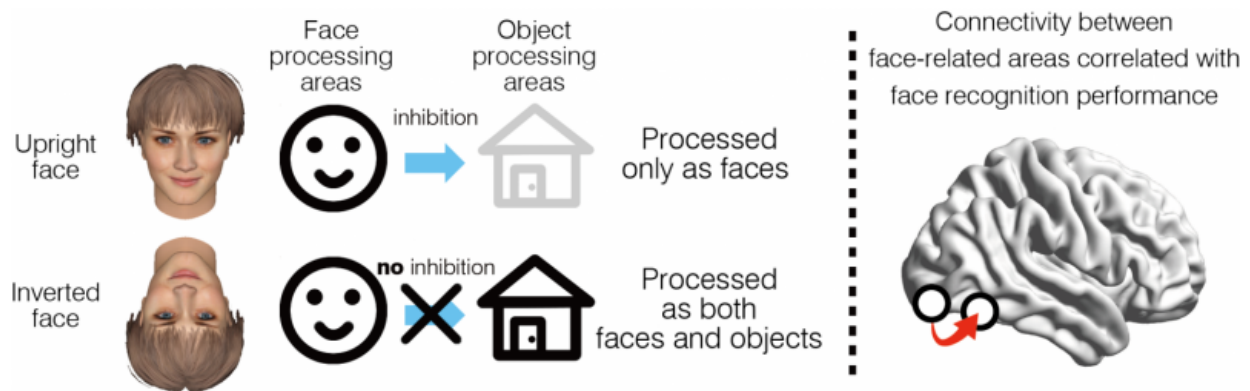


The neural network necessary for 'normal face' recognition

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In the brain, the face recognition mechanism and object recognition mechanism are divided into separate areas. The fMRI study and mathematical simulation revealed that neural networks between these areas in the brain are necessary for normal face recognition. Credit: National Institute for Physiological Sciences

The neural network necessary for normal face recognition has been not fully understood yet until now. Here, the research group of Dr. Daisuke Matsuyoshi (present affiliation: The University of Tokyo) led by Prof. Ryusuke Kakigi and Prof. Norihiro Sadato of the National Institute for Physiological Sciences (NIPS), National Institutes of Natural Sciences (NINS), by using the functional magnetic resonance imaging (fMRI), revealed that suppression of the brain area responsible for object recognition by that for face recognition is necessarily for "normal face" recognition. The researchers simulated mathematically networks

between the brain areas and showed that not only brain areas that execute face recognition but also brain areas that had been considered non-essential to face recognition are important for "normal face" recognition.

This result was published in [*The Journal of Neuroscience*](#).

The research group focused on the phenomenon of becoming markedly-difficult to recognize a face that is presented upside-down (such as so-called "Thatcher illusion"). The group investigated the [neural network](#) in the brain during [face recognition](#) by using fMRI. Accordingly, they found that when faces were shown upright, the brain area responsible for object recognition was suppressed by the area responsible for face recognition. In contrast, when faces were inverted, the [object recognition](#) area was not suppressed by the face recognition area and the brain is in a state of "being clearly not sure if it is a face or an object". In addition, mathematical simulation revealed that neural networks between the multiple areas in the brain are necessarily for "normal face" recognition.

Prof. Ryusuke Kakigi says, "In this research, we have found that not only [brain areas](#) that execute face recognition but also brain areas that had been considered non-essential to face recognition are important for "normal face" recognition. It could be that disorders of face recognition such as developmental prosopagnosia may be attributable to the brain networks".

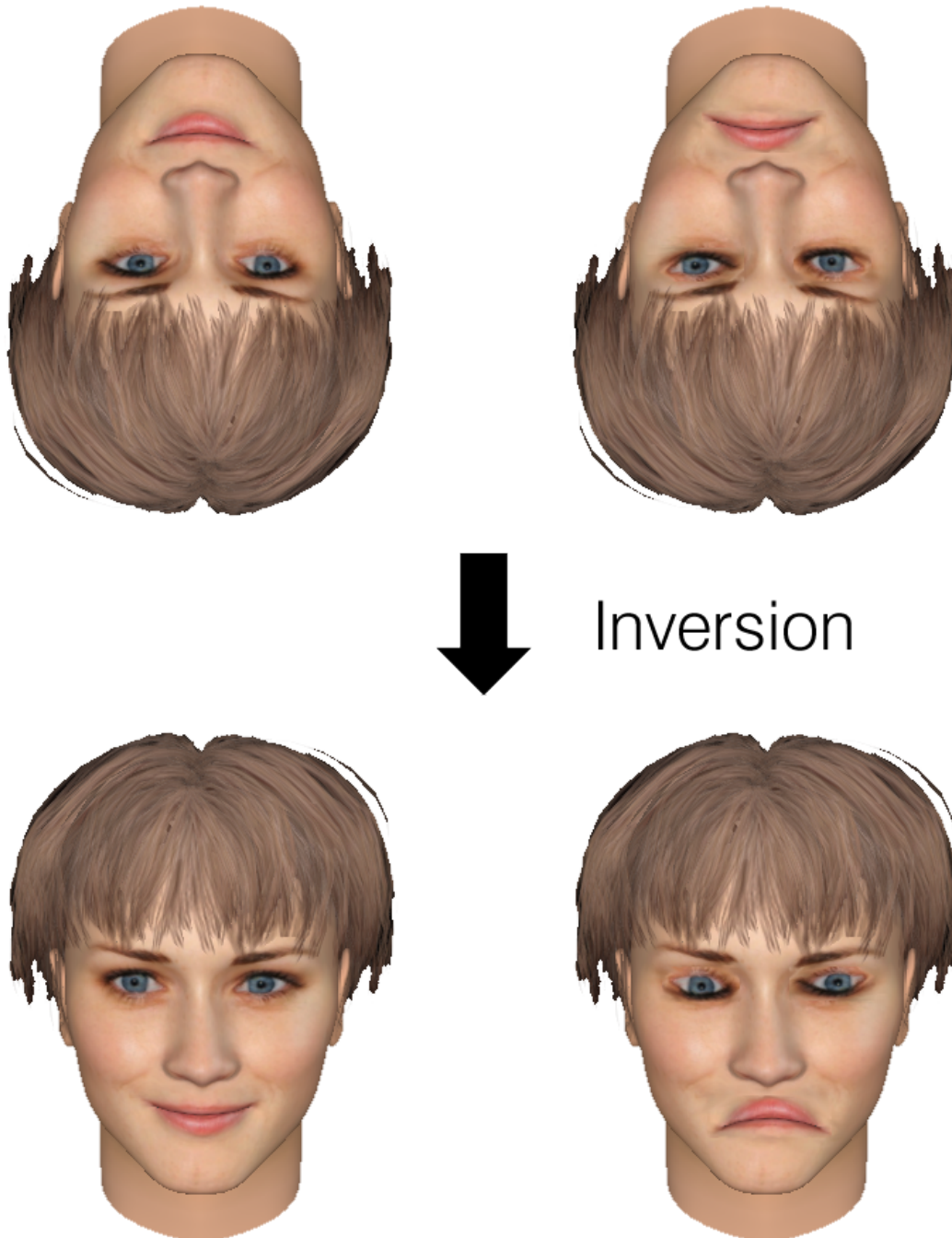


Image 1 shows a normal (left) and an inverted face image (the eyes and nose were tampered with) (right). Unless the image is turned over, it is difficult to realize the peculiarity of the "thacherized" face. In this study, researchers show the reason why face recognition is ineffective when the face is shown inverted. Credit: National Institute for Physiological Sciences

Provided by National Institutes of Natural Sciences

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