Dear Editor,

My name is David Boulton, I have been a learning theorist and educational philosopher for almost 20 years. What I wish to share with you is from the heart and for the children who are suffering from reading problems . I have no commercial intentions in writing you. My purpose is simply to stimulate your thinking; and perhaps your suggestions. As you know the stakes are enormous - I think you will find what I have to say is fresh - please take a few minutes and read me out.

I have placed in this document 3 short pieces of work: An Abstract. An Analogy that illustrates how we (maybe not you but the public in general) have missed a significant point in our thinking about what's causing our reading problems and a short article which explains my proposal. In addition to the information contained in this email, my web site, http://www.implicity.com/reading/ contains additional research and a more elaborate unfolding of my thinking.

It seems to me that our most basic information technology - the 'code' we read with needs the scrutiny of information scientists such as yourself.

Thank you - David Boulton

AbstractThe greater the number of ambiguous letter-sounds (and letter-sound combinations) coexistent in a word, the greater the number of iterations of ambiguity reduction required before the word can be virtually-heard or spoken. The greater the number of ambiguity reducing iterations (disambiguations) involved the longer the reader's attention must stretch to process them. The longer the span of attention required, the greater the vulnerability to miscues in decoding causing drop outs from the decoding-stream-flow-rate necessary to sustain the flow of reading. The single most significant underlying cause for this, ***ambiguity-overwhelm > stutter > drop out,*** is the archaic "technology" we read with.

A 1000-year-old lack of leadership in managing the relationship between the Latin alphabet and the English spoken language has resulted in a deeply entrenched, convoluted and highly ambiguous 'code'. Every attempt to change the alphabet or reform spelling - to render their relationship more simply phonetic - has failed. Phonics and phonemic awareness pedagogies are both attempts to compensate for, not directly address, the ambiguities created by the idiomatic correspondence of these two systems (the code).

With modern font technology it is relatively easy to add another dimension of functionality to the concept of a character or letter. Specifically, it is possible to print (paper or screen) letters with shape, size, intensity and spacing variations that, while retaining unambiguous letter recognition features, convey additional information or cues about how the letter sounds in the particular word in which it is encountered.

What I am proposing is that a small number of alphabet-general letterface variations, acting as phonetic cues, can dramatically reduce the disambiguation-overhead involved in learning to read. My intent is to catalyze if I can, and, drive if I must, the development of a new learning to read system based on developing this concept and subsequently integrating it with the best of what remains relevant from phonemic awareness, phonics and whole language pedagogies and practices.

An Analogy

Imagine that a fictional product called ***AlphaPhon*** is the world's leading English language GUI (Graphemic User Interface). AlphaPhon is the entry-level product of a company (also fictitious) named USASoft. All is not well with USASoft. Market research has revealed that

92 million older AlphaPhon customers, due to their poor use of the product, are suffering major financial losses.

> **42 million** *adult Americans can't read;* ***50 million*** *can recognize so few printed words they are limited to a 4th or 5th grade reading level. According to Literacy Volunteers of America,* ***237 billion*** *dollars a year in unrealized earnings is forfeited by persons who lack basic reading skills.*
> *The National Right to Read Foundation*

Perhaps even more alarming, user-test reports indicate that 60% of the company's new customers are less than proficient with AlphaPhon even after 12 to 13 years of day in and day out attempts to learn it: USASoft is in serious risk of losing its future customer base.

> ***69%*** *of 4th graders read below the proficiency level*
> ***60%*** *remain below it in the 12th grade*
> *National Assessment of Educational Progress 1998 Reading Report Card*

> **The first casualty is self esteem**: they soon grow **ashamed**… about **half** of youths with a history of substance abuse have reading problems.
> *National Institute of Child Health and Human Development*

> **35%** of children with reading disabilities drop out of school, a rate twice that of their classmates. **50%** of juvenile delinquents manifest some kind of learning disability, primarily in the area of reading.
> *National Center for Learning Disabilities*

Disturbed by these reports, USASoft undertakes a massive research campaign to discover why their customers are having such difficulty learning to use AlphaPhon. Billions of dollars and thousands of research studies later a scientific consensus emerges: the customers who have difficulty learning AlphaPhon exhibit a common 'core deficit' in something the researchers call 'alphaphonemic awareness'

> Phonemic Awareness: **It's the hottest topic in education**.
> *National Adult Literacy and Learning Disabilities Center*

> Converging evidence from all research centers show that deficits in **phonemic awareness** reflect the **core deficit** in reading disabilities.
> *National Institute of Child Health and Human Development*

Moreover, they also lack 'alphaphonic' code knowledge and skills.

> **Letter knowledge**, which provides the basis for forming **connections between the letters in spellings and the sounds in pronunciations**, has been identified as a strong predictor of reading success
> *National Center to Improve the Tools of Educators*

> Moreover, if the **letter-sound code** (**phonics**) is **not taught**, all reliable studies concur that poor readers and nonreaders **will not become fluent readers**
> *National Adult Literacy and Learning Disabilities Center*

Based on this new understanding, USASoft issues orders to all of its distributors to initiate a nationwide training program designed to train the minds of its users in the alphaphonemic awareness and alphaphonic skills required to use AlphaPhon.

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If it worked, the analogy started to sound absurd as USASoft began to act like AlphaPhon's problems were exclusively in the minds of its users. As if it were inconceivable that anything could be wrong with AlphaPhon, or, that if something was wrong, that AlphaPhon could be in any way changed or improved. What's disturbing, of course, is this is exactly how we have come to think about our reading problems and the role our reading technologies play in creating them. How could USASoft be so blind and negligent about the usability

implications of such a human-engineered human-interface product? **How could we?**

A Short Article: Training Wheels for Literacy

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There is no natural, biological-evolutionary precedent for reading. Spoken language - yes - the ability to discriminate among sounds and associate distinct sounds with distinct meanings has been evolving for millions of years. But, nothing about our natural evolutionary development has prepared us to read – to focus our eyes into small static spaces and translate and assemble strings of visual symbols into virtually heard sequences that simulate the sounds of spoken words. Human beings invented reading (and writing), and it should be added, those that did were far less familiar with how our brains work and children develop than we are today

Reading is a technology skill that requires the use of two archaic technologies or systems (the 3,000+ year old alphabet and the 1,000+ year old system of English spelling) that were developed by adults for adults and were never designed (or since in any way optimized) for use by young developing minds. Moreover, they were never designed to work together; like the proverbial square peg/round hole, we have been 'force fitting' them for over a thousand years. The fact is, that most people who struggle to read are suffering from a kind of ***interface incompatibility*** with our reading technologies that is the fault of the technologies, not them!

HISTORICAL ROOTS

> Ancient Greek and Latin were almost completely ***phonetically written…***
> *Teaching Reading - a History*
>
> *Just as in learning to read, I said,* ***we were satisfied*** *when we knew the* ***letters of the alphabet…***
> *Plato, the Republic*

The major cause of today's reading problems began taking root nearly a thousand years ago as the Latin alphabet and the English language collided. The Latin alphabet was nearly phonetic; it had one letter for each sound spoken in the Latin language. But in trying to represent the English, the Latin alphabet came up short by over a dozen letters. There were simply more sounds spoken in English then there were letters to represent them in the Latin alphabet.

With religion, politics and academia so entrenched in the written Latin any thought of changing it was virtually inconceivable. Consequently, instead of adding letters to the alphabet, a series of rules developed whereby some letters, (but not all) would no longer have just one sound but could have other sounds depending on which of the other letters (in what sequence) they preceded or followed (most but not all of the time). Sound pretty convoluted? The consequence of this 'hack' has haunted us ever since: the phonetic principle was broken and the relationship between written letters and spoken sounds became complex and confusing.

> ***What happened significantly altered the course of human history and its effects are still felt today by over 700 million people. The result of making up for the shortage of letters was an ambiguous alphabetic***

'code' that strained the process of learning to read - a process that had for over fourteen hundred years been based on the phonetic simplicity of one letter for one sound. No longer as quickly self-evident, reading now involved the need to determine which of a letter's possible sounds it was supposed to actually sound like in the particular word in which it was appearing. The stress involved in such decoding has remained deep in the 'overhead' of our reading process ever since.

To make matters worse further complications followed as the words, spellings and accents of Greek Philosophers, French clerks, Danish typesetters and others were added to the system. Now, in addition to idiomatic codes for missing letters, spellings became incoherent as the various spelling conventions of non-English influences were imposed on the language. With the combination of Luther's reformation, Guttenberg's printing press and the King James translation of the Bible, the cement began to harden. All these diverse and complicating stresses heaped upon a writing system that was already inadequate resulted in a seriously flawed and dysfunctional system.

TODAY

The underlying cause of our reading difficulties is that we have rigidly held to an inherited, technologically archaic, symbol system (the Alphabet) that was developed in an entirely different 'age of the world', for adults not children, and that was never designed to represent the 44+ sounds of the English spoken language.

As a result, the number and duration of the mental processing iterations necessary to resolve the ambiguity of letter sound correspondences all too frequently exceeds the attention span of beginning readers. The consequences are 'reading stutters' and 'drop outs' in reading flow. **The core problem is AMBIGUITY-OVERWHELM and it is an *artifact* of the "technology" involved.** For some reason - its 'sacredness' or simply its institutional inertia - we have been unable to update the technology to reflect what we know about human neurological processing and to make it friendly to the self-esteem and developing mental processes of our young people.

> The first **casualty is self-esteem**: they soon grow **ashamed**… about **half of youths** with a history of substance abuse have reading problems.
> *National Institute of Child Health and Human Development*
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There aren't many parallels to this. Under what other circumstances do people spend years trying to learn something that continually makes them feel bad about themselves as they do? Most children and adults have very limited patience for repeatedly trying to do something that results in self-esteem-lowering feelings. Yet, we must compel people to learn to read. They can't function in our modern world if they can't. However, the way things stand the technology is causing real and significant damage to people's lives (and costing us billions of dollars).

Up to this point, absent a new alphabet or a way of spelling phonetically with the one we have, our only course of action was to facilitate the development of explicit skills and attention span increases such that developing readers might be better able to process the ambiguities we can't spare them from experiencing. This has been the role of explicit phonemic awareness exercises and explicit, systematic phonics both of which are attempts to compensate for, not directly address, the ambiguity created by the archaic alphabet and spelling system.

But what if we could, without changing the alphabet or the way English is spelled, present our letters (on paper or screen) with cues embedded or accompanying them that could significantly reduce the letter-sound ambiguity involved in reading?

This kind of thinking was impossible until very recently, until computers and modern font

technology. Though the moveable type of the printing press was a breakthrough innovation in its day, it restricted us to thinking about printing through a paradigm that was based on what was and was not possible in a mechanism that used real physical objects to print letters with. Whereas moveable type made it relatively easy to set up any number of alternative typefaces, once within a typeface it was impractical to offer letterfaces or optional variations on the way each letter might appear.

However, today, with modern font technology, it is possible and relatively easy to add another dimension to the idea of a character or letter. Specifically, it is possible to print (paper or screen) letters with shape, size, intensity and spacing variations, that while retaining unambiguous letter recognition features, allows the presentation of the letter to convey additional information or cues about how it sounds in the particular word in which it is encountered.

The P-CUES Concept: Mind your Ps and Qs - Phonic Cues - P-Cues

The intention is to prompt the reader with unambiguous CUES that reduce the number and complexity of the instances of ambiguity encountered during the immediate decoding-stream-flow of the reading process. Imagine that while learning to read developing readers were able to immediately recognize cues 'built-in' to each letter that informed them that a letter's sound is:

alphabet-or-not: use variations in intensity to indicate that the letter is to sound like its letter name

Tr**a**ining Wh**ee**ls

silent-to-loud: use variations in the size and intensity of letters to indicate the relative amplitude of the letter's pronunciation from silent to loud

Tr**a**ining Wh**ee**ls

distinct-or-blended: use the space between letters to suggest distinction or degree of blend

Tr**a**ining Wh**ee**ls

Though these cues may appear visually annoying to the advanced reader (though much less so than Twain's example of 'simplified' spelling), consider, if you can, how mentally annoying it is to learn to read without such cues.

There are more cues possible, this is a starting set. For example extending the width of a letter could cue the reader to the relative duration of its sound. Rotation or vertical centering could be substituted for spacing as an indicator of blend and spacing could be used for timing instead. The final visual variation styles for the cues should be the result of a collaborative effort which includes reading specialists, graphic artists, font designers and, of course, extensive learning and testing with developing readers. However, as you can see from just these 3 examples the reduction in potential ambiguity is dramatic. Because these cues are alphabet-general rather than letter-specific, the developing reader need only learn to recognize 3 kinds of cues, via immediately comprehendible variations in the appearance of the letters, to have the benefit of that reduction.

The Software and Font Technology Involved

Conceptually, the technology involved is relatively straightforward. The first component is the "carrier" or shell that extends the font family to have the added capacity to store the alternate presentations for each character in a font. The second component is the "P-Cue presentation dictionary" which, like a spell checker in a standard word processor, scans the words in documents and looks them up in its database. When a word match is found, the P-Cue dictionary reads the character presentation variations (P-Cues) for the letters in the word and substitutes the P-Cued letters into the publication to match.

IN CLOSING

The examples I have put forth are placeholders. There is significant work ahead to map the territory of letter-sound ambiguities and to determine which metaphors and variations of

letter presentation will best serve different types of developing readers. With that said, I believe it is possible to develop a system of variations that will cue developing readers in ways that reduce the 'overhead' involved in reading by many times the 'overhead' involved in processing the cues. Based on my preliminary and informal experiments with children, I am confident that, once fully developed as an overall system, this approach will dramatically simplify and speed up the process of learning to read.

What I am proposing bridges the phonic and whole language ideologies. Instead of having to create ‘dumbed down’ reading materials or having to design reading materials around the awkward pedagogical requirements of cryptic decoding, the P-Cue model reduces the ambiguity involved in decoding and allows developing readers to access more meaningful materials faster (extending the ceiling on ‘decodable text’ to a more meaningful and enjoyable level). Finally, it does this without changing the alphabet or English spelling.

This is not meant as an alternative to learning other rules of decoding, as it won't eliminate all the ambiguities. Rather, what I am proposing will provide developing readers the means to quickly filter out a significant portion of what would otherwise be ambiguities leaving them with a less dissipated attention span to apply whatever rules remain appropriate (arguably new rules based on an integrated approach to using this technology with phonemic awareness and phonic instructional pedagogies).

I call this 'Training Wheels for Literacy" because this system is not intended to replace our colossal inventory of written materials, but rather to provide developing readers with an 'on-ramp' and the ‘training wheels’ that enable them to develop better phonemic awareness, phonic skills and greater attention span by making it easier for them to keep themselves from 'falling' out of reading. By enabling them to extend their reading flow, they will learn to associate the P-Cues with the phonemic distinctions available in written word structures and ultimately take the 'wheels off' - stretching into the next step of becoming an empowered reader.

In summary, this learning to read barrier; it's pain, shame and life-disabling consequences...our arguments about methodologies and the money we spend on efforts intended to compensate for it, stem not from some *deficit* or lack of natural capacities in our brains, but rather, from the change resistant technology of our 3000 year old alphabet and its poor interaction with the (nearly as change resistant) 1000 year old technology of English spelling. For the sake of the children, in the spirit of plain good science, lets acknowledge the fact and do something about it.

Learning to read is a process of acquiring an “inner-interface” between our biologically native all-at-onceness processing and our enculturated mind’s one-at-a-time thought processes. Indeed, reading plays a significant role in creating the later. Taking up this challenge could create a breakthrough in literacy, reduce damage to self-esteem, reduce the waste of billions of dollars and, perhaps, beyond all of that, change the ecology and efficiency of the "inner interface" that regulates our learning, and, who we are.

I know that, as they are, these pieces are not appropriate for Journals But I do think these ideas need discussion in the right circles. Do you know of someone in the community that might collaborate with me in seeing these issues come to light in the right journals?

Thanks again, David

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Love of goodness without love of learning degenerates into simple-mindedness. Love of knowledge without love of learning degenerates into utter lack of principle. Love of faithfulness without love of learning degenerates into injurious disregard of consequences. Love of uprightness without love of learning degenerates into harshness. Love of courage without love of learning degenerates into insubordination. Love of strong character without love of learning degenerates into mere recklessness.57 (An. 17:8.) Confucius

From the heart to the mind for the spirit
For the children