Curriculum Vitae

Shiro OJIMA

As of April 2010

Assistant Professor (non-tenured), Graduate School of Human Relations (Global COE CARLS), Keio University

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PERSONAL GOAL

To maximally contribute to the society by solving communication problems via basic and applied brain science research

RESEARCH FIELDS

Neuroscience of language, first and second language acquisition, applied brain science

DEGREES

B.Ed., B.A. (Honors), Ph.D.

EDUCATION & EXPERIENCE

Bachelor of Education	Education, Okayama University (Prof. Shigenobu Takatsuka)	Okayama, Japan	April, 1994 – March, 1998
Bachelor of Arts with Honors	Linguistics & Applied Linguistics, University of Melbourne (Prof. Tim McNamara)	Melbourne, Australia	March, 1998 – December, 1998
Doctor of Philosophy	Language & Linguistics, University of Essex (Prof. Roger Hawkins)	Colchester, U.K.	April, 1999 – January, 2005
ERP/MEG training	Integrative Physiology, National Institute for Physiological Sciences (Prof. Ryusuke Kakigi)	Okazaki, Japan	October, 2001 – March, 2005
Post-doc	Language Sciences, Tokyo Metropolitan University (Prof. Hiroko Hagiwara)	Tokyo, Japan	April, 2005 – March, 2010

HONORS

Study-Abroad Scholarship, Heiwa-Nakajima Foundation (March, 1997)

Honors in Applied Linguistics, Melbourne University (December, 1998)
University Scholarship, University of Essex (May, 2000)
Overseas Research Students Award, Committee of Vice-Chancellors and Principals of the Universities of the United Kingdom (July, 2000)

EMPLOYMENT HISTORY

April, 2004 – March, 2005	Part-Time Contract Researcher, Department of Integrative Physiology, National Institute for Physiological Sciences
April, 2005 – March, 2010	Research fellow, Research Institute of Science and Technology for Society (RISTEX), Japan Science and Technology Agency (JST)
April, 2005 – March, 2010	Visiting Research fellow, Department of Language Sciences, Tokyo Metropolitan University
April, 2010 – present	Assistant Professor (non-tenured), Graduate School of Human Relations (Global COE CARLS), Keio University

JOURNAL ARTICLES (First Author)

1. **Ojima, S.**, Nakata, H., & Kakigi, R. (2005) An ERP study of second language learning after childhood: effects of proficiency. Journal of Cognitive Neuroscience 17, 1212-28.
2. **Ojima, S.**, Nakamura, N., Matsuba-Kurita, H., Hoshino, T., & Hagiwara, H. (in press) Neural correlates of foreign-language learning in childhood: a 3-year longitudinal ERP study. Journal of Cognitive Neuroscience.

JOURNAL ARTICLES (Co-author)

1. Inui, K., Wang, X., Qiu, Y., Nguyen, B. T., **Ojima, S.**, Tamura, Y., Nakata, H., Wasaka, T., Tran, T. D., & Kakigi, R. (2003) Pain processing within the primary somatosensory cortex in humans. European Journal of Neuroscience 18, 2859–66.
2. Tamura, Y., Hoshiyama, M., Inui, K., Nakata, H., Wasaka, T., **Ojima, S.**, Inoue, K., & Kakigi, R. (2004) Cognitive processes in two-point discrimination: an ERP study. Clinical Neurophysiology 115, 1875–84.

CONFERENCE PROCEEDINGS

1. Al-Hamad, M., Al-Malki, E., Casillas, G., Franceschina, F., Hawkins, R., Hawthorne, J., Karadzovska, D., Kato, K., Liszka, S., Lozano, C., **Ojima, S.**, Okuwaki, N., & Thomas, E. (2002) Interpretation of English tense morphophonology by advanced L2 Speakers. In: Foster-Cohen SH, Ruthenberg T, Poschen ML. (eds.), Eurosla Yearbook: Volume 2, pp. 49–69. Amsterdam: John Benjamins.

DOCTORAL DISSERTATION

Ojima, S. (2004) Theory and evidence in second language research: the acquisition of English by native speakers of Japanese. Doctoral dissertation, University of Essex.

REVIEWER EXPERIENCE

Neuroimage, Psychophysiology, Brain and Language, Cognitive Studies

PRESENTED CONFERENCE PAPERS

1. **Ojima, S**. (2000) L2 wh-fronting as scrambling. NWCL Research Training Workshop. University of Salford, U.K.
2. **Ojima, S**. (2000) Pronouns in L2. Looking at Language Acquisition. University of Cambridge, U.K.
3. **Ojima, S**. (2002) Language Acquisition Device: Are the device and the knowledge different? Summer Institute for Japan Linguistics Society. Lake Sirakaba, Japan. (Paper in Japanese)
4. **Ojima, S.**, Okusa, T., & Kakigi, R. (2002) Processing of compound verbs in Japanese: an MEG study. KIT International Symposium on Experimental Linguistics. Kanazawa Institute of Technology, Japan.
5. **Ojima, S**. (2003) A minimalist reinterpretation of access to Universal Grammar. 4th International Symposium on Bilingualism. Arizona State University, U.S.A.
6. **Ojima, S.**, Hawkins, R., & Kakigi, R. (2003) An ERP study of parameter resetting in a second language. Kagamiyama Linguistic Colloquium. Hiroshima University, Japan. (Paper in Japanese)
7. **Ojima, S**. (2003) A magnetoencephalography (MEG) study of compound verbs. Japan Linguistics Society. Aoyama Gakuin University, Japan. (Paper in Japanese)
8. **Ojima, S**. (2003) The basics of MEG, ERP, and fMRI. Language, Mind, and Brain. Tateshina, Japan.
9. **Ojima, S**. (2004) Second-language proficiency and event-related potentials. English Linguistics Society. Dokkyo University, Japan. (Paper in Japanese)
10. **Ojima, S.**, Nakata, H., & Kakigi, R. (2004) Effects of second-language proficiency on ERPs. Language, Mind, and Brain. Hiroshima University, Japan. (Paper in Japanese)
11. **Ojima, S**., & Kakigi, R. (2004) The critical period hypothesis assessed by electrophysiological markers of language processing: N400, LAN, and P600. KIT International Symposium on Brain and Language 2004. Kanazawa Institute of Technology, Japan.
12. **Ojima, S**., & Kakigi R. (2004) An ERP study of second language learning: effects of proficiency. 8th International Evoked Potentials Symposium. Fukuoka, Japan.
13. **Ojima, S**. (2005) Second language acquisition research using electroencephalograms. Tohoku University Graduate School of Humanities Symposium on Cognitive Neuroscience Perspectives on Foreign Language Education. Tohoku University, Japan. (Paper in Japanese)
14. **Ojima, S**., & Koso, A. (2005) Memory and computation in language and brain development. Public Symposium on the Development of Language and Brain in Infants. Tokyo University, Japan. (paper in Japanese)
15. **Ojima, S**. (2006) Limitations and new perspectives in non-invasive neuroimaging. The Future of Language Research and Brain Science. Tokyo Metropolitan University, Japan.(paper in Japanese)

16. Hagiwara, H., & **Ojima, S**. (2007) Brain science and foreign language education: preliminary results of a three-year cohort study using ERP and NIRS. International Mind, Brain and Education Society Conference 2007. Fort Worth, Texas, U.S.A.

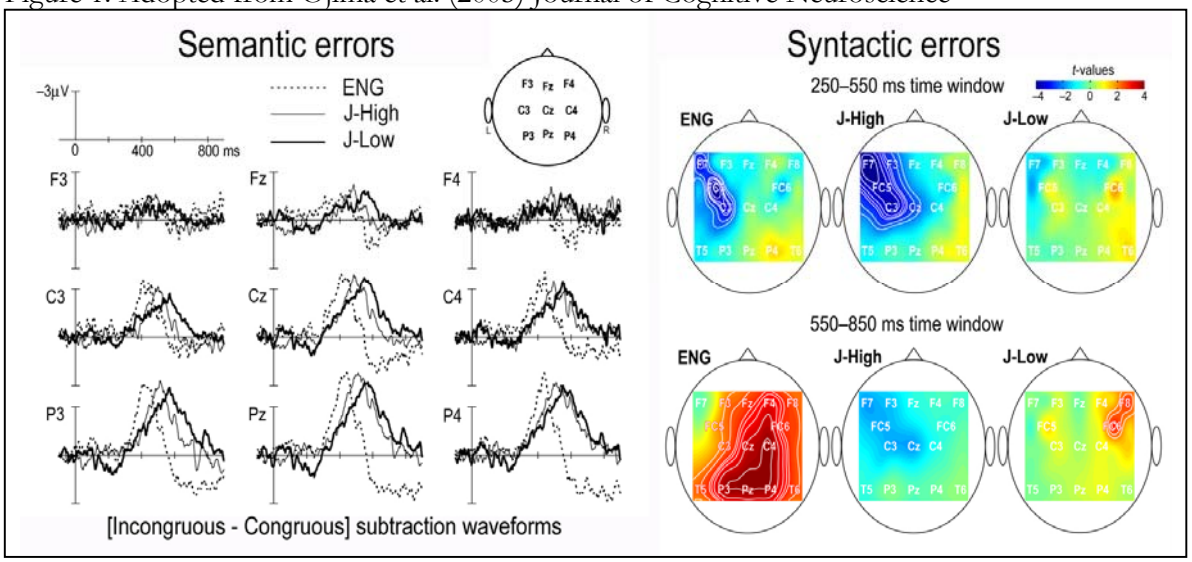
17. **Ojima, S**. (2007) Mother-tongue acquisition and foreign-language learning in the developing brain: a large-scale cohort study on primary-school children. JST-RISTEX Symposium on the Approaches to English Language Education from Brain Science. Tokyo International Exchange Center, Japan. (paper in Japanese)

RESEARCH SUMMARY

I entered University of Essex as a PhD student to study the process of second language acquisition (e.g. the acquisition of English by native speakers of Japanese) in the general framework of Noam Chomsky's Generative Grammar. After having completed some work using behavioral and psychological measures on this topic, I decided to pursue a carrier in neuroscience of language and was admitted to National Institute of Physiological Sciences (NIPS) as a Special Collaborative Researcher, retaining the student status of Essex.

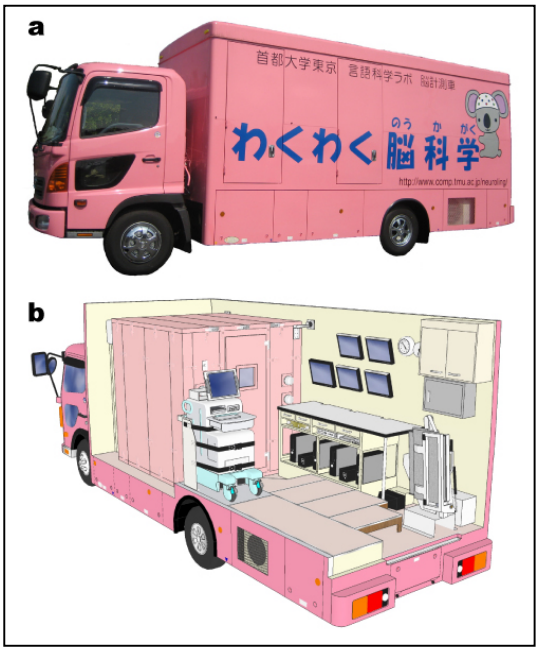
At NIPS, I first conducted an MEG (magnetoencephalography) experiment on the cortical processing of a special type of words (compound verbs) and reported neural correlates of the theoretical distinction proposed between two types of such words, at several conferences. Later I worked more extensively on ERP (event-related potential) research on the learning of a second language after childhood. I compared native speakers of English, native speakers of Japanese with high English proficiency, and native speakers of Japanese with intermediate English proficiency, in their ERP responses to semantic (i.e. meaning) errors and syntactic (i.e. grammar) errors in English sentences (Figure 1). This study was published in Journal of Cognitive Neuroscience, and my PhD dissertation which integrated this ERP study and my previous theoretical and behavioral studies was accepted by University of Essex.

Figure 1. Adopted from Ojima et al. (2005) Journal of Cognitive Neuroscience



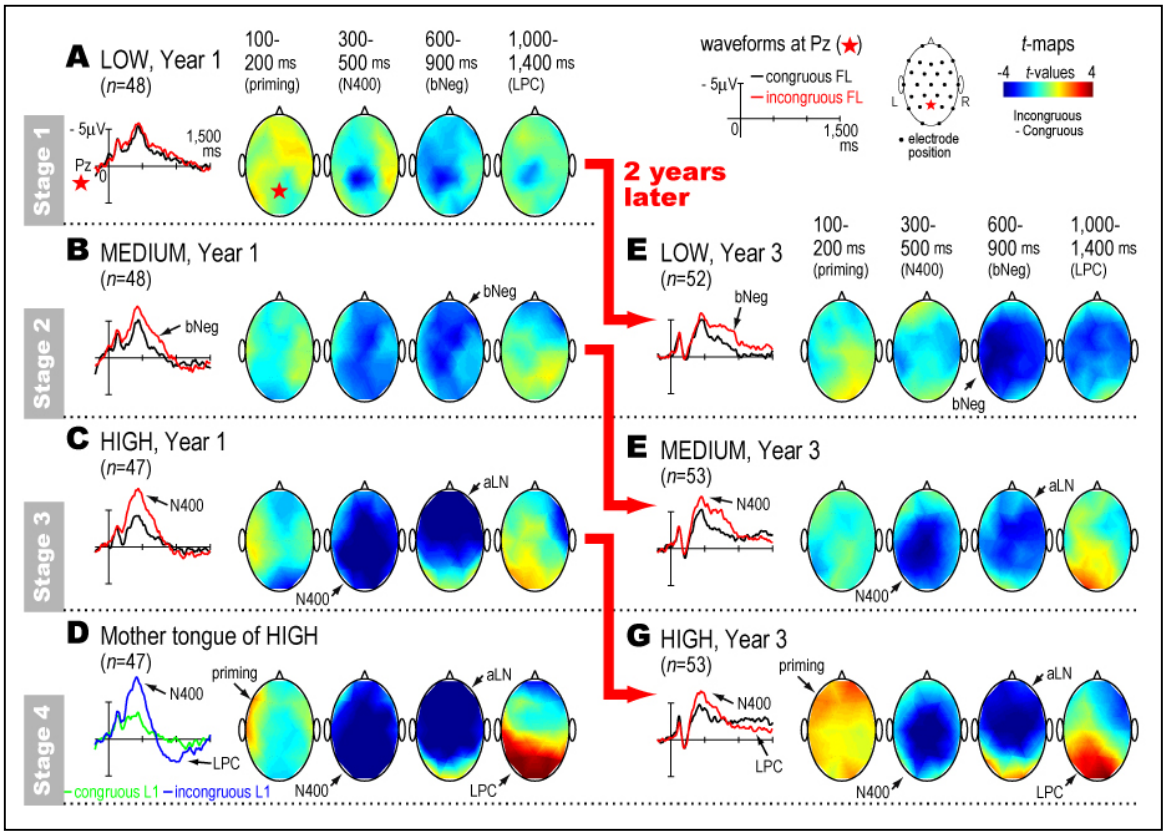
I then became part of a 5-year neuroscience project on children's language learning as a post-doctoral researcher, and joined Department of Language Sciences at Tokyo Metropolitan University. To provide the society with as reliable neuroscientific data as possible, we aimed to measure more than 300 primary-school children every year for a 3-year period in a longitudinal design (same participants tested multiple times). I played the central role in this project and designed all three neuroimaging experiments (two ERP experiments and one NIRS or near-infrared spectroscopy experiment). To attract as many children as possible, I proposed that a special neuroimaging vehicle which we can drive to schools be manufactured. I designed both the interior and exterior of the vehicle (Figure 2), set up the experimental facility inside, obtained a special license for driving large trucks, and drove the vehicle myself to seven elementary schools.

Figure 2



Thankfully, both children and their parents seem to have supported our style of research; the number of participants constantly exceeded 300 every year in the 3-year period (389 in Year 1, 485 in Year 2, and 445 in Year 3; 330 children took part in all three years). Our team (me + student assistants) went to schools more than 300 times in this period, and I supervised more than 1300 ERP experiments and conducted more than 1300 NIRS experiments myself. We finished data collection at schools in May, 2009, and are currently writing up papers. Journal of Cognitive Neuroscience has already accepted my first paper emerging from this project. The paper analyzed 3-year longitudinal ERP changes within each of three groups of Japanese children who differed in proficiency of English as a foreign language (Figure 3). We found not only that specific ERP responses appear at specific levels of foreign-language proficiency, but also that those responses are quite similar to those found in mother-tongue acquisition. Moreover, the order of the appearance of those responses was also identical to mother-tongue acquisition. These observations were confirmed in longitudinal analyses of the same children over time, and individual differences cannot explain the data. This study is expected to make profound social as well as scientific impacts, because early foreign-language education is becoming increasingly important in many societies including Japan.

Figure 3. Adopted from Ojima et al. (in press) Journal of Cognitive Neuroscience



FUTURE INTERESTS

My ultimate goal is to contribute to the society by helping solve communication problems via basic and applied brain science research. We humans are social beings. Our quality of life (QOL) is much affected once communication problems arise. I believe brain science can contribute to the improvement of verbal QOL in many areas, by revealing the neural mechanisms of communication and language, by visualizing an individual's brain activities to encourage his/her language learning/recovery, or by providing patients with supplementary communication capacities. New technological advances may be necessary for these goals. The specific areas of my interest are:

(1) Mother-tongue acquisition in infants and young children
Parents, especially mothers, often feel frustrated and insecure when their children cannot express themselves fully. Brain science can be used to show children's marvelous ability to acquire language in general and to visualize a particular child's neural responses to linguistic stimuli, which I believe will enrich and encourage child raising.

(2) Complex communication skills in adolescents
To fully function in adults' society, adolescents must acquire complex communication skills. An example of such skills is the ability to logically comprehend or construct a lengthy speech or text consisting of multiple sentences. Lack of this ability is becoming a social problem. Non-invasive neuroimaging may be able to pinpoint the level at which the processing of logic breaks down.

(3) Foreign language learning in children and adults
Despite its ever increasing importance, a foreign language is rather difficult to master completely. Neuroscience can show the process of foreign-language learning in a population or an individual, to the learners themselves, their parents, and teachers. Applied research may lead to the development of biofeedback system that helps the learner keep an optimal brain state for learning.

(4) Language recovery after brain damage
The loss of language ability due to a brain lesion suddenly and severely reduces QOL. Training for recovery can be quite painstaking. Neural markers of recovery may be detected before behavioral recovery. Such findings will encourage both patients and their families.

(5) BMI technology to help paralyzed patients communicate
Patients with neuro-muscular disorders may eventually lose all conventional media of communication. Brain-machine interface technology may provide paralyzed patients with some communication capacities. Real-time rapid and accurate decoding of the patient's intent must be achieved. Successful systems must incorporate the idiosyncratic features of particular writing systems (e.g. Japanese kanji and kana).

(6) Interactive EEG acquisition system
Thousands of neuroimaging experiments are underway all over the world. Data are usually analyzed offline and noisy trials are discarded then. Interactive data acquisition systems that analyze neural responses online and controls stimulus presentation simultaneously may save a significant amount of energy, time, and money. Stimulus presentation can be withheld automatically when any kind of artifact is detected. The system may terminate the experiment when the results of online analyses reached high enough signal-to-noise ratios. Real-time noise reduction and signal enhancement developed for BMI may contribute to the development of such systems.

(7) Large-scale neuroimaging research as social research
Neuroimaging can be integrated into large-scale social research, but several past attempts have already failed, because neuroimaging experiments are demanding for both researchers and participants. A whole new system of research must be created, which brings together appropriate human resources such as brain-science coordinators and super-rapid data acquisition systems. If this is possible, a new range of social and scientific issues will be open to neuroscientific investigation.

SKILLS

Programming languages: C and Matlab. C mainly for stimulus presentation (at millisecond precision), and Matlab mainly for mass data analysis and brain topography display.

ERP/NIRS/MEG: study design, electrode/probe attachment, data acquisition (Neuroscan, NihonKohden, Hitachi), 3D digitization, mass data processing, visualization using Matlab, source modeling, etc.

Software and programs: Photoshop, Illustrator, SPSS, Visual Studio, SketchUp, WaveLab, Cubase, Praat, STRAIGHT, MRICro, etc.

English language: TOEFL 647 (before study abroad)

TEACHING INTERESTS

Linguistics (introduction, phonetics, phonology, morphology, syntax, semantics, language acquisition, language education, psycholinguistics, neuroscience of language, etc.), statistics, programming languages (C, Matlab), cognitive neuroscience, neuroimaging (theory, hands-on training)

CONTACT INFORMATION OF REFERENCES

Letters of recommendation can be obtained from:

Prof. Roger Hawkins	Email <	>	Language & Linguistics University of Essex
Prof. Ryusuke Kakigi	Email <	>	Integrative Physiology National Institute for Physiological Sciences
Prof. Hiroko Hagiwara	Email <	>	Language Sciences Tokyo Metropolitan University
Prof. Yukio Otsu	Email <	>	The KEIO Institute of Cultural and Linguistic Studies Keio University