Automatic decoding, its role in comprehension

(Research: look-guess doesn't work)

Dr. S. Jay Samuels

I am very proud, pleased and honored to be here. Truthfully, I've never seen a more dedicated group. As I wandered around, I found people actually talking about reading. I go to many conventions and people talk about everything except their work. You talk about your work.

I also would like to mention something in terms of the discussion that was held last night and this morning about the need for research to support particular viewpoints. I am the new co-editor of the *Reading Research Quarterly*, the major research publication of the International Reading Association. I just want you to know that we don't have any particular axes to grind; we'll publish any research that's well done. We're not trying to push any one viewpoint. If it's reasonable, well done research, it will get an exposure in the journal.

I'm going to talk about three things today. One, I'm going to present some research which indicates that the look-and-guess method doesn't work. I'll only touch on it peripherally. I don't have tome to go into it in depth.

Second, I'm going to present just a bit of research from my own laboratory on how the eye works in reading. This will indicate to you that the beginning reader is doing is actually a letter-by-letter search through the word. It's not holistic.

And third, I'd like to tell you about automatic decoding, which fits in very nicely some of the things you've been talking about. If you talk about phonics, you talk about accuracy. You have to go beyond accuracy to automaticity if you want to build fluency in reading. I think you'll find these ideas are not at all strange and new to you because probably you've been saying something similar all the time.

Let me start with point one, the studies which indicate that look-and-guess method has its shortcomings. In 1965 Ken Goodman published a now famous study, *Reading, A Psycholinguistic Guessing Game*. Let me describe to you what Goodman did.

He took third graders and gave them a list of words to read. These words were presented in isolation. He got a score on how many of these words the child could read in isolation. Then he took the same words and put them into a story, and now he recorded how many of the words they could read in context that they could not read when the words were in isolation. And Ken was able to demonstrate that you could read more easily when words were in context than when the same words were presented in isolation. That was the study about which I think Ken has gotten the most publicity.

Now in 1966, when I was relatively new to the University of Minnesota, I did some research on the effects of picture on learning to read. We gave children words to learn to read, then there was a picture of that word and also the word. For example, a picture of a boy and underneath it was the word b-o-y. We found that children who have pictures of words, pictures plus word, did not really learn to read the word. What do think they did? They looked at the picture. Why suffer learning to read the words when there's a picture?

One thing we found was that pictures can interfere with reading. (By the way, that study about pictures upset quite a few people.) Then about 10 years after that, in 1976 Harry Singer and I did another study where we were trying to look at two things: what was the effect of pictures on learning to read? And what was the effect of context on learning to read? We had experimental conditions where there were children learning to read with pictures, and where children were trying to read words when they were imbedded in context plus pictures, and then an isolated condition where word were presented alone.

We found kids learned to read words best when there were no pictures and no context.

Now, this upset Ken Goodman, as you could imagine, because we were coming up with data, which says in effect that context is not always helpful. Ken Goodman, as you know, and Frank Smith, have a lot of followers throughout the United States, in fact the rest of the world, who believe very much in what they are saying – that you can learn to read holistically in context.

At Texas Women's University there is a woman by the name of Martha Wood who really favored Ken Goodman's approach and wanted to demonstrate that Ken was right, so she took first graders and tried to demonstrate that context really did help. But to her horror, she could not demonstrate that context helped children. Her first doctoral students at Texas Women's University, Mavis Brown, tried to again demonstrate what the mentor had failed to do the first time, which was to demonstrate that context could help. In fact, Mavis could not demonstrate that either.

It happened that I was invited to Texas under what they called the Distinguished Professor's Program, and discovered there were two studies that were buried. They would not publish them. I met with Wood and Brown, and my analysis of their failure goes like this: Ken Goodman used third graders to demonstrate that context helps. These third graders already had some decoding skills so they could use context. First graders, beginning first graders, couldn't use context. In other words, the only way you're going to use context is if you've got some ability to read. These children could not read, to get at this point is what some of Ken Goodman's ideas apparently are not supportable. We've found that Ken Goodman's results don't stand up strong, as strong as Ken said.

What we're beginning to find is that Goodman had a good idea. We can use context. But he's dealing with what adults are doing, what fluent readers are doing. It doesn't make sense if you talk about beginning readers.

The second thing I'd like to talk to you about has to do with what the eye does when you read. What we're dealing with is the unit of visual perception in reading. What is the unit of visual perception? There are some people who say that it is the whole world and others who say it's less than the whole word.

Let's go back a little bit in terms of the history. The debate about word recognition is: do we recognize words letter-by-letter or holistically?

In 1885 Cattell did a now-famous experiment. He took highly skilled readers and gave them words to recognize. The words were presented one at a time and he recorded the amount of time it took to recognize the entire word. He also gave these same people a single letter to recognize, and he found that you could recognize a whole word in the same amount of time that it takes you to recognize a single letter. He concluded from this that the unit of recognition was the word or the unit. You see and recognize the unit. It doesn't make any difference whether it's a letter or a word. That was the scientific basis for supporting the whole word method.

Now, nearly 100 years later at the University of Texas, Phil Gough found just the opposite, that word are recognized letter-by-letter. Let's see what the implications are of these two views, totally diametrically opposed views. If a word is recognized letter-by-letter, it should take longer to recognize longer words, right? If words are recognized holistically, it doesn't make any difference how many letters you're adding. It doesn't make any difference whether it a three-letter word like "cat" where you add another letter to make "cats." It shouldn't make any difference.

I'd like to describe the method that we used in my laboratory. We have a computer which will present words on a screen, and you are supposed to read these words. If the word you see is an animal word, you just push a button, which is held in your hand. If you see a word like "cat," you push the button, because it's an animal word. If you see the word "horse," you push the button because it's an animal word. But if you see "car," you don't do anything because I is not an animal word. So we took words which were animal words that were 3-letters in length, 4-letters in length, 5-letters in length, 6-letters, and so on. "Cat" is a three-letter word. "Birds" is a four-letter word. "Horse" is a five-letter word. "Turkey" is a six-letter word. The computer presents the word to you and then it measures the amount of time it takes you to respond to that word by pushing the button. Now, if people are doing a letter-by-letter process, it would take longer to process a six-letter word, to push the button, than for a short three-letter word. Our computer will tell us how long it takes you to look at the word, read the word, and think to yourself, is it a member of the animal category or not? Longer words should take longer if you're doing a letter-by-letter search.

(Alert readers will note where Dr. Samuels used slides to illustrate his talk, slides which cannot be reproduced here.)

What we found is that for every letter you add it takes a student a little longer to recognize the word. In other words, the student is doing a letter-by-letter process. For second graders, even first graders again, these are common words, the most commonly used in English. Words like "cat," "horse," "dog," "bird." They're still doing letter-by-letter search.

Let's look at grade four. They're not only faster on a three-letter-word, which indicates that they have faster word recognition, but also notice that they're beginning to change. They're not doing letter-by-letter searches anymore. It takes them no longer to recognize a four or five-letter word than a three-letter word. And by the time they get to college, they can recognize a six-letter word as rapidly as a three-letter word.

This suggests first of all, the developmental improvement in word recognition as one gets more skill in reading. The beginning reader is doing letter-by-letter search, whereas the highly fluent reader "chunks" the word.

Who's right, Cattell or Gough? Neither one. There's data here, for example, to support Phil Gough's view. Phil Gough said words are recognized letter-by-letter. The second-grade data supports the letter-by-letter position. Cattell said that people recognize words holistically. The college data supports that. For a hundred years we've been having this huge controversy about how word are recognized when in fact, both theories are right, but under different conditions.

Now what does this say to you as an educator who is teaching reading? The second-grade data says that in fact children are doing letter-by-letter processing. They have to know the letter-sound correspondences.

The college data says they've become so fluent that they're not doing just letter-by-letter processing: they're using far more sophisticated strategy.

Here is additional data that come from college students who are reading words presented on a computer screen. The words are all animal words, just as before. We told the college students to push the button if the word is an animal word. The words varied in length from three to six letters. However, the computer can play marvelous games with the college student. Sometimes the computer presents the word in mirror image, as though you were reading from a mirror. At other times, the computer presents the words the way you would read it in a newspaper. We make the college student into a beginning reader again. Every time we presented a word in mirror image, we were making that word very hard to decode – as hard as a beginning reader finds the word when he is encountering it is for the first time.

The college student was made into a beginning reader again because the words were presented in mirror image and the college student began to process the words like a first or second grader. He was doing a letter-by-letter search. In fact, the college student who is highly fluent does a letter-by-letter search every time he encounters a new and unfamiliar word, like a name in a foreign language. So you see, we don't use only one method in processing words, we use a variety of methods.

And again, the important thing to remember is that the beginning reader is processing a word letter-by-letter, which I think gives you strong support for the work that you do with phonics, because if you don't have a basis for decoding, you're not going to decode the word. But you've been saying that for years.

I'd like to leave that now and move on to the third area of my talk, which is automaticity. You remember Barbara Bateman said that teaching consists in the following things. Get their attention, hold their attention, and teach in such a way that everyone is accurate. But accuracy is not enough. I'd like to call this part of the talk "Beyond Accuracy to Automaticity."

In reading, if the person is nearly accurate, he will not be reading fluently, nor will he be understanding what he is reading very easily. In other words, fluent reading is a high-speed process. We've got to go beyond accuracy.

There are two parts to the reading process. One part is decoding, and the other is getting meaning. For example, I can take anyone in this room and in about two weeks or less I can teach you to read Hebrew. I can give you those funny looking scribbles on the page, and I can teach you the way to pronounce each of those scribbles and you'll be pronouncing or decoding those words, but there will be no comprehension. None whatsoever, unless you happen to speak Hebrew. It is also possible for a person to be able to comprehend Hebrew without being able to decode it. To be literate you have to be able to do two things, decode **and** comprehend.

The phonic approach that you have been advocating is based on the notion of accuracy, but we've got to go beyond accuracy. Let me explain the theory behind this.

The human mind has certain limits. The limitation that we're dealing with is the limit of what we call attention.

A beginning reader has limited resources and may find all of his attention is being put on decoding. Now when you put all of your attention on decoding, comprehension is not getting done but we do know, in fact, that beginning readers comprehend, and they do this by switching attention first to decoding and then to comprehension.

Let me give you an example of what goes on in the classroom. The teacher says, "Read the following sentence. Find out why the farmer went to the market."

The teacher thinks the student is reading to get the answer to the question. **No.**

The first time the student is reading it, he is simply decoding the words on that page. He really does not understand exactly what is being read. Then the student reads the sentence a second time to find out why the farmer went to the market.

The student has switched attention, first getting the decoding done and then getting the comprehension done. This is a laborious, inefficient, painstaking process. But that is actually what is happening. If the student is merely at the accuracy level, then it is taking so much attention for the decoding that there is no attention left for the comprehension. The goal is to go beyond decoding to the point where you can decode automatically with no attention. In fact, let me define automatic for you. Automatic means no attention in necessary for the behavior that you're doing.

I can give you some very concrete examples of what I'm talking about. Did you ever notice a young child who is first learning how to tie his shoelaces? That is a task which will require all the child's attention. The child has to see what is going on, and has to direct his fingers, which don't want to be bothered with other things. The child can't talk to you while tying the shoelace. The adult can tie shoelaces automatically, and his attention is then left over to listen to talk.

Another example is typing. At my university we have typing pools and I have asked secretaries there, "When you type, what are learning?"

The answer is, "We don't learn anything when we type."

We can type with so much ease …" They can type so easily that their heads daydream all day long. They tell me they daydream as they type. The fingers do what the eyes sees, but their heads are free to go elsewhere.

Driving a car is another example. When you first learn to drive, all your attention is on the mechanics of driving. People who are learning to drive don't want to talk. They want to concentrate on driving. A highly skilled driver can do the mechanics without attention. He can listen to the radio, he can think about what's going on at work, etc.

So we see there's a developmental shift in any skill from the accuracy state to the automatic stage. And the same thing happens in reading.

When we talk about reading as a developmental task, what we're really talking about is the change of attention from the time when you first have to put your attention to decoding to the time when you don't have to do that anymore.

Your goal as instructions, it seems to me, is to bring your students to the automatic stage in whatever it is that you are doing. If you're teaching your students letter-sound correspondences or recognition of digraphs and blends, or to blend sounds into words, they've got to go beyond the accuracy level where they can do it without attention. Then they can put their attention completely on meaning.

In other words, the decoding gets done automatically, with all the attention on getting meaning. That's the theory. Now, how do you get there? That's the next question.

What are the indicators that a student is in fact automatic? Let me give you some examples that you can use in your own work.

One of the best indicators of automaticity in decoding is speed. Accuracy plus speed. If the student has to spend a great deal of time thinking about the sounds or how to blend, then it's not going to be good enough for fluent reading. It has to be done with great speed.

Let me give you a simple technique which you can use diagnostically. If the student is not doing well, if the student is not comprehending, give the student a passage to read. Tell him, "I want you to read this passage aloud and at the end of the passage I want you to tell me what it is that you read."

The student has got to do two things at the same time: there's a purpose to having the student read out loud….. (By the way, give the student a passage he has never read before.)

When the student is reading aloud, you're sure that the decoding's going on, right? The student is not permitted to back over the word: you can encourage the student to go right on, you know, from the beginning to the end of the message. In order for the student to be able to tell you in his or her own words what was read, the student has had to do two things: decode the passage and get the message. The only way he can do those two things at the same time is that the decoding had to be done automatically so that attention could be on meaning.

If your student can read out loud and at the end tell you what was read, there is high probability that that student has in fact decoding automaticity. It's a good diagnostic technique.

Another thing you should do is read to the student. Then ask the student to tell you what it was that was heard. Now you're just testing general comprehension without decoding. If the student can listen, and then feedback fairly accurately what was heard, then the student has pretty good comprehension, right? If the student is then asked to read a passage but can't tell you what is in the passage, then it's not a comprehension problem, is it; because you've already established the student can comprehend? If the student cannot read with comprehension but can listen with comprehension, it's a decoding problem.

It's a very good diagnostic technique; my bet is that many of you have used it. If you haven't, start!

One other thing, how do you get speed? How do you get automaticity? Only one way that I know of! Practice. It sounds trite, but it's true. If you're a good teacher, you can only do two things. One you can bring your student to the accuracy level. Show your student how to be accurate, let's say, in word recognition, word decoding. The other good thing that a good teacher does is to encourage the student to practice. You cannot practice for the student, but you can provide time and motivation to practice.

A good coach does only those two things: brings team members to the accuracy level and provides encouragement to practice. At the University of Minnesota, the athletic department has brought me in a number of times to talk about my research in automaticity. It may seem strange that an athletic department would be interested in this work. Not at all! Because a good coach is very interested in developing these two things.

Minnesota being in the land of frozen winter, has one of the country's best hockey teams, Herb Brook, our coach, told me, "All I can do is make my men accurate in what they're doing, and I then give them lots of practice.

I encourage you to do those two things. Help your student to be accurate and provide motivation for the student to read, read, read.

The idea is not to get them to read difficult material, because when you start them off on something too difficult. It is often not only difficult, but turns them off. Get them to read easy things; you want them to put time in on the task, lots of time, and they'll develop the skill.

A number of you have said that everyone can read; firmly believe that. That's one of the ways I got interested in learning disability.

My next-door neighbors have a boy who is severely retarded, an 18-year-old boy whom they were sending to a sheltered workshop for the rest of his life. He not only is retarded, but he has some physical problems, his coordination is terrible.

I asked the boy before he went to the workshop if he would read to me. I knew he was interested in baseball. We both read an article about Minnesota Twins, and I tell you in all honesty, his comprehension of that article was superior to my own.

I asked myself, if this boy can read, why can't everybody read? Why do we have so many youngsters in ghettos who can't read? They're not retarded. That got me curious.

I went to the director of research in charge of special educational for the Minneapolis schools, and I asked, "What data do you have on how well the children in special education are reading?"

He said, "We don't have any."

I said, "Why not?"

The answer was a short of sub rosa understanding or belief that these kids couldn't read and so why waste teaching time and resources on testing them?

Of course, I was shocked, and that's one of the ways in which I got into the whole area of special education and learning disability; I'm continuing my work in that.

I don't see any reason why almost everybody can't read.
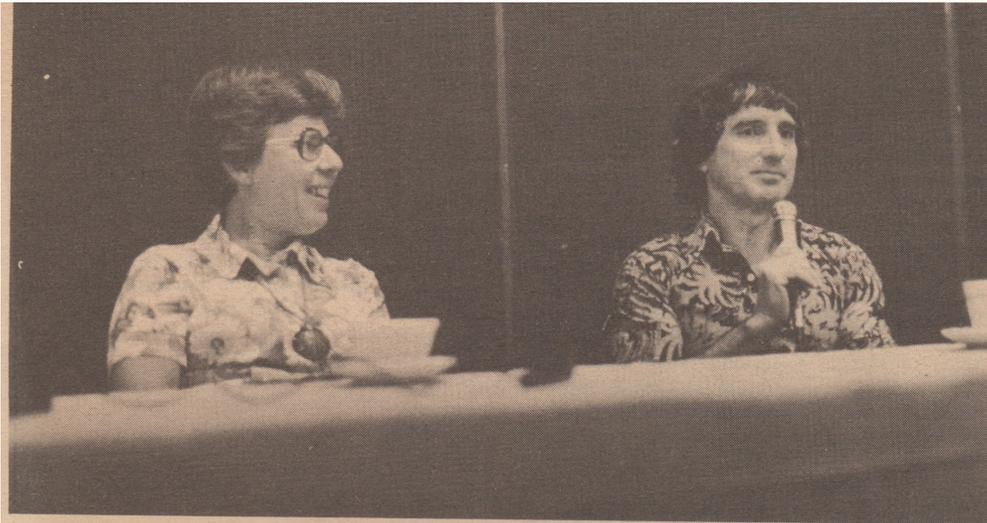
Drs. Barbara Bateman and S. Jay Samuels were two of our featured speakers who also got together for a lively breakfast session, "Batting the Breeze with Barb and Jay."

Note from Internet Publisher: Donald L. Potter

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This talk by Dr. S. Jay Samuels, Professor of Education, University of Minnesota was taken from the *The Reading Informer*, Vol. 7, No. 1 – October 1979, Conference Report of the 17th Annual Conference of the Reading Reform Foundation, July 22-22, Boise, Idaho.

At the time of this RRF Conference, Samuels' research was cutting edge. It reflects his understanding of the reading process at that time.

I appreciate the late Samuel Blumenfeld, my long time mentor, and Kathy Diehl, who was the Research Director of the RRF, for supplying with a complete set of the Reading Informers and Conference Reports.

Samuels research remains seminal in this area of reading research. This talk is a very teacher-friendly presentation of the theory of automaticity, free of all technical jargon.

There are 4,047 words in Dr. Samuels's talk.

Below are some Internet resources on the topic of automaticity.

https://archive.org/details/ERIC_ED105430

http://learningfestivalreadla.wiki.westga.edu/file/view/The%2520Method%2520of%2520Repeated%2520Reading%2520Article.pdf

http://rfwest.net/Site_2/Welcome_files/Stanovich-longitud-JRB81.pdf

https://www.slideshare.net/DohaZ/reading-automaticity-by-david-laberge-and-s-jay-samuels

https://files.eric.ed.gov/fulltext/ED101307.pdf

"Fluency: Deep Roots in Reading Instruction" by William H. Rupley, William Dee Nicholas, Timothy V. Raskiski and Avid Paige.

https://www.mdpi.com/2227-7102/10/6/155/htm

Fluency Instruction: Research Based Best Practices (2006) Ed. Timothy Raskiski, Camille Blachowicz, Kristen Lems. Excellent articles, especially the one by Samuels on the history of fluency.

https://archive.org/details/fluencyinstructi0000unse/mode/2up

What Research Has to Say About Fluency Instruction (2006) Ed. S. Jay Samuels & Alan E. Farstrup.

https://archive.org/details/whatresearchhast0000unse/mode/2up

"Modes of Word Recognition" (1969) S. Jay Samuels.

https://archive.org/details/ERIC_ED032194/mode/2up

For more information on the theory and practice of teaching reading, visit my website below.

www.donpotter.net

www.blendphonics.org

Last corrected on July 10, 2020.