaker may think he is pronouncing it. Such a duration problem happens to other fricatives like /f/. Likewise, quantitative difference in intensity occurs to plosives like /p/, /t/ & /k/. Transcending the IPA level, the trajectory of accent enhancement is of a continuous nature and becomes more subtle. Experiments show that the human ear is able to distinguish quantitative difference between native and non-native accent. However, even teachers of phonetics and native English teachers are not taught to pay attention to this level of accent difference. Even though it is possible for them to develop the skill of judging, describing and correcting accent at this level, reliance on human perception is bound to be subjective. This is where traditional descriptive linguistics and phonetics come to a limit and where the physical (acoustic) studies of speech can shed new light. This breakthrough is analogous to the advent of nanoscope, which allows one to gain higher resolution than microscope. Description of acoustic manifestation and difference between Cantonese English and native English is still largely unknown. Textbooks on phonetics and phonology, mostly written by native English speaking scholars, usually describe sounds of the target language without giving due consideration to foreign learners' difficulty arising from the influence of their mother tongue. Hence, even experts are not in a position to perceive difference from a foreigner's point of view. At this level, we need to work on acoustic phonetics research to correlate native speakers' perception and acoustic reality. For this reason, we have to work with the few practicing experts of English phonetics and pronunciation in the world, especially those engaged in forensic phonetics, to learn about their native perception judgment and probe it scientifically.

Current speech technology for accent reduction / enhancement

To assess learners and potential trainers, and to assist trainers in teaching the skills objectively, a scientific tool is necessary (Ng, Chen, & Sadaka, 2008; Ng, Hsueh, & Leung, 2010). This leads us to develop a scientific, evidence-based foreign accent modification programme. Training would be more efficient if it can be complemented by machine training because pronunciation does not belong to the mainstream English education and the number of contact hours with a native English teacher at school is very limited. Before the highly congested syllabus can be reformed to make space for this fundamental training, computer-assisted training is a way to automate the training and learning of this more fundamental skill. It is our ultimate goal, and a worldwide trend, to exploit the full capacity of computer and information technology to automate the learning and training process.

Although speech technology is not mature enough to fully automate pronunciation enhancement, the trend of ultimate development is emerging. Due to the very limited number of contact hours with native speakers the education authorities can afford to offer, the solution is to automate students' learning and training. E-learning or computer-assisted is the direction of ultimate development, which liberates people from the constraints of traditional type of teaching. Language policy makers and teachers should envisage its eventual impact. In the new generation of IT technology, teachers are no longer the centres of power to determine how information, knowledge and know-how should be distributed to students as they can be easily obtained by students. Teachers cannot deny that students can easily get better training than they can offer. It is the responsibility of teachers to keep themselves abreast of latest development. The education authorities should empower teachers by equipping them with more skills and abilities to meet new challenges. Acoustic training will become an inevitable component of language learning in the future. There is a need of modifying the existing syllabus and coming up a new one by including an English pronunciation training component. It is our long-term goal to develop an acoustic training programme which is transparent and differentiate all the skills as separate variables.

Acoustic characterization and perceptual evaluation

Before we can achieve all the above, we need to embark on the fundamental work of acoustic characterization and comparison of the target speech accent and our current English accent as well as perceptual rating. In singing, the most fundamental skill is to sing a melody in tune, according to a score. Basically, mastery of native-like accent is largely a skill of faithful reproduction of an acoustic signal. Whereas the underlying score of a musical tune exists and can be retrieved, some underlying recurring patterns for a foreign language, particularly those of intonation and stress, which are highly

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complex and vary from occasion to occasion, are yet to be discovered or described sufficiently. One objective and crudest means to probe the skill of native-like reproduction of pronunciation is to evaluate single instances of imitation, where the nearness of a target speech token and a test token can be compared by calculating their distance function for a set of physical parameters associated with the phonetic features extracted from the tokens. For instance, duration of single consonants, vowels and syllables, intensity and pitch contrast between stressed and non-stressed syllables, voice on-set time (VOT), formant frequency make-up associated with vowels and so on are the physical parameters which can be measured objectively. Acoustic characterization and perceptual evaluation, which are two standard research methods of speech rehabilitation for laryngeal cancer survivors, can be extended to acoustic accent reduction / enhancement (Ng, Hsueh, & Leung; 2010) therapy programme.

Pronunciation survey and characterization of errors and deviations

To develop an effective accent reduction training curriculum that is more targeted and tailor-made for the present need of the majority of native speakers of Cantonese, there is a need to identify the current state of their problems and areas of difficulty. So far, the collective accent of Hong Kong English has never been characterized objectively. Teachers are relying on their intuition and subjective memory when they refer to common mistakes. A large-scale perceptual survey will allow us to understand the actual distribution and error patterns, which forms an objective basis for the design of the curriculum.

The presence of accent in English produced by the ESL speakers can be readily perceived by native English speakers (Wells 1982). A more professional English teacher should learn to sensitize their ability of discerning accent not only categorically by means of classical phonetic transcription but also quantitatively which can be revealed by acoustic measurement. For instance, Flege (1984) revealed that foreign accent can be detected from segments of word-initial consonants of as short as 30 milliseconds (Sagisaka, 2003). To achieve even greater objectivity, we need to cross the traditional discipline boundary and turn to an acoustic (physical) and perceptual (psychological) approach. The dissemination of results of the large-scale pronunciation survey and acoustic characterization through workshops and seminars for teachers will fulfill the pioneering mission of educating the next generation of English teachers about descriptive phonetics as well as acoustic phonetics.

Thanks to the traditional dichotomy of education into the humanities and natural sciences, there is a huge gap between technological advance and the ability and readiness of teachers to use them. Conventional language policy makers tend to be skeptic about new technologies. For this reason, the most straightforward way of characterization by consulting native English experts' opinion on how native our pronunciation sounds, what sounds are heard as errors and deviations by native-speakers and what not, is not disposable. For this reason, our survey will include perceptual evaluation by native experts. We also try to include perceptual evaluation by phonetics practitioners and English teachers in order to probe the current societal limitations of know-how about English phonetics indirectly. By comparing their acoustic characterization, it is hoped that we can present a more realistic picture and point out the true problem of the present state of English pronunciation teaching to English educators at large and shed new light on the blind spot of English pronunciation education.

1.3 Long-term goals and objectives

We are planning a series of projects which aim at achieving the long-term goals discussed above and summarized below, with the ultimate goal of introducing a new paradigm of foreign language accent reduction (pronunciation errors and deviations at both segmental and supra-segmental levels) / native-like accent enhancement training programme, as well as an assessment system backed up by speech science.

Long-term & ultimate goals (with future projects)

⬦ conduct a large-scale survey of pronunciation errors of students of other education levels
⬦ conduct a large-scale survey of pronunciation errors of teachers across all sectors of education
⬦ develop a perceptual and acoustical framework for assessing English pronunciation errors
⬦ develop an attainment scale for assessing degrees of nearness to native-like pronunciation

◇ implement an official accreditation system to assess and recognize attainment
◇ develop a teacher-based training curriculum for pronunciation accent enhancement
◇ develop a computer-assisted accent assessment and training tool
◇ establish a multi-disciplinary centre for foreign language accent research and education
◇ establish a society of foreign language pronunciation and phonetics to promote native-like acquisition of foreign languages through pronunciation and accent teaching and training
◇ introduce a training regimen for teachers of all levels who use English as a medium of instruction

2. Project description

2.1 Short-term goals and objectives (present project)

Conduct a large-scale survey (through recording, perceptual and acoustic characterization) of English pronunciation errors and deviations of primary five and six students compared with those of dominant varieties of native English, based on which the needs of enhancement training for students are identified, competence of English teachers are probed, limitations of native English teachers are revealed, the competence of native English teachers and practitioners of English phonetics are probed indirectly, assessment framework is developed:

i. speech recordings will be obtained from 1,000 primary 5 & 6 students across all levels of academic ability randomly selected from schools of different districts and bandings. (As many schools as possible are targeted; 6 schools have given permission already; around 150 from one school have been recorded in a pilot test; all schools will be invited when the project commences officially). To ensure randomness and representativeness of participating students, the English teachers of the selected schools will be asked to provide a list of students of different English proficiency covering over-achieving, average, and under-achieving students.
    o identify and reveal the distribution and patterns of students' English pronunciation problems and difficulties,
    o identify the needs of pronunciation correction and accent reduction training,
ii. conduct perceptual characterization of students' pronunciation problems, errors and deviations based on the judgment of local practitioners and teachers of phonetics and pronunciation, local English teachers and native English teachers, and comparison with analysis by overseas native experts
    o set up working and study groups for local English teachers, native English teachers and various educators
    o probe and reveal the limits of the current state of perceptual nativeness of English teachers and educators.
    o identify needs of teacher training and development, university education
    o probe the competence of both non-native and native English teachers and practitioners of English phonetics.
iii. conduct acoustic characterization by speech scientists and project team,
    o calibrate perceptual judgment and correlate with dominant varieties of native English accent
    o provide objective basis for discussion, education and curriculum development
iv. enhance English teachers' knowledge and ability in pronouncing and help students pronounce more accurately
    o through hand-on participation in speech data evaluation, discussion with other teachers in working groups
    o workshops, seminars and meetings for working groups
v. research and development
    o learn about the state of the art of phonetic analysis practiced by native experts and adapt it to local needs
    o formulate a framework for assessing the pronunciation errors and deviations
    o develop an attainment scale to accredit achievements of native-like pronunciation

2.2 Tasks to achieve the goals and justification

▶ *Publicizing project and recruitment, setting up an advisory committee and project office*

Recruitment will be publicized. A multi-disciplinary advisory committee consisting local academics will be set up to monitor the progress and quality of the project. Job openings will be sent to all education institutes and departments of universities where relevant skills are relevant in order to look for and recruit the best candidates.

► *Invitation of local subjects and participants*

To recruit subjects for speech recording, invitation letters will be sent to all primary schools in HK, addressed to their school committees, principals and parent associations. Non-native and native English teachers, principals and parent representatives from all primary and secondary schools will be invited to participate in different working and study groups of the project. It is hoped that the sample will include participants (both females and males) from schools of different background (different districts, bandings, etc.)

► *Invitation of local practitioners of English phonetics and pronunciation*

Invitation letters will be sent to all education and tertiary institutes in HK, including secondary and primary schools, language institutes, language centres, departments of language education, modern languages, linguistics, English, phonetics, speech science, speech engineering, clinical linguistics, neuro-linguistics, and so on, where English teaching, English phonetics and pronunciation courses are offered. Teachers, instructors and academics will be invited to participate in perceptual evaluation.

► *Setting up an overseas native English experts of phonetics and pronunciation*

We will invite native English practitioners, researchers, professors and professionals of phonetics and forensic speech science who are interested in analyzing Hong Kong English accent to form a panel committee of native English judges. British English and American English are taken as the target models as they are the best described varieties of accent. The former has been the model targeted by English Education in Hong Kong whereas the latter is more dominant in the media and business. Modern research on phonetics has stemmed from Britain and flourished in America. We can surely find some experts in these two countries. Led by them, their research teams will take up transcription work. This is a feasible collaboration since we could contribute to them massive authentic data which they themselves will have immense difficulty and effort to collect.

► *Setting up a local teacher study group for English phonetics and pronunciation*

Through letters sent to schools, English teachers and teachers using English as an instruction medium who have a strong interest in upgrading their skills of phonetics and pronunciation will be recruited to form a study group. They will participate in different tasks. First, they will become subjects in our computer-assisted acoustic accent enhancement experiment. Second, they will become core attendants of regular talks and workshops organized for all English teachers and teachers using English as an instruction medium in secondary schools. Third, they will participate in a series of workshops on recollection of students' pronunciation errors. Fourth, they will participate in analyzing the errors of student's recorded speech. In the long run, we hope to develop this study group into a society for English pronunciation teaching and learning. The group will help organize and benefit from visits and talks by visiting overseas experts. We would establish a culture of opinion sharing and open discussion of one's pronunciation problem and limitation. Their experience, which will be shared in an annual report, will become very valuable reference for others.

► *Regular talks and workshops on English phonetics*

Regular workshops for non-native and native English teachers, and other evaluators are organized for them to discuss problems of students' pronunciation and evaluation. Regular seminars will be organized for all English teachers and teachers using English as an instruction medium in secondary schools, with the working group members as the core participants. Speakers include local specialists, and once to twice a year overseas experts. Topics of talks include standard to advanced knowledge and practical skills of phonetics and pronunciation. The aim is to educate

teachers and educators about the state of the art of professional phonetic analysis and acoustic phonetics, the needs and feasibility of accent reduction by scientific means. Through the workshops, teachers will explore and exchange their understanding and experience in classroom practice and teaching of pronunciation. Results of the progress of our survey and research will partly be disseminated through the talks. Talks are also held to reward parents who consent to let their children participate in speech recording.

▶ *Perceptual evaluation*

Concepts and framework will be developed based on which the speech recordings will be evaluated. Errors, deviations and accent will be evaluated by different evaluators. Evaluation by different groups is expected to be different due to different perceptual predisposition and knowledge. Comparison will lead to interesting results and patterns.

▶ *Error and deviation analysis based on narrow phonetic transcription*

All the recordings will be analyzed phonetically through narrow phonetic transcription, without reference to the text. Analysis is conducted by the panel of native English experts and by local panel. Based on their transcriptions, error and deviation analysis will be performed.

▶ *Accent (errors and deviations) analysis by native English experts*

Native English speaking experts of phonetics and forensic speech science will be consulted on the state of the art of transcription and description of accent in terms of errors and deviations in segmental and supra-segmental features. RP English is taken as the first target model as it is the best described variety of accent and it has been the model targeted by English Education in Hong Kong. Modern research on phonetics has stemmed from Britain. And there is no lack of experts in this nation. We would send our researcher to England to learn about the state of the art, as to how this knowledge is practiced in forensic speech science and other phonetics training. Collaboration with university research group of phonetics will be made

▶ Implementation of a web platform
A web platform is implemented to enable online access of speech data, retrieval for analysis and result uploading depending on user status. The platform will include tools for uploading and download speech data for evaluation. It will also contain teachers' experience about students' pronunciation deviations. It includes a forum enabling comment on and discussion about analysis of certain speech data. It serves as a platform for teacher development.

▶ *Research & development*

Acoustic characterization forms a cornerstone of all subsequent development -- correlation of subjective perceptual evaluation with objective reality, development of assessment framework and scale, development of accent reduction training curriculum, and development of speech technology for training purpose.

3. Targets and expected number of beneficiaries

3.1 Targets and participants

Students, English teachers, teachers using English as a teaching medium, native English teachers, phonetics practitioners, schools, international circles of scientific research related to English phonetics

3.2 Expected beneficiaries

3.2.1 *Direct beneficiaries*

professors, school principals, teachers, speech therapists, speech engineers, primary school students, secondary school students, university students

i. *For students*
- ★ All students participating as subjects in the text-dependent speech recording sessions will benefit from the report on their accent profile and comparison with others (anonymous).

ii. *For teachers*
- ★ Enhance teachers' sensitivity and ability in tracking students' pronunciation errors and deviations.
- ★ Enhance teachers' knowledge and skills of more native-like English pronunciation.

3.2.2 *Indirect beneficiaries*

The large-scale survey and analysis will provide real and objective data which reflect the realistic situation of our collective state of progress. They serve as valuable reference for departments across universities which should have been involved with teaching and research of English phonetics, and institutes and departments which are concerned with English language education, for government bodies such as the Curriculum Development Institute, the Hong Kong Examination Assessment Authority in formulating future directions and policy for curriculum development and assessment for students, teachers, lecturers and professionals on pronunciation attainment with respect to native-like standard. In the end, the whole English learning community will benefit from it.

4. Expected outcomes and deliverables

4.1 Deliverables

All data and analysis outcomes are distributed in the form of CDs, downloadable/ playable video and speech files, printed manuals and handbooks.

i. *Speech corpus* (CDs and online sound files)
- ★ speech recordings of all subjects (anonymous)

ii. *Handbook* (online publication & CD)
- ★ analysis results of pronunciation errors and deviations by different evaluators
- ★ published in printed version and delivered to each school
- ★ form an objective basis for teacher training and development
- ★ the analysis results present indirectly the perceptual limitations of English teachers at large. Local English teachers can learn about students' errors and deviations which they have not thought of or which they are not able to discern.
- ★ help enhance teachers' sensitivity of discerning pronunciation errors and deviations not only categorically by means of classical phonetic transcription but also quantitatively as revealed by acoustic measurement.

iii. *Manual on guidelines for phonetic analysis* (online publication & CD)
- ★ framework for analyzing pronunciation error and deviation
- ★ attainment scale for analyzing pronunciation error and deviation
- ★ published in printed version and delivered to each school
- ★ it serves as an education tool to broaden the horizon of local English teachers on phonetic science
- ★ study groups consisting of local English teachers of participating schools will receive training on how to use computer tools for phonetic analysis through workshops.

iv. *Web platform*
- ★ speech data retrieval and uploading
- ★ tools for perceptual evaluation, dissemination of results
- ★ forum for comment and discussion on speech data and analysis
- ★ platform for education of English phonetics and pronunciation, and accent reduction
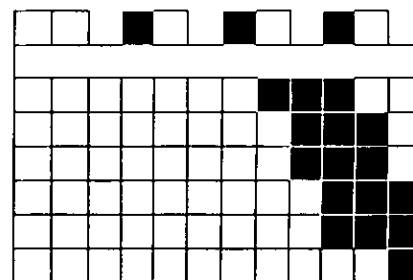
4.2 Outcomes

i. *Distribution and patterns of English pronunciation errors, deviations and accent*
   ★ perceptual evaluation by English teachers, native English teachers, local and overseas experts
   ★ acoustic characterization

ii. *For teachers*
   ★ elevate teachers' sensitivity and ability in tracking students' pronunciation deviations.
   ★ enhance teachers' sensitivity in their own pronunciation errors and deviations.
   ★ enhance teachers' knowledge and skills of reducing Cantonese English accent.
   ★ arouse attention and interest in English phonetics and pronunciation among the English teaching circles.

iii. *For students who have contributed their speech data*
   ★ participating students and their parents could login to the website to check their own profiles

iv. *For all participants who have contributed their speech data*
   ★ participating students and their parents could login to the web platform to check their own results and learn about the latest news and development
   ★ platform to be extended to provide pronunciation correction service

iv. *Research output*
   ★ Presentation of findings in international and local conferences
   ★ Publication in international and local journals
   ★ Our data will be very valuable for international research communities across different disciplines -- English linguistics, speech engineering, neurology, second-language education, and so on for future research purposes.

5. Implementation plan with time-line (Duration: 24 months)

Time line (Month): 0 2 4 6 8 10 12 14 16 18 20 22 24

Task	Timeline
Setting up the project team	
• Recruitment of project manager, IT developer & research assistants, setting up project office	■ (0–2)
• Publicizing project, setting up a project advisory committee	■ (0–2)
Liaison	
• Inviting all primary schools in HK to recruit student subjects	■■ (0–4)
• Inviting all primary and secondary local and native English teachers to join working groups	■■ (0–4)
• Inviting and liaising with local English phonetics practitioners, instructors and academics, and native English speaking experts	■■ (2–6)
Speech recording and data management	
• plan and organize recording materials	■ (2–4)
• record text-dependent speech from students	■■■■■■ (4–16)
• organize speech data for retrieval, storage and publication	■■■■■■ (4–16)
IT & web programming	
• Implementation of web platform and evaluation tools	■■■■■ (0–10)
• Web publication of assessment results	■■■■ (10–18)
• Presentation of acoustic characterization of speech accent	■■■■ (16–24)
Perceptual evaluation of speech data & acoustic characterization	
• by English teachers, native English teachers, local phonetics practitioners	■■■■ (8–18)
• acoustic characterization	■■■■ (10–18)
Research & development	
• literature review, development of assessment framework & attainment scale	■■■■ (2–10)
• compilation and collation of different perceptual evaluations	■■■ (4–14)
• writing reports and presentation of results for conferences and journals	■■■■ (8–18)
Workshop and seminars	
• hold regular talks for parents and schools of speech recording subjects	■ ■ ■ ■ (intermittent)
• hold regular workshops and seminars for participating teachers	■ ■ ■ ■ (intermittent)

• hold regular workshops and seminars for practitioners of phonetics
Production of deliverables & dissemination of results
• drafting and review of handbooks and manuals
• collection and compilation of feedback from the experts and participants
• implementation of website for access of demonstration, data and results
• production of attainment scales and assessment manuals
• production of handbook for survey results, assessment manual
• two-day local conference disseminating outcome of project

6. Manpower

Technical Manager II (2-year full-time)	A full time Technical Manager II functioning as a Project Manager is needed to oversee and coordinate the entire project. A candidate possessing the most cross-disciplinary and multi-lingual skills is sought to fill the post. He has to demonstrate good knowledge of phonetics and phonology and experience in some foreign languages. Working knowledge in acoustic phonetics and programming would be an advantage. • overseeing the administration and proper execution of the entire project; • liaising with experts to develop assessment framework and attainment scale; • coordinating with PI to handle all research-related and academic issues; • visiting schools and liaising with teachers, and arranging for data collection; • coordinating with research assistants to conduct and monitor data collection; • carrying out acoustic analysis and supervising research; • directing production of deliverables (handouts, documents, website, CD, etc.); • disseminating research results including giving seminars to and leading workshops for schools.
Research Assistant II (IT Technician) (1-year full-time)	A full time Research Assistant II with an emphasis on information technologies who possesses a degree in IT or related field will be hired for a period of 12 months (during the second year of the project). • coordinating data collection and analysis; • setting up and maintaining the website platform for data storage and showcase project results; • CD production and online publication.
Research Assistant II (2-year full-time)	One two-year full-time research assistant at the level of RAII will be needed. direct speech recording with school children • help organize accent reduction seminars and workshops; • provide talks for parents whose children participate in speech recording; • carry out acoustic analysis and phonetics research; • develop accent assessment framework and curriculumvisiting schools and liaising with teachers and principals on matters related to data collection and workshops; • assist in workshops to teachers; • oversee production and delivery of CDs; production of CDs in bulk and delivery to schools; dissemination of results
Services provided by overseas experts and local specialists	Inputs from the overseas experts and local specialists, including the PI, are crucial to the success of this project. The services will include providing high-level academic leadership in planning and implementation of the project over the entire project period (24 months). In particular, the time used in analysing the acoustic and video data, running seminars and workshops for teachers and principals, etc.

7. Budget with detailed breakdown

	Detailed breakdown / justification	Year 1 (HK$)	Year 2 (HK$)	Subtotals (HK$)
i. Staff Cost				
Technical Manager II (full-time)	$20,950 + $1,000 MPF per month (24 months)	263,400	263,400	**995,268**

Research Assistant II (IT) (full-time)	$12,380 + 5% MPF per month (12 months)	0	155,988	
Research Assistant II (full-time)	$12,400 + 5% MPF per month (24 months)	156,240	156,240	

ii. Services

Consultancy fees	assessment by overseas experts of forensic /acoustics phonetics ($800/hour x 100 hours)	0	80,000	**248,000**
Services & lectures provided by experts & specialists	$700/hour x 20 hrs/month (12 months)	0	168,000	

iii. Equipment

Portable audio recording systems	Since all data recordings will take place in schools, and high-quality recordings will be required, 3 high-end portable recording systems will be needed. Each system is equipped with a fast notebook computer ($8,500) connected with a preamplification unit (Fast Track Pro, M-Audio) ($1,600) and a high-quality condenser microphone (SM58, Shure) ($1,200). (Total for each system: $11,300) $11,300 x 3 = $33,900	33,900	0	**63,900**
Portable video recording system	To capture visual images of school children during English production, a good-quality portable video recording system will be needed.	30,000	0	

iv. General Expenses

Local travelling expenses	for speech recording	2,500	2,500	
Production of CDs	to all stake holders and participants	0	15,000	
General expense for workshops and seminars		0	20,000	
Digital media	High-capacity digital storage media for storing and transporting recorded audio and video data from site of recording to Speech Science Laboratory of University of Hong Kong for editing and data analyses.	3,000	0	**45,000**
Others	• Stationery, office equipment and accessories • Printing, photocopying and mailing • Books, journals and software for referencing	1,000	1,000	
Administrative service charge	• Cost of administrative support provided by the University of Hong Kong • This includes bookkeeping and management reporting (covering daily accounting tasks, periodic statements and reporting), staff recruitment and retention (covering advertisement, processing of applications and appointments), tendering and purchasing of equipment and supplies (covering provision of tendering and procurement services).	12,516	12,516	**25,032**

			Total	1,377,200

8. Asset Usage Plan

Category (in alphabetical order)	Item / Description	No. of Units	Total Cost	Proposed Plan for Deployment *(Note)*
audio and video equipment	(1) portable audio recording systems, (2) portable video recording system	3 1	$33,900 $30,000	To be used by the Speech Science Laboratory of the Division of Speech and Hearing Sciences, University of Hong Kong for teaching and research purposes

Note: *for use by school / organization / in other projects (please provide details of the department / centre to which the asset will be deployed and the planned usage of the asset in activities upon project completion).*

9. Report Submission Schedule

My organization commits to submit proper reports in strict accordance with the following schedule:

Project Management		Financial Management	
Type of Report and covering period	Report due day	Type of Report and covering period	Report due day
Progress Report 1/1/2012 - 30/6/2012	31/7/2012	Interim Financial Report 1/1/2012 - 30/6/2012	31/7/2012
Progress Report 1/7/2012 - 31/12/2012	31/1/2013	Interim Financial Report 1/7/2012 - 31/12/2012	31/1/2013
Progress Report 1/1/2013 - 30/6/2013	31/7/2013	Interim Financial Report 1/1/2013 - 30/6/2013	31/7/2013
Final Report 1/1/2012 - 31/12/2013	31/3/2014	Final Financial Report 1/7/2013 - 31/12/2013	31/3/2014

10. Evaluation Parameters and Methods

The success of the project can be evaluated in terms of the following parameters:
- ► Internal and external evaluation will be conducted to ensure the effectiveness of the project and to identify benefits and facilitating factors as well as limitations and hindering factors
- ► The internal evaluation will be administered via informal and formal meetings, questionnaire surveys and field tests with participating schools to understand the stakeholders' views, comments and satisfaction with the system. Their comments would be reflected in the performance indicators. In addition, the Project team will review, evaluate, revise and modify the work and then suggest ways for improvement.
- ► The external evaluation will be done by a steering committee comprising members from tertiary institutions, oversea experts, local subject experts, school principals and teachers to monitor the overall progress of the project to ensure that it is on track, on schedule and on budget.

11. Sustainability of the Outcomes of the Project

► The project is just the beginning of a whole series of research projects and implementations which can be sustained for at least another decade. With this first experience of assessing the English accent of students at the end of their primary education, the project team will continue to find resources and funding for assessing the accent of other forms and levels.

► This project can be considered the first systematic attempt of a speech community in working out a large-scale survey and characterization of her own foreign language pronunciation errors and deviations, a fundamental and realistic problem which has never been tackled seriously.

► The compilation of a large speech corpus and native perceptual characterization will expose the problem in an objective manner to the local English teaching sector at all levels. These valid and reliable data serve as sources of reference and a basis for developing a curriculum for English pronunciation and accent reduction and training.

► The data serve as an objective basis for development of automatic acoustic accent reduction computer programme, which will be attempted in future projects, and for other scientific studies of speech accent.

► Recognizing and correcting pronunciation mistakes is practiced at all levels, across all professions, but with little professionalism. Making the pronunciation data objective and publicly accessible through a website is a pioneer effort of generalizing and manifesting this common wisdom of our society. Hence, the web platform has a great potential of being further developed to educate the public about English pronunciation and phonetics and to provide service of English pronunciation correction and training.

► The room of professional improvement and enhancement for teachers of a foreign language never ends. Through the study groups consisting of enthusiastic teachers and school heads, we will strive to create a culture of self-correction and self-improvement through mutual assessment and discussion. To sustain the momentum of the new impetus, we would strive to develop the study groups into a kind of society of English phonetics and pronunciation for the English teaching profession, and apply for research and education funds to fill the huge gap of fundamental teacher development.

► The accent reduction programme to be developed will be useful not only for acquisition of English but also that of Mandarin and other foreign languages. It will lend support not only to Hong Kong speakers learning foreign tongues but also overseas or Chinese immigrants learning Cantonese. The unique programme of accent reduction and therapy will be the first of its kind, not only in China but also in Asia, if not in the world. It will meet the surging demand for more efficient English accent acquisition in a rapidly developing China. With the core know-how, we can move on to apply it to address other issues of foreign accent.

► Under the present university hierarchy, we are the least mono-disciplinary division or department which can accommodate an initiative with such widespread applicability. From our division, we aim at striving for a university-wide multi-disciplinary collaboration with departments of engineering, music, Chinese, English, linguistics, physics, computer science and give support to language centres, departments of languages and linguistics. Our vision is to extend our speech therapy programme to that for second language acquisition.

Appendix A
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