

FUTURE LOOK OF UPPER LIMB PROSTHETICS

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INTRODUCTION

Since their development the cosmetic quality and appearance of upper-limb hand and arm prostheses has been limited. Simple hand reproductions (MyoBock Hands, Motion Control Hand, etc.) with skin-colored gloves or hook like terminal devices (Ottobock Greifer, Motion Control ETD, Hosmer, etc.) were all that was available. Also the construction of the interface was typically simple in design and shape, restricting the availability of customized designs and shapes.

In the last decade the appearance of multiaarticulating hand designs has created a new trend in technology and cosmesis with launch of the i-limb (Touch Bionics) in 2008 and the Michelangelo Hand (Ottobock) in 2010. Besides improved functionality the desired prosthetic look has changed from a natural and physiologic appearance to more futuristic presentation. Combined with various possibilities in glove and socket design, hand and arm prosthetics are presently offering individual fittings. Nevertheless, the factors for choosing a futuristic/robotic look in contrast to natural appearance still remains largely unknown.

STUDY OBJECTIVES

In the last decade the appearance of multiaarticulating hand designs has created a new trend in technology and cosmesis with launch of the i-limb (Touch Bionics) in 2008 and the Michelangelo Hand (Ottobock) in 2010. Besides improved functionality the desired prosthetic look has changed from a natural and physiologic appearance to more futuristic presentation. Combined with various possibilities in glove and socket design, hand and arm prosthetics are presently offering individual fittings. Nevertheless, the factors for choosing a futuristic/robotic look in contrast to natural appearance still remains largely unknown.

METHODS

This design analysis represents a quantitative market research of Orthotics and Prosthetics (O&P) professionals from North America, Germany, Austria, Australia, South Africa, Spain, Italy, Finland, Russia, Turkey, Poland, China, Japan, South Korea and Sweden. The questionnaire was provided to support data collection and to retrieve feedback

from O&P professionals regarding their expectations of user's preferred future upper limb prosthetic appearance. Possible contributing factors identified were current timeline, the users' gender, age, activity level, cultural background and the professional's knowledge of current prosthetic technology.

The questionnaire was divided into two main sets of questions. Part one targeted the O&P opinion about the prosthetic wearers' past experience and future expectations, plus various factors that can influence the wearers' decision to use a natural or futuristic looking prosthesis. Part two gave the O&P professional the possibility to freely write about his/her expectations of the users' choice. The questionnaire was offered in paper form or as online survey. Descriptive analysis was performed on an anonymous data set via Excel.

RESULTS

The survey has been posted since November 7th, 2016 in 16 different countries. The planned availability of the survey will be until July 2017. Current results are based on 49 responses of O&P professionals. The results, given in figure 1, show the expected trends towards natural and futuristic looking prosthesis regarding: timeline, gender, age, activity level, background and the O&P knowledge of the state of the art prosthetic technology and Up-to-Date level of O&P professional (UtD). In the past, only 10% of users preferred futuristic UL prosthetic appearance, while in future this number might increase up to 51%. Correspondingly, 73% preferred a natural look in the past and 16% might prefer this appearance in the future. Females tend to prefer natural prostheses (85%), whereas men might have a tendency for futuristic prostheses (51%). 45% of younger prosthetic users (0-12) would prefer the futuristic/robotic like look, while this form of prosthesis would be chosen by 8% of people with UL deficiency older than 65 years of age. Active people have a tendency for a more futuristic look (73%) than less active people, who would rather choose a natural one (82%). Preference for a natural prosthetic appearance seems to be favored by prosthetic users with traditional background (79%). The opinion and knowledge of the O&P expert might influence the amputee's choice to use a futuristic looking prosthesis.

DISCUSSIONS & CONCLUSIONS

According to the overall feedback from O&P professionals regarding expectations of user's preferred future upper limb prosthetic appearance, the trend seems to indicate a more futuristic/robotic appearance, though age and gender play an important role for the individual fitting. Older users preferred a natural look, while males tend to favor futuristic prosthetic appearance.

These results reflect international O&P professionals' opinions. The feedback from actual prosthetic wearers should be acquired in the future to verify the validity of the collected data. Nevertheless, manufacturers should consider exploring this segment further.

DISCLOSURE

Authors are Ottobock employees.

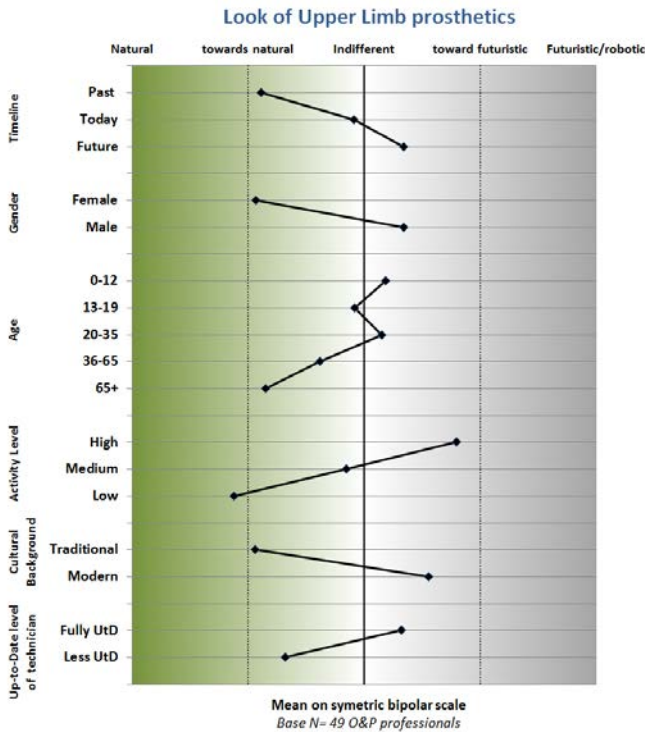


Figure 1: The future look of the upper limb prosthesis