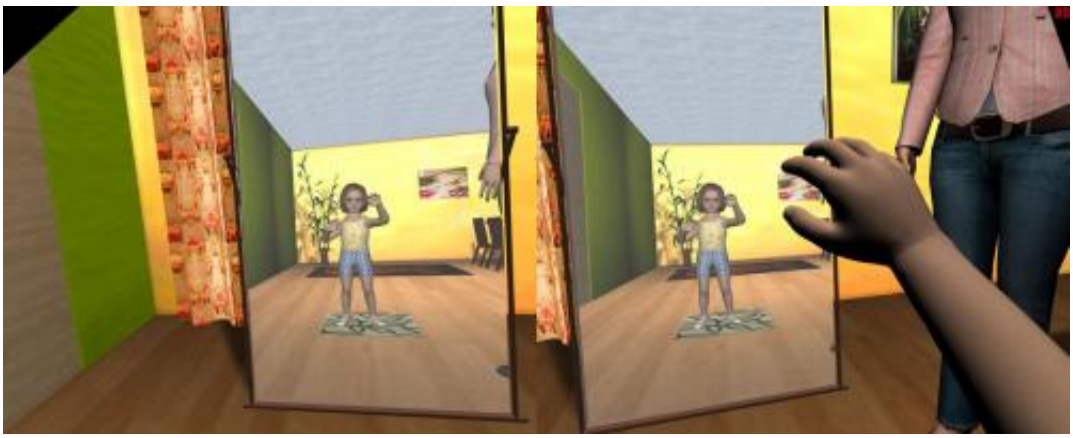
Researchers find form of virtual body impacts perception with immersive virtual reality (w/ Video)

July 16 2013, by Bob Yirka



Experimental setup. The body of the participant was substituted by a gender-matched virtual body, viewed from first person perspective, onto which body and head movements were mapped in real time. The body could also be seen as reflected in a virtual mirror as shown. The body each participant viewed depended on the condition C (for Child) or A (for Adult) to which each one was assigned. Credit: *PNAS*

(Medical Xpress)—An international team of researchers has found that the form of a virtual body an adult person takes in immersive virtual reality experiments can impact the perceived size of objects placed into the virtual environment. In their paper published in *Proceedings of the National Academy of Sciences*, the group describes the results of two types of experiments they ran using volunteer participants equipped with

full-body virtual reality gear.

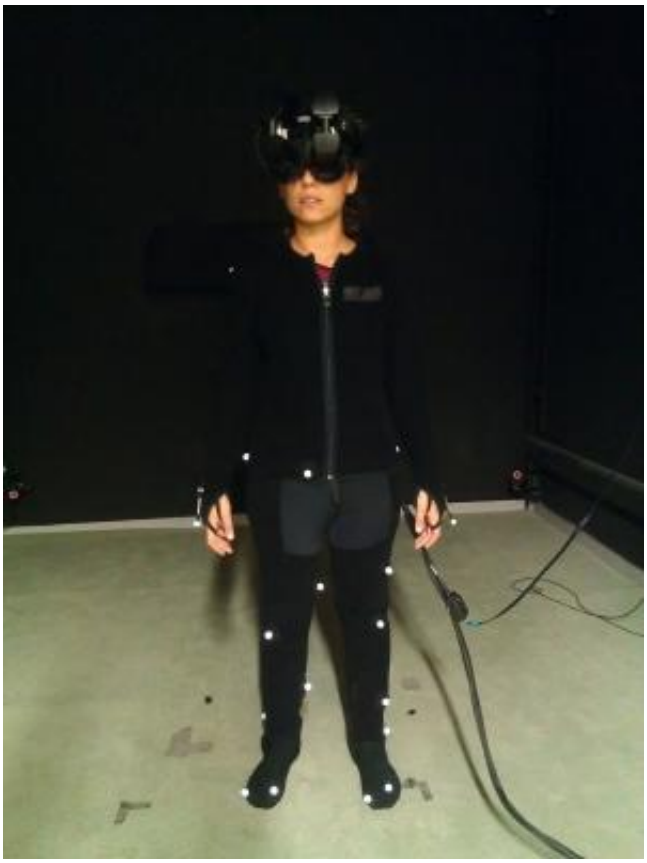
Immersive virtual reality is where a person enters a virtual world by wearing a full body suit, including helmet with goggles. Movements the person makes in the real world are translated to movements in the virtual world. Because participants come to feel as if they are actually existing in the virtual world, the experience has come to be described as immersive—people tend to lose themselves in it. As the technology has improved, researchers have started to use such environments to test human perception in new ways. In this latest effort the researchers wondered if the type of body avatar used was of equal importance to size.

To find out, the group enlisted the assistance of 60 volunteer adults—30 were given avatar bodies the size and form of a four year old child—another 30 were given adult avatar bodies of the size of a four year old child. Both groups were then asked to estimate the size of objects in the virtual worlds into which they were immersed. In analyzing the results, the group found that the volunteers that were given the child's bodies overestimated the size of virtual objects to a much larger degree than did the volunteers inhabiting the down-sized adult bodied avatars.

This experiment demonstrated that human perception is tied very closely with not only perceived body size, but the form of the body inhabited. Some of the volunteers actually described feeling as if they'd reverted to being a child.

In the second experiment, the researchers conducted much the same experiment with another group of volunteers but didn't allow for synchronizing body movement in real life with that occurring in the virtual world. This time around, neither group overestimated the size of the virtual objects. This experiment demonstrated that in order for self

perception to be altered in a virtual reality environment, there must be an element of synchronicity involved.



A female participant in a scaled-down adult's body. Credit: PNAS

Because of the ways virtual reality can alter self perception, the researchers suggest that people be warned of the possible repercussions of moving immersive virtual reality technology out into the real world—people wearing Google's project glass headset for example, could misjudge or misinterpret information in the real world and put themselves at risk.

More information: Illusory ownership of a virtual child body causes

overestimation of object sizes and implicit attitude changes, *PNAS*, Published online before print July 15, 2013, doi: 10.1073/pnas.1306779110

Abstract

An illusory sensation of ownership over a surrogate limb or whole body can be induced through specific forms of multisensory stimulation, such as synchronous visuotactile tapping on the hidden real and visible rubber hand in the rubber hand illusion. Such methods have been used to induce ownership over a manikin and a virtual body that substitute the real body, as seen from first-person perspective, through a head-mounted display. However, the perceptual and behavioral consequences of such transformed body ownership have hardly been explored. In Exp. 1, immersive virtual reality was used to embody 30 adults as a 4-y-old child (condition C), and as an adult body scaled to the same height as the child (condition A), experienced from the first-person perspective, and with virtual and real body movements synchronized. The result was a strong body-ownership illusion equally for C and A. Moreover there was an overestimation of the sizes of objects compared with a nonembodied baseline, which was significantly greater for C compared with A. An implicit association test showed that C resulted in significantly faster reaction times for the classification of self with child-like compared with adult-like attributes. Exp. 2 with an additional 16 participants extinguished the ownership illusion by using visuomotor asynchrony, with all else equal. The size-estimation and implicit association test differences between C and A were also extinguished. We conclude that there are perceptual and probably behavioral correlates of body-ownership illusions that occur as a function of the type of body in which embodiment occurs.