

Auditory Roots of Literacy Skills

By Nina Kraus, PhD, and Travis White-Schwoch

The degree to which hearing supports literacy development remains a topic of intense debate in scientific literature. It is by now generally agreed that hearing thresholds are important for literacy development only to the extent that early acoustic experience drives language development. That is why it's critical to provide children with hearing loss access to meaningful sounds as soon as possible. Beyond this, however, there does not seem to be a link between hearing thresholds and literacy skills.

What is still being debated is the extent to which auditory processing—the ability to make sense of sound—supports reading development. Evidence shows children with diagnosed reading impairment have difficulty performing complex auditory tasks; they also have diminished neural responses to subtle sound features, supporting the idea that the integrity of auditory processing is important for reading development. Furthermore, there is evidence that training to improve auditory processing abilities in children with diagnosed reading disabilities improves their scores on standardized reading tests. Together, this evidence suggests that auditory processing is a driver of literacy development.¹

Still, a key question is whether early auditory processing abilities augur reading skills. This is important because the experience of learning to read changes the mechanisms that underlie reading—imagine going from sounding out each word on a page to recognizing them instantly. This developmental transition makes it difficult to extrapolate performance in older children to younger children.

Bonacina and colleagues addressed this question in a four-year longitudinal study of 27 children, following them from age 3 to 7.² They focused on three aspects of phonological processing, a cluster of skills reflecting one's fluency with the sound structure of spoken language that is crucial to learning to read:

1. Phonological awareness: the knowledge of what speech sound units may be combined. For example, /b/ and /a/ can be combined to form /ba/, but /b/ and /g/ cannot be combined to form /bg/.
2. Rapid naming: the ability to quickly and accurately recite written information, which is important for eventually linking sounds to letters efficiently. In very young children, this can be tested by asking them to name color blocks aloud.



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3. Phonemic memory: the ability to remember combinations of speech sounds. For example, a child may not know the word onomatopoeia, but precocious children can remember the sequence of sounds (/oh-no-ma-toe-pee-ah/) and repeat it back.

To evaluate auditory processing, Bonacina, et al., measured the stability of neural responses to speech, which is systematically disrupted in children with reading impairment.³ Children's neural response stability at age 3 predicted their phonological awareness one year later. It also predicted phonological awareness two years later, albeit to a weaker extent. This predictive link disappeared three years later, which is consistent with the idea that learning to read changes the mechanisms that underlie reading development.

However, no relationship was found between auditory neural stability and either rapid naming or phonemic memory, supporting a unique link between phonological awareness and neural stability.

Together, this suggests that the stable neural processing of sound is important for some, but not all, aspects of phonological development. Longitudinally, the strength of sound processing in the brain predicts future success on a test of phonological awareness. Efficient auditory processing may lead to a robust knowledge of the sound structure of spoken language. However, this does not necessarily translate into fluent access to and/or retention of this information.

These results show that auditory processing—accurately and efficiently making sense of sound—is indeed important for learning to read. We can see this objectively in the neural response to sound. But auditory processing must act in concert with other cognitive and linguistic skills. This subtlety may account for some discrepancies in the literature on auditory processing and reading. Nevertheless, these results reinforce that auditory development is an important factor in literacy development. Early and meaningful engagement with sound prepares children to learn to read. [📖](#)



Dr. Kraus, left, is a professor of auditory neuroscience at Northwestern University, investigating the neurobiology underlying speech and music perception and learning-associated brain plasticity. **Mr. White-Schwoch** is a data analyst in the Auditory Neuroscience Laboratory (www.brainvolts.northwestern.edu), where he focuses on translational questions in speech, language, and hearing.

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References for this article can be found at <http://bit.ly/HJcurrent>.