Amputees misperceive the size of artificial limbs

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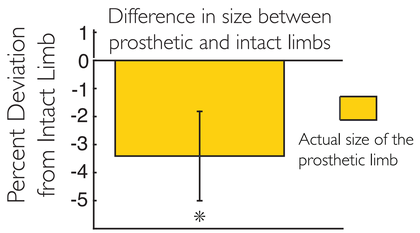
Introduction: Prosthetists report creating a prosthetic limb smaller than the corresponding intact limb due to the patients' report that the prosthetic appears too 'bulky' if exactly matched in size to the intact limb. These experiments investigated the veracity of this perceptual bias in both non-amputees and amputees.

Pilot Experiment

Question: Do prosthetists make artificial limbs smaller than the corresponsing intact limb?



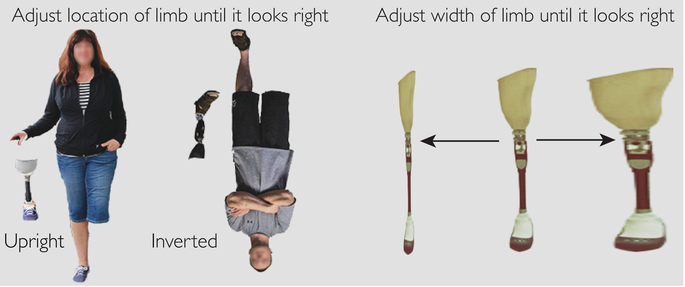
In this example, the prosthetic limb is 5.6% smaller than the intact limb



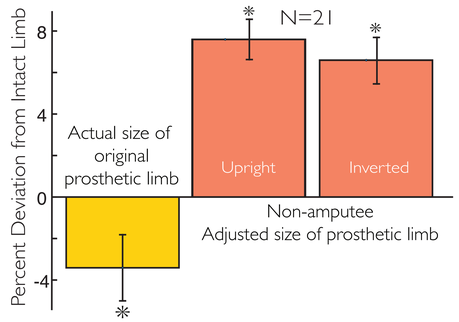
* Signficantly different from the intact limb (i.e., 0)

Experiment 1A

Design:



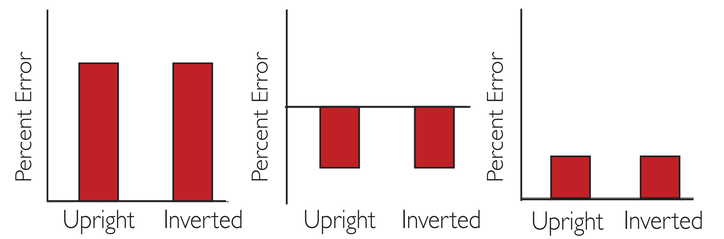
Question: How do non-amputees perceive the size of prosthetic limbs?



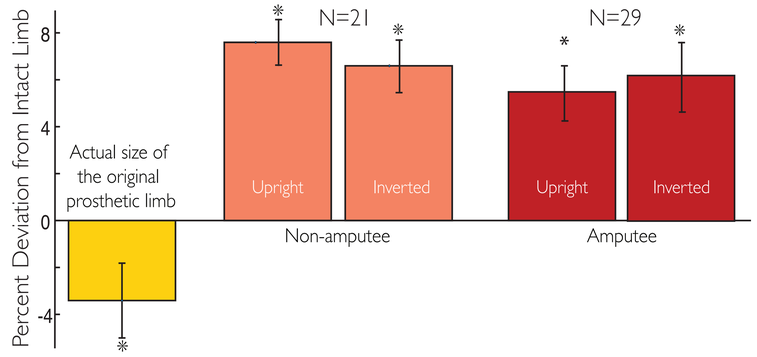
Experiment 1B

Question: How do amputees perceive the size of prosthetic limbs?

Predictions for Amputee Population



Results



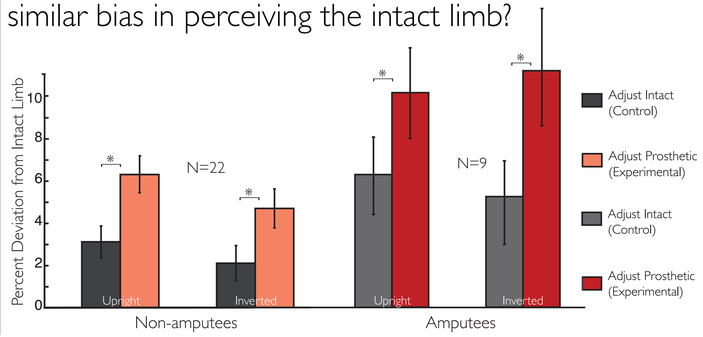
Conclusion: Amputees show the same bias to the same extent as non-amputees.

Experiment 2

Design:



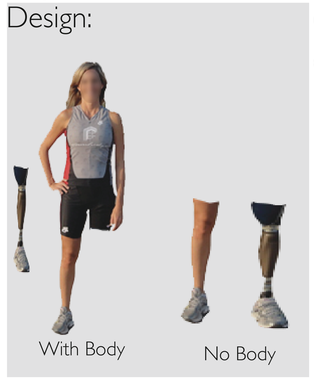
Question: Do amputees and non-amputees show a similar bias in perceiving the intact limb?



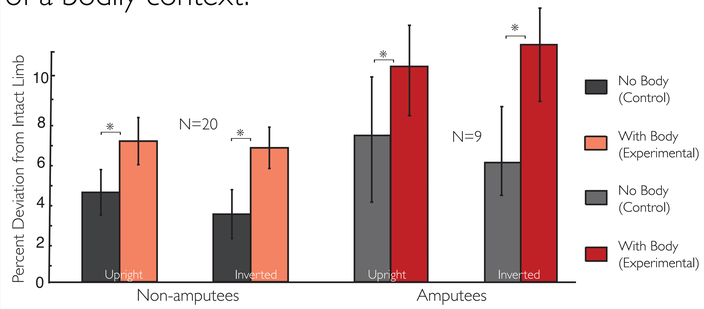
Conclusion: In both groups, the bias in perceiving the intact limb is significantly reduced relative to the bias in perceiving the prosthetic limb. Therefore, some aspect of the bias may be uniquely attributed to how we perceive prosthetic limbs.

Experiment 3

Design:



Question: Is there still a perceptual bias in the absence of a bodily context?



Conclusion: The bias is significantly mitigated without a bodily context for non-amputees and amputees alike. This suggests the configuration of a body in part drives the perceptual bias of the prosthetic limb.

Overall Conclusion: There is a striking disconnect between what non-amputees and amputees perceive versus what prosthetists practice. These data suggest the visual system is not driving the size bias reported by clinicians. Rather, it may be that somatosensory representations are responsible. Current experiments are exploring this possibility.

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