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Actual Interface Design  
Design Approach for Enhancing a Bodily Involvement of the Self in an  
Object and in a Mediated Space

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**ABSTRACT OF THE TALK**

In this talk, I'll introduce an outlined-below background and an approach of "Actual Interface Design" for enhancing a bodily involvement of the self in an object and in a mediated space, and subsequently show several studies in the fields of brain science and cognitive science related to the design approach. Furthermore, I'll have a talk on our communication system to create a sense as if remote people were being at the same place by interacting with a physical disk networked to a remote corresponding disk, and our interaction system that a user stretches a virtual stick toward a video space with a sense as if own hand were reaching toward the remote space. Finally, I'll introduce our ongoing researches on transformation and evaluation of body image and of motor image to investigate significance, principle and application of "Actual Interface Design".

<Outline of "Actual Interface Design">

There are several problems in human-human communication by use of video image and of virtual environment, and also in human-robot communication; for example, it's difficult for people to adjust the timing with another communication partner, to read the subtleties of emotion, and to attune themselves to mood. Interestingly, some of patients with depersonalization neurosis report symptoms similar to above-mentioned problems in interpersonal communication. Bin Kimura, psychiatrist, explains the feature of the symptoms as follows: the patients understand that the communication partner and the objects are present around them, or they have a sense of "reality" of the objects around them. However, the patients lose a sense that they are acting in the physical space where they exist, or they lack a sense of "actuality" that they are bodily involved in the objects and in the space.

When we consider features of a lot of computer-mediated communication systems and human-computer interaction systems from the unique viewpoint of the difference between "reality" and "actuality", it will be shown that those systems have advanced toward the way to raise the quality of "reality" in communications and interactions. However, the bodily involvement of the self in the other people, in the objects and in the space to create a sense of "actuality" is significant for human activity, as Hubert Dreyfus, philosopher, pointed out that such a relationship is essential for people to make sense of what they are experiencing and to acquire skills.

Therefore, our research group terms a comprehensive design approach "Actual Interface Design" to enhance a bodily involvement of the self in an object and in a space. To address the design approach, we have focused attention on a phenomenon of utilizing a physical tool as hammering, riding a bicycle, and writing with a pen. When a person writes a sentence with a pen on piece of a paper, the person can act it without paying attention to how to control the pen and also can feel the texture of the paper. The person experiencing such a situation often tell that he/she feels as if the pen became a part of own body. We consider that the situation indicates that the person is being bodily involved in the pen or in the paper while writing down, and believe that the phenomena of being involved in the tool and in the other object through utilizing the tool is a significant clue to investigate a design

principle of “Actual Interface Design”. Especially, we’ve looked into a research topic, how the brain works when a person or a primate utilizes a tool, in recent brain science and cognitive science. Based on those findings, we’ll address; 1) what a phenomenon of bodily involvement means, 2) how the involvement can be enhanced, and 3) what specific areas in daily life the approach can work on. As to the third challenge, we believe that the approach will be useful in supporting Neurorehabilitation.

## **CURRICULUM VITAE**

1999 Dai Nippon Printing Co., Ltd., The "Ba" Research Institute, Kanazawa Institute of Technology  
2001 Graduate School of Sci. and Eng., Waseda University  
2002 Research Associate, School of Sci. and Eng., Waseda University  
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2005 Research Associate, Lecturer, Institute for Biomedical Engineering, Waseda University  
2007 Assistant Professor, Faculty of Sci. and Eng., Waseda University  
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