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Reading rate: Theory, research, and practical implications

The same comprehension processes underlie both reading and auding, so the central process for understanding spoken or written language can be called "rauding." Rauding rate, which depends on cognitive speed, rises as a young person matures. But rauding is only one of five reading processes—sometimes we shift into other gears.

During the past 100 years, there has been a great deal of research on reading rate (see Carver, 1990). Until recently, however, reading rate was considered to vary with so many factors that it was not predictable in any particular situation. Conventional wisdom has usually considered reading rate to vary with the difficulty level of the material and the purpose of the reader.

Recently, however, the primary factors affecting reading rate and reading comprehension have been delineated so that both can be predicted with surprising precision in normal reading situations. For example, it can be predicted that a typical girl in Grade 6 will read her history textbook (200 pages with 250 words per page) at a rate of 177 words per minute (see Carver, 1990). Furthermore, if she reads this entire history text twice, it will take her about 9.4 hours and she will comprehend about 78% of it.

Reading rate is quite lawful. The predictions described above have not even been considered in the past—partly because rate was regarded as too mercurial in nature. It turns out that reading rate can be predicted with surprising accuracy in a wide range of situations using a relatively new theory, called rauding theory (Carver, 1984, 1990). This theory and its supporting research evidence will be described first. Then, a number of practical implications will be given for classroom teachers.

Rauding theory

Rauding is a word derived from two words—reading and auding. Reading means to look at words and determine their meaning, and auding means to listen to words and determine their meaning. The term rauding focuses upon the fact that the comprehension processes underlying typical reading and auding are the same. Rauding refers to comprehension of the complete thoughts in the sentences of textual material, whether presented visually or auditorily. When individuals are understanding most of the complete thoughts in the material they are reading, they are said to be rauding.

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The rauding process is one of five basic reading processes, also called reading gears. Gear 1 is memorizing. Gear 2 is learning. Gear 3 is rauding. Gear 4 is skimming. Gear 5 is scanning. The basic process that most readers use most of the time is their rauding process, Gear 3. It involves looking at each consecutive word in the sentences of textual material and attempting to formulate the complete thoughts that the writer intended to communicate. College students ordinarily operate their rauding process at rates around 300 words per minute.

Sometimes individuals shift up to a higher gear. For example, they may shift up to a skimming process, Gear 4, when they need only an overview of the material and do not need to comprehend the complete thought in each sentence. College students typically operate skimming processes around 450 words per minute. Sometimes individuals shift up to a scanning process, Gear 5, whenever they only need to find a target word in material. College students typically operate scanning processes at rates around 600 words per minute, or even higher.

Sometimes individuals shift down to a lower gear when they need more power. They may shift down to a learning process, Gear 2, whenever (a) they want to know the material well enough to be accountable for it later, or (b) the material is relatively difficult for them and they did not understand the sentences the first time they were read. College students typically operate learning processes at rates around 200 words per minute. Individuals may shift further down to a memorizing process, Gear 1, whenever they need to be able to accurately recall the details of material later, either orally or in the form of an essay test, for example. College students typically operate memorizing processes at rates around 138 words per minute, or even lower.

Different components and goals

Shifting gears from one reading process to another does not mean a simple shifting of rate. Instead, shifting gears means a shift in goals, process components, and outcomes. This point can be illustrated with an example from each of the five basic processes, starting with Gear 5, scanning. Suppose a college student is given the goal of searching a passage for a target word, such as *horse*. This task requires finding each word in memory, called word recognition or lexical access.

Fisher and his colleagues investigated this type of scanning in several studies (Fisher, 1975; Fisher & Lefton, 1976; Fisher, Lefton, & Moss, 1978); it is called model scanning in rauding theory. When Fisher's search rate data for normally typed prose is converted into milliseconds (msec) per standard word, it turns out that about 100 msec is required for college students to scan each standard word successfully. A standard word, or standard length word, is 6 character spaces long—including letters, punctuation, and blank spaces. Expressed in standard words per minute, the above scanning rate of 100 msec per standard word is 600 standard words per minute—the rate mentioned earlier for Gear 5.

Hereafter, actual words per minute will be abbreviated as wpm (uncapitalized) and standard words per minute will be abbreviated as Wpm (capitalized).

➤ Suppose the goal of the individual is changed from finding a single target word, such as *horse* in the example above for Gear 5, to finding two words in a passage that have been transposed, such as a sentence that starts with "Horse the trotted toward...." This task also requires that each word be lexically accessed, as in Gear 5. However, the meaning of the word as it is used in the sentence must also be recognized, and this is called semantic encoding. Finding these transposed words will take longer because it involves more than word recognition, or the lexical access component of model scanning described above. This latter task involves not only recognizing the word but determining its meaning as it is being used in a sentence—semantic encoding. This extra component in the process (called the culminating component) is likely to take about 33 msec longer than the 100 msec for the single component in model scanning described above. So, the rate for a skimming process that involves finding transposed words (called model skimming) is likely to be around 133 msec per standard word, or 450 Wpm, which is the rate mentioned earlier for Gear 4.

There are many types of skimming (besides model skimming), but college students seem to operate the typical skimming process around 450 Wpm. In 1982, Masson gave textual material to college students and asked them to "skim" it. Their average rate was

382 wpm. Back in 1917, Whipple and Curtis asked college students and college graduates to skim, and their rate was 455 wpm, as calculated from their reported reading times.

➤ Suppose the goal is to comprehend the complete thought in each sentence of textual material. Then, each word must be lexically accessed, semantically encoded, and integrated into the complete thought of a sentence (called sentential integration). This extra component in the process is likely to take a college student about 67 msec per standard word longer than the 133 msec required for the two components of the model skimming process, Gear 4. Sentential integration is the culminating component of the rauding process.

The rate for the three components in the rauding process is about 200 msec per standard word, or 300 Wpm—the typical rate that college students operate Gear 3. A number of researchers have found that college students typically read at rates around 300 Wpm. For example, in 1965 Taylor measured the reading rate of a national sample of 12,143 students, in Grade 1 through college. He found that the college students involved averaged 280 wpm.

It should be noted that Perfetti published a book in 1985 which summarized a great deal of the research evidence relevant to the existence of the above mentioned components—lexical access (Gear 5), semantic encoding (the culminating component of Gear 4), and sentential integration (the culminating component of Gear 3).

➤ Suppose the goal is to know the information in a passage well enough to be able to correctly answer most of the items on a multiple-choice test. Then, some of the words in the sentences will have to be pondered longer and reread with continual checking to determine whether the ideas are likely to be remembered later (called idea remembering). The culminating component of this model learning process is idea remembering.

This extra component is likely to take about 100 msec per standard word longer than the 200 msec required for the three components of the rauding process, Gear 3. This rate is 300 msec per standard word, which is the 200 Wpm rate of a typical learning process, Gear 2. For example, in 1970 Morasky and Willcox gave college students a 2,000 word passage to read with multiple-choice questions immediately following each of the 21 paragraphs contained in the passage; the mean reading rate of these students was 170 Wpm.

➤ Suppose the goal is to be able to recall, orally, all the thoughts that were read. In this situation, the textual material will have to be rehearsed several times (called fact rehearsal). The culminating component of this model memorizing process is fact rehearsal. This component will take about 133 msec longer than the 300 msec per standard word required for the four components of the model learning process, Gear 2. This amounts to about 433 msec per standard word, which is the 138 Wpm rate of Gear 1. For example, in a 1975 study Meyer asked college students to write down, in sentence form, everything they could remember about each passage that they read; the average rate of these college students under one experimental condition was calculated to be 124 Wpm and under the other it was 127 Wpm (see Carver, 1990).

Shifting gears

Notice that each of the five gears discussed above has a different goal, different components, and different outcomes ranging from finding a target word (Gear 5) to recalling a passage (Gear 1). Thus, the rate at which college students read can be predicted first from their goal, ranging from around 138 Wpm for very difficult tasks that require recalling the content of text to around 600 Wpm for tasks that simply require finding target words in text.

College students need to shift up from their typically operating Gear 3 whenever their goal can be accomplished with fewer components, and they need to shift down when their goal can be accomplished only with more components. For example, the time consuming, sentential integration component required for the rauding process is not needed for skimming and scanning processes. This shifting up or down from Gear 3 is called process flexibility. The best readers are process flexible because they know how and when to shift out of third gear in order to achieve their goals more efficiently by including the appropriate components in the process.

As noted earlier, the most common goal of a reader is to understand the thoughts that the writer intended to communicate, and this goal is accomplished by Gear 3, the rauding process. Thus, most readers do very little gear shifting because they can accomplish their purpose almost all of the time by operating their rauding process. The operation of this process is called normal reading, ordinary reading, typical reading, natural reading, or simple reading. So, the most important reading rate is the rate at which individuals operate their rauding process.

Table 1
Summary of the relationships among gears, basic reading processes, goals, culminating components, and rates

Reading gear	Five basic reading processes	Goals of model process	Culminating component of the model processes	Typical college rates for model processes
5	Scanning	Find target word	Lexical access	600 Wpm
4	Skimming	Find transposed words	Semantic encoding	450 Wpm
3	Rauding	Comprehend complete thoughts in sentences	Sentential integration	300 Wpm
2	Learning	Pass multiple choice test	Idea remembering	200 Wpm
1	Memorizing	Recall, orally or in writing	Fact rehearsal	138 Wpm

Rauding as the central process

The primary advantage of conceptualizing five basic reading processes is to clarify the unique existence of the rauding process. There is only one rauding process with its components of lexical access, semantic encoding, and sentential integration. However, there can be more than one of the other basic processes. The descriptions given earlier for the other four processes are best regarded as examples or models, as noted earlier. For example, the components of a reading process involving skimming for an overview are not likely to be exactly the same components as skimming to find transposed words. Also, the components of a learning process involving the passing of a multiple-choice test on a college textbook are not likely to be exactly the same components as a learning process applied to a software manual for a new computer program.

So, there are many reading processes which can be roughly conceptualized into five basic processes. But, the most important reading process is the rauding process because (a) it is the most frequently used reading process, and (b) it involves the same three components for all readers. Thus, I will not refer to "the" reading process because that would be disregarding the large variety of different reading processes. On the other hand, I will refer to "the" rauding process because it is unique among reading processes but common to all readers.

Table 1 contains a summary of the connections described earlier among gears, basic reading process, goals, culminating components, and rates. For example, Gear 4 is skimming and it is one of five basic reading processes; the model skimming process (a) involves finding transposed words in sentences, (b) includes the component of lexical access and the culminating component of semantic encoding, and (c) typically proceeds at a rate around 450 Wpm for college students.

Rauding rate

In rauding theory, the fastest rate at which individuals can successfully operate their rauding process

What is rauding?

The word rauding was formed from the combination of two words—reading and auding. Rauding refers to the accurate comprehension of the complete thoughts in sentences, whether reading or auding.

During reading, rauding refers to the typical or ordinary kind of reading. The rauding process is one of five basic reading processes—memorizing (Gear 1), learning (Gear 2), rauding (Gear 3), skimming (Gear 4), and scanning (Gear 5).

The rauding process involves sentence comprehension and requires the components of lexical access, semantic encoding, and sentential integration. This third gear of reading is where natural or normal reading occurs.

The best readers are process flexible in that (a) they will shift out of the rauding process and up to a higher gear when their goal can be accomplished without the time consuming component of sentential integration, and (b) they will shift down to a more powerful gear when they need extra components not involved in third gear. Therefore, reading rate changes when gear shifting occurs—slower in the lower gears because more than sentence comprehension is needed, and faster in the higher gears because the comprehension of sentences is not needed. However, reading rate is relatively constant in third gear, even with different levels of material difficulty and even with different purposes set by researchers and teachers.

This constant rate for readers in third gear is called their "rauding rate." The rauding rate of an individual increases each higher grade in school due to maturation, and it varies greatly between individuals in the same school grade due to differences in thinking rate, called cognitive speed.

on relatively easy material is called their rauding rate (R_r). Successful in this context means to understand or comprehend most of the complete thoughts in the consecutive sentences of textual material. As noted earlier, many researchers have found that college students typically read at rates around 300 Wpm (e.g., Carver, 1983; Rayner, 1975; Zuber & Wetzel, 1981). It appears that the typical rate that college students read is also their rauding rate, i.e., the fastest rate at which they can accurately comprehend. If the typical reading rate of college students is around 300 Wpm, and this rate is also their rauding rate, then forcing college students to read faster than 300 Wpm should reduce the efficiency at which the rauding process operates.

In my research, I investigated whether college students have an optimal rate that is most efficient for them (Carver, 1982). I forced college students to read at rates faster and slower than 300 Wpm by using motion picture film. The lines of textual material appeared and disappeared on a screen. There were always two lines on the screen but the line above would disappear at the same time that a new one was added below. Reading rates were manipulated this way, from 83 Wpm to 500 Wpm. The accuracy at which these students comprehended the passages was measured three different ways: (a) multiple-choice tests based upon paraphrases of the sentences in the passage, (b) multiple-choice tests based upon recall for the words in the text, and (c) a judgment by the readers themselves of their percentage of comprehension. The efficiency (E) of reading was calculated from the product of accuracy (A) and rate (R), i.e., E = AR (see Carver, 1990).

For all three ways of measuring comprehension described above, efficiency was consistently highest at rates around 300 Wpm. Notice that when I forced these college students to read at a rate faster than their typical rate of about 300 Wpm, they were less efficient. And, when I forced them to read slower than their typical rate of 300 Wpm, they were also less efficient. This research finding supports the notion that (a) students have a certain fastest rate for accurately comprehending the sentences in passages, called their rauding rate, R_r, and (b) students normally read at their rauding rate because it is their most efficient rate for comprehending the complete thoughts in sentences.

The 300 Wpm rate for these college students was the most efficient rate across a wide range of material difficulty. The passages I presented to them were at four grade levels of difficulty—5, 8, 11, and 14—and the results were generally the same at every level of material difficulty. The 300 Wpm rate was the most efficient rate for these college students whether they were reading college level material, or elementary level material. Furthermore, these same results were replicated when these college students listened to the passages being read to them, instead of being visually presented using film.

Time-compressed speech was used to provide auding rates that also varied from 83 to 500 Wpm. The rate at which passages could be comprehended most efficiently during auding was also 300 Wpm. So, the most efficient rate for comprehending the sentences in passages (300 Wpm) seems to be the same rate that college students typically read (300 Wpm)—no matter what method is used to measure comprehension, no matter how difficult the passages are, and no matter whether the students are reading or listening.

Thus, it seems reasonable to contend that college students have learned to operate their rauding process at their rauding rate because their rauding rate is the rate at which they can comprehend the complete thoughts in sentences most efficiently.

Inner speech

When individuals are operating their rauding process at their rauding rate, R_r, they are probably saying the words silently to themselves. Talking to oneself while reading has been called silent speech, subvocalization, inner speech, plus many other names. As early as 1908, Huey noted that "the fact of inner speech forming a part of silent reading has not been disputed, so far as I am aware, by anyone who has experimentally investigated the process of reading" (p. 117). Researchers subsequent to Huey seem to have confirmed that silent speech is helpful to the operation of the rauding process, Gear 3—as well as the two more powerful gears of learning (Gear 2) and memorizing (Gear 1).

In 1975, Kleiman made up unacceptable sentences such as "Pizzas have been eating Jerry," and he found that the suppression of silent speech slowed the speed at which these unacceptable sentences could be detected. Kleiman interpreted his results as indicating that silent speech is an aid to memory. Thus, it appears that talking to oneself while operating the rauding process helps individuals to remember the beginning words of a sentence as the ending words are reached so that the complete thought can be comprehended.

Eye movements

During the rauding process, the eyes of individuals move across the words on a line of print, acting as a perceptual scoop so that the words can be lexically accessed, subvocalized, semantically encoded, and sententially integrated. The eye movements have become habituated so they move in a manner that allows each consecutive word to be perceived, with minimal attention directed to where the eyes will move next. In rauding theory, these habitual eye movements have been called apping, taken from *a*utomatic *p*ilot for *p*rose. Apping allows the comprehension process to be just as fast and accurate as when the words are read aloud to the individual at the same rate.

With the aid of subvocalization and these habitual eye movements, no attention is diverted from the cognitive components required for comprehension—lexical assessing, semantic encoding, and sentential integrating. Thus, the thoughts in sentences can be understood during reading just as efficiently as when no eye movements are needed during auding.

It is obvious that eye movements are needed during ordinary reading and that eye movements are not needed during auding, or listening. However, it is also possible to read without eye movements. Recent advances in computer technology have made it possible to present words one at a time in the middle of a computer screen so that reading can occur at various rates without any eye movements. This technique is called RSVP, for rapid serial visual presentation.

Evidence that comprehension during reading is just as accurate without eye movements comes from the RSVP research of Potter and her associates (Potter, Kroll, & Harris, 1980). Their RSVP technique in-

volved the presentation of textual material one word at a time, or a few words at a time, in the same position on the computer screen; the eyes remained focused in the same position while the words changed rapidly in the serial order of the text.

The researchers compared RSVP with two other conditions—reading a standard text and listening. These three experimental treatments were compared at each of three rates—240, 480, and 720 wpm. As for comprehension, they found no important or consistent differences among these three experimental treatments at any of the three rates. Since comprehension was not higher under the reading condition, there does not appear to be any advantage to moving the eyes during reading. Instead, it seems that most individuals have had so much practice in reading a page of print that their eyes can be moved across a line without thinking about it, at a rate that allows the sentences to be comprehended just as efficiently as when no eye movements are required.

Individuals probably learn to move their eyes at the fastest rate that they can think, i.e., lexically access, semantically encode, and sententially integrate. It appears that the fastest rate that individuals can successfully operate their rauding process, called their rauding rate, is limited by their thinking rate.

Cognitive speed

In rauding theory, thinking rate is called cognitive speed. The cognitive speed of an individual probably acts as a governor for rauding rate. Cognitive speed can be measured using tasks that involve naming symbols, such as letters or digits.

In my research, I have used a letter naming task called the Posner task after Michael Posner at the University of Oregon (Carver, 1991a). This task involves deciding whether pairs of upper and lower case letters have the same name or a different name. For example, the two letters "Aa" have the same name, but "bA" have different names. I have found that the speed of accomplishing this task increases a constant amount each year from Grade 2 through college, and it varies considerably between individuals at the same age. Furthermore, this speed of naming seems to be useful for diagnosing which students are reading at a rate commensurate with their potential, or whether certain students need to spend more time reading relatively easy material to bring their rauding rate up to their own speed limit (Carver, 1991b, 1991c).

An individual's cognitive speed seems to act as a speed limit for the rauding process. When individuals go faster than the limit set by their cognitive speed, they no longer are spending the time necessary to operate successfully the three primary components of the rauding process—lexical access, semantic encoding, and sentential integration. So, the rauding rate of individuals is limited by their own cognitive speed.

Going too fast to comprehend the complete thoughts in sentences is probably not the biggest problem for some students at the elementary and secondary level, however. These students probably do not practice enough, reading easy material, so as to reach and maintain their rate up to their speed limit. Such practice is needed to allow words to be recognized during the rauding process at the same high speed as letters and digits are recognized because they have been practiced thousands of times.

Most students at the elementary and secondary level probably do read enough to maintain their rauding rate at the limit set by their cognitive speed. Each year their cognitive speed goes up, due to maturation, and their rauding rate goes up accordingly. I have found that rauding rate does increase about 14 Wpm each year in school, from about 121 Wpm in Grade 2 to about 261 Wpm in Grade 12 (Carver, 1989).

Table 2 contains the estimated rauding rate of typical students in Grades 2-12. The first column contains Grades 2-12 expressed in grade equivalent units—2.5 to 12.5. The second column contains the corresponding rauding rate in Wpm. The third column contains rauding rate expressed in standard length sentences per minute. In rauding theory, there are 16.67 standard words in a standard sentence, and standard sentences per minute have been abbreviated as "Spm."

Individual variation

Although Table 2 contains the rauding rate of typical students in each grade, there is great variability in rate between individuals within each grade. The rauding rate of a particular individual can be estimated by administering a standardized reading test. For example, a published test called the Rate Level Test (Carver, 1987) can be given to a student, and from the score on this test rauding rate might be estimated to be 300 Wpm or 18 Spm. Rauding rate can also be measured in grade equivalent (GE) units, called rate level (R_L), which is the heading for column 1 in Table 1.

Table 2
Typical students' reading with understanding (rauding) rates as they mature

R_L (Grade equivalent)	Wpm (Standard (words/minute*)	Spm (Standard sentences/minute*)
2.5	121	7.2
3.5	135	8.1
4.5	149	8.9
5.5	163	9.8
6.5	177	10.6
7.5	191	11.5
8.5	205	12.3
9.5	219	13.1
10.5	233	14.0
11.5	247	14.8
12.5	261	15.7

Note 1: This table was adapted from Appendix B of Carver (1990).
Note 2: There is great variability in rauding rate between individuals at the same age or grade in school.

*A standard word is 6 letter spaces including punctuation and spacing, and a standard sentence is 16.67 standard words.

The great variability in rate between students at a certain grade in school can be illustrated using previously collected data (Carver, 1987). A typical 7th grader has a rauding rate around 190 Wpm. A 7th grader who is one standard deviation below the mean (below average) rauds at about 143 Wpm. A 7th grader who is one standard deviation above the mean (above average) rauds at about 235 Wpm. In this example, notice that the above average student rauds 64% faster than the below average student. Furthermore, the below average 7th grader is at a 4th grade equivalency in rauding rate while the above average 7th grader is at a 10th grade equivalency.

The measured rauding rate, R_L, of individuals will likely provide an accurate prediction of the rate at which they typically read textual material. This prediction will be accurate most of the time because most readers operate their rauding process most of the time. However, if college students have the goal of studying for a multiple-choice test or if they are given relatively hard material to read, then it can be predicted that they will shift down to a lower gear, such as Gear 2 with a slower rate.

As noted earlier, it can be predicted that college students (a) will read faster than their rauding rate when their goal can be accomplished without the sentential integrating component required in Gear 3, and (b) will read slower than their rauding rate when their goal cannot be accomplished without additional components such as idea remembering and fact rehearsal associated with the more powerful Gears 1 and 2.

Schema theory

It should be noted that rauding theory is a partial theory in that it is primarily relevant to the rauding process, not scanning, skimming, learning, or memo-

rizing processes. Another partial theory is schema theory which is primarily relevant to learning and memorizing processes—often associated with studying (see Carver, 1992). The idea that schema theory is not relevant to normal reading or rauding has been acknowledged by Anderson and Pearson (1984). In their review of schema theory research they noted that schema theory is (a) most appropriate "when a person is studying a text—that is, reading with the deliberate intention of learning ideas and information..." (p. 277), and (b) less appropriate when a person is "simply reading."

Some of the traditional variables involved in schema theory—such as prediction activities, prior knowledge, and text type—probably are highly relevant when students are studying, i.e., using Gears 1 and 2. However, a case has been made elsewhere that these variables have no important effect upon the amount comprehended during typical reading, or rauding (Carver, 1992). Indeed, if these schema theory variables did have an important effect upon rauding, then the predictions of rauding theory would be less than adequate. For example, the specific predictions made at the outset about the 177 wpm rate and 78% comprehension for a sixth grader were based upon mathematical equations published elsewhere (see Carver, 1990).

These equations do not account for differential effects associated with such schema theory variables as prediction activities, prior knowledge, or text type. Yet, these equations should be highly valid for predicting the accuracy of comprehension whenever individuals are operating their rauding process—which will cover most of the reading that occurs in the real world. However, these equations are not likely to work well much of the time for college students since they will often be operating in Gears 1 and 2 where schema theory is most appropriate.

When evaluating what reading process is being used as students read, during research studies or in the classroom, we need to know about the instructions, objective consequences, and levels of material difficulty. For example, when experimenters or teachers tell students to read normally, that is conducive to the rauding process; telling them to read carefully because they will be given a multiple-choice test when they are finished is more likely to induce a learning process.

When experimenters or teachers ask students to simply make a judgment about the difficulty of the material when they have finished, then that is conducive to the rauding process; asking them to write down everything they can remember or recall is more likely to induce a memorizing process. If experimenters or teachers give students relatively easy material to read, that will be conducive to the rauding process; if experimenters or teachers use relatively hard material, that is more likely to induce a learning process.

Now that some of the theory and research associated with reading rate has been described, what are the practical implications for teachers in secondary or college classrooms?

Practical implications

I have prepared a list of 10 items that I think college teachers, or high school teachers, should expect or observe in their classrooms.

(1) Expect that most students will use their personal rauding rate on almost everything they read. Changes in the difficulty of material are not likely to result in changes in rate (e.g., see Ballantine, 1951; Carver, 1983; Miller & Coleman, 1971; Zuber & Wetzel, 1981) unless the material becomes relatively difficult or they are studying for a test. Also, rauding may be used for many different purposes. Even good readers are not likely to change their rate just because the teacher sets a different purpose for the day in class—such as to identify key ideas or analyze an author's motives (see Hill, 1964).

(2) Students will change their reading process—and therefore their rate—only if they downshift for learning/memorizing or upshift for skimming/scanning. Teachers should be specific in setting goals when a different process is desired. Talk to students about using process flexibility rather than rate flexibility.

(3) Don't expect students' reading rates to go up just because the content is familiar. Even college professors read at about the same rate in their own subject areas and other subject areas (Dixon, 1951) unless downshifting into a learning process is necessary. Each individual's current rauding rate—reflecting his or her cognitive maturation between Grades 2 and 16—will hold quite steady unless the goal calls for a downshift to a learning gear.

(4) Teachers shouldn't worry if they suspect students are subvocalizing as they read (Edfeldt, 1960). This appears to be a normal aspect of the rauding process and helps keep the accuracy of comprehension high. It is likely to be an aid to memory; it appears to be the principal mechanism of thinking (Sokolov, 1972).

(5) Expect that students will be reading every word. There is good evidence from computerized research studies that every word in each sentence is lexically accessed, semantically encoded, and sententially integrated during the rauding process (typical reading) even by good adult readers (McConkie & Hogaboam, 1985; Rayner, 1975).

(6) If you notice that a student is spending more time on certain words and phrases, assume that the vocabulary is unfamiliar or the concepts new, or that you have set the student a learning task rather than a rauding task. Previous research by Just and Carpenter (1980) which indicated that good college readers spent more time (milliseconds) on certain words or phrases definitely did not involve the rauding process; the passages they used contained scientific words and they asked students to recall everything remembered when finished.

(7) Don't ask students to skip over the less important words unless you want them to shift up to a higher gear. Skipping words will prevent them from using their rauding process and force them into skimming or scanning. When students skim to get an overview, they lose equal amounts of important and unimportant information at their faster rates (Masson, 1982). If students are to read for comprehension, they should be allowed to use their rauding process.

(8) If students ask whether they should pay to take a speed reading course, say no. Speed reading courses have not been shown to increase the *efficiency* of reading comprehension or an individual's rauding rate (see Carver, 1990, reviewing data collected by Brandt, 1975; Collins, 1979; Labmeier & Vockell, 1973). Speed reading training is really skimming training in disguise (Carver, 1972), and tripling your apparent rate is likely to cut down your accuracy of comprehension to about one third (Carver, 1985; Just & Carpenter, 1987). The super readers you hear about are super skimmers, and they fail to pass carefully constructed comprehension tests (Carver, 1985; Homa, 1983).

(9) Expect students to increase their rauding rate rather evenly from Grades 2 through 12. The gain each year is about 14 Wpm, and it appears that this is not due to schooling or practice but to cognitive maturation (see Carver, 1990, reviewing data collected by Doehring, 1976). However, it probably is necessary for individuals to read relatively easy material on a regular basis to maintain their rauding rate up to their cognitive speed (although there has been no research yet about the minimum amount of practice needed).

(10) There are many ways to slow the rauding process, such as using dim lighting, dot matrix printers, poor handwriting, or poor screen contrast, but no easy way to speed it up. It is true that beginning readers are helped in Gear 3 when extra spaces are placed between words in a standard typewritten text, more clearly delineating each word (Carver, 1983). And, some of the creative techniques tried for improving the rate of comprehension, such as using spaces between phrases to create meaningful chunks, might be effective for Gear 1, memorizing, or Gear 2, learning. But, in general, for readers beyond grade level 3 in reading ability, teachers may assume that most of the students can already read and comprehend text as fast as they can think — changes in the way normal text is presented are not likely to help the rauding process (Carver, 1970; Coleman & Hahn, 1966).

Summary and conclusions

There appears to be research support for the existence of five basic reading processes called memorizing, learning, rauding, skimming, and scanning. The rauding process, Gear 3, is the one used most often by children and adults. It involves the comprehension of the complete thoughts in the sentences of textual material; this process requires a certain minimal amount of time for each word to be lexically accessed, semantically encoded, and sententially integrated. There are individual differences with respect to the fastest rate this process can be operated successfully, and this rate seems to be limited by an individual's own thinking rate, or cognitive speed.

In the past, shifting up to a higher reading gear at rates around 500 to 1,000 Wpm has too often been misinterpreted as evidence that the rauding process, Gear 3, can be successfully operated at these rates. However, there is no solid evidence that anyone exists who can operate his or her rauding process, Gear 3, at rates higher than 600 Wpm. The best readers probably are those who demonstrate process flexibility by shifting up or down from the rauding process whenever their goals can be achieved most effectively by a different reading process.

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