The Significance of Letter Position in Word Recognition

PhD Thesis, 1976, Nottingham University, by Graham Rawlinson

A Summary

This summary is supplied by Graham Rawlinson on the trust that people will use it wisely and accurately. I hope people will include a quote of my book, How to Invent (Almost) Anything, my latest 'Thesis', published by Spiro Press, 2003.

The Purpose

It is always easy to state a purpose after the event. Key drivers for me were:

To aid understanding of the reading process through examination of one part – namely word recognition.

To examine the current theories of the time, which included the idea that we recognise words through shape.

I hoped "the model word recognition to be given will be a ..... justifiable complement to an understanding of the total reading process".

That is, I did not believe that researching one aspect was likely to deny totally other views on how we read and learn to read. I hoped that creating simple experiments would enlighten us a little as to some aspects of the process. Nothing more, but nothing less.

The Experiments

Some 16 experiments were included in the PhD. Some of these have parts, so in all I think it might be fair to say bout 36 experiments were conducted, but it all depends on how you carve them up.

For example, Experiment 1 had variations as follows:

1/R/1, 2/R/0, 2/R/2, 4/R/0 for 2 groups

and

2/R/2, 2/X/2, 4/R/0, 4/X/0 for 2 other groups.

R meaning random, x means substituting x's in place of the original letters, and 2/R/2 means the first 2 and last 2 are kept as originally, fir a whole text.

Other variations included randomising all but last 4 letters, replacing all but last 4 with x's, randomising all but 4 middle letters and replacing all but 4 middle letters with x's. Other variations included disallowing letters to fall into a place occupied originally by the same letter, and in another experiment comparing reading of randomised words with x replacements but where those randomised words were coming up with letters which held their position then the x comparison allowed the original letter to be not replaced by an x.

I also tried letter order reversal, word order reversal, letter image reversal, letter reversal and letter image reversal, randomised vowels, substituted vowels, substituted letters (for vowels), randomised replacement by x's, randomisation but with selection according to how 'confusable' the 'replacements' were (so one group would read passages with words where there were more replacements of say a 'b' with a 'd', the other where the 'b' might be replaced with a 'u' – less confusable.

Passages were used in some experiments, in others the words were displayed as a whole, in sequence left to right, and in 'sequence' outer to inner.

Adults and children were tested.

All these experiments were designed to try to test out particular possibilities for systems involved in word recognition.

Hypotheses and Conclusions

I did attempt some kind of testing of hypotheses. Without repeating the whole PhD, to give an example, my multiple-sample model had equations like this:

$1 – (1-ap'0)(1-ap'1) = 0.105!$

p is probability, and a is a reduction factor according to recognition probability of letters!

My conclusions, and these are open to question of course, were that:

Letter features are processed through a route of letter classification/identification.

Middle letter identification proceeds largely independently of position.

Higher level units seem to be significant only for the beginnings and endings of words.

Information from the middle letters may operate via a sampling/probability system (rather than absolute accuracy). That is, you can have sufficient letters, even though in the wrong position, for the brain to 'recognise' the word.

My end model was of a multiple access system "allowing some direct use of features without precise letter identification, use of word length information, and some structuring of phonemic or syllabic units, as well as incorporating a sampling recognition system using letters or their attributes directly."

I suggest the experiments "demonstrate the considerable flexibility of the reading process". Stimulus sampling theories seem to apply more than simple phonetic theories of word recognition.

As regards learning to read, "when the child is beginning to learn to read he already has a highly refined set of skills not only for dealing with the known world but also for selecting and using information from the unknown world".

Also "word recognition skills develop which are not only not taught but which develop despite sometimes fairly specific teaching in alternative skills".

Maybe the phrase, "hey, teachers, leave us kids alone" applies here?

However, I did recognise that some children have specific difficulties, and other rules and advice may apply.

My thesis also, bravely or foolishly, commented on Braille reading, Handwriting, Morse Code, Computer Recognition Systems, and Information Processing.

I then went on to do an M.A. in Child Development and Educational Psychology, and for 13 years worked as an educational psychologist!

Finally

I have seen various comments of how I was suggesting this or that, and people saying why this or that can or cannot be true. But trying to sort out what may or may not be a factor in word recognition is quite complicated. I was only doing my PhD, this was a compressed into a sort space of time, I did the best I could. Sorry if it was not good enough, though the interest in it now is rather refreshing.

I did try to publish the main findings, but the papers were turned down, by reviewers who perhaps had theories of their own to defend?

Science is an interesting process, easy enough to get wrong, easy enough to go off in a direction which is a false trail, and sometimes easy enough to cheat. In the end, I hope, we all get wiser.

Wishing all those who were interested in scrambled words, a happy life!

Dr Graham Rawlinson