

*Residency summary report:* My ICE-funded research was conducted at Kanagawa University in Yokohama, Japan, between June and August, 2017. I worked under the supervision of Dr Rie Matsunaga on the perception of traditional Japanese and Western musics in native Japanese listeners. Dr Matsunaga's previous research had demonstrated dissociable neural networks in the inferior frontal gyrus of Japanese listeners that independently process tonal-syntactic violations of Japanese and Western musics. My research schedule was to investigate whether or not these tonality-detecting neural populations interacted with the timbral and temporal dimensions of music. MEG neuroimaging protocol was developed in collaboration with Drs Jun-Ichi Abe and Koichi Yokosawa at Hokkaido University in Sapporo. Five weeks into the project, however, I received news that the MEG apparatus had broken down, that repairs would take several weeks, and that these circumstances rendered the original research schedule nonviable. By this time we had completed our stimulus development and pilot testing at Kanagawa University and were one week away from beginning the neuroimaging research at Hokkaido University. The challenge thus became How to translate the work in progress into a new, meaningful and informative research project, with six weeks on the clock.

I had made acquaintance with sensei ANDO Masateru, a koto master and the last living student of MIYAGI Michio. ANDO-sensei had offered to teach me traditional koto performance twice a week for the duration of my stay in Japan. These private lessons were conducted in Japanese and concerned all aspects of the world of koto, from the physical mechanics of the instrument, instrument care, performance posture and techniques, to the traditional names of the thirteen strings, tones, and scales, and finally the reading of traditional Ikuta School musical notation. Thus, in addition to the sheer privilege of such an opportunity to immerse myself in the traditional Japanese musical culture, I learned more about the theory, structure and technical organization of Japanese music than I ever could have grasped from analytical investigations in the laboratory.

One of the most exciting discoveries to come from this experience was the formal notation within the Ikuta scores of a phonetic code representing the "timbral envelope" of the music. That is, in addition to the melodic, metrical, and rhythmic markings found in Western scores, the traditional Ikuta scores include a symbolic transcription of the intended timbral development of the piece. I decided to turn my research efforts to the investigation of this phonetic code, and the ways in which the timbral envelope of Japanese music interacted with the melodic contour and metric delineation of the music.

Before leaving Japan I had discovered that the phase relationships between these sound structures differed between the Japanese and Western musical traditions; these structures appear to develop in monophasic relation to one another in the Western tradition, but polyphasically developed in traditional Japanese music. Furthermore, a behavioural study confirmed that Japanese native listeners are perceptually sensitive to these phase relations, and use this information to determine the "cultural semblance" (whether a melody sounds more or less Japanese or Western) of a piece of music. I presented these results at the 6th triennial conference of the Asia-Pacific Society for the Cognitive Sciences of Music in Kyoto from August 25–27.

The chance-opportunity to study under one of Japan's greatest living musicians and the paradigm-shifting discoveries and experimental research that it inspired would never have been possible without the financial support of the CIRMMT ICE grant, and for this I am very grateful.

Follow-up experiments are now planned and-or underway to investigate 1) the cross-cultural similarities and differences between Japanese and Western listeners' perception of time, timbre, and tonality in Japanese and Western musics, 2) computational representations of the "timbral envelope" of traditional koto music, 3) a corpus analysis including statistical descriptions of the phase relations between the timbral, melodic, and metric organization of traditional Japanese music, 4) to what extent the computational and statistical representations of Japanese music from 2) and 3) can be applied to analyses of Western musical forms, and thus 5) the similarities and differences in the timbral-temporal-tonal interactions of sound within the Japanese and Western musical traditions.