

Project number 63

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 9,5000 YEN
Consumables 5,000 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 (2019-2020), we hosted two international symposia at Tohoku and University College London, wherein a research team discussed, conceptualized, and refined our research collaboration plan. With an aid of the fund, we conducted a pilot study in order to test the validity of the measurement batteries (e.g., memory tasks, auditory processing tasks) as preparation for the main study. The results of the pilot study were presented at various online conferences (Saito & Tierney, September, 2020, *Japan Second Language Acquisition Research Forum, Tokyo, Japan*).

In Year 2, we have launched a main project which aims to examine the perceptual, cognitive, and biographical profiles of advanced EFL learners in Japan. A total of 75 university-level students were recruited at various sites in Sendai, Japan. After their learning experience was interviewed in terms of the length, quality and timing of foreign language education and immersion (study-abroad), they took the linguistic, perceptual, and cognitive ability tasks. Their linguistic performance was measured via Grammatically Judgement Task, Speech Perception Task, and Speech Production Task. Their perceptual abilities were measured via Formant, Pitch, and Duration Discrimination Tasks. Their cognitive abilities were measured via Phonological Short-Term Memory Task, Complex Working Memory Task, Declarative Memory Task, and Procedural Memory Task. As for the participants' speech production, a range of native speaking raters were recruited to assess the quality of sample for segmental, prosodic, temporal, and lexicogrammar accuracy based on the rubrics that PI Saito established elsewhere (Saito, Trofimovich, & Isaacs, 2017, *Applied Linguistics*).

[3] Research outcomes

(3 – 1) Results

All the temporary analyses were completed. The results have demonstrated a range of emerging patterns. First, the primary determining factor of advanced L2 proficiency concerns the presence/absence of participants' immersion experience (explaining 30-40% of the variances). Second, the secondary determining factors include to participants' individual differences in auditory perception (explaining 10-20% of the variances) and in cognitive abilities (explaining 5-10% of the variances). The tentative findings here lend support to the team's hypothesis (a) that the rate of success in EFL settings can not fully explained by experience-related factors; and (b) that both

perception and cognitive factors matter to some degree.

The PI and CIs are currently working on manuscript writing, including a range of student collaborators as co-authors (e.g., Cui Haining). The ms will be submitted to *Bilingualism: Language and Cognition*.

*indicates student collaborators

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

Furthermore, the team is planning another follow-up experiment/data collection (Experiment 2) in order to further examine precisely how auditory perception relates to a specific case of L2 speech acquisition (i.e., participants' sensitivity to second and third formants vs. English [r] and [r̥] perception and production by Japanese speakers).

(3 – 2) Future perspectives

In addition to the ongoing papers, the team will write a few academic papers to summarize the outcomes of the international collaborations 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., *Haining, C., *Suzukida, Y., Suzuki, Y., Jeong, H., Sugiura, M., Révész, A., & Tierney, A. (in progress). Registered report: Perceptual-cognitive

foundations of successful foreign language learning. *Bilingualism: Language and Cognition*.

(2) Saito, K., *Kachlicka, M., *Sun, H., & Tierney, A. (under review). Domain-general auditory processing as a bottleneck of language acquisition: Dimension-specific relationships between perceptual acuity and second language segmental learning in adulthood. *Cognition*.

Pilot Dataset

(3) Saito, K., *Kachlicka, M., *Sun, H., & Tierney, A. (2020). Domain-general auditory processing as an anchor of post-pubertal second language pronunciation learning: Behavioural and neurophysiological investigations of perceptual acuity, age, experience, development, and attainment. *Journal of Memory and Language*, 115, 104168.

(4) Saito, K., *Sun, H., *Kachlicka, M., *Alayo, J. R. C., Nakata, T., & Tierney, A. (in press, 2021). Domain-general auditory processing explains multiple dimensions of L2 acquisition in adulthood. *Studies in Second Language Acquisition*, 1-30.

(5) Saito, K., *Sun, H., & Tierney, A. (in press, 2021). Domain-general auditory processing determines success in second language pronunciation learning in adulthood: A longitudinal study. *Applied Psycholinguistics*.

(6) *Sun, H., Saito, K., & Tierney, A. (in press, 2021). Domain-general auditory processing and L2 segmental and prosody acquisition: A longitudinal study. *Studies in Second Language Acquisition*.

(7) Saito, K., *Suzukida, Y., *Tran, M., & Tierney, A. (in press, 2021). Domain-general auditory processing partially explains L2 speech learning in classroom settings: A review and generalization study. *Language Learning*.

(8) *Zheng, C., Saito, K., & Tierney, A. (in press, 2021). Successful second language pronunciation learning is linked to precise auditory processing rather than music aptitude. *Second Language Research*.