



AOTA Evidence Briefs

Stroke

**A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project*

S #8

Reaching for an object elicits better quality of movement in stroke patients than reaching for no object

Wu, C.-Y., Trombly, C. A., Lin, K.-C., & Tickle-Degnen, L. (2000). A kinematic study of contextual effects on reaching performance in persons with and without stroke: Influences of object availability. *Archives of Physical Medicine and Rehabilitation*, 81, 95–101.

Level IC1c

Randomized controlled trial, less than 20 participants per condition or group, high internal validity, low external validity

Why research this topic?

Occupational therapy emphasizes the interaction between context and performance. Yet the contribution of context to performance is not well understood. The materials involved in performing a task represent one aspect of context, and a line of research on this aspect has been to examine the effects of the presence or absence of an object on task performance. Some evidence indicates that, in people who have no neurological damage, working with an object facilitates better performance than working with no object.

What did the researchers do?

Wu and colleagues (2000), variously of Chang Gung University (Tao-yuan, Taiwan), Boston University, and National Taiwan University (Taipei), sought to determine whether the availability of an object affected reaching in stroke patients. In their study, participants performed under two conditions: (a) the presence of objects, which called for them to reach forward with one hand and scoop two coins off a table into their other hand; and (b) the absence of objects, which called for them to reach to the same spot with no coins present and then bring their arm back to the starting point.

There were 14 participants who had experienced a stroke: 9 men and 5 women. They averaged 63.2 years in age. All were right-handed, able to understand and respond to instructions, and able to move the upper part of their impaired arm. Twenty-four healthy people, 7 men and 17 women, also participated. They were matched for age with the stroke patients. All the participants performed 10 trials of each condition in a random sequence in a laboratory, under the supervision of an occupational therapist.

The outcome areas of interest were *movement organization*, as measured by movement time (the time it takes a person to execute a reach); *total displacement* (the length of the path of the hand in three-dimensional space); *number of movement units* (an indication of smoothness of movement, measured as a combination of one acceleration phase, when the arm is accelerating toward the target, and one deceleration phase, when the arm decelerates as it changes direction, corrects its trajectory, or approaches the target); *percentage of reach where peak velocity occurs* (an indication of control strategy, measured as the proportion of reach corresponding to a changeover from acceleration to deceleration); and *amplitude of peak velocity* (an overall indication of the force of the movement, measured by the highest level of velocity achieved during the reach).

What did the researchers find?

The researchers found **significantly** (*see Glossary*) better organization of reaching movement in the object-present condition on four of the five measures (amplitude of peak velocity being the exception). The **effect sizes** (*see Glossary*) were large. The results for the healthy participants were similar to those of the stroke patients, although their performance was better under both conditions.

What do the findings mean?

For therapists and other providers, the findings suggest that the use of real objects facilitates efficient, smooth, and coordinated movement in people who have experienced a stroke and in healthy people.

What are the study's limitations?

The study was well controlled. The high rating (1) that it received on internal validity indicates that the outcome was due to the intervention and not some other factor.

Glossary

effect size (Cohen's r)—An effect size is a measure of clinical significance. It provides information about the magnitude of effect of the treatment. Although related to significance, it is not as influenced by the size of the sample. Therefore, it is possible to have an outcome on which the treatment had a large effect (i.e., the treatment group improved a lot more than the control group) and still have a non-significant result. If the results have a large effect but no significance, this means that this effect may be sample specific and not generalizable outside the study. There are many different types of effect sizes. What is reported here is Cohen's r . Cohen's r can be interpreted in a manner similar to a Pearson's correlation coefficient:

Effect size r	Size of the effect
<0.10	Negligible
0.10–0.29	Small
0.30–0.49	Medium
>0.50	Large

Cohen, J. (1977). *Statistical Power Analysis for Behavioral Sciences*. New York: Academic Press.

significance (or significant)—A statistical term, this refers to the probability that the results obtained in the study are not due to chance, but to some other factor (such as the treatment of interest). A significant result is one that is likely to be generalizable to populations outside the study.

Significance should not be confused with clinical effect. A study can be statistically significant without having a very large clinical effect on the sample. For example, a study that examines the effect of a treatment on a client's ability to walk, may report that the participants in the treatment group were able to walk significantly longer distances than the control. However, if you read the study you may find that the treatment group was able to walk, on average, six feet, while the control group was able to walk, on average, five feet. While the outcome may be statistically significant, a clinician may not feel that a one foot increase will make his or her client functional.

■ Terminology used in this document is based on two systems of classification current at the time the evidence-based literature reviews were completed: *Uniform Terminology for Occupational Therapy Practice—Third Edition* (AOTA, 1994) and *International Classification of Functioning, Disability and Health (ICIDH-2)* (World Health Organization [WHO], 1999). More recently, the *Uniform Terminology* document was replaced by *Occupational Therapy Practice Framework: Domain and Process* (AOTA, 2002), and modifications to *ICIDH-2* were finalized in the *International Classification of Functioning, Disability and Health* (WHO, 2001).

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For more information about the Evidence-Based Literature Review Project, contact the Practice Department at the American Occupational Therapy Association, 301-652-6611, x 2040.

