



AOTA Evidence Briefs

Stroke

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

S #9

When stroke clients are reaching to accomplish a functional goal with a real object, they may show better organization of reaching movement than when they are simply reaching to perform the motion

Wu, C.-Y., Trombly, C. A., Lin, K.-C., & Tickle-Degnen, L. (1998). Effects of object affordances on reaching performance in persons with and without cerebrovascular accident (CVA). *American Journal of Occupational Therapy, 52*, 447–456.

Level IC1c

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

Why research this topic?

Research has examined whether working with an object, versus working with no object, affects task performance positively, and the evidence suggests that it does. But how does the quality or the quantity of objects affect performance? That is, does access to richer resources result in better performance than access to impoverished resources?

What did the researchers do?

Wu and colleagues (1998), variously of Chang Gung University (Tao-yuan, Taiwan), Boston University, and National Taiwan University (Taipei), tested the issue of quality and quantity of resources. The study involved two conditions: an enriched one, in which the participants reached forward to a chopper and pushed the handle down to chop a mushroom; and an impoverished one, in which the participants reached forward to a chopper without anything in it and pushed the handle down. In the latter condition, the chopper was covered to conceal its shape and content.

There were 38 participants in the study: 16 men and 22 women. Their average age was 62.7 years. Fourteen (9 men and 5 women) were stroke patients recruited from stroke clubs. All were right-handed, able to understand and respond to instructions, and able to move the upper part of their impaired arm. The other 24 (7 men and 17 women) were neurologically intact. In a laboratory, all 38 participants performed 10 trials of each condition in a random sequence, under the supervision of an occupational therapist.

The researchers were interested in the following outcome areas: *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?

There was **significantly** (*see Glossary*) better organization of reaching movement in the enriched condition on three of the four measures (movement time, total displacement, and number of movement units) and a marginally significant effect on one (percentage of reach where peak velocity occurs). The overall **effect size** (*see Glossary*) was moderate.

What do the findings mean?

For therapists and other providers, the findings suggest that providing natural objects to complete a task (e.g., a chopper and mushrooms to complete a chopping task) and enriched information about the objects (e.g., providing common objects whose use is obvious from viewing them) is beneficial. In the study, reaching to chop a real object resulted in more time-efficient, more direct, smoother, and more preplanned movement by stroke clients than simply reaching to perform the same chopping motion without contextual support.

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.

