PCUES Letter Sound PROUNCIATION CUES
reducing the confusion in learning to read

HOME | Background | Kinds Of Confusion | Introduction to PCUES | PCUES | Examples | Technology | Vision | Strategy

Training Wheels for Literacy

Note: This site is a follow up to an earlier TWFL site and an early predecessor of the "Magic Ladder". Click on *any word on this page* (and keep clicking it) to experience the next evolutionary step in technology supported reading and online learning. This site is an example of embedding **OLSN** the Online Learning Support Network.

Training wheels on bicycles help beginning riders by reducing the complexity, difficulty, and precariousness of *learning* to pedal their bikes without losing balance – without falling. As they reduce the complexity and difficulty of coordinating the movements involved, they also reduce the *fear of falling*. Physically, cognitively, and emotionally, they create a pedagogically conducive structure – a 'safer, easier, path for learning'.

Training Wheels for Literacy helps beginning and struggling readers by reducing the *complexity, difficulty, and precariousness* of learning to read.

———

The life-learning trajectories of a great many children (arguably up to two-thirds) and adults (90 million) are harmfully skewed by their learning to read difficulties (see "What's At Stake"). Though there are many 'readiness for reading' issues involved (see: Readiness), and many other variables exacerbate the difficulty (see "Causes and Factors"), the *most common impediment to progress in reading is the 'confusion' involved in learning to 'sound-out' words (See "Background" and "Kinds of Confusion").*

From Apple's Siri and talking GPS devices to the voice menus we dread, today's machines routinely do what struggling readers find so difficult. Our most common machines (PCs, Tablets, GPSs, Smartphones) have become nearly indistinguishable from humans at pronouncing individual words. How is it that free software running on inexpensive information appliances can do what so many millions of humans find so difficult? Note: highlight any part of the text on this page and click to hear an example of text-to-speech!

Today's text-to-speech capability is made possible by 'online pronunciation dictionaries and speech synthesis systems' that match human-language written words with the machine-language instructions that computing devices use to produce sounds. The Training Wheels for Literacy system uses the same online systems, but instead of using them to instruct a machine's sound system to produce speech, Training Wheels for Literacy uses the pronunciation information to systematically vary the appearance of letters in ways that reduce the confusion involved in sounding out words. The system of letter-face variations that guide pronunciation is called "PCUES" (See *"Introduction to PCUES"*).

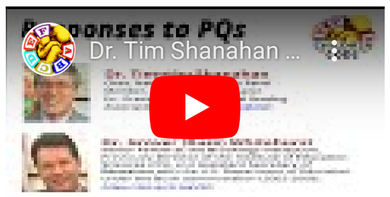
Just as bold, italics, and underline provide readers with cues that emphasize meaning, PCUES are variations in the appearance of letters that emphasize sounds – they *cue readers to which of a letter's possible sounds it actually sounds like in the word in which it is appearing.* There are a small number of PCUES that together cover the variations in letter-sounds most confusing to beginning and struggling readers. (See *"PCUES"*)

Training Wheels for Literacy can provide parents, teachers, curriculum developers, literacy organizations, and content publishers simple tools that can instantly transform ANY English language text into PCUED text. From vocabulary lists, chapter books, and homework assignments, to entire web pages and online courses, PCUES can turn any content, printed on paper or screen (computers, tablets and smartphones), into learning to read friendly content.

———

Training Wheels for Literacy is a project of Learning Stewards, a 501(c)(3) non-profit organization, and is based on the reading-related research work of the Children of the Code Project. The technology component of the project is being developed under the 'open source' model (freely available for use in non-profit products). For more, see the project that succeeded it the Magic Ladder.

Comments are closed.



COMMENTS FROM LITERACY LEADERS

"It's a good idea. Very researchable. It would relate to the quality …and overall efficiency of the process compared to the hit and miss… It makes a lot of sense to me." - Dr. **Grover (Russ) Whitehurst** Ex-Director of the Institute of Education Sciences and Assistant Secretary of Education,U.S.Department of Education

"Your ideas upon graphically reducing the ambiguity of spelling are innovative and worthy of support." - **Dr. John Robert Skoyles,** Neuroscience Researcher, London

"I think it's an interesting way of approaching it. What you're talking about is obviously very different (than anything else ever done), it's fascinating." – Dr. Timothy Shanahan, Chair National Literacy Panel, President (2006) International Reading Association, Member of National Reading Panel; Director, Center for Literacy,University of Illinois at Chicago

"Basically what I'm feeding back to you is reinforcement of the theory that you have been discussing based on our on-the-ground experience with adults…". -Dr. Robert Wedgeworth, Past President of ProLiteracy (world's largest literacy organization), former executive director of the American Library Association (ALA)

"As a linguist I'm all in favor of your method of adding more phonetic information" - Martin Haspelmath - Linguist, Max-Planck-Institut fur evolutionare Anthropologie

"Your Training Wheels approach is a novel and promising way of tackling a long-standing serious social problem, the functional illiteracy of many young people in the United States and other English-speaking countries." - Robin Allott - Linguist, Author of the Motor Theory of Language Origin, Sussex, England

"Training Wheels for Literacy holds compelling promise for unlocking the key to reading." – **Senator John Vasconcellos** – Ex-Chair of The California Senate Education Committee

PERSONAL STORY

TWFL – Background

Though good readers recognize words as orthographic-wholes, beginning and struggling readers must ***learn to recognize*** wordsby using the letters within them (in some cases, the words surrounding them) to *sound them out*. For beginning and struggling readers, the process of sounding out words from their letters is *confusing* (see "Unnatural Confusion"). It is "unnatural", in that the whole process is based on learning to use a *technological artifact* (see "It's Unnatural – It's Technology") to *inform and instruct the brain to create a simulated language experience* (See What Is Reading?"). The central challenge faced by *most* beginning and struggling readers is *learning to work through the confusing relationship between letters and sounds* (see "Kinds of Confusion") fast enough to sustain attentional engagement.

Resolving this confusion takes *time*. Taking too long to decode a word (work through its grapheme-phoneme correspondences to recognition) is the most common bottleneck to progress in learning to read. The starts, stops, and hesitations heard in the voices of struggling readers are 'drop outs' in word-recognition flow caused by brain processing delays in working through the code's letter-sound correspondence confusion (as experienced by beginning and struggling readers). The greater a reader's experience of letter-sound confusion in a word, the longer his or her attention must stretch/span while working out recognition of the word. The longer the span of attention required, the greater the stress on working memory and the greater the vulnerability to mistakes in decoding. Taking too much time to decode unfamiliar words stutters up the synchronization of the brain processes required to maintain attentional engagement and, consequently, fluency, and comprehension.

Though we systematically blame and shame kids, parents, teachers (as well as improficient adults) for their difficulties, the root of their difficulties – the underlying confusion – is in *no way* their fault. It's the legacy effect of a series of historical accidents in the development of the English writing system itself (see "First Millennium Bug"). Many notables including, Benjamin Franklin, Noah Webster, Melvile Dewey, Theodore Roosevelt, and Mark Twain, recognized that the code's letter-sound confusion was at the root of reading difficulties. But despite their efforts and those of hundreds of others, centuries of attempts to change the alphabet or reform English spelling – to render their relationship more simply phonetic – have failed. The central issue is inertia; any change to the alphabet or spelling would create a 'before' and 'after' disconnect in the continuity of written english and it would be a disturbance, nuisance, and expense to everyone literate in the system as it is (for more see COTC Thoughts about Orthographic Reform). Because changing the code – changing the alphabet or spelling – has such intolerable consequences, our conceptions of 'teaching reading' have been constrained to accepting the confusion as immutable and, consequently, to paradigms of reading teaching organized around training the brains of readers to deal with it (see "Paradigm Inertia"). Phonics and whole language methods are both attempts to compensate for (work around), *rather than directly address*, the confusing correspondence between letters and sounds. (see Alphaphon analogy)

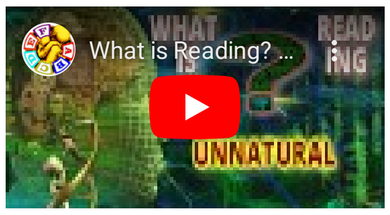
All previous attempts to reform the code failed because they involved changing the alphabet and/or changing English spelling.

How else might we reduce the confusion between letters and sounds in our orthography? Constrained to the two-dimensional thinking of printing press based 'type' it's not possible but with today's modern font technology we have previously inconceivable options.

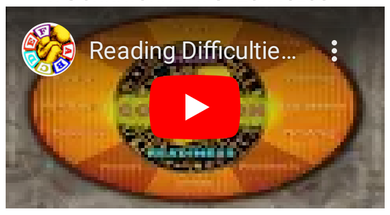
Summary

Reading is an artificially simulated language experience constructed by our brains according to the instructions and information contained in a c-o-d-e (see "What is Reading"). Though many factors contribute to learning to read difficulties, what most makes learning to read (English and other deep orthographies) difficult for *most* beginning and struggling readers – what most challenges their brains – is the *confusing relationship* between the *naturally evolved* and *naturally learned* code of speaking and listening, and the *artificially created* and *artificially learned* c-o-d-e of reading and writing (see "Disambiguation").

Though it was inconceivable before the advent of modern digital typography, it is possible today to add another dimension to the visual attributes of 'letters' and to use variations in that dimension, without affecting spelling conventions or adding letters to the alphabet, *to indicate which of a letter's possible sounds it is actually making in each word it is appearing.* In other words, without changing the alphabet or spelling, we can add another layer to modern digital typography that varies the appearance of letters in systematic ways that significantly reduce the **kinds of confusion** at the root of learning to read difficulties.



IT'S UNNATURAL - IT'S TECHNOLOGY



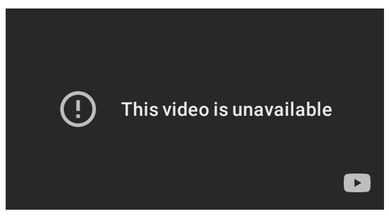
UNNATURAL CONFUSION

THE FIRST MILLENIUM BUG

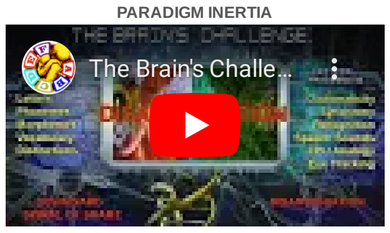
"Letters, the most useful invention that ever blessed mankind, lose a part of their value by no longer being the representatives of the sounds originally annexed to them. The effect is to destroy the benefits of the alphabet." **- Noah Webster**

"In trying to learn this [written English], two or three years are worse than wasted" **- Melvile Dewey**

"The heart of our trouble is with our foolish alphabet. It doesn't know how to spell, and can't be taught." **- Mark Twain**



PARADIGM INERTIA



DISAMBIGUATION

Comments are closed.

Kinds Of Confusion

The letters of the English writing system have confusing relationships with the sounds of the English language.

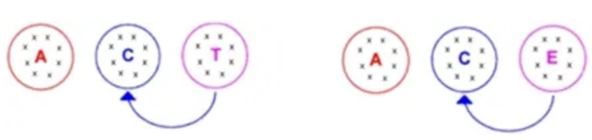
To beginning and struggling readers of English, the relationships between letters and sounds is complexly confusing. Letters can sound like their letter names (ape, oatmeal, zebra), they can be silent (lamb, knight, guess), they can represent other letter's sounds (giant, my, is), they can represent a spectrum of sounds related to their name-sound (ace, fast, fall), they can have sounds completely different from their name-sounds (clock, yes, xylophone), they can combine to represent sounds not represented by any other single letters (ch, th, wh, sh, ti, si, ci, tu,), and they can individually or in combination represent sounds of other single alphabet letters (c=k, x=z, ph = f). Working through these confusing relationships (before attention runs out of time) is what *most* challenges *most* beginning and struggling readers.

In English orthography, letters function like equation 'variables' that contain a number of possible sound values. Each successive letter, though it may itself be a variable, reduces the letter-sound possibilities of the letters that precede it and constrains the possible sounds in the letters that follow it. The field of possible sounds that a letter can make collapses / disambiguates down (like waves that become particles in a measuring context) to the particular sound it is actually making only after processing other letters in the word (sometimes other words) and only then by reference to phonical and /or spelling rules and conventions.

Lexical: Determining which of a letter's potential sounds that it is to actually sound like, more often than not, depends on resolving the letter sounds of the other letters that accompany it in the word it is appearing (Bite or Bit – Deed, Dead). Resolving the letter sounds in a word is determined by the *spelling* of the word (or sub-word sound). Notice the "c" sound variations in the following:

an agency for advancing the clarity of consciousness about changes in scientific uncertainty

The sounds conveyed by the c can be a '**c**' as in agency, a near 's' as in advancing, a 'k' as in clarity; it can join with other letters to make a larger unit as in consciousness or changes; it can represent silence as in scientific, and it makes the sound of a stronger 's' as in uncertainty. In each case the sound of the c is determined by one or more letters preceding, following, or surrounding it in the word.



The words 'act' and 'ace' both have an 'a' before the 'c'. The sound of the 'c' changes from a 'k' sound to a 'c-s' sound when the 't' on the end of act is replaced with an 'e' making the word 'ace'.

The 'c' sound changes as the 'e' shifts the 'a' sound from act to **a**ce.

It is possible for any given letter in a word to have its letter sound determined by any one of the other letters within the word.

Semantic: Some words (heteronyms) sound different even though they are spelled the same. Same-spelling word-sound variations can only be determined by the *meaning of other words*.

It is important to live well. I like live performances.

The 'i' in 'live' can represent different sounds depending on the word's meaning even though the word is spelled the same. Words like this sound different not because of any difference in the letters within them but rather from the meaning of the word which is a product of its context of use not its letters or spelling.

The bottom line is that the sounds of letters are variable and the process of determining which of a letter's possible sounds it is actually making in a word can be very confusing to beginning and struggling readers:

- Does it sound like its letter name?
- If not a letter-name, which of its other sounds?
- Is it a silent letter?
- Does it stand alone or combine with others?
- Does its sound run together with its adjacent letters' sounds or is there a pause before or after it?

Virtually everything we think about reading, learning to read, and the teaching of reading (including "Scientifically Based Reading Research"), is based on – warped by – accepting the code's letter-sound confusion as immutable (see "Paradigm Inertia")**.** Consequently, all traditional approaches to teaching reading are based on training the brains of readers to deal with this letter-sound confusion by either working around it (whole – contextual guessing) or by recognizing rule-clues (cues) in the letter's lexical and semantic context (phonics). Phonics and whole language methods are both attempts to compensate for (work around), *rather than directly address*, the confusing correspondence between letters and sounds. (see Alphaphon analogy)

PCUES is based on an entirely different starting assumption: the orthography can itself be varied, without changing the alphabet or spelling, in ways that reduce (and in many cases remove) the confusion. PCUES accomplishes this *visually-intuitively and neurologically-efficiently on the edge of letter recognition flow rather than requiring complexly-contextual post letter-recognition processing*. PCUES adds a layer to the orthography that overlays its messy letter-sound relations and provides readers a new parallel pathway for both sounding out words and learning to recognize the spelling-sound patterns within them.

Comments are closed.

VALIDATE THIS FOR YOURSELF!

Learn to 'sync-up' with the flow of confusion in struggling readers

SYNC-UP

ORCHESTRATING READING

DOWNLOAD THE POWERPOINT SLIDE OVERVIEW OF AND GUIDE TO "ORCHESTRATING READING"

Introduction to PCUES

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

PCUES are alphabet-general, letter-face variations that act as phonetic-pronunciation cues that significantly reduce the confusion involved in learning to read (See: Disambiguation).

DESIGN PRINCIPLES:

PCUES or PQs – The "P" stands for 'phonic', 'phonemic', 'pronunciation', and 'parallel'. Phonic because they cue sounds, phonemic because they cue sub-sound boundaries, pronunciation because they cue which of a letter's possible sounds to pronounce, and parallel because they create a parallel process path for decoding to draw upon.

Ambiguity Reduction – The primary function of the PCUE system is to reduce the letter-sound correspondence ambiguity that is inherent in the 'code' and problematic to the process of learning to read.

Alphabet and Spelling Independent – PCUES do not require any changes to the alphabet or to English spelling. PCUES are variations in the appearance of letters that cue readers to pronounce letters and letter combinations in ways that corresponds to the sub-sounds of the words they appear in.

Readway Signs and Phonic Serifs – PCUESare analogous to 'highway signs' that inform a driver's movement in traffic. PCUES are 'readway signs' that inform a reader's pronunciation while reading. Just as serifs are intended to guide the eye toward more fluid letter-appearance recognition, PCUES are intended to guide the mind toward more fluid letter-sound recognition. Another parallel is with 'parentese' – the toddler talk that parents engage in to slow down the pace of language and emphasize the sounds in words. Pcues provide beginning readers what parentese provides listening toddlers – extra help that guides learning.

Font General – Pronunciation Specific – PCUES are font-general, not letter-specific. They, like 'bold', 'Italics', and 'underline', are general attributes of fonts that can, in principle, be applied to any letter. However, the way the cues are used to guide pronunciation is specific to a letter's sound in the specific word it is encountered in. Just as 'bold', 'italics', and 'underline' are used to indicate or emphasize a specific meaning for the word or words being read, PCUES are used to indicate or emphasize a specific pronunciation for the letter or letters being read.

Visual Distinction – PCUES are visually distinct and easy to recognize. They do not obscure underlying letter recognition features.

Mental Resource Efficiency – PCUES are as intuitive as possible. To facilitate this, the appearance of a cue is, everywhere possible, *a morphic analogy of the letter-sound variation it represents* (e.g., larger for louder – faintly visible for silent – horizontally stretched to indicate a drawn out sound variation – closer together to indicate combined sounds). By making the visual difference in a letter's appearance analogous to a corresponding difference in how it is to sound, PCUES minimize the memory and attentional processing resources required to recognize and use the cue.

Learning Ease – the pedagogy for learning to recognize and apply each cue is very simple and direct.

Minimal Number – The intent of Pcues is to reduce unnecessary mental processing operations. The trial-optimized system will achieve a balance between the numbers of cues, their ease of learning and the ambiguity the cues reduce.

Minimal Distraction – the cues should pose little distraction to an experienced reader.

Paper and E-paper based – It is our long-range intention to make this system available to all beginning and struggling readers. As it will be a while before tablets and other information appliances replace paper as the primary medium of learning to read, the basic PCUES system is designed for the most low-cost common denominator: black and white paper printing. However, for those with smart learning appliances, PCUES can be significantly more dynamic. They can be animated to appear synchronous with auditory pronunciation (pre-recorded or text-to-speech). They can also be personalized – any number of the cues can be turned on or off to better isolate attention on just the areas of code confusion the reader is learning to work through.

Training Wheels – PCUES act like training wheels by helping to keep readers from falling out of flow. Like training wheels, they are designed to 'come off' when the reader is ready. Because beginning and struggling readers will be learning to read with the normal alphabet and spelling (just getting help from the cues in decoding how they 'sound' together), their repeated successes with ever more familiar sub-word decoding will give them a 'training wheels' effect. When we later phase out or drop the cues, their decoding / reading experience will still be applicable. Recognizing letter combinations/sub-word sounds and how they combine should be much easier (very closely paralleling the bicycle training wheels metaphor).

Comments are closed.

DISAMBIGUATION

AMBIGUITY EFFECTS ON WORD RECOGNITION SPEED

PCUED: COMPARISON

COMMENTS FROM LITERACY LEADERS

"It's a good idea. Very researchable. It would relate to the quality …and overall efficiency of the process compared to the hit and miss… It makes a lot of sense to me." - Dr. **Grover (Russ) Whitehurst** Ex-Director of the Institute of Education Sciences and Assistant Secretary of Education,U.S.Department of Education

"Your ideas upon graphically reducing the ambiguity of spelling are innovative and worthy of support." - **Dr. John Robert Skoyles,** Neuroscience Researcher, London

"I think it's an interesting way of approaching it. What you're talking about is obviously very different (than anything else ever done), it's fascinating." – Dr. Timothy Shanahan, Chair National Literacy Panel, President (2006) International Reading Association, Member of National Reading Panel; Director, Center for Literacy,University of Illinois at Chicago

"Basically what I'm feeding back to you is reinforcement of the theory that you have been discussing based on our on-the-ground experience with adults…". -Dr. Robert Wedgeworth, Past President of ProLiteracy (world's largest literacy organization), former executive director of the American Library Association (ALA).

"As a linguist I'm all in favor of your method of adding more phonetic information" - Martin Haspelmath - Linguist, Max-Planck-Institut fur evolutionare Anthropologie

"Your Training Wheels approach is a novel and promising way of tackling a long-standing serious social problem, the functional illiteracy of many young people in the United States and other English-speaking countries." - **Robin Allott** - Linguist, Author of the Motor Theory of Language Origin, Sussex, England

"Training Wheels for Literacy holds compelling promise for unlocking the key to reading." – **Senator John Vasconcellos** – Ex-Chair of The California Senate Education Committee

PCUES

PCUES are systematic variations in the appearance of letters that look like *morphic analogs* of the sound variations they suggest (for example, barely visible grey for silent letters). By improving how letters cue sounds (like the alphabet originally did), PCUES reduces the cognitive processing work that most impedes and endangers the progress of beginning and struggling readers (disambiguating letter-sound relationship confusion).

KINDS OF CUES

It's important to separate a cue's logical function (what kind of letter-sound confusion it addresses) from a cue's rendering (how the visual variation in a cued letter or letters looks). In the PCUES / Training Wheels for Literacy system, the logic of cues (PCUES Logic) and how cues are rendered (PCUES Code) are separate processes (see Technology)

PCUES Logic:

In order to assign PCUES font-rendering variations, we have to delineate the sound variations they are to cue. Here we depart from the already literate expert labelling conventions used by linguists and orthographists (vowels, consonants, diphthongs, trigraphs, etc.,) and focus instead on the kinds of confusion beginning and struggling readers experience:

- **Does it sound like its letter-name?** One of the difficult confusions for developing readers is a consequence of learning the ABCs (letter-name sounds) and the ABC song. Because most children learn the 'ABCs' before they begin to learn to read, their brain's learn (neurons wire and fire) to associate a letter with its letter name sound. When later learning to read, their brains' response to seeing a letter is to 'hear' its letter name. As it is often the case that letters don't sound like their letter names, this association confuses the process of learning to read.
- If not a letter-name, **which of its other sounds?** Letters have letter-name sounds and many letters have more than one non-letter name sound.
- **Is it a silent letter?** Some letters are not pronounced, as in the case of the 'a' in 'sea' and the 'k' and 'w' in know.
- **Does it stand alone or combine with others?** Combined letter sounds are in a class by themselves. The problem with combined letter sounds is recognizing that their individual letters are not to be decoded separately but combined to represent their distinctly assigned sounds.
- Does its sound run together with its adjacent letters' sounds or **is there a syllable/segment pause** in sound before or after it?

PCUES: provide readers cues which let them know when a letter sounds like it's letter name and when it doesn't; whether a letter is silent, which of a letter's non-letter name sounds it's making, whether a letter is part of a larger unit with it's own sound, and where the segments of pronunciation are in the word they are reading.

PCUES Rendering: Within existing font technology, there are a number of ways (without changing basic letter recognition features) to vary the appearance of individual letters to cue their sounds:

- Increase/Decrease Size
- Bold (if word already bold, then bold + increased size)
- Shades of Gray (color)
- CW-CCW Rotation
- +/- Elevation
- +/- Spacing
- dots (between segments)
- gray underline (blends)
- Shape Distortion (morph just width or height or angular distortion)
- Using two or more fonts in the same word

By using special, but already existent fonts, we can add

- Outlined fonts

By creating PCUES custom fonts, we can add

- Partially filled in outlined fonts

The appearance of cues can also be varied to fit the needs and preferences of different types of beginning and struggling readers (for example, large fonts with kiddie serifs for children). The first version of PCUES will stay within the defined limits of font rendering/appearance variation rendering common to all software and hardware platforms. With special fonts designed to maximally enable and emphasize PCUES we will eventually do even more. As we progress, PCUES rendering will evolve through trials and, later, more widespread use.

PCUES Styles: Logic and Rendering (simple)

Many of the kinds of confusion PCUES logic targets can be cued with relatively simple and straightforward variations in font rendering,

(LN) Letter-Name [Bold]

The first class of PCUES provides beginning readers a way to determine when a letter's sound is to be read as its letter name and when it is not.

a = cake a = cake

By using **bold** to indicate letter-name sounds, there is a direct analogy of form to the letter name's difference in sound and the recognition of the visual cue is minimally abstract – more intuitively obvious – and therefore easier to remember. *Larger bold is used for letter-name sounds when the entire word is already rendered in bold.

(SL) Silent Letters [Grey]

Silent / Unpronounced (possibly minimally pronounced) are PCUED rendered in **GRAY.**

know You are right

By graying silent letters, there is a direct analogy of form to the letter name's difference in sound and a minimally abstract and maximally analogous, intuitive, and easy way to recognize and remember the use of the cue.

(CL) Combined Letter Sounds (th, ph, ch, sh, etc.,) [- Kerning]

Reducing the space between letters (-kerning) is used to cue readers to recognize such groups and to indicate that they are to make their own sound. This immediately removes the combined letters (blends, digraphs, trigraphs) from consideration for isolated decoding.

change the phoneme

The letter spacing of the 'ch' in 'change', the 'th' in 'the', and the 'ph' in 'phoneme' are nearly in contact with one another (obviously differently spaced) to cue that they are letter combinations to be read as one unit. Placing letters in contact with one another to indicate that they are to be read as a group is a perfect morphic analogy.

(CL) Combined Letters Sounds and/or Blends [Gray underlining]

In addition to or as an alternate to reducing the space between letters we can underline combined (th, ph, ch, sh, etc..) or blended (bl, tw, oo, st, etc..) letters.

Change the phoneme

(SG) Segmentation [+ Kerning]

To avoid the decoding problems posed by 'longer' words, PCUES extends the space between letters (+kerning) to cue syllable boundaries:

compartmentalized segmentation

(SG) Segmentation [dots]

An alternate to increasing the space between segments we can use the traditional dictionary approach of inserting dots:

com·part·men·ta·lized
seg·men·ta·tion

With straightforward cues for Letter Name (LN), Silent (SL), Combined (CL), and Segments (SG) addressing the simpler confusions, we can address the more complex variables associated with the remaining alternate letter sounds.

PCUES Styles: Logic and Rendering: Alternate Letter Sounds (complex)

Once we can rely on the letter-name (LN) cues to indicate when a letter is making its letter-name sound, those letters that have only one non-letter-name sound can be left as is. For the remaining letters that have more sounds than the letter-name, silent, and combined PCUES cover, we can make further distinctions about their sound differences that can be used to cue recognizing them.

Pitch – Alternate letter sounds have higher or lower pitches than then their letter names (for example: the first 'y' in mystery and dynasty is making a short 'i' sound and the second 'y' is making the 'e' sound. The short 'i' sound, is a lower pitch than the 'e' sound).

Slice – Alternate letters sounds often have some part or 'slice' of the letter's letter-name sounds. (for example: the 's' in PCUES is making the 'z' sound which is the later part of the whole 'S' sound).

Duration – Alternate letter sounds can be longer or shorter in duration than their letter-name sounds. (for example the short 'a' in cat vs the long drawn out 'a' in walk.

Spectrum – Sometimes all the sounds of a letter are internally related variations as in the case with the letter 'a', which in addition to the LN **'a'** sound can also sound like aw (talk), or ae (dad). In this sense, 'a', 'ae' and 'aw' are variations along a spectrum of sounds the 'a' makes.

Discreteness – Some letters have letter sounds that do not sound at all similar, as in the case with the letter 'c', which can also sound like the totally different sound 'k'.

Rendering Options for Alternate Letter Sounds (AL)

(AL-DL) Alternate Letter Sounds – Discrete: Many letters are used to represent sounds that have no resemblance to their letter name sound ('c' as 'k', 's' as 'c', 'x' as 'z', etc.). One approach to cueing is to draw upon their difference in pitch. Each different letter sound can be distinguished as being either lower or higher in tone or pitch than the letter's LN sound. Using this basis for discrimination, we change the elevation of the letter as a cue for prompting the reader to know that this letter has discrete letter sounds as opposed to a spectrum of letter sounds and, subsequently, which of the letters alternate sounds it is to make.

Discretely Different Alternative Letter Sounds

Lower Letter = Lower Alternate Sound
Higher Letter = Higher Alternate Sound

c = K = can
x = z = xerox
y = I = tYpe

The 'c' in 'can' is a 'k' sound that is lower in pitch than its LN and can be represented by lowering it. The 'x' in 'xerox' is a 'z' sound and can be represented by raising it. Vertical centering or elevation represents a visually-conceptually analogous rendering.

(AL-SP) Alternate Letter Sounds – Spectrum: As with the 'discrete' alternate letter sounds, each spectrum ('a', 'ae', 'aw', etc.) letter's alternate sounds can be represented on a scale within which each alternate sound is either 'lower' or 'higher' in tone/pitch than its letter name sound. For example, the 'i' in 'animal' sounds like 'eh' which is a 'lower' tone then the 'i' in 'his' which sounds like 'ih'.

a = ae = had a = ae = had
a = aw = walk a = aw = walk

The 'a' in 'had' is lower in tone than it's LN and can be represented by rotating it backwards or lowering it. The 'a' in 'walk' is even lower in tone than the 'a' in 'had' and can is represented by a greater exaggeration of rotation or lowering.

PCUE Alternate Letter Sound Styles:

In a future trial system, we will use rotation for spectrum cues and elevation for discrete cues:

See also our page on additional "Alternative PCUE Styles"

Additional Pcues:

Affixes at the beginning (prefixes), the middle (infixes) or the end (suffixes) of words can be Pcued by using a different font to render them.

OUR STARTING SYSTEM:

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, of the cues described here, these are our starting set:

Letter Name (LN), Combined Letter (CL), Silent (SL) and Segmentation (SG) cues are the core set. They all offer significant ambiguity reduction, are easy to recognize and appear as visual analogs of the pronunciation directions they cue.

Of the more complicated remaining cues, we favor elevation for discrete letter cues (DL) and an either duration or rotation for spectrum letter cues (SP).

NOTE: for our initial trial with adults we combined 'discrete' and 'spectrum' cues and used elevation (up or down) to represent both. See: **Examples**

Our implementation examples are incomplete and not fully consistent. We are not suggesting that these embodiments of the concept are the 'right' ones. Determining which variations of PCUE styles are 'right' for each class and kind of ambiguity (PCUE logic), will require further research and trial based tuning. In particular, ALcues, which require more post-recognition processing, need to evolve via trials with beginning readers.

We can iterate our way to a system of cues that will dramatically reduce the ambiguity that impedes learning to read. We can do this without change to the alphabet or the English system of spelling and without having to train the minds of our students in any way approaching the complexity of phonics. We can create a tool that can scan through the text of any document and automatically reformat the appearance of the document (by employing the cue system) and consequently render it significantly easier to read. (see: Technology)

Alternative PCUE Styles

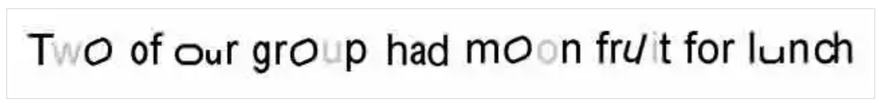
OTHER POSSIBLE ALTERNATIVE PCUE STYLES:

(AL-DUR) Duration: Another distinction available to letters that have a spectrum of alternate sounds is the difference in length of time, or duration, that each alternate sound lasts. In this case we could 'stretch' the width of characters to emphasize their longer or shorter durations.

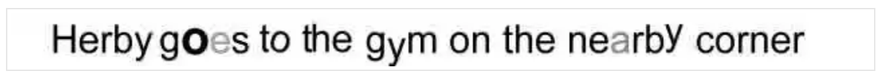
In cake the 'a' sound is it LN and therefore LN cued. In 'had' the 'a' sound is the shorter 'ae' sound and is therefore cued by its slim width. In 'walk' the 'a' sound's duration is longer and is therefore cued by its stretched width.

A related alternative is to use duration for spectrum cues and elevation for discrete cues:

(AL-PM) PhoniMorphs: Another method would be to combine stretch or shrinkage for duration with a directional skew representative of higher or lower pitch:



It is also possible to integrate one or more of the sound pitch based cues into a common system. In this case the rotation (or duration or Phonimorphed) cues would only be used for the not most common non-letter name sounds and elevation would be used for the not most common discreet sounds. This actually uses less cues to provide more distinction.



In the above example, the 'y' in 'Herby' is making an '**e**' sound, the most common non LN sound for a 'y' therefore it is left plain (it will most probably be rendered as a silent sound with the b rendered as the LN '**b**'). In 'gym' the 'y' is making and 'eh' sound which is lower in tone than the LN '**y**' and is therefore lowered. The 'y' in 'nearby' is making an '**i**' sound which is higher in tone than the LN '**y**' and is therefore elevated. In the case of the 'o' in 'on' it is making the most common non LN 'o' sound and is therefore left plain. The 'o' in 'to' is making the 'ooh' which is higher in tone than the LN 'O' and is therefore rotated right.

(AL-AMP) Amplitude: Another dimension of distinction in heard or virtually heard language is the spectrum of amplitude (loudness to relative softness). This is the varying 'loudness' that is 'heard' in the unfolding stream of sound we hear as words. The ideal form-analogous cue for this discernable variation in amplitude is SIZE. (LN)s are almost always 'loud' (why we favor the (LN) cue distinction be larger and bolder).

(AL-OUT) Outlined: As an alternative to rotation, elevation or widened or phonimorphic cues, we could use outline letters and partially fill the outline to suggest the pitch, slice, or duration difference. This can be done using left to right or up and down for tone scale or duration. (shown extra large for viewing on a low resolution display):

Comments are closed.

Examples

The Magic Ladder Library

Every word on every page its own tutor.

Pre-K | 1-2 | 3-4 | 5-6 | Mid | High | Adult

E-Books | Book Excerpts | Family Tools | Teacher Tools

Guided Tours

NEW? Click here | A INDEPENDENT LEARNERS | B HOME and FAMILY | C EDUCATORS and SCHOOLS

About

OLSN ONLINE LEARNING SUPPORT NET | The MAGIC LADDER | HOW TO USE OLSN | X-RAY Reading | ABC's of PQ | Interactive INO Orthography | PLEASE SUPPORT US!

Because nothing is more important to our children's futures than how well they can learn when they get there.

Notes: The following examples are short stories and lists used in our initial trial with adult learners (ages 25 to 62 who read below 6th grade levels). They have inconsistencies in how we they are Pcued in part because of our experiments with the students and in part due to remaining short comings in the Pcue automation technology. Blends and combined letters are particularly inconsistent as the tool allows us to enable and disable different combinations at different stages of student progress. Due to tech issues in rendering adjacent combined/blended letter Pcues (soon to be corrected), we are inserting segment cues where they shouldn't be (th-ing). The gray color used for silent letters and to indicate combined letters may be hard to read on monitors. It was chosen to look best when printed on the trial site's printer.

Example links non functional
refer to the Magic Ladder's PQ
Logic Page for more

Short Stories:

Thomas Jefferson The Iron Horse The Need for Power Moving with Machines Early Weapons and Defenses Bringing Home the Fossils The True Fish Being Left-Handed The Story of Louis Braille They Forgot to Plant an Acorn on the Moon The Shepard Boy and the Wolf New World Vegetables What Does an Architect Do? Supermarket Temptations The Color in the Clouds Legs, Hands and Thumbs The Great Wall Names of Shapes New Home Inventing Tilt n Turn Salt Reading Arithmetic Ruler in the Desert Big Noise – Thunder Pocketful of Numbers The Story of Pants Systems of Measurement Eating the Right Foods How We Hear Eyes Cops Barbers Ticky Lizards House Eaters To Sea and Home Again Beavers – Builders at Work The Air Here to There Popcorn Oldest Still Works

Longer Stories:

Daniel Boone in Kentucky The Story of Abraham Lincoln – Part 1: Kentucky Home The Story of Abraham Lincoln – Part 2: Work and Sorrow Thomas Edison – Part 1 Thomas Edison – Part 2 Thomas Edison – Part 3 Let's Go Fishing

Timed Reading Stories:

The Tomato Birth of the Blues (Jeans) Death of Titanic Hatching a Butterfly

Vocabulary Lists:

2nd Grade Vocabulary: Part 1 Part 2

3rd Grade Vocabulary: Part 1 Part 2

6th Grade Vocabulary: Part 1 Part 2 Part 3 Part 4 Part 5 Part 6

7th Grade Master Vocabulary: Part 1 Part 2 Part 3 Part 4 Part 5

GED Science Vocab Math Vocabulary

Assessment Word Lists:

A1000 (red) A1100 (orange) A1110 (yellow) A1111 (green) A2111 (blue) A2211 (purple) A2221 (brown) A2222 (white) A3222 (gray) A3322 (black) A3332 (silver) A3333 (gold) A4333 (maroon) Graded Word List I: Preprimer to 1st 2nd to 4th 5th to 7th 8th to 10th 11th & 12th Graded Word List II: PrePrimer and Primer 1st and 2nd 3rd and 4th 5th and 6th 7th and 8th 9th and 10th 11th and 12th

ADRI Word List -1 ADRI Word List -2

Pcue Teaching Aids: Pcue Poem Count the Cues

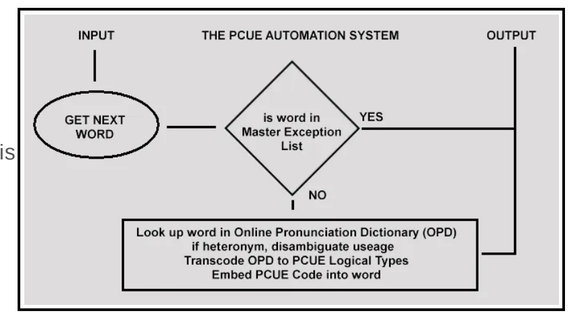
Comments are closed.

Technology

The Training Wheels for Literacy system has three main components:

- The PCUES Automation System
- The Authoring / Assignment Tool
- The Reader App / Browser Plug In

The PCUES Automation System

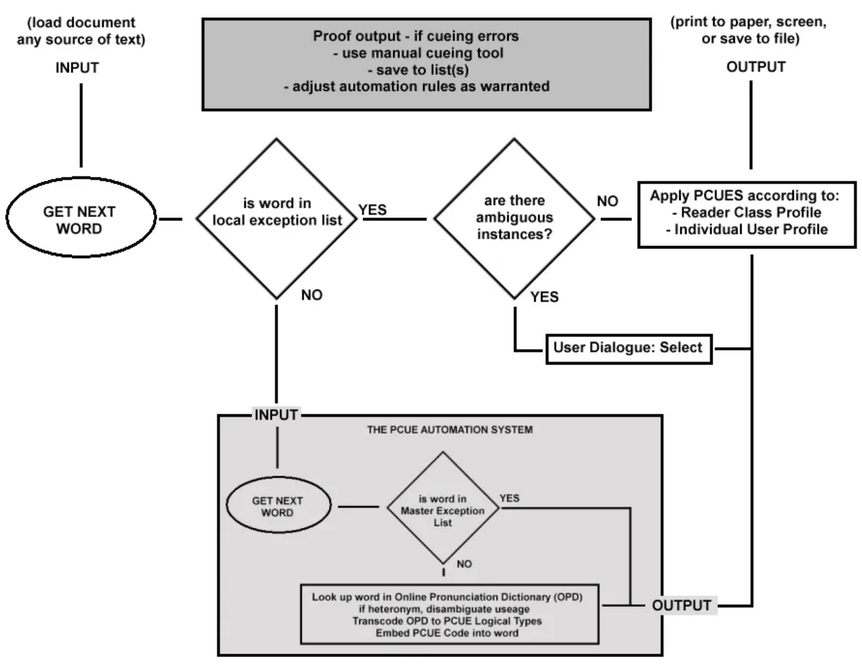


The PCUES Automation System is the intelligent backbone of Training Wheels for Literacy that transcodes human readable text into text-to-speech (machine) pronunciation code and subsequently to the PCUES code (which is embedded in the word as a mark-up language). The PCUES Automation System consists of:

- Master Exception List – list of manually cued words that bypass automation
- Online Pronunciation Dictionary (OPD) – open source or proprietary text-to-speech code library
- Rule Application Engine – transcodes (OPD) code into PCUE Code
- The PCUES program

The PCUES program automatically assigns and embeds PCUES Code (mark-up language) to words not found in the Master Exception List. After disambiguating heteronyms, it looks-up (OPD) the phonetic /pronunciation code of a word and transcodes the results into PCUES Code according to the Rule Application Engine. The program returns words with (invisible to humans) PCUES Code embedded in the word.

The Authoring / Assignment Tool (paper or file)



The Authoring / Assignment Tool allows content publishers / educators to personalize the application of PCUES to their content and to their learners. The application will be hosted on our website and could eventually be a plug-in for common word processors and publishing tools. The tool can open the content from common files or have it pasted into its workspace. It outputs PCUED texts that can be saved, copied, and pasted into popular word processing and publishing software, or directly printed.

The major components of the tool include:

Local Exception List – list of manually cued words that bypass both the Master Exception List and The PCUES Automation System

CUE Bias Setting – provides the ability to exaggerate the rendering of PCUES Font Styles (make letter name (LN) cues larger, change grayscale of (SL) cues, increase (SG cues) or decrease (CL cues) space between letters, increase or decrease the elevation of (AL-DL) cues, increase or decrease the morph of (AL-DUR) cues.

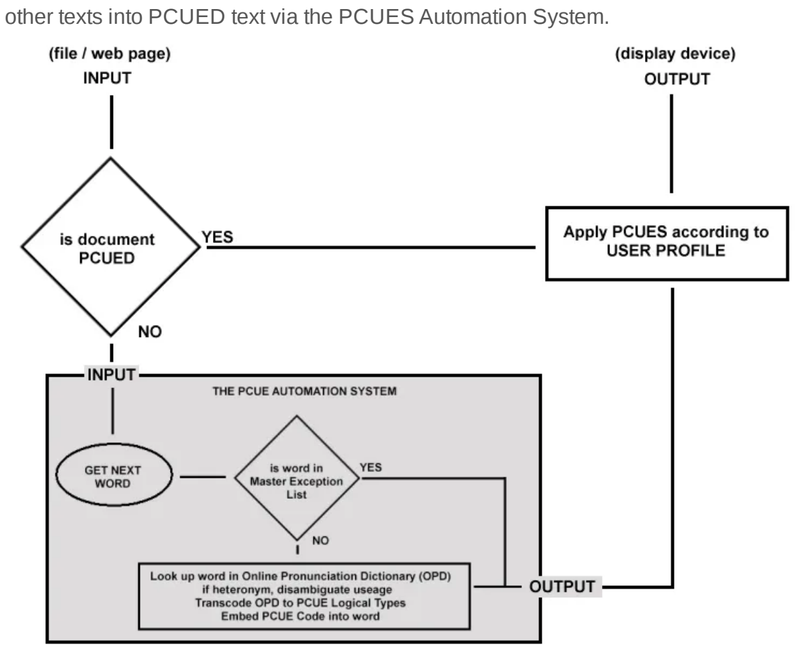
Reader Class Profile – a modifiable list of preferences that includes assignations of PCUES Font Styles to PCUE Code and selective disabling of individual PCUES

Individual Reader Profile – a modifiable list of preferences for individual students that includes selective enabling and disabling of individual PCUES (including various blends and affixes)

The Manual PCUES Assignment Editor – while the system evolves to include PCUES for every word in the English language there will be instances when the automation fails to cue a word correctly. The Manual PCUE assignment editor is a human interface dialogue that allows authors and educators to manually assign PCUES to the letters in a word. The resulting PCUED word is then added to the Local Exception List and submitted to the Training Wheels for Literacy Team which will either adjust the Rule Application Engine that controls the automation or add it to the Master Exception List (so that, one way or the other, the overall system learns).

The Reader App / Browser Plug-In

The Reader App and Browser Plug-In are analogous to ‘receivers’ or ‘players’ designed to display pre PCUED texts or to process any other texts into PCUED text via the PCUES Automation System.



The Reader App is designed to run on PCs, tablets, and smartphones. The Browser Plug-In is an extension that adds PCUES reader functionality to common web browsers and allows for the dynamic PCUEING of most web-page content. For an example of the Browser Plug-In (still using an older automation logic and not yet correctly Pcueing) press the button below and scroll up to see its effects on the rendering of this very page.

PCUES

Both the Reader App and Browser Plug-In provide users (and their teachers/parents) the ability to adjust the exaggeration of the cues as well as to enable or disable any particular cue.

Comments are closed.

Vision

Rough/beginning work in progress – placeholder

Future System

A web site parents and educators can use to enter reader profiles and that will generate PCUED content tailored to their children.

Automated content (ala Narrative Software) created per reader profile with vocabulary and density leveled to relevant stretch for individual readers.

Periodic speech recognition inferenced (error assessed) cue calibration and story creation.

Teacher print module that automatically applies PCUES to any and all printed homework assignments per each student's profile.

Vision: Adults

An adult in China learning to read English chooses a title on her Kindle. She dowloads a TWFL version of the (any) title. It has a chinese language version and a Pcued English version. The reader app allows her to move back and forth between the two languages and when in English uses the Pcues to guide her into learning English pronunciation.

Vision: Children in US Homes and Schools

Children learn a new kind of ABC song… a music video… one that uses a dynamic animation of letters morphing into their cued variations in time with the variations in sounds they represent. Once past the basic alphabetic insight, children learn that letters can vary in appearance and sound and an easy way to track how a variation in the letters appearance visually cue the sound it's making.

Strategy

Rough/beginning work in progress – placeholder

Initial focus on demonstrating PCUE efficacy to worst case readers.

TRAINING WHEELS FONTS Until the trials provide the feedback needed to tune into the optimal cue types, morphs and recognition thresholds, we can't be sure whether the final fonts will be specifically created for Training Wheels or whether a general rendering system can be used to automatically morph any number of existing font's characters with Pcue attributes. Our preference, and we think probable outcome, is a font general system capable of rendering PCUES with all existing fonts. However, initially, to support trials, we will use the font family(s) considered most easily readable by the reading research community. If necessary we will create a Pcue specific font or series of fonts that include the full range of Pcue expressions. Whether we use font general rendering or create unique PCUE fonts, we will test which kinds of cues are most helpful to different groups of beginning readers at different stages of progress. We will have alternate systems for adults, remediation, and 'from the beginning' grouped into pre-k, k-1,1-2,2-3. Later, we will also use fonts more 'friendly' to beginning readers of English that are coming in from another language (For example, Chinese to English).

Comments are closed.