

# Study finds link between beat synchronization in preschoolers and learning reading skills

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Credit: George Hodan/public domain

(Medical Xpress)—A team of researchers with Northwestern University in the U.S. has found that an ability to synchronize with a beat may be an indication of how well preschoolers will later do when developing reading skills. In their paper published in *Proceedings of the National Academy of Sciences*, the team describes a study they undertook that

involved testing for beat synchronization and sound recognition in preschoolers and what they found as a result.

Devising a test for reading aptitude prior to teaching children to read, it is believed, would help children of all levels learn better. If a teacher knew beforehand that a child was going to have a [reading disability](#), for example, that child could be placed into a program developed specifically for their needs, hopefully offering a better long term outcome. Likewise, children with an exceptional aptitude for reading could be put into an accelerated program to prevent boredom.

Unfortunately, there is no such test, thus parents and teachers are left to discover a child's reading abilities on their own. In this new effort, the researchers devised a study to find out if beat synchronicity skills might be used as the basis for such a test.

Reading specialists have suspected that there is a link between beat synchronization and both language and reading ability—reading and speech are both timing based after all. To better understand that link the researchers arranged to test preschool volunteers. In the first test, 35 children were given a toy drum and asked to beat it in time with an adult beating on a similar drum. Those that could do it well were described as synchronizers, those that could not, as nonsynchronizers.

The same group of children then had electrodes pasted to their scalps to measure brain waves—as the researchers watched monitors, the children listened to sounds the researchers played, such as "da" and "ba" with no other sound, and then with background noise.

In studying the data, the researchers found that the children dubbed synchronizers in the first part of the experiment processed the played sounds with greater precision than did the nonsynchronizers. Further tests revealed that the synchronizers did better on overall language abilities than the nonsynchronizers, which suggests that it might be possible to use

the same process to [test](#) children as young as infants for later reading ability.

The researchers plan to continue monitoring the same [children](#) in the study for five years to see if their testing method is viable.

**More information:** Beat synchronization predicts neural speech encoding and reading readiness in preschoolers, Kali Woodruff Carr, *PNAS*, [DOI: 10.1073/pnas.1406219111](https://doi.org/10.1073/pnas.1406219111)

### **Abstract**

Temporal cues are important for discerning word boundaries and syllable segments in speech; their perception facilitates language acquisition and development. Beat synchronization and neural encoding of speech reflect precision in processing temporal cues and have been linked to reading skills. In poor readers, diminished neural precision may contribute to rhythmic and phonological deficits. Here we establish links between beat synchronization and speech processing in children who have not yet begun to read: preschoolers who can entrain to an external beat have more faithful neural encoding of temporal modulations in speech and score higher on tests of early language skills. In summary, we propose precise neural encoding of temporal modulations as a key mechanism underlying reading acquisition. Because beat synchronization abilities emerge at an early age, these findings may inform strategies for early detection of and intervention for language-based learning disabilities.

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