Reference

Kyberd, PJ

Department of Engineering Science, University of Greenwich, Chatham Maritime, United Kingdom.

Assessment of Functionality of Multifunction Prosthetic Hands

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Products

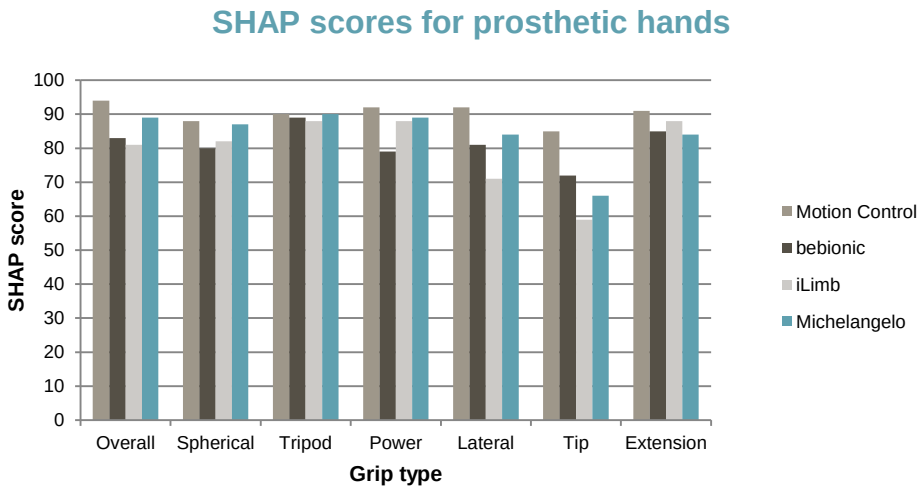
Michelangelo Hand

Major Findings

With Michelangelo Hand (Ottobock) compared to i-Limb (Touch Bionics), bebionic (Steeper) and Motion Control Hand (Motion Control).

→ **The Motion Control Hand had the highest overall performance score (94)**
Within multifunctional hands,
→ the Michelangelo Hand had the highest overall performance score (89), followed by the bebionic (83) and iLimb hand (81).

→ **The Motion Control and Michelangelo hands had significantly higher scores than the iLimb and bebionic hands when using a Power grip.**



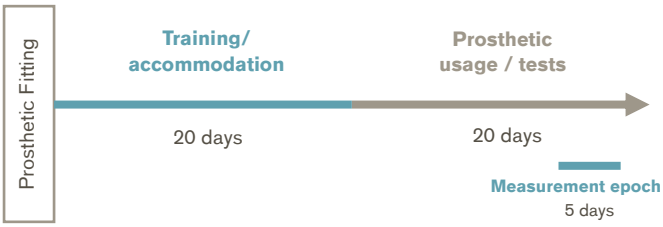
The column chart provides a comparison of the Southampton Hand Assessment Procedure (SHAP) scores of the three multifunction hands and the single degree of freedom (sDoF, Motion Control) hand (results taken from a previous publication from the same author). Overall score, Power grip score and lateral score for Michelangelo hand and Motion control were significantly better than bebionic hand and iLimb. The Motion Control score for Tip grip was significantly better than all other hands.

Population

Subjects:	1 abled bodied subject
Previous prosthesis:	none
Previous prosthetic experience:	none
Amputation causes:	no amputation
Mean age:	not reported
Mean time since amputation:	no amputation

Study Design

Not a clinical study, interventional, proof of concept design. Author was the single able bodied subject in the study.



Prosthetic fitting consisted of a splint over the left (non-dominant) forearm, used to hold the prosthesis over the dorsal surface of the arm, which was controlled by myoelectrode amplifiers/processors.

The training/accommodation phase (20 days long) consisted of the subject performing general activities with the prosthetic hands; considered successful if the subject could switch control to a different hand state on the first attempt on more than 90 % of trials.

After the training, 20 additional days were divided into four 5-day epochs. The results reported in the publication are the mean of the last epoch (last 5 days).

Results

Body Function		Activity			Participation	Others	
Mechanics	Pain	Grip patterns / force	Manual dexterity	Activities of daily living (ADL)	Satisfaction and Quality of life (QoL)	Training	Technical aspect

Category	Outcomes	Michelangelo hand compared to other prosthetic hands	Sig.*
Grip patterns / force	SHAP score	Motion Control overall score (94) significantly better than Michelangelo hand(89); Michelangelo hand overall score significantly better than both bebionic (83) and iLimb (81)	++
		Spherical grip: Motion control & Michelangelo hand score slightly higher than both iLimb & bebionic	0
		Tripod grip: No clear difference between hands	0
		Power grip: Motion Control & Michelangelo hand score significantly higher than both bebionic & iLimb	++
		Lateral grip: Motion Control > Michelangelo > bebionic > iLimb	++
		Tip grip: Motion control > bebionic > Michelangelo > iLimb	++
		Extension grip: Motion Control > iLimb > bebionic > Michelangelo	0

* no difference (0), positive trend (+), negative trend (–), significant (++/––), not applicable (n.a.)

Author's Conclusion

"Using a validated procedure to measure hand function, the more complex multiarticulated hands were tested and they did not show improved functional performance compared with the simpler prosthetic designs. Each device requires more actions to trigger the different grips to respond to the range of objects and tasks. The factors that affect the Overall score include the control format and the design of the hand, as it was not possible to program each of the hands with the same control formats; thus it was not possible to separate the different factors. All three hands were more anthropomorphic in action and appearance than the earlier hands, but this did not result in greater function than the simpler fixed geometry hands." (Kyberd, 2017)