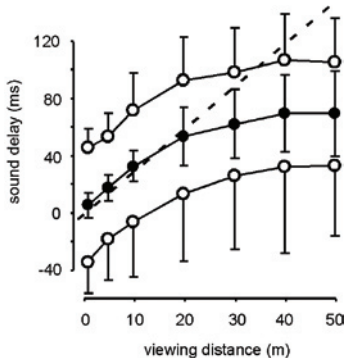
Implicit Estimation of Sound Arrival Time

Yoichi SUGITA
Neuroscience Research Institute
e-mail: y.sugita@aist.go.jp
AIST Today Vol. 3, No. 5 (2003) 4-6

A sound is often produced by visible movements of objects in natural environment. Complementary inputs from vision and audition are coordinated to perceive real-world objects and events. Although auditory inputs are received much later than visual inputs, the delay is seldom noticed. Here, we show that audio and visual inputs are coordinated not because the brain has a wide temporal window for auditory integration but because the brain is actively changing the temporal location of the window depending on the distance from the visible sound source. A sound burst via headphones and a light flash were presented with different stimulus onset asynchrony. At greater distances from observers to the light, they could withstand a longer sound delay while still maintaining the impression of a common source object. These results indicate that real-world constraints, such as sound travels much slower than light, are implemented by audio-visual integration processes.



PSEs (filled circles) were plotted against viewing distance. 25% (lower open circles) and 75% level (upper open circles) of light first response were also plotted to indicate the threshold for detecting asynchrony. A dashed line represents sound arrival time in the real world.

The World's First Precise Human Model for ESS Training

Juli YAMASHITA
Institute for Human Science and Biomedical Engineering
e-mail: juli@ni.aist.go.jp
AIST Today Vol. 3, No. 6 (2003) 14-17

While minimally invasive endoscopic sinus surgery (ESS) is a benefit for the patient, it requires the surgeon a higher level of surgical skills due to its complex structure and its location adjacent to vital organs. This new human paranasal sinus model is based on the CT images and built using rapid prototyping techniques with originally developed materials and structures. This provides tactile perceptions similar to the human body and enables the surgeon to practice surgical techniques that are nearly equivalent to those acquired with cadavers, which are decreasing. This model should contribute to an increase in ESS with improved safety.

TOP LEFT: The whole view of a precise model of the human sinus (primary test piece). It has been named "SurgReady" (TM)
RIGHT: Opening the natural ostuim of the maxillary sinus (ABOVE). After making an incision with a scalpel (BELOW), the interior of the maxillary sinus is observed through the exposed natural opening.
BOTTOM: Ethmoidectomy. (LEFT) The right ethmoidal sinus is approached from the front using forceps. (MIDDLE) The posterior part is being exposed.