

Project number 31

## Neural Foundations of Successful Second Language Learning: Roles of Cognitive, Experiential and Sociopsychological Individual Differences

### [ 1 ] Research group

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Expenditure report of research funds :

Subject's honorarium 157,000 YEN

Consumables 23,000 YEN

### [ 2 ] Research setup

The main objective of the current project was to examine perceptual and cognitive profiles of successful English-as-a-Foreign-Language (EFL) learners in Japan. This will in turn provide a crucial information for both teachers and students to better understand how to make the most of their experience in classroom settings.

In Year 1, our team recruited a total of 55 first-year Tohoku University students who had studied English only through six years of EFL education without any experience overseas. First, we assessed their L2 English proficiency from multiple angles via using up-to-date listening (phonemic and prosodic perception), pronunciation (timed oral narratives), and lexicogrammar tests (non-word and grammaticality judgements).

Then, we individually interviewed to elicit information regarding participants' past, recent and current L2 learning experience (where, how, and how much they have been practicing L2 English inside and outside classrooms) by using

the Foreign Language Learning Experience Questionnaire (Saito et al., 2018, *Language Learning*). Finally, we assessed each participant's brain signatures related to three perceptual-cognitive abilities relevant to phonological (auditory processing), lexical (declarative memory) and grammatical (procedural memory) aspects of L2 learning.

In 2019-2020, the team organized two international symposia in Sendai and London. At each event, we presented and introduced the preliminary ideals and results of our collaboration project to researchers, students and practitioners. To further discuss and strengthen the methodological rigor of the project, we invited a range of experts in neuroscience (e.g., Dr Christos Pliatsikas, University of Reading, UK) and second language acquisition (e.g., Dr Robert DeKeyser, University of Maryland, USA) and seek their receive feedback and advice.

1<sup>st</sup> SYMPOSIUM (2019.4.24): “*Interdisciplinary Approaches to Cognitive Foundations of Successful Second Language Acquisition*,” Tohoku University, Sendai, Japan.



2<sup>nd</sup> SYMPOSIUM (2019.12.3 ~ 12.4): “*Second Symposium: Neurocognitive Foundations of Foreign Language Learning*,” Institute of Education, University College London, London, England.

*Figure* Summary of Event Organization Between 2019-2020

### [ 3 ] Research outcomes

#### ( 3 – 1 ) Results

All the linguistic, perceptual and cognitive data are currently analyzed from multiple angles. According to our preliminary analyses, those who attained high-level L2 proficiency likely demonstrated greater precise auditory processing; however, the predictive power of cognitive abilities (phonological short-term memory, executive functions, long-term memory) remained unclear within the current dataset.

Given scholars have increasingly acknowledged the importance of the open science approach in various academic disciplines, we are currently working on a registered report for a top-tier journal, *Bilingualism: Language and Cognition* (Wiley Blackwell). In this way, we can start publicizing our collaboration work even before data collection and analysis is completed. After our initial discussion with the journal's editor, we plan to submit by **the end of March 2020**.

- Saito, K., Jeong, H., Sugiura, M., Révész, A., & Tierney, A. (in progress). Registered report: Perceptual-cognitive foundations of successful foreign language learning. *Bilingualism: Language and Cognition*.

A range of pilot studies were conducted at University College London and Tohoku University, wherein we tested the validity of our perception and cognition measures. A total of seven papers are currently under revision or review (with PI's student collaborators).

#### ( 3 – 2 ) Future perspectives

In addition to the registered report, the team will write a few academic papers for publication in top-tier journals in L2 education (e.g., *Studies in Second Language Acquisition*) and cognitive psychology (e.g., *Cognitive Science*). This proposed project will allow the team to test the validity/feasibility of the research framework, strengthen the record of collaboration, and apply for large-scale research grants in the near future (e.g., JSPS Bilateral Grant; ESRC Standard Research Grant).

At every phase of manuscript writing and grant application, PI and CIs' postgraduate students will be involved. They will receive training, which will in turn help develop their future career.

### [ 4 ] List of Papers

\*indicates PI's student collaborators

#### Main Dataset

(1) Saito, K., Jeong, H., Sugiura, M., Révész, A., & Tierney, A. (in progress). Registered report: Perceptual-cognitive foundations of successful foreign language learning. *Bilingualism: Language and Cognition*.

#### Pilot Dataset

(2) Saito, K., \*Kachlicka, M., \*Sun, H., & Tierney, A. (under revision). Domain-general auditory processing, age, experience, and post-pubertal L2 speech learning: A behavioural and neurophysiological investigation. *Journal of Memory and Language*.

(3) Saito, K., \*Sun, H., \*Kachlicka, M., \*Robert, J., Nakata, N., & Tierney, A. (under revision). Domain-general auditory processing explains multiple dimensions of L2 acquisition in adulthood. *Studies in Second Language Acquisition*.

(4) Saito, K., \*Sun, H., & Tierney, A. (under revision). Domain-general auditory processing as a perceptual-cognitive anchor of L2 pronunciation learning in adulthood: A longitudinal study. *Applied Psycholinguistics*.

(5) \*Sun, H., Saito, K., & Tierney, A. (under revision). Domain-general auditory processing and L2 segmental and prosody acquisition. *Studies in Second Language Acquisition*.

(6) Saito, K., \*Tran, M., \*Suzukida, Y., & Tierney, A. (under review). Auditory processing and individual differences in L2 speech learning in adulthood. *Language Learning*.

(7) \*Zheng, C., Saito, K., & Tierney, A. (under review). Successful second language pronunciation learning is linked to precise auditory processing rather than music aptitude. *Second Language Research*.