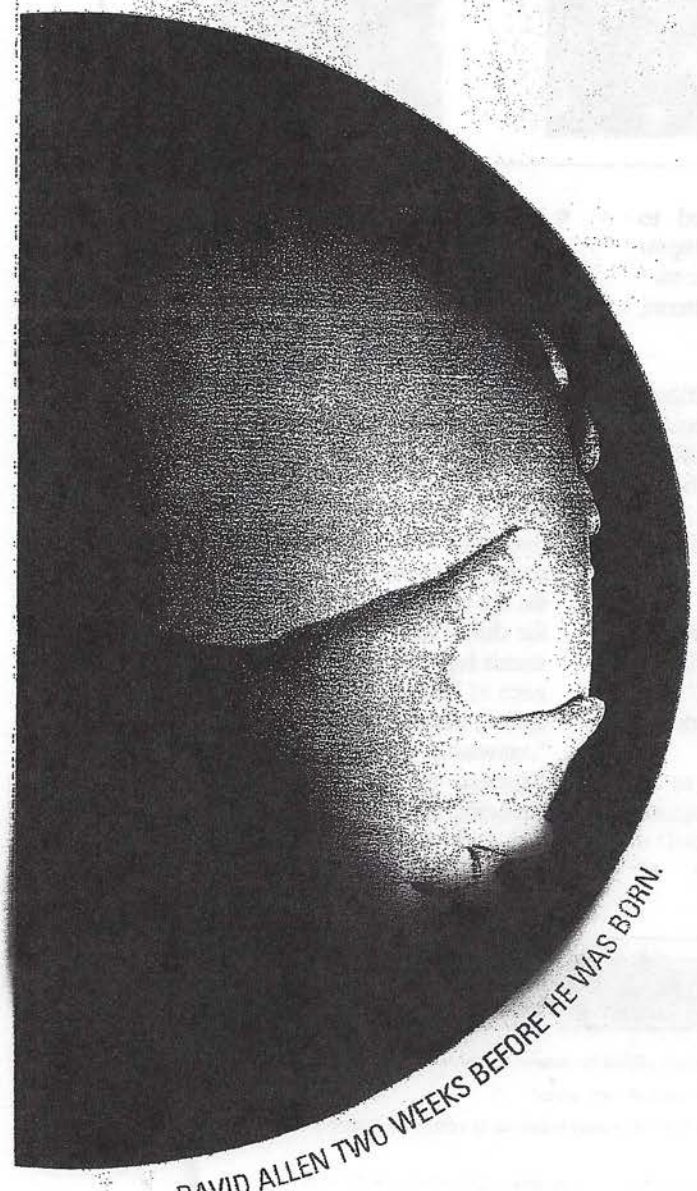
# LANGU

## THE CONNECTION

BY JOYCE L. GOSS, M.A.



DAVID ALLEN TWO WEEKS BEFORE HE WAS BORN.

Using technological advances made during the last decade, developmental psychologists, early childhood experts, neurobiologists, and others have amassed tremendous knowledge about the ways infants acquire language. Let's embark on a "guided tour" of speaking and reading, the methodology used to gain insights into the various means of communication, and suggestions for early childhood educators, including parents, on effective ways to enhance language acquisition from the fetal stage to preschool age.

### SPEECH AND LANGUAGE

All communication must begin with the ability to understand and use some form of language (Chomsky, 1986). For the vast majority of humans, communication begins with learning verbal speech. However, it is important to differentiate between language and speech:

- Language is the brain's ability to interpret, organize, process, and communicate a message. It is through language that thoughts, ideas, and feelings are expressed.
- Speech is the actual formation and pronunciation of sounds and words.

Language is receptive (making sense of information received in either oral or written form); expressive (giving information back in oral or written form); or pragmatic (social language). Speech, on the other hand, is dependent on the oral and nasal cavities and the ear, which work together to articulate sounds, develop tonal quality, and fluency.

When does an infant begin to categorize and differentiate between sounds and words? How does an infant distinguish between the sounds of its mother's voice and that of a stranger? It is now proven that language acquisition begins long before birth. Early in the first trimester the fetus can recognize voices and emotions of the mother. How is this possible? Infants have this ability because the human brain is wired to recognize the sound of voices. Pascal Belin and his team of neuroscientists at the Montreal Neurological

# AGE

## BETWEEN SPEAKING & READING




Institute have shown that specific regions of the brain are selectively activated and guided by the sound of human voices.

### METHODOLOGY

How are fetal and very young babies' responses to stimuli measured? Four methods used by developmental psychologists have been described (Golinkoff and Hirsh-Pasek, 1999).

1. Decreased heart rate. When something interesting or new is presented to a baby inside the womb or to a newborn there is a decrease in the heart rate. The difference in heartbeat allows scientists to measure an infant's response to divergent stimuli.
2. Sucking reflex (non-nutritive sucking).Specially-designed nipples connected to very sensitive pressure switches which control other devices (i.e. a projector lens) serve to indicate an infant's handling of new information.
3. Habituation. Babies confronted with the same stimulus over and over become "habituated to it;" they lose interest and stop responding. But when challenged with a new event they resume interest.
4. Visual expectation. Infants have a very strong tendency to look at things which grab their attention. Gaze patterns can be used to determine their degree of comprehension when exposed to different visual effects (changing patterns, color intensity, etc).

With these techniques, significant progress regarding language acquisition has been made (Golinkoff & Hirsh-Pasek, 1999; Damasio & Damasio, 1983; Ramus et al, 2000; MacNeilage & Davis, 2000). Some of these findings include:

- Fetuses can distinguish patterns in the language they hear. Closely related words such as "babi" and "bibi" evoke different responses.
- Newborns, even as young as 72 hours old, are able to distinguish their mother's voice from a pleasant-sounding voice of another female.
- Babies are born ready to learn any language and are capable of distinguishing between French and Russian or between English and Japanese. Infants rely on the rhythm of a language, not the sounds of it, in order to make these fine distinctions.
- By two months of age babies begin to utter and combine sounds (babbling). "Cooing" and "gooing" sounds develop at a rapid pace from the age of four to eight months. As the child's vocal apparatus grows, sounds begin to take on the appearance of language. At this stage, spoken interaction with adults is "conversation." The baby takes turns listening and then responding. Analyzing the language they hear and memorizing familiar sounds, babies learn to pair words with meaning and build the foundation for

### Competencies for the Language Article

STOUT

The Child Development Associates (CDA) competency that can be used for this article is:

- To advance physical and intellectual competence.

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This article helps meet the following [illegible] Professionals (CCP) [illegible]

- [illegible] ability to enhance the cognitive development of young children

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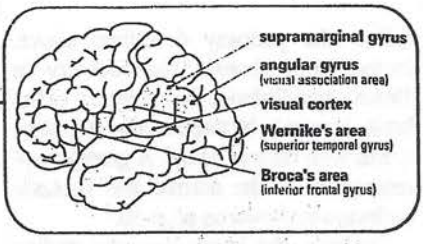
language. The very strong relation which exists between babies' babbling and the emergence of speech is now one of the most active areas of research in developmental psychology (Bower, 2000).

From the above discussion one can surmise the tremendous importance of interactive communication between babies and their parents and caregivers. Children whose parents and caregivers talked to them a lot as babies show higher IQ scores than those whose parents and caregivers talked less frequently to them. This is not surprising since talking with babies promotes problem-solving abilities, creativity, and later on reading and writing skills. But what is the connection between speech, language, and reading?

Reading is the process of extracting meaning from print and involves a third of the brain. It requires hearing and vision, the ability to connect the two, and most important, effective understanding and interpretation of what is read. All of these things happen in less than a second. Given this complexity it is easy to understand why reading difficulties are so common. According to Barinaga (1996) five to eight percent of all children suffer from auditory deficits relating to speech, and 85 percent of those children will go on to develop reading difficulties. The problem has been shown by the experiments of Paula Tallal and her coworkers (1982) to be the result of slow cortical processing of sounds. For example, the syllables "ba" and "pa" differ only in the beginning consonants ("b" and "p"). These sound patterns differ by just a few milliseconds. When the brain cannot correctly process the rapid changes, the two consonants cannot be distinguished, leading to problems in understanding spoken language (Spitzer, 1995).




In attempts to understand why so many children (about one in five) have difficulty reading, Dr.'s. Sally and Bennett Shaywitz, co-directors of the Yale University Center for Learning and Attention, have discovered what appears to be the neurological pathway for reading and some of the problems associated with it. In their studies, individuals (32 normal readers; 29 dyslexic) performed tasks paralleling the reading process: letter recognition, identification of rhyming pairs ("g" and "c"), separating words that make sense from words that do not, and sounding out words. The results of the study showed that in going from the simple to the more complex tasks, normal readers activated small areas of the brain going from the back to the front. In other words, from the primary visual cortex (back), to the visual association area (Angular gyrus) and finally to Wernicke's (Superior temporal gyrus) area. Translation: The brain registers what the eyes can see (visual cortex), translates the letters and words into language (visual association), then takes the sounds of language and converts them into specific words (Wernike's area). When reading, dyslexic subjects did not

follow the pathway described above. Instead they showed high activity in Broca's area (Inferior frontal gyrus) of the brain, known to be responsible for pairing words with units of sound. A graphic representation of the normal and dyslexic pathways is shown on page 50.

Dyslexia, the most common reading disorder, is the inability to distinguish the smallest sounds (phonemes). According to the Orton Dyslexia Society, 11 to 15 percent of school-aged children are afflicted. In dyslexics, the phonologic component, which is extremely important for the first two or three years when a child learns to read, is defective. Those with dyslexia constantly encounter blurry, jumping, and moving words. Result? Reading becomes a difficult, burdensome activity. The exact cause of dyslexia is not yet known and myths about it abound (see page 52), but it is thought to involve both biological and environmental factors. The strong, inherited tendency for phonologic awareness suggests a genetic connection. Environment plays an important role, too. Children not read to from an early age develop reading troubles in school. In short, there are no definite answers for effective diagnosis or therapy of dyslexia. But whether caused by nature or environment, the problem has the same potential solution—intensive instruction given at an early age.

Dyslexia, undoubtedly, takes various forms and probably has different etiologies. E. Paulesu and co-workers have shown, using brain scan technology, that at least one type of dyslexia (known as a dissociation disorder) may be caused when a particular brain module fails to fire (E. Paulesu et al, 1996). Brain scans of above-average intelligence volunteers, normal and dyslexic, performing word tasks were strikingly different.

- In non-dyslexic individuals the language areas of the brain fire in unison. Both Wernicke and Broca's regions are activated and this phenomenon is made possible through fibers that connect the two (known as the Insula).

- In dyslexics the Insula did not fire in concert. When challenged with the word task, each of the two regions activated separately.

- The disjointed activity makes words difficult to be understood (Wernicke's function) or articulated (Broca's function) at the same time.

Based upon this knowledge, the challenge of teachers and parents becomes how to utilize the enormous plasticity of the brain to help those individuals with reading disabilities to either make pre-existing pathways more effective or to create new ones (rewiring the brain). The lesson to parents and early childhood educators is simple. Children, before birth, and into the early grades, should be read to consistently. The stimulation provided by reading helps all children build permanent brain connections.

Results of a review of over 100,000 research studies undertaken by the National Reading Panel (appointed by the Director of the National Institute of Child Health and Human Development) conclude the path to becoming a good reader is the teaching of sounds of letters and groups of letters. Specific recommendations:

- **Phonemic awareness.** Children

should know that spoken words are made up of tiny segments of sound. For example, the words "go" and "she" consist of two phonemes each.

## Myths about DYSLEXIA

**MYTH:** Children who write letters backward or in reverse may be dyslexic.
FACT: Backward writing is common among children learning to write, whether or not they are dyslexic. Dyslexic children may be able to see and copy letters quite well.

**MYTH:** Dyslexia is a visual problem.
FACT: Researchers think dyslexic children have trouble identifying phonemes–the tiny sounds that make up words such as the "at" sound in cat.

**MYTH:** Children can outgrow dyslexia.
FACT: Dyslexic children become dyslexic adults. With the right kind of early intervention, poor readers can learn to compensate for their disability and read accurately, but it may always be difficult for them.

**MYTH:** More boys than girls are dyslexic.
FACT: They are about the same; however, more girls' reading problems often go undetected.

- **Phonics skills.** Children should understand that there are relationships between letters and sounds.
- **Guided oral reading.** Students should read out loud to a parent, teacher, or other student who can correct their mistakes and give them oral feedback.

As children begin to learn to read, their progress should follow general guidelines. Parents and early childhood educators must remember, however, that children's development varies widely. If signs of trouble appear, early intervention is crucial.

### Infant to Three Years

- Recognizes specific books by their cover.
- Pretends to read books.
- Looks at pictures in a book and realizes it represents a real object.
- Produces letter-like forms and scribbles.

### Three to Four Years Old

- Knows that it is the print that is read in stories.
- Pays attention to repeating sounds (like Peter, Peter, pumpkin eater.) Shows an interest in reading.
- Can identify 10 alphabet letters.

### Kindergarten

- Begins to track print when listening to a familiar story.
- Recognizes and can name all letters.
- Understands that letters in a written word represent sounds.
- Makes predictions based on the illustrations.

### Conclusion

Human communication is an extremely complex phenomenon consisting of two primary facets. Newborns demonstrate an amazing ability to discriminate among the sounds they hear and it is our responsibility to constantly stimulate and enhance that ability. The "expression" of language in the written form and thus, the ability to read, plays an integral role in the acquisition of knowledge by children from birth and throughout their lives.

**Joyce L. Goss, M.A.,** chose the field of education as a second career and is now a primary teacher in the Lodi (California) Unified School District.

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