Definition: **reading** from *The Hutchinson Unabridged Encyclopedia with Atlas and Weather Guide*

Communication skill that involves the reception and interpretation of written communication. Written communication in any form must take account of the level of reading skill attained by its intended audience, including reading age, reading speed, and inferential reading ability. These are all indicators of a reader’s general literacy, and affect their degree of comprehension.

In order to avoid the difficulties posed by a multilingual society, such as the European Community, extensive use is made of picture-based instructions and signposts. Fire exits and road signs are good examples.

**essays**

How reading develops vocabulary

Strategies for those with reading and writing difficulties

Using a thesaurus

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**Summary Article: Reading**

From *Encyclopedia of Human Development*

In a split second, a skilled reader identifies words, recovers their meanings, and integrates them with prior words in the passage. The average skilled reader recognizes at least 50,000 words, having read about a hundred million words. Though reading seems automatic, it is a complex cognitive act consisting of several component operations that deal with the sequence of words, phrases, and sentences of a text. These operations act together to achieve the result of reading, which is the comprehension of the text. Reading involves other cognitive processes, including perception, memory, reasoning, and problem solving. Unlike spoken language comprehension, the reading skill requires a long period of instruction and practice. However, the rewards are ample as our society values literacy as a prerequisite for success.

**COGNITIVE PROCESSES IN READING**

Coherent text is based on the repetition of key concepts in a text. In order to comprehend the text, readers must spot the recurring ideas in the text and integrate them into a mental structure. Because most texts are too long to be processed in one piece, the reader creates a memory representation by processing the text’s smaller units, its sentences, and its clauses. A variety of processes at several levels of structure, including letters, words, phrases, and sentences, contribute to comprehension. At the letter level, visual features must be decoded to identify letters. Word-level processes include the encoding of the word into an abstract unit and lexical access by which the word’s meaning is retrieved from a mental lexicon. Sentence-level processes include operations that handle both the segments of the sentence and the sentence as a whole. Text-level processes integrate the information from different sentences into the reader’s model of the text. To achieve such integration, the reader must maintain the prior information from the current text in memory. All along, inferential processes occur.
that make use of the reader's general knowledge of the physical and social world.

How does the reader integrate text information with prior knowledge, whether it is from the current text or from other sources? Different models of reading comprehension attempt to find an answer to this question. Memory-based models assume that information in memory is activated automatically during reading. This is a continuous process that requires relatively little mental work. The text concepts currently in focus broadcast a signal to the contents of memory. Concepts in memory are activated by virtue of passive resonance. The degree of activation of a concept in memory depends on its similarity to the specific text concept.

Constructionist models view reading comprehension as an active building of the text representation. The representation captures the causal relations among events in the text. The events include the goals, reactions, and actions of a story's character as advocated by story grammar theory. Situation models focus on what the text is about rather than the repetition of individual concepts. In addition to causal relations, the scenario of a text includes the spatial and temporal context within which the story evolves.

READING RESEARCH

There are four largely independent traditions in reading research. These include research on (1) basic cognitive processes in reading, (2) the precursors of reading, (3) reading instruction, and (4) reading disabilities with special emphasis on dyslexia. Basic researchers and dyslexia researchers increasingly turn to neuroimaging methodologies to complement behavioral assessments of reading.

Basic Research

Basic reading research examines the behavioral and neural manifestations of reading comprehension. The research uses patterns of eye fixations and other behavioral measures, as well as neural images, to track the changing mental load as a person reads a text. Eye fixation studies reveal that reading does not involve the smooth movement of the eyes across the page that one might assume. Rather, the eyes make short and rapid movements, known as the saccades, and then fixate on a text unit, which is typically a word. It is during the fixation that the reader is assumed to extract the meaning of the word. Thus, reading is much like a slide show where words are flashed for about a quarter of a second. The reader controls the exposure duration of each word, albeit unconsciously. The duration of eye fixations reflects the difficulty of a text segment. Unfamiliar words, challenging syntactic structures, and concepts introduced for the first time in a text require longer fixation durations. In addition, both behavioral and brain imaging research have shown that reading involves shifts of activation to currently relevant meanings and active suppression of meanings no longer relevant.

Brain imaging research supports the hypothesis that reading builds on spoken language processing in that reading makes use of the same brain regions implicated in understanding spoken language. In normal readers, these typically are centers in the left hemisphere, the rear-brain parietal region, including Broca's area, and the boundary region between the temporal and occipital lobes. The latter region is presumably implicated in word decoding. Integrating information across clauses and sentences activates centers in the right frontal lobes.

The Precursors of Reading

There is a profound difference between learning to speak and learning to read. Speaking is innate, but reading is not. Children must be instructed to learn to read. Spoken language has existed for at least
50,000 years. The human brain has evolved to produce and comprehend spoken language. Reading is of a more recent vintage, perhaps no older than 5,000 years. Learning to read presumably capitalizes on the brain systems used for spoken language processing.

There is consensus among researchers that phonological awareness is a critical precursor to reading and that it plays a fundamental role in reading acquisition. Phonological awareness refers to our sensitivity to the sounds in words, the phonemes, and our ability to manipulate those phonemes. Phonemes are the smallest sound units in language. Phonological awareness is tested, for example, by asking the person to say crane without the r or cat without the c. There are three aspects of phonological awareness: phonological sensitivity, phonological access to the mental lexicon, and phonological memory.

Phonological sensitivity is reflected in the child's ability to identify words that rhyme, to combine phonemes into words, and to delete syllables or phonemes from a word to create another word. Such sensitivity advances the child's understanding of the correspondence between letters and phonemes, which is the basis of alphabetic languages.

Phonological memory involves short-term memory for sound-based information. This is measured by span tests where the child must repeat a sequence of items in the order they were presented. Phonological memory enables a child to maintain a representation of the phonemes corresponding to the letters of a word, as the child processes the text's clauses, sentences, and relations between repeated concepts. Not surprisingly, phonological awareness accounts for much of the difference between poor and good readers. Most children have no trouble manipulating phonemes, but for poorer readers this is a difficult challenge.

Reading Instruction

Throughout the last century, there has been a vocal debate on the best method of reading instruction involving advocates of the whole-word method and the phonics method. Proponents of the whole-word method believe it is best to teach children to read by exposing them to whole words and by reading entire stories. This method works adequately for children who can break the decoding barrier on their own, but not for those who cannot.

The phonics method is more attuned to phonological awareness as a precursor to reading. Recent research evidence from a diverse set of sources has demonstrated that this is more successful for most children than the whole-word method. According to the phonics method, children are instructed to form mental links between letters and sounds, and between sounds and words. Specifically, as noted in the National Reading Panel report (2000) “explicit, systematic instruction in phonemic awareness is more successful in teaching children to read than any other method.”

Research on Dyslexia

Whereas the reading level of poor readers is on par with their general intelligence, dyslexic readers read at a level significantly below their level of intelligence. Dyslexia is defined as a learning disability that is neurobiological in origin. Dyslexic individuals have difficulty with fluent word recognition thought to result from a deficit in the phonological component of language. Dyslexic children typically have problems in identifying specific target words visually, even when given unlimited time. As a result, these children encounter problems in understanding passages of text. They tend to read less, thus impeding the growth of their vocabulary and general world knowledge. It is estimated that about 5% of all school-
age children, or approximately 2.5 million, are dyslexic.

Brain imaging research reveals a contrast in the brain processes of normal and dyslexic children during reading. In dyslexic readers, including the youngest ones, brain centers other than those in normal readers are activated during reading. Notably, the occipital-temporal word decoding area is not active. Importantly, when performing other cognitive tasks such as problem solving, the brain activation patterns of normals and dyslexics do not differ. When systematic remedial tutoring in phonics and phonological awareness is started early enough with young dyslexic children, their reading skills improve significantly. Indeed, their brains prove to be malleable to such instruction and their brain patterns come to resemble the brain patterns in unimpaired children.

SUMMARY

Much progress has been made in the last decade on basic, instructional, and remedial issues in reading. Nevertheless, as Edmund Huey, the pioneer of reading research, noted nearly a century ago, “to completely understand the mental processes of reading represents the acme of reading research.”

See also

School

Further Readings and References

- Castles, A.; Coltheart, M. Is there a causal link from phonological awareness to success in learning to read? Cognition 91: 77-111.

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