Identifying Early Literacy Practices that Impact Brain Processing and Behavior

Amanda Prokasky[1], Victoria Molfese[1], Dennis Molfese[2]
[1]Department of Child, Youth, and Family Studies, [2]Department of Psychology
University of Nebraska-Lincoln

What Are Phonological Processing Skills?

- What are phonological processing skills?
  - Discriminating phonetic contrasts or specific differences between speech sounds
    - voice-onset time (e.g., /ba/, /pa/, /ga/, /ka/)
    - place of articulation (/b/ and /g/)
  - Some phonological processing skills are present at or near birth
  - Other phonological processing skills develop in early infancy
- Event-related potentials (ERPs) - a non-invasive method of measuring brain activity during perceptual and cognitive processing

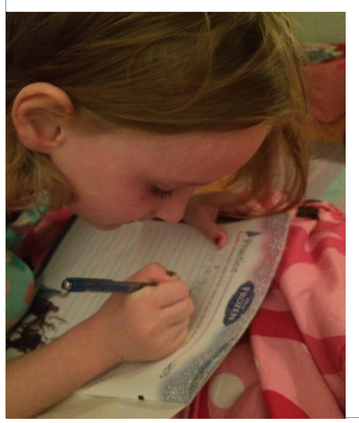
- ERPs recorded over left hemisphere (LH) temporal regions of newborn infants to auditory presentations of consonant-vowel combinations were strongly related to verbal skills measured at 3 years old (Molfese & Molfese, 1985)
- Children with high verbal skills at 3 years generated distinctly different ERP responses as newborns depending on the phonetic contrast presented compared to children with low verbal skills
- Strong relations have been found between ERP responses recorded at birth and children's language skills at 5 of age, and children's reading skills at 8 years old (Molfese & Molfese, 1997; Molfese, 2000)
- Using auditory brain-stem responses, White-Schwoch & Kraus (2013) found that children with better phonological processing skills had brain responses showing more consistent discrimination of two speech sounds (/ba/ and /ga/)
- Children's performance on phonological awareness assessments was related speech sound discrimination even in noisy environments (White-Schwoch et al., 2015)
- These brain responses predicted composite reading skills, sight-word reading, and spelling scores in the same children 1 year later

Research to Practice: Fostering the Development of Phonological Processing and Alphabetic Knolwedge Skills

- Parents, teachers and caregivers can foster the development of phonological processing and alphabetic knowledge skills in a variety of ways:
  - Engage children in writing activities to strengthen the link between spoken word and written sounds and words
    - One example is **Letterland**- a systematic phonics instruction cited in the National Reading Panel Report (NICHD, 2000) as showing strong reading gains for kindergarten children
      - Developmentally appropriate activities involve letter naming, phonological processing, and writing activities using letter-shaped pictograms with phonologically matched names (Clever Cat, Munching Mike)
  - Shared book reading, language and vocabulary learning games, and frequent parent-child communication to build exposure to language sounds, vocabulary and conversations
  - Home-school partnerships can be used to share literacy practices and strengthen important emergent literacy skills

What Are Alphabetic Knowledge Skills?

- Alphabetic Knowledge
  - letter names and the association between letter names and letter sounds
  - an emergent literacy skill linked with later reading skills
- Accuracy and and fluency in letter naming is related to later reading skills (Adams, 1990; Badian, 1995; Blatchford, Burke, Farquhar, Plewis & Tizard, 1987)
- In a study of low-income preschoolers, Molfese et al. (2006a) found that letter naming skills were related to phonological processing skills in preschoolers who could name more than 3 letters
- Letter naming is often emphasized in preschool classrooms, however the link between letter sounds, letter names and written letters is often overlooked



- In one study, researchers found that preschool children could name on average 6 letters, but scores for writing dictated letters were much lower (Molfese et al., 2006b)
- The strong positive relationship between letter naming and writing letters to dictation suggests an important activity for early alphabetic knowledge acquisition