

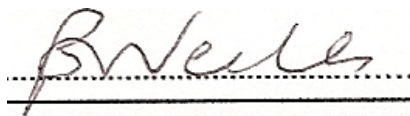


Spring Symposium  
27-28 February 2015

Young Researchers  
in the Science of  
Learning

I am delighted to welcome you to the **Spring Symposium for Young Researchers in the Science of Learning** hosted by the Laboratory for Communication Science, the Strategic Research Theme in Science of Learning (SoL) and the Faculty of Education.

The goal of the SoL is to establish an Area of Excellence that will be the first in Asia. To achieve this goal we are actively developing cross-disciplinary collaborations with groups of researchers across campus. Our strategy aims to synthesize expertise from Faculties to ignite innovation and build a platform for research development in the Community. Our collaborations with Healthy Aging, Neuroscience, Public Health and Law and Literature illustrate our success as do our projects, publications and funding achievements with colleagues in Dentistry; Diagnostic Radiology; Electrical & Electronic Engineering; Institute for Human Performance; Linguistics; Neurology; Neuroscience; Nursing; Oncology; Orthopaedics and Traumatology; Paediatrics and Adolescent Medicine; Psychology; Psychiatry; the State Key Laboratory for Brain and Cognitive Science; Social Work; and Surgery. The Faculty of Education and specifically the Division of Speech and Hearing Sciences (SHS) has developed a niche in the study of skilled and impaired reading and spelling in a range of languages including Cantonese, Greek, Mongolian, Persian, Putonghua, Russian, Spanish, Slovakian, Swedish and Turkish. In less than five years we have established an international reputation for cross-linguistic work on literacy making the Faculty a global hub for the study of reading across language groups (Indo-European and Sino-Tibetan). We are privileged to host talented HKPF PhD students, Post-Doctoral Fellows and Research Assistant Professors as well as junior research scientists. A strategic goal is develop expertise in Semitic and African languages and here we look to colleagues in our highly ranked (RAE) English and Linguistics Departments who have expertise in these languages as well issues reflecting the range of languages in our such as Asian Englishes, Superdiversity and others. We are delighted to welcome our guests today.



Chair Professor Brendan Weekes, PhD  
Co-convenor of the Strategic Research Theme in the Science of Learning (HKU)  
Director of the Laboratory for Communication Science  
Key member and Coordinator, Strategic Research Theme in Neuroscience, HKU  
Principal Investigator in the State Key Laboratory for Brain and Cognitive Sciences  
Professorial Fellow School of Psychological Science, University of Melbourne  
Visiting Fellow Hughes Hall, University of Cambridge.

## Schedule (Venue: Meng Wah Complex Room 802)

### Day 1 February 27

- 8.30-8.45 Registration  
8.45-9.00 Opening Remarks

### Methods

- 09.00-09.30 Dr Andy Gao (Education)  
09.30-10.00 Dr Cathryn Donohue (Linguistics)  
10.00-10.30 Mr Steve Roberts (EPSU)

Break 10.30-10.45 Meng Wah Terrace

### Post-Doc Presentations

- 10.45-11.05 Dr Elizabeth Barrett (SHS)  
11.05-11.25 Dr Junling Gao (Centre for Buddhism Studies)  
11.25-11.45 Dr Kati Keuper (Psychology)  
11.45-12.05 Dr Andy Tse (IHP)  
12.05-12.25 Dr Cherry Yum (SHS)  
12.25-12.45 Dr Linda Zhang (Radiology)

Lunch 12.45-2.00 Meng Wah Terrace

### Graduate Student Presentations I (14.00-15.40)

- 2.00-2.20 Anastasia Ulicheva  
2.20-2.40 Mehdi Bahktiar  
2.40-3.00 Jinghua Ou  
3.00-3.20 Carmen Ooi  
3.20-3.40 XinXin

Break 3.40-4.00 Meng Wah Terrace

### Student Experience

- 4.00-4.30 Dr Cecilia Chan (CETL)  
4.30-5.00 Dr Lisa Lim (English)

### Keynotes

- 5.00-5.40 Professor Jubin Abutalebi  
5.40-6.20 Professor Dekai Wu tba  
6.20-7.00 Professor Andy Tolmie

Day 2 February 28

Impact

09.00-09.30 Dr Janet Hsiao (Psychology)

09.30-10.00 Dr Kofi Yapko (Linguistics) tba

10.00-10.30 Dr Olga Zayts (English)

Break 10.30-10.45 Meng Wah Terrace

Graduate Student Presentations II (10.45-12.45)

10.45-11.05 Sanyin

11.05-11.25 Kate Kuzmina

11.25-11.45 Eileen

11.45-12.05 Wilhelm? van Ginneken

12.05-12.25 Guanzhong

12.25-12.45 William Choi

Closing Remarks (12.45-13.00)

## Abstracts

Jubin Abutalebi, Dr. Assoc. Prof.  
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### **Bilingualism induces neural benefits for aging populations**

Culture, education and of other forms of acquired capacities act on individual differences in skill to shape how individuals perform cognitive tasks. Of interest, bilingualism also appears to be a factor that shapes individual performance on tests of cognitive functioning. Bilingualism seems to affect also brain structure, inducing increased gray matter in brain areas responsible for executive control. This neural benefit may potentially offer protection to bilinguals against cognitive decline in aging.

The primary aim of this presentation is to illustrate how the bilingual brain becomes more resistant to cognitive decline. The results of our combined comparative behavioral and neuroimaging studies carried out in aging bilinguals and monolinguals show that if well matched for demographic and behavioral variables such as age, socio-economic status, education, and global cognitive functioning, bilinguals have generally increased grey matter densities as compared to monolinguals in brain areas usually affected by physiological aging and in areas involved in cognitive control. Increased grey matter also correlates with the superior performance of bilinguals on executive control tasks. Interestingly, in order to keep such a neural benefit the degree of proficiency of the second language has to be relatively high and bilinguals have to be constantly exposed to their second language.

In conclusion, bilingualism may represent a neural reserve for healthy aging. However, the benefits are most prominent when second language proficiency and exposure are kept high.

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### **Whole-body vibration as a potential treatment to improve phonatory function**

Background: Whole-body vibration, the oscillatory movement transmitted from a mechanical vibration source to the body, has been shown to cause neurogenic adaption of the skeletal muscles and facilitate muscular function improvement (Cardinale & Wakeling, 2005). Phonatory function, in terms of intensity, has been found to improve following whole-body vibration at around 10 -15 Hz when compared to vibration below 10 Hz (Yokoyama and Hoshino, 1973).

Aim: To identify whether whole-body vibration, compared to resonant voice training, would improve voice related quality of life and vocal function, in terms of maximum frequency and intensity.

Method: Adults with self-perceived voice problems were randomly assigned to one of three treatment groups: 1) resonant voice training, 2) whole-body vibration, or 3) a combined treatment. Vocal folds were visually examined. Pre- and post-treatment outcome measures included: maximum fundamental frequency, intensity and voice related quality of life. Participants attended individual therapy three times a week for three weeks.

Results: All treatment groups showed an improvement in their voice related quality of life following treatment. The whole-body vibration and resonant voice training groups showed similar improvements on vocal function outcomes, with an increase in maximum fundamental frequency and intensity.

Conclusion: Similar vocal function outcomes were observed after nine sessions of whole-body vibration or resonant voice training.

References:

Cardinale, M., & Wakeling, J. (2005). Whole body vibration exercise: are vibrations good for you? *British Journal of Sports Medicine*, 39, 585-589.

Yokoyama, T., & Hoshino, K. (1973). Effects of whole-body vibration on speech voice intensity and maximum phonation time. *Nihon Jibiinkoka Gakkai kaiho*, 76 (12), 1414-1425. Retrieved from <https://www.jstage.jst.go.jp/browse/jibiinkoka/-char/ja/>

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### **How to develop generic skills for engineering students in Hong Kong Higher Education?**

As the world moves towards knowledge-based economies, increased emphasis is being placed on graduates' acquisition of generic skills competency along their disciplinary knowledge. The inclusion of generic skills development into the accreditation criteria of accreditation bodies highlights the importance of generic skills development in engineering education.

A mixed method study conducted in Hong Kong with a representative sample of over 1700 engineering undergraduate students from three research-intensive universities found that majority of the engineering students believe that generic skills are important

and are better developed through extra-curricular and out-of-class activities such as internship, community service-learning and hall education.

Widely supported in the higher education literature is that students' perception of the learning context and their approaches to learning can influence student learning outcomes (Prosser & Trigwell, 1999; Lizzio, Wilson, & Simons, 2002). While deep approach to learning is found to be related to high quality learning outcomes in discipline knowledge context (Trigwell & Prosser, 1991), the extent to which the approaches of deep, surface and strategic learning can be applied to generic skills development as a learning outcome is questionable. By introducing a framework developed based on Prosser and Trigwell's 3P model (1999) and Yan and Kember's (2004) concept of "avoider" and "engager" behavior in learning activities, this paper aims to offer another perspective to student approaches to learning and student engagement in the development of generic skills, apart from the well-known deep and surface approaches.

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### **Thinking Styles of University Students with and without Hearing Impairment in the Context of Inclusive/Mainstream Higher Education**

With the development of inclusive/mainstream higher education, an increasing number of students with hearing impairment have achieved access to university education. However, how these students experience higher education is largely unknown.

The present research addresses this issue from the perspective of intellectual styles. A series of three studies with samples of 213, 366, and 129 students with hearing impairment were first conducted to validate the Thinking Styles Inventory-Revised II (the TSI-R2) through test accommodations. Then, the TSI-R2 was administered twice to 256 students with and 286 without hearing impairment within one academic year.

Results indicated that the accommodated TSI-R2 was reliable and valid for students with hearing impairment. In comparison with hearing students, students with hearing impairment scored lower on Type I (more creativity-generating, less structured, and cognitively more complex), but higher on Type II (more norm-favoring, more structured, and cognitively more simplistic) thinking styles. After one academic year, hearing students showed increased use of Type I and less use of Type II thinking styles, whereas students with hearing impairment demonstrated increased use of both Type I and Type II thinking styles. Moreover, style changes differed across university class levels. Contributions, limitations, and implications of the present research are discussed.

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## **One system or two? Evidence from cross-language lexical prosodic transfer**

Whether L1 and L2 are processed by one or two systems has been a focus of debate for many years. The current study examines this issue by investigating the possibility of cross-language prosodic transfer among Cantonese-English bilinguals. Also, the underlying pathways or theoretical accounts, namely the acoustic and linguistic hypotheses for prosodic transfer have been tested.

A total of 27 Cantonese-English bilingual and 27 English monolingual second and third graders have been evaluated for their Cantonese lexical tone sensitivity, English lexical stress sensitivity, general auditory sensitivity and working memory. Independent t-tests revealed that the two groups performed equally well on English stress perception, general auditory processing and working memory. Correlational analysis revealed an association between Cantonese lexical tone and English lexical stress sensitivities even after controlling for general auditory sensitivity. General auditory sensitivity, however, showed no significant correlation with either Cantonese lexical tone or English lexical stress sensitivity.

The results suggest the occurrence of prosodic transfer among tone and stress, implying that L1 tone and L2 stress are not processed by completely separate systems. Furthermore, collective evidences suggest that the prosodic transfer is mediated by their linguistic but not acoustic features, which is consistent with the linguistic hypothesis regarding the underlying pathway for prosodic transfer. In addition, collective evidences implied the role of prosodic transfer in helping bilinguals achieve native-like L2 stress perception. Our findings regarding prosodic transfer not only inform the bilingual research field the importance of suprasegmental perception, but also lend our support to the holistic view of a classic and ongoing debate about “one system or two”.

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## **An Examination of Wisdom in the form of Nonattachment in relation to compassion meditation: A preliminary evidence from EEG**

Introduction:

There is an increasing trend for educators to explore the mindfulness-based approaches or other contemplative techniques to improve teaching and learning. Awareness of present context and of ever-changing nature of information helps mindful learning (Langer 1997). A non-judgmental attitude can reduce our habitual reaction which may makes our attention stray away from the present learning. Awareness Training Program (ATP) is a Mahayana Buddhist teaching based intervention, of which, wisdom and compassion are the main ingredients. In this study, the correlation between wisdom and



compassion would be examined. Wisdom, in the form of nonattachment, would be measured by the Nonattachment Scale (NAS; Sahdra, et al., 2010). Compassion would be measured by EEG while subjects meditated.

#### Methods:

Thirty healthy adult subjects with age of  $47 \pm 8$  year-old participated in this study. They were asked to perform an 8-minute compassionate meditation and have an 8-minute normal rest with the eye closed during an EEG recording section. The EEG (Davidson, et al. 2000) data was obtained by EGI™ 128-channels system in a quiet and dim room. All subjects had filled in the Nonattachment Scale questionnaire (NAS) in prior.

For Data analysis, the raw EEG data was firstly resampled with 250Hz and filtered by a bandpass of 0.5~100Hz and notched with 48~52Hz. Data segments with obvious artifacts such as head movements were deleted directly. Other bad channels were replaced by interpolation with rest channels. Independent component analysis was done for the data and the components related with eye movement/ blink, muscular activity, and other possible noise were removed. Finally, the EEG data was re-referenced by the average of all channels. EEGLab was used for spectrum analysis (Zietsch, et al. 2007) in delta band (1~4Hz), theta band (4~8), alpha band (8~12), beta band (12~30), and gamma band (30~80). Analysis was performed on the EEG data of compassion meditation and resting-state, and also with that of NAS.

#### Results:

EEG spectrum power between resting-state and compassion meditation were compared. However, no significant difference was found. Correlational analysis between NAS measurement and the EEG spectrum power of resting-state and compassionate meditation was performed. NAS was found to have significant correlation with alpha-wave and delta-wave during resting-state and compassionate meditation. Therefore, investigation continued with focus on these data with significant correlation. The participants were further separated into high-NAS and low-NAS sub-groups for comparison. Analysis showed that high NAS sub-group had significantly higher alpha-wave and delta-wave than those with low NAS during resting-state and compassionate meditation (Fig.1).

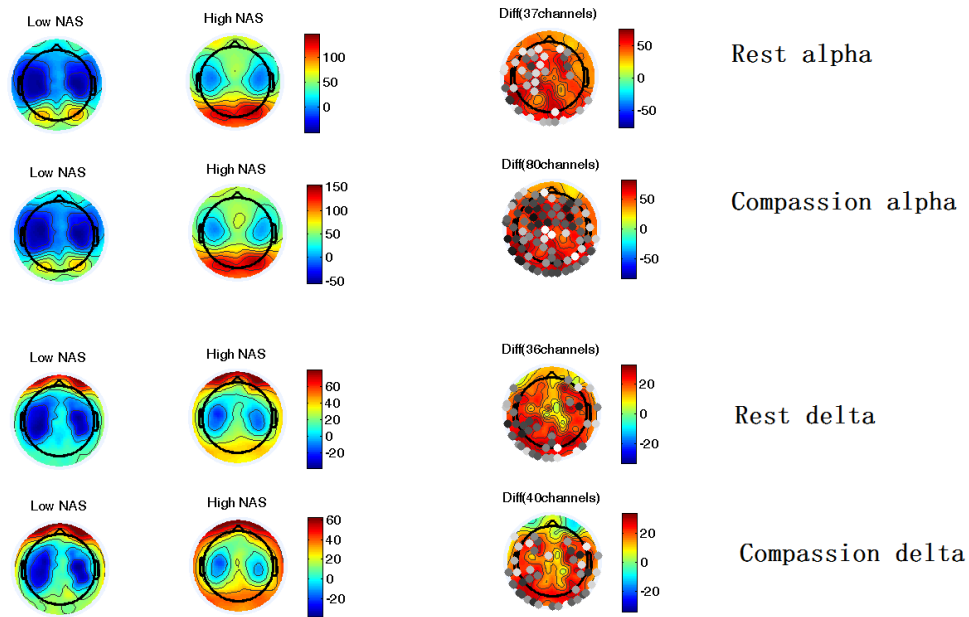
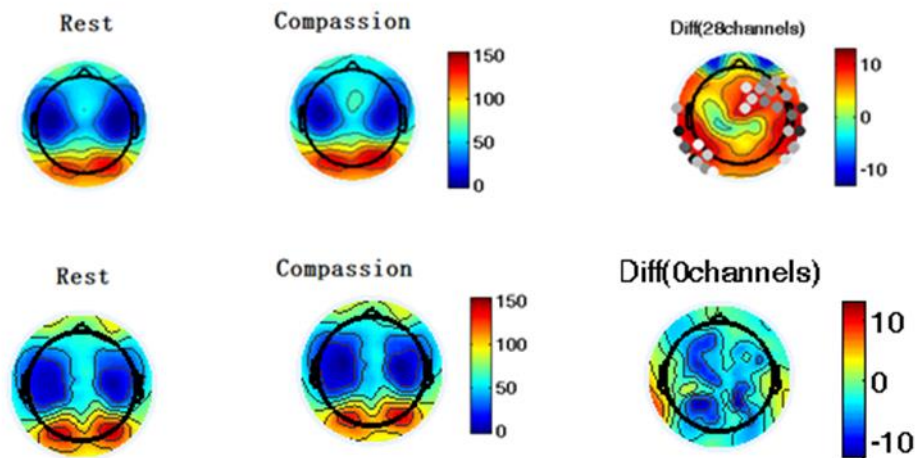


Fig. 1 Differences in alpha and delta waves of low-NAS subgroup and high-NAS subgroup during rest-state and compassionate meditation.

Analysis was also carried out to compare the two sub-groups in term of their respective alpha waves during resting-state and compassionate meditation. Significant difference between resting-state and compassionate meditation was only observed in high NAS subgroup with alpha wave power significantly higher in the frontal-central region and bilateral temporal lobes (Fig. 2).



**Fig.2 Difference of alpha wave between compassion meditation condition and normal rest condition in high-NAS sub-group (upper figure) and Low-NAS sub-group (lower figure).**

#### Discussion and conclusion:

Non attachment, the most important kind of wisdom as understood by Mahayana Buddhist (NAS; Sahdra, et al., 2010), may help to minimize the impact of external stressors, or distraction during learning. Our data showed that participants with high NAS tend to have high alpha and delta waves, both in resting-state and compassion meditation. The higher power of slow wave (i.e. alpha and delta waves) has been found to be related with the experience of nondual awareness (Berman and Stevens 2015). This is in line with another study that long-term meditators exhibit slower mean frequency of theta-alpha (Aftanas and Golocheikine 2001). It is plausible that higher NAS participants might have greater compassion and peace of mind and thus decreased automatization and reactivity by influencing the activities related to the bilateral temporal lobes, which are related to memory recall, and the frontal lobe, which is related to decision making and categorization. This difference seemed more obvious in subjects with high NAS during compassion meditation. Our data suggest that wisdom of non-attachment may influence brain wave pattern and mediate the impact of compassion meditation. This potentially, can foster a present-centered attention for learning.

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### **A Critical Review of Empirical studies on foreign language learning and teaching in Chinese journals**

In this presentation, I report on a review study on empirical studies in leading language learning and teaching journals published on the Chinese mainland during the years 2008–2011. Through an extended process of selection, 60 empirical studies were chosen to showcase the research scholarship published in these leading Chinese journals. The selected studies were found to have documented a variety of approaches to improving the teaching of the English language and meeting the demand for proficient English graduates in China. They address a wide range of topics including language learners' cognitive processes, their language performance, and language teachers' professional development. The review also noted that these leading Chinese journals have become more receptive to empirical studies and have published an increasing number of qualitative and mixed method studies. However, in comparison with those published in international journals, research scholarship in those journals is still beset with problems and there is a pressing need for Chinese researchers to become 'discerning' producers of scholarship. The findings suggest that they should be more critically aware of methodological issues in conducting language learning and teaching research.

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### **Perceptual expertise: Attention and information processing mechanisms**

Perceptual expertise in the recognition of visual stimuli, such as faces and visual words, has often been described as fast and automatic. Recent research has started to reveal the cognitive mechanism underlying this perceptual feat. In this talk, I will introduce two behavioral effects that are related to the development of perceptual expertise: holistic processing, defined as failure of selective attention to parts, and left side bias, an indication of right hemisphere lateralization in information processing. Using face

recognition and visual word recognition as examples, I will illustrate the relationship between recognition performance and these behavioral effects, and how different learning experiences such as reading an alphabetic vs. an logographic language or drawing/writing experiences modulate these effects. These findings have important implications for the perceptual skills required for mastering visual recognition and the universals and specifics for different expertise domains.

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### **Asymmetries in Prefrontal Control over Emotional Stimulus Processing – Effects of Targeted Cortical Inhibition by Continuous Theta Burst Stimulation on Event-Related Potentials and Fields**

Basic research suggests that the dorsolateral prefrontal cortex (DLPFC) contributes to emotional affect and emotional stimulus categorization. In order to investigate the causal influence of lateralized prefrontal structures on emotion-related neural networks and processes (Davidson, 1992), left vs. right DLPFC activity was selectively reduced by means of inhibitory continuous theta burst stimulation (cTBS, Huang et al., 2005). After the stimulation protocol, participants passively viewed low-arousing neutral and high-arousing positive and negative German nouns while EEG and MEG were recorded. We found enhanced brain activity in posterior brain regions for both positive and negative compared to neutral stimuli (200-600ms, Early Posterior Negativity (EPN/EPNm) and the Late Positive Complex (LPC/LPCm)). Importantly, ERPs (P1, EPN, LPC), ERFs (EPNm, LPCm) and behavioral data converge in the finding of a differential influence of the stimulation site on the processing of negative compared to positive words: Left frontal inhibition led to enhanced activity and better behavioral performance in response to negative stimuli whereas right frontal inhibition caused the reverse pattern. Based on these findings, we conclude that lateralized prefrontal structures control early stages of emotional stimulus processing by modulating neural networks related to perception and attention in a valence-specific manner.

Davidson RJ (1992) Emotion and affective style: Hemispheric substrates. *Psychological Science* 3: 39–43.

Huang Y-Z, Edwards MJ, Rounis E, Bhatia KP, Rothwell JC (2005) Theta burst stimulation of the human motor cortex. *Neuron* 45: 201–206.

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**Statics and dynamics of cognitive deficits in Russian speakers with aphasia**

Clinical neuropsychology has a long tradition in Russia particularly Luria's work on the functional anatomy of language and memory in the study of aphasia. Luria's work developed in conjunction with cultural psychologist Vygotsky who wrote that "A word is, first of all, an abstraction and generalisation, thus it is an act of thinking". The idea about the intimate relationship between language and thinking was supported by findings revealing that deficits in attention, memory and executive control coexist in aphasia (Hachioui et al., 2014).

Here we investigated the cognitive deficits associated with aphasia. Our first step was to develop a standardized battery of cognitive processing based on Birmingham Cognitive Screen (BCoS) (Bickerton et al., 2012), BCoS was chosen as it minimizes language processing relying instead on non-linguistic performance to assess cognitive function. 34 patients with aphasia and 23 healthy controls were tested with the BCoS. Results show that patients had lower memory and executive control scores than controls. Re-testing after a 1 year allowed us to assess the validity of these tests in measuring functional outcomes.

People with aphasia are challenged to re-learn their native language for rehabilitation. Our results highlight the cross-cultural validity of using BCoS for neuropsychological rehabilitation of aphasia.

Bickerton, W. -L., Riddoch, M. J., Samson, D., Balani, A. B., Mistry, B., & Humphreys, G. W. (2012). Systematic assessment of apraxia and functional predictions from the Birmingham Cognitive Screen. *Journal of Neurology, Neurosurgery & Psychiatry, 83*, 513-521.

Hachioui, H., Visch-Brink E., Lingsma, F., Sandt-Koenderman, M., Dippel, D., Koudstaal, P., Middelkoop H. (2014) Nonlinguistic Cognitive Impairment in Poststroke Aphasia: A Prospective Study. *Neurorehabilitation and Neural Repair, 28*, 273 – 281.

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### **Review: Phonetic and Phonological Development on Mandarin Speaking Children**

Standard Chinese, referring to Mandarin, has become the most popular language in the world with more than 1.9 billion speakers worldwide. Yet, the Mandarin speech sound acquisition is still not well established despite of plentiful studies on the phonetic and phonological development of other languages. Before 1990s, related longitudinal studies have been carried out in US and Taiwan with quite limited number of Mandarin children. Later on, some population studies have investigated Mandarin speech sound acquisition and the phonological patterns but with an incomplete age range and not many research findings published in English. So this review aimed to provide a comprehensive

understanding of Mandarin speech sound development conducted by previous research. Methodological issues and study results were analyzed, with design flaws identified and directions for future research proposed.

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### **Urban linguistic diversity in-field and online: Nurturing collective, socially relevant and transformative research in education**

That cultural and linguistic diversity is diminishing worldwide has been recognised for some years now, and research on minority/endangered languages has burgeoned in the past two decades. Recent work also encompasses the diversity found in large urban centres, to which increasing numbers of peoples, many of them speakers of such languages, migrate. Using research on Hong Kong's diversity as a case in point, I distil three elements that I consider crucial in research and teaching and learning practice if our aim is to nurture students with the integrity and competences for the complex ecologies of the 21<sup>st</sup>-century knowledge economy. First, the world is indeed the best classroom: teaching practice that involves as a major component the conducting of research in the field – in particular in local contexts and communities that are at the same time familiar and unfamiliar – brings across to students lessons no classroom can impart. Second, the platform for delivery needs to have potential for the authentic: having projects contribute to an academic website, for instance, underscores to students that their research output has value beyond their final paper and course grade, and is a means of motivating original and socially relevant research. Finally, leading students to a critical reflection helps crystallise their learning experience. Together these can bring about a transformation in students – evidence that our research and teaching do have impact on learning.

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### **Characterising Secondary Students' Reasoning about Data in Relation to Prior Concept in Science**

Approaches to conceptual change teaching assume the role of data in modifying students' concepts. This paper aims to understand secondary students' reasoning about data in relation to prior concepts about Newton's First Law.

324 Grades 6-8 students first completed a conceptual pre-test. Then they completed a reasoning task in which they evaluated a claim about the motion of an object against data as measurements of its speed. A 2 (the claim: scientific concept vs. misconception) by 2 (quality of data: high vs. low) between-participants design was taken. Participants rated

how they thought the data were sufficient for evaluating the claim, and gave explanations.

Results suggested that: (1) most of them evaluated data quality or evaluated correctness of the claim in the reasoning; (2) the effect of quality of data on strategy use in the reasoning, and this effect was moderated by prior concept; (3) the interaction between prior concept and quality of data was not moderated by the consistency between prior concept and the claim under evaluation.

These findings reveal that reasoning about data varies as a function of prior concept, data characteristics, and knowledge about experimentation and data variation. Implications for instruction and future work were discussed.

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## **Phonological short-term memory and Cantonese relative clause comprehension in children with and without SLI**

Children with Specific Language Impairment (SLI) have difficulties with relative clauses (RC). One proposed explanation is a deficit in the computation system for argument movement and thematic role assignment. It was suggested that these computation difficulties are a result of a phonological short-term memory (pSTM) deficit. The ability to store items, and to accurately retain their serial order, is crucial for learning the comparatively longer and the non-canonical word order of sentences with RC. This study aimed to examine the pSTM of 18 Cantonese-speaking children with SLI, aged between 4;00 and 6:4 years, via tasks that either maximized the serial order or the item pSTM. Study 2 examined RC comprehension in these children and Study 3 examined the role of pSTM in RC comprehension via a change detection task. Children with SLI performed significantly poorer than their age-matched controls in the serial order task, the item pSTM task, and the change detection task. The children with SLI were comparable with their aged-matched controls on RC comprehension. Results confirmed earlier findings that



children with SLI had a pSTM deficit. Their deficit in pSTM however did not translate into RC comprehension difficulties. This study provided directions for clinical intervention.

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### **An ERP study of individual variations in perception of Cantonese rising tones: Implications for a perception-production link**

During speech perception, sound representations are derived from a multidimensional space encompassing a plethora of acoustic information unfolding over time (Holt & Lotto, 2010). This dynamic process is characterized by individual variations in which listeners might differ in their sensitivity to contrasts of different linguistic cues. The present study employs both behavioral and event-related potential (ERP) measures to examine individual differences in speech perception and production emerging in an on-going sound change - merging of the two rising tones, T2 and T5, in Hong Kong Cantonese (HKC). Two patterns are particularly focused on – good perception and production (control), good perception but poor production (partial-merger). Our overall findings reveal differential sensitivity of controls and partial-mergers to different acoustic signals at the perceptual and cognitive levels as evidenced by differences in magnitude of brain responses to rise time, and to pitch as reflected in the Mismatch Negativity which is taken to indicate auditory memory. They not only shed light on the dynamic processing of tone in sound change but also potentially contribute to our understanding of the link between speech perception and production.

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### **Educational Video Production: Design Principles for Meaningful Learning**

It would take an individual over 5 million years to watch the amount of video that will cross global internet networks each month in 2018, with video consisting of 79% of all consumer internet traffic in 2018 (Cisco, 2014). Whilst this vast access and consumption of video by no means implies viewers are engaging with or learning from high-quality content, it does indicate that video is a dominant online modality for information 'chunking' and broadcasting.

In light of this ubiquity of video, the ease in which technology can be leveraged to create viewing environments, and its potential as a medium to provide input, higher education (HE) has been integrating video into teaching and learning at a rapidly growing rate. Flipped classrooms, Massive Open Online Courses (MOOCs), blended-learning classrooms

and distance courses are a few of the many contexts in which video is employed as a tool for learning.

But, given this huge uptake, perhaps it is worth pausing to consider the nature of the videos which are being produced. In this seminar, we will discuss approaches to multimedia design; explore foundational ideas on cognitive load and working memory; and collaboratively analyse multimedia design principles to aid cognition and learning.

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### **Educational Neuroscience: Why, What – and How?**

Scientific understanding of learning and its use to inform teaching practices is of central importance to both researchers and educators. The sheer range of theories about learning illustrates the complexity involved, but over the past ten years it has become clear that any complete understanding will depend on the integration of work on cognitive and social processes with consideration of how brain function shapes – and is shaped by – learning. Educational neuroscience attempts to coordinate evidence from behavioural and neuroimaging studies to obtain this more complete picture, with the goal of specifying the pedagogical approaches and educational systems that will support learning most effectively. I will use research in science learning to demonstrate the potential of the field to better explain learning processes in a coherent fashion and identify the key features of successful pedagogical strategies. The translational nature of this work presents challenges because it requires significant levels of collaboration between researchers and educational practitioners. However, communities of researchers and education professionals have now begun to emerge in a number of different locations, providing models of how these might work to set an effective research agenda and ensure that it is targeted at application and intervention from the outset.

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### **Effects of different motor learning instructions on motor skill acquisition: A pilot study of rope skipping training for children aged 5-6 years**

Research in motor learning suggests that provision of analogy instructions can induce stable motor performance in difficult situations, such as those that involve psychological stress or secondary tasks (e.g., Liao & Masters, 2001; Poolton, Masters, & Maxwell, 2006, 2007). Limited research has been conducted to test this proposition in children. The purpose of this pilot study was to explore the use of an analogy-assisted instruction protocol compared to explicit instructions on children's rope skipping training. A group of

four experienced physical education teachers were invited for a focus group interview to (a) design explicit and analogy-assisted instruction protocols that best describe the rope skipping skill, and (b) identify key assessment criteria to evaluate performance outcomes. Twelve children (5 boys and 7 girls) 5 to 6 years of age were recruited and were randomly assigned to one of the two instruction protocols for 3 training sessions. Results revealed that children in the analogy-assisted instruction group gained significant improvements earlier than those in the explicit instruction group, indicating analogy-assisted instruction may be more effective for promoting early improvement in performance. Moreover, a transfer test with a concurrent secondary cognitive task (counting backward in 2's) further indicated that children in the analogy-assisted instruction group performed more effectively with a higher number of successful jumps, while those from the explicit instruction group displayed decrements in performance. However, both groups showed no significant difference in movement form. These results suggest that analogy-assisted instructions may be used to aid children when acquiring complex motor skills, with potential benefits related to reduced cognitive processing requirements (effective dual-task performance). The findings provide the basis for further research that will examine the effectiveness of analogy-assisted instruction for complex motor skills in children.

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## **Reading in Russian: What is different? Evidence from humans and computational models.**

The Anglocentric view on the reading process could be rather limiting when applied to other orthographies. One dimension that has not been widely investigated in reading research is phonotactics. This talk will focus on how phonotactic rules influence oral reading in the Russian language. Notably, the correspondences between orthography and phonology in Russian are regular and consistent, but they are subject to substantial phonotactic constraint, because the position of a phoneme and its context within the word alter its pronunciation. I will present empirical data on how humans read Russian words and nonwords and report the results of simulations performed by the Russian

versions of the dual-route cascaded (DRC) and the connectionist dual-process models (CDP++) that give some idea of the potential difficulties that the models may experience when faced with a language that is much different from English.

Wouter Frans van Ginneken (Supervisors: Dr. Catherine Capio, Dr. Jamie Poolton, and Prof. Richard Masters)

### **Where to look for automaticity; in the brain or in the body?**

The well trained movements of athletes, dancers or musicians can seem effortless. Untrained movements on the other hand require effortful attention. Apparently, over the course of learning, movements become automatized. What exactly is this automaticity? Traditionally, it is pictured as a processing shift from conscious to unconscious that occurs inside the brain. Indeed studies show that automatized skills are less dependent on working memory, which indicates a shift away from consciousness. But is this shift necessarily confined within the brain? Alternatively, motor control might be outsourced to the body itself. In fact, the human body has a large capability to control itself. Automaticity might therefore be a cultivation of this capability. A literature review was conducted to investigate the prevalence “brain vs. body centered” views of automaticity. Results revealed that most studies adopt “brain centered” views. Bodily movements are either not measured, or in ways that do not reflect their ability for self-control. Suggestions, for “body centered” investigations are provided. Especially, by studying throwing motions – for which feedback by the brain is too slow to have an effect - it might be possible to investigate how the body can achieve self-control.

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### **Playing with a model of competition and selection in the multilingual mind**

For language to evolve and change over time the language system needs to have variants caused by imperfect replication and there must be a *selection* process on those variants (Croft, 2000). In my research I regard the mind as the primary locus of competition and selection of variants, and hence of language change. By drawing on the analogy between language contact in the development of creoles and language contact in the multilingual brain a model is developed that intends to explain what type of structures tend to converge in multilinguals. The model takes aspects from evolutionary biology, attractor networks and optimality theory in terms of constraint ranking. Competition between variants is characterized by the degree to which they overlap in conceptual space and the extent to which they are reinforced by other structures with similar form, but is also determined by inherent properties of the variants. In the model, these inherent properties are spelled out by a continuum reflecting the degree to which the content

relates to the discourse level. That is, a variant that has low semantic content is a weak competitor whereas a variant that bears discourse-related content is a strong competitor.

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### **Phonological regularity and consistency effects in second language Chinese reading**

This study examined the sensitivity to and time courses of two measures of orthography-phonology mapping – phonological regularity and consistency – in relatively proficient second language (L2) Chinese readers. A Chinese character is regular when it has the same pronunciation as its phonetic radical, while it is consistent when it is pronounced similarly to its orthographic neighbors that share a phonetic radical. Using a lexical decision task, we collected event-related potential (ERP) data of single character reading. Native readers have shown phonological effects at the N170, but L2 readers did not exhibit either regularity or consistency effects at this component. Regularity effects were seen starting at the P200, with irregular characters eliciting greater positivity over right frontal regions relative to regular characters, followed by greater N400 in the left hemisphere for irregular characters. Consistency effects were not seen at the P200, and inconsistent characters showed an enhanced N400 and a smaller LPC compared to consistent characters. The findings demonstrated that L2 readers responded to both phonological regularity and consistency, although phonological access was delayed compared to native readers. The timing of the effects also supported that regularity affected sub-lexical orthography-phonology mapping while consistency exerted lexical-level influence in L2 Chinese reading.

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### **Brain volumes differ between Caucasian and Chinese cognitively normal elderly controls**

International neuroimaging initiatives are convenient resources for researchers; however, for these global cohorts, ethnicity may be a confounding factor. Studies have shown that brain morphometric differences exist between Asians and Caucasians, but to understand the effect of ethnicity in normal ageing and its implications on neurodegenerative disease, further research is required.

Cortical volumes of 32 cognitively normal Hong Kong Chinese elderly individuals (HK-Ch) were compared with those from 99 Caucasians from the ADNI database (ADNI-C),

matched in age and gender distribution. We replicated our analysis using 32 Chinese (UCSF-Ch) and 32 matched Caucasian (UCSF-C) cognitively normal elders scanned at the University of California, San Francisco. All 3T MRI scans were processed at UCSF using FreeSurfer v5.1. Segmented and parcellated volumes were extracted and analysed in Stata 11. We compared total cortical volume (TCV) and the combined cortical volume of regions typically affected by Alzheimer's disease (ADRCV), correcting for brain volume.

Both TCV and ADRCV were significantly smaller in Chinese groups compared to their Caucasian counterparts. In addition, ADRCV was significantly smaller in HK-Ch compared with ADNI-C even after correcting for TCV ( $p=0.005$ ).

Our findings show that ethnicity has an effect on TCV, and may also affect AD-specific regions. Future studies should take care to use ethnically appropriate comparison groups.