Research Center for Applied Perceptual Science (RCAPS)
九州大学大学院 芸術工学研究院附属 応用知覚科学研究センター
設立記念シンポジウム

Between Perception and Language
知覚と言語のあいだで

2013 年 4 月 1 日（月）に，九州大学大学院 芸術工学研究院附属「応用知覚科学研究センター」が発足します。同センターは，デザインの基礎として「知覚科学」という学際的な領域を確立し，分野の壁を越えた研究が迅速になされるように，さまざまな工夫をいたします。

まずは「知覚と言語のあいだで」と題して設立記念シンポジウムを開催いたします。幅広い分野からの第一線の研究者をお招きし，当センターからも関連する話題を提供いたします。発達心理学，応用言語学，英文学研究，多変量解析，音声科学，音響学，人工現実研究，バイオ統計学，脳研究，科学基礎論などの一見かけ離れた分野が少しずつ結びつく様子をご覧ください。講演内容はオンライン上で公開し，世界中から閲覧できるようにする予定です。

日時 2013 年 4 月 1 日（月）13:30-18:30

会場 九州大学大橋キャンパス（福岡市南区塩原 4-9-1）3 号館 2 階 322 教室

使用言語 英語

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Program

13:30 *Greeting*
Yoshitaka Nakajima
Department of Human Science/Director of RCAPS, Faculty of Design, Kyushu University
中島祥好（九州大学大学院芸術工学研究院デザイン人間科学部門／応用知覚科学研究センター長）

13:35 *Opening address*
Shinichi Ishimura
Dean, Faculty of Design, Kyushu University
石村真一（九州大学大学院芸術工学研究院長）

13:45 *Keynote lecture*
Poetry and silence
Eishu Sonoi
Professor Emeritus, Kyushu University
園井英秀（九州大学名誉教授，人文科学研究院）

A poem is ordinarily composed of words, sounds, rhythm and metre. Silence, the unspoken blanks within or after the lines, however, involves as much significance as sounds and meanings of poems. This lecture will look into the nature of silence in poetry in some of the English and the Japanese examples.

14:15-14:30 Break

14:30 The expert on language learning: Infant speech development for the first two years of life
Yuko Yamashita
Graduate School of Design, Kyushu University
山下友子（九州大学大学院芸術工学府博士課程）

During the first 2 years of age, infant vocalization changes from cooing to babbling, and then to words similar to adult speech. This talk reviews recent research on infant speech development.

14:45 Morphologic and kinematic observation of speech articulators
Tokihiko Kaburagi
Department of Communication Design Science/RCAPS, Faculty of Design, Kyushu University
鏑木時彦（九州大学大学院芸術工学研究院コミュニケーションデザイン科学部門／応用知覚科学研究センター）

Movements of the articulatory organs form the configuration of the vocal tract and determine acoustic property of speech such as formants. Methods are presented in the talk for enabling kinematic and morphologic observation of hidden, invisible state of the articulatory organs during the production of speech.

15:00 *Invited lecture*
Infant vocal behaviors when playing alone
Yohko M. Shimada
Center for Baby Science, Doshisha University
嶋田容子（同志社大学赤ちゃん学研究センター）

Five-month-old infants' motivation for vocalization in the absence of others was investigated. Three experimental conditions were conducted: responded by the mother, alone without response, and no response with amplified feedback. Results suggested that the infants prolonged their sounds when they received amplified feedback, and they repeated the same phrases more frequently when alone as they were singings in a primitive way.

15:20-15:40 Break

15:40 Cortical processing of whispered speech
Gerard B. Remijn
International Education Center, Kyushu University
ジェラード・B・レメイン（九州大学国際教育センター）

Whisper is a deliberately degraded speech signal that is produced without vocal fold vibration. Acoustic differences between whisper and normally-vocalized speech mainly concern intensity, syllable duration, and fundamental frequency. Because whisper is commonly used in highly personalized communication, understanding of whisper not only requires accurate processing of the signal's degraded acoustic properties, but also "mind reading" of the speaker's confidentiality. Here we present four experiments on the cortical processing of whispered spoken words. Two experiments were performed with near-infrared spectroscopy, in which cortical hemodynamic responses were obtained of adults, typically-developing preschool children, and autistic preschool children while they listened to whispered word associations. In the other two experiments, event-related potentials were obtained of adults listening to whispered words and syllables. The combined results seem to indicate that processing of whisper mainly implicates the right temporal cortex, with involvement of bilateral frontal areas depending on stimulus content and research paradigm.

15:55 Interactive evolutionary computation as a tool for human science
Hideyuki Takagi
Department of Human Science/RCAPS, Faculty of Design, Kyushu University
高木英行（九州大学大学院芸術工学研究院デザイン人間科学部門／応用知覚科学研究センター）

Interactive evolutionary computation (IEC) is a technique for optimizing a target system based on human subjective evaluations. Fitting a hearing-aid based on user's hearing, for

example, is a typical application. Since the target system is optimized based on an IEC user's psychological scale, we may be able to analyze the human characteristics indirectly by analyzing the target system, i.e., we may be able to use the IEC as a tool for analyzing human characteristics. We introduce this new direction of IEC research.

16:10 *Invited lecture*

Evolution of the analysis of brain signal
Fumikazu Miwakeichi
Department of Statistical Modeling, Institute of Statistical Mathematics
三分一史和（統計数理研究所モデリング研究系）

Various techniques have been proposed to record neural activity in the brain, such as Electroencephalography (EEG), functional Magnetic Resonance Imaging (fMRI), Optical Imaging (OI) and so on. In order to extract spatio-temporal pattern of neural activity and connectivity between regions, regression analysis and cross correlation analysis have been widely used. These approaches evaluate resemblance of temporal pattern between time series corresponding to a channel/pixel/voxel and a preliminarily assumed reference function, which reflects temporal changes in neural activation. Another approach is based on statistical time series, such as Autoregressive (AR) type model, which was proposed in our previous research. This approach enables us to extract brain neural activation as a phase transition of dynamics in the system without employing external information such as the reference function. I will overview typical brain signal data and methodological approaches for the data analysis in this talk.

16:30-17:00 Break (to take group photos)

17:00 Modulation of vection by sound

Takeharu Seno
Institute for Advanced Study/RCAPS, Kyushu University
妹尾武治（九州大学高等研究院／応用知覚科学研究センター）

Visually induced self-motion perception (vection) could be modulated by sound. In this talk three examples will be introduced. The positive sound i.e. the sound of baby laughing could facilitate upward vection. The ascending and descending pitches enhanced vertical vection. The music could enhance forward vection.

17:15 *Keynote lecture*

How many words are needed to be a competent user of English?
David Hirsh
Faculty of Education and Social Work, University of Sydney
デービッド・ハーシュ（シドニー大学教育・社会事業学部）

We know approximately how many words there are in the English language. We also know how many of these words competent native speakers know. In addition, we can calculate the vocabulary size a language user requires in order to understand and produce language in a range of spoken and written contexts. This seminar paper will provide an overview of the current understandings and methodologies in the area of second language vocabulary studies to provide a basis for quantifying *language competence* and thus estimating the number of words a language user requires to achieve a level of competence in their use of the English language.

17:45-17:55 Short break

17:55 *Keynote lecture*

Intuition, logic, and scientific experiment

Takashi Yanagawa
Biostatistics Center, Kurume University/Professor Emeritus, Kyushu Univeristy
柳川堯（久留米大学バイオ統計センター／九州大学名誉教授，数理学研究院）

Medical science, and perceptual science likewise, is concerned with human beings. Not to mention, but human beings are all different in their background such as medical history, genetic and environmental factors. The difference may easily distort the reproducibility and universality of your research findings and thus come to nothing your effort and resources. Carefully designed (human) experiment that controls the influence of those background factors is essential to establish scientific evidence from the findings. I will introduce you in this talk our experience at the Biostatistics Center, Kurume University, for establishing scientific evidence in medical science according to the following outline.

1. Medical doctors have medical hypothesis intuitively obtained through their daily practice. The first step is to quantify their medical hypothesis and change it to a statistical hypothesis. Asking what are feasible measurements, we must establish the principle endpoint and secondly endpoint. Asking what are confounding factors involved in the study, we must identify them and assess their impact. Much logical thinking is needed in this stage.
2. In the designing stage of (human) experiment, two groups, the study group and control group, must be established randomly. Use stratified randomization to control the impact of strong confounding factors at the designing stage. The randomization introduces the comparability of the two groups and thus validates the reproducibility of the findings. It also provides the justification of any statistical analysis.

18:25 *Closing remarks*

Toshio Sakata
Department of Human Science/RCAPS, Faculty of Design, Kyushu University
坂田年男（九州大学大学院芸術工学研究院デザイン人間科学部門／応用知覚科学研究センター）