Prosthetic embodiment: Review and perspective on definitions, measures, and experimental paradigms

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Abstract

The term embodiment has become omnipresent within prosthetics research and is often used as a metric for the progress made in technological prosthetic development, as well as a hallmark for user acceptance. However, despite frequent use of the term, the concept of prosthetic embodiment is often left undefined or used interchangeably with other distinct notions such as ownership. This terminological ambiguity complicates the comparison of studies using embodiment as a metric of success, which in turn hinders the advancement of prosthetics research. In an attempt to resolve these terminological ambiguities, we reviewed the used definitions of embodiment in the prosthetics literature, found common denominators, and developed a pragmatic perspective. We found that embodiment is often conceptualized in either of two frameworks based on body representations or phenomenology. We concluded that treating prosthetic embodiment as the combination of ownership and agency allows for measurement and thus improvement. Together with the measures and experiments to study ownership and agency suggested herein, we provide a pragmatic definition of prosthetic embodiment that allows for outcome comparisons between studies and creates a common reference for further discussions within prosthetics research.

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