Intermanual Transfer in Training with an Upper-Limb Myoelectric Prosthesis Simulator: A Mechanistic, Randomized, Pretest-Posttest Study

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| Reference | Romkema S, Bongers R, van der Sluis C  
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| Products | Prosthetics simulator – PAULA software connected to MyoBoy |
| Major Findings | Prosthesis’ control was compared between groups with and without previous training:  
→ Training with prosthesis simulator enables faster handling of the prosthesis  
→ Intermanual transfer effects were present after training with a myoelectric prosthesis simulator |

**Movement time for all tasks**

To determine the improvement in skill, a test was administered before (pretest), immediately after (posttest) and 6 days after training (retention test) for experimental group. The control group only performed the tests without training.

| Population | Subjects: 48 healthy, abled bodied participants  
Previous: none  
Amputation causes: none  
Mean age: 24.6  
Mean time since amputation: none |
| Study Design | A randomized study:  
Experimental group performed the training with the unaffected arm, and tests were performed with the affected arm (the affected arm simulating an amputated limb). Half of the participants were tested with the dominant arm and half with the non-dominant arm.  
dominant side = “affected limb”  
non-dominant side = “affected limb” |
Results

<table>
<thead>
<tr>
<th>Body Function</th>
<th>Activity</th>
<th>Participation</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanics</td>
<td>Pain</td>
<td>Manual dexterity</td>
<td>Activities of daily living (ADL)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Outcomes</th>
<th>Results for with and without previous training:</th>
<th>Sig.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>Initiation time</td>
<td>Time from starting signal until start of the movement was not different between groups.</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Movement time</td>
<td>Time from beginning of the movement until competition of the task was shorter in experimental group.</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Force control</td>
<td>Maximal applied force on the object did not differ between groups.</td>
<td>0</td>
</tr>
</tbody>
</table>

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

Author’s Conclusion

“Intermanual transfer effects were present after training with a myoelectric prosthesis simulator in individuals who were healthy. The initiation time did not show intermanual transfer effects, presumably because of the differences in training tasks and test tasks. The movement time showed intermanual transfer effects, whereas the force control did not. Finally, no laterality effects were found. These findings suggest that intermanual transfer might be of clinical relevance for people with an upper-limb amputation because intermanual transfer training would enable them to start prosthetic training shortly after the amputation.” (Romkema et al. 2013)