

# Clinical application of the Assessment of Capacity for Myoelectric Control

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## Assessment of Capacity for Myoelectric Control – ACMC

The ACMC is administered and scored based on clinical observations of the myoelectric prosthesis user as he or she is performing everyday occupations. Any task, easy or hard, can be used to evaluate the capacity for control as long as the task requires active use of both hands (i.e., the unaffected hand and the prosthetic hand). During the assessment, the persons are encouraged to accomplish the tasks spontaneously in their usual way (i.e., by using the prosthetic hand as they are used to, as an active assisting hand or as a passive support or stabilizer of objects).

The occupational therapist assesses their capacity for control of their myoelectric prosthesis by rating their performances on 30 items representing different aspects of quality of myoelectric control. Each person's performance is rated with scores ranging from zero to 3, where zero = not capable, 1 = sometimes capable, capacity not established, 2 = capable on request, and 3 = spontaneously capable. To convert the ordinal ratings into linear measures, Rasch measurement analysis of the data is performed.

The Assessment of Capacity for Myoelectric Control (ACMC) was developed in order to determine a person's current level of myoelectric control for planning, re-evaluating or measuring the outcomes of prosthetic control training. The aim of this study was to report the clinical application of ACMC.



## Methods:

A consecutive sample of 10 subjects (4 males, 6 females, aged 3-39 years) with limb reduction deficiency or amputation and electric prosthetic hand underwent assessments prospectively six times during an 18-month period. Three subjects had had myoelectric prostheses for 4 years prior to entering the study; their ability measures were expected to remain relatively constant over sessions (group I). Seven subjects had their first myoelectric fitting when entering the study; their ability measures were expected to increase over sessions (group II). The subjects' performance on ordinary tasks were observed by occupational therapists and rated on the ACMC. The ACMC yields valid interval and reliable level measures. The mean ability measures for each of the first six sessions for each group were plotted to see if the intra- and inter-group changes in ability were consistent with expectations based on the clinical knowledge of the participants prosthetic experience. Additionally, for each group the participants' individual ability measures were plotted to see the intra-individual orders of the ACMC measures.

## Results:

Overall, the results from this pilot study confirmed our expectations. However, in group II we noted two different patterns, one for persons with successful prosthetic fitting (group II a) and another for those who had additional problems (group II b) (Figure 1). Unexpected peaks and drops in ability measures were found in some persons (Figure 2-4). Information from the clinical files of the subjects suggests that these fluctuations were originating either from the prosthetic socket fit; a tight fit was related with high ability measure and a loose fit was related with low ability measure; or, from a break in continuity of prosthetic training or use resulting in low ability measure.

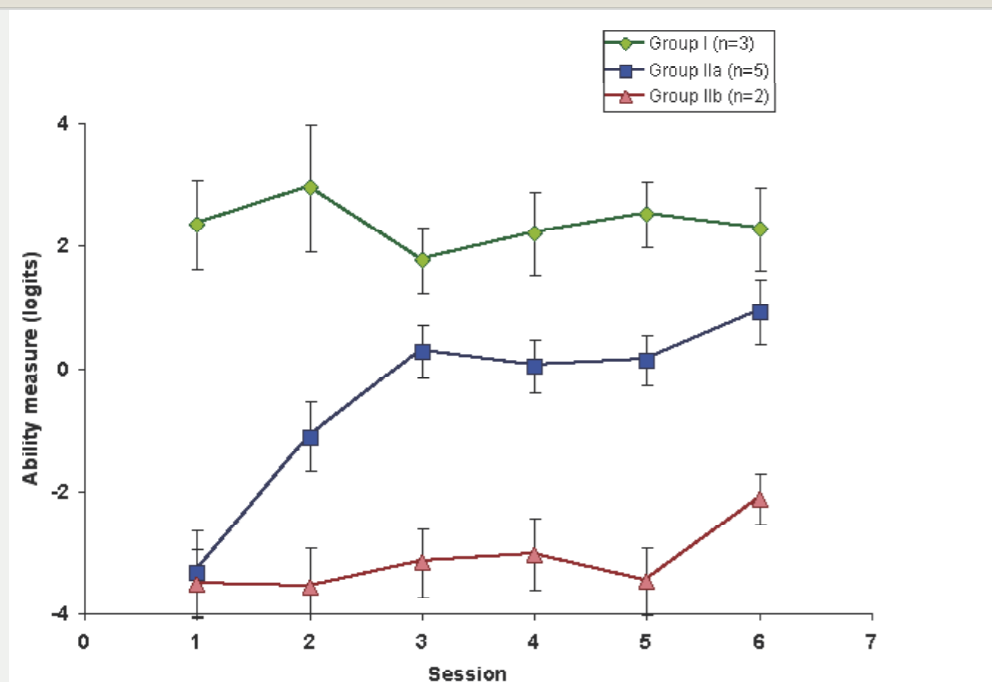


Figure 1. Mean ability measures for experienced prosthetic users (group I), new prosthetic users with expected improvements (group II a), and new prosthetic users with additional problems (group II b). Note: Capped bars (whiskers) indicates mean standard error of the measurement.

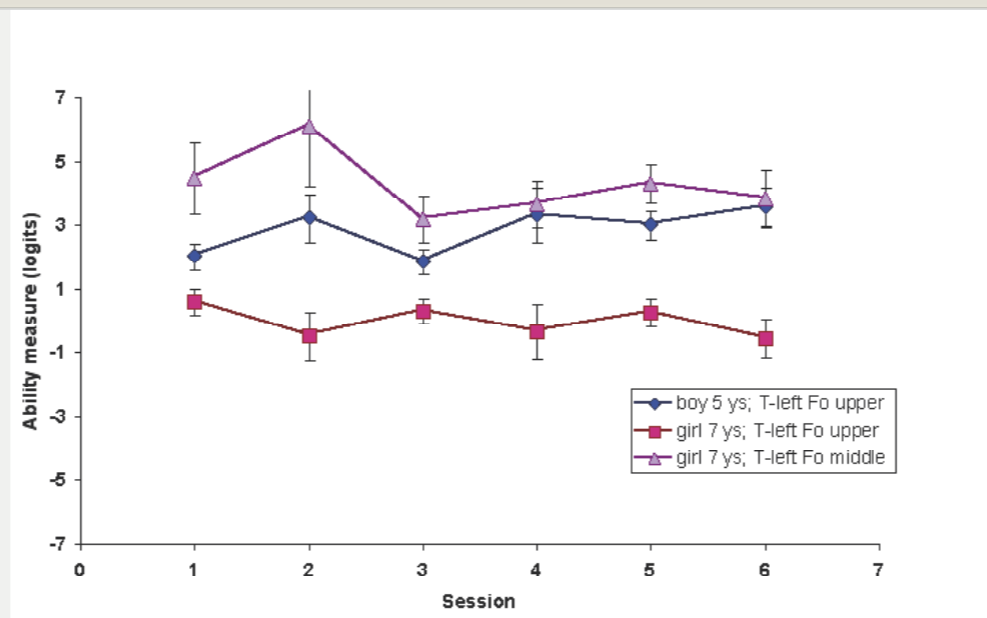


Figure 2. Individual ability measures for experienced prosthetic users (group I). Note: Capped bars (whiskers) indicates mean standard error of the measurement.

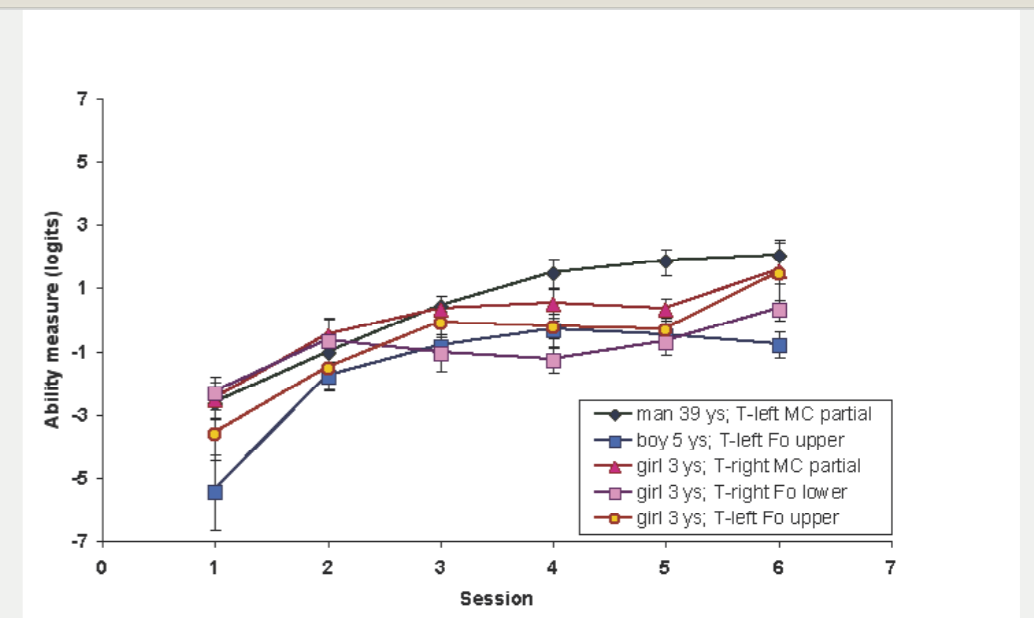


Figure 3. Individual ability measures for new prosthetic users with expected improvements (group II a). Note: Capped bars (whiskers) indicates mean standard error of the measurement.

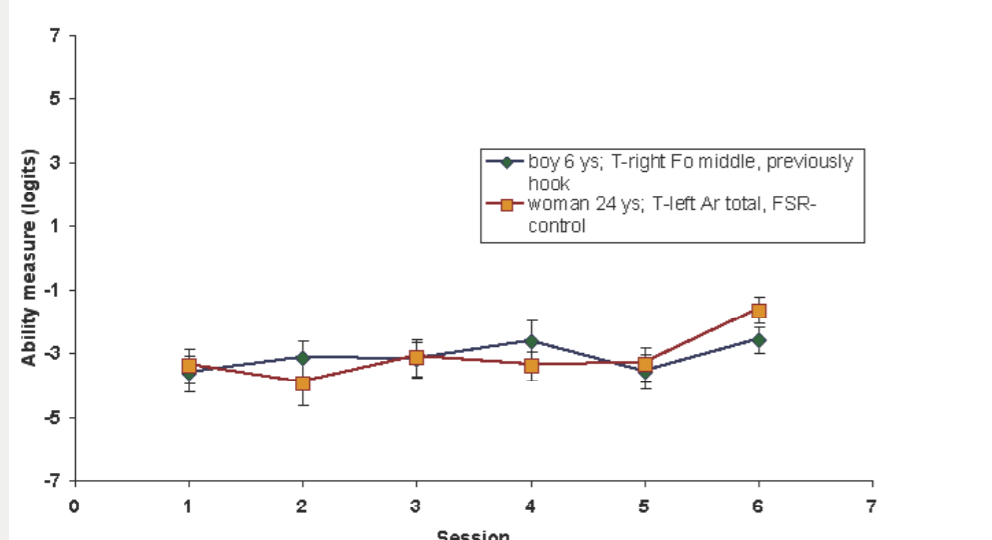


Figure 4. Individual ability measures for new prosthetic users with additional problems (group II b). Note: Capped bars (whiskers) indicates mean standard error of the measurement.



## Conclusions:

The ACMC is a clinically applicable and useful tool, both for measuring improvements and for demonstrating intra-individual fluctuations in clients. Further controlled studies to examine responsiveness to treatment and prosthesis adjustment, predictive power and sensitivity to change, are needed.