Research In Focus: A Weekly Digest of
New Research from the NIDILRR Community

Animation May Help Children with Autism Spectrum Disorders Learn to Use Symbol-Based Communication Devices

A study funded by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR).

According to the Centers for Disease Control and Prevention, up to 1 in 59 U.S. children has an autism spectrum disorder (ASD). ASD is a developmental disability that affects how people communicate and process information. About 30% of people with ASD have little or no functional speech. These individuals may benefit from using augmentative and alternative communication (AAC) systems to express themselves. AAC systems can range from cards or boards with symbols or pictures to electronic devices that generate speech. An individual using AAC may communicate by pointing to graphic symbols that represent words. In order to use these graphic symbols, children must learn the meaning of these graphic symbols. For symbols representing verbs like "walk," "sit," or "close," animated graphic symbols may be easier to learn than static symbols because the animated symbol depicts the action directly. Previous research has shown that many children with ASD may have a preference for moving images over still photos and graphics. In a recent NIDILRR-funded study, researchers compared the abilities of children with ASD to recognize animated vs. static graphic symbols depicting action verbs. They wanted to find out whether the children could recognize the animated symbols more accurately than the static symbols.

Researchers on the project "Do Animations Facilitate Symbol Understanding in Children with Autism?" enrolled 27 children with ASD in a study. The children were 3-7 years old and spoke less than 50 words verbally. The children were randomly divided into two groups: an "animated symbol" group and a "static symbol" group.

During the study, each child was invited to play a "guessing game" on a computer. The children heard the computer say "point to [name of verb]" and then guessed which of four graphic symbols represented the verb. The children had to point to the correct symbol within 30 seconds. The study began with a training phase where the children practiced with two verbs, "climb" and "hug." For this training phase, the game would acknowledge or correct the choices. The children also received spoken feedback from the tester and could practice until they indicated that they understood the game. Then, during the main part of the study, the children were asked to point to the graphic symbol representing 24 different action verbs (blow, bounce, close, cover, cut, dance, drop, eat, fall down, give, jump, kick, lie down, lift, pull, push, ride, run, sing, take, throw, turn around, walk, and wave). These included "transitive" verbs such as bounce, carry, and eat, as well as "intransitive" verbs such as fall down, jump, and run.

The children in both groups played the same game and all heard the same verbs in the same order. The children in the "animated symbol" group were presented with moving pictures that directly depicted the target action, such as a boy throwing a wad of

paper for the verb *throw*. The children in the "static symbol" group were shown a single frame from each animated symbol that represented the action involved but did not explicitly show any actual movement of that action. During the testing, the computer logged correct and incorrect choices, but did not acknowledge or correct the responses. If the child did not choose a response within the 30 seconds, the computer logged that as an incorrect response and moved on to the next word.

The researchers compared the average percentage of verbs that the children identified correctly between the static and animated symbol groups. The researchers also rated the performance of individual symbols based on the percentage of children who identified the correct verbs associated with those symbols. Symbols were rated as exceptional (85% or more), effective (75% or more), adequate (50% or more), or inadequate (less than 50%).

On average, the researchers found that the children in the animated-symbol group identified 80% of the verbs correctly while the children in the static-symbol group identified 59% of the verbs correctly. All 24 animated symbols performed adequately or better. Out of those, nine symbols performed exceptionally; nine symbols performed effectively; and the remaining six symbols performed adequately.

In contrast, 20 of 24 static symbols performed adequately or better. Out of those 20 static symbols, one symbol performed exceptionally; two symbols performed effectively; and 17 symbols performed adequately. The remaining four static symbols performed inadequately, meaning that less than half of the children were able to correctly identify the associated verb. The biggest differences in identification accuracy between the animated and static symbol versions were seen in the symbols for intransitive verbs that require no direct object, such as fall down, jump, and run. For this type of verbs, the children identified the verbs with higher accuracy using the animated symbols.

The authors noted that children with ASD may have difficulty learning to recognize static graphic symbols representing action verbs. In static graphic symbols, movement is implied and may be too abstract for these children to understand without specific instruction. Animated symbols, in contrast, show movement explicitly and may also better engage the attention of children with ASD. Clinicians who teach minimally verbal children with ASD to use AAC systems may wish to incorporate animated graphic symbols into AAC. The authors also noted that if animated symbols are not available, photographs may be easier for children with ASD to recognize than static graphic symbols, since they are more realistic and detailed. Future research may be useful to test the feasibility of other ways to represent action verbs in AAC, such as by using videos or alternate graphic symbol sets.

To Learn More

Digital books with dynamic text have shown promise in helping children with ASD to learn sight words, a key step in literacy. Learn more in this Research In Focus article.

AbleData's database of assistive technologies lists hundreds of augmentative and alternative communication products and more than 75 products to support literacy.

To Learn More About this Study

Schlosser, R.W., Brock, K.L., Koul, R., Shane, H., and Flynn, S. Does animation facilitate understanding of graphic symbols representing verbs in children with autism spectrum disorder? Journal of Speech, Language, and Hearing Research, 62(4), 965-978. This article is available from the NARIC collection under Accession Number J80960.

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