

# Science of Reading Research

Implications for Hebrew Decoding  
in part-time synagogue settings



This document complements the resource:  
“Conquering the Challenge of Hebrew Decoding”

**A project of #OnwardHebrew**

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and the Jewish Education Center of Cleveland

**Organization of this document:****SECTION 1 (starting on page 3, below)**

Quotes, paraphrases and citations organized by theme.

**SECTION 2 (starting on page 9)**

Complete bibliography organized by author; includes URLs to the cited documents.

**SECTION 3 (starting on page 13)**

Quotes, paraphrases and citations for the “Conquering the Challenge of Hebrew Decoding” document, organized by Challenge.

**A caveat on the sources presented:**

*Most of the research findings, below, are from studies on learning to read a language that a child already knows well, meaning they were not designed to address the decoding focus of part-time/synagogue education. That said, decoding is a subset of reading and it seems fair enough to hypothesize that there are potential applications from learning to read in one’s native language to part-time Hebrew decoding instruction.*

*The quotes/paraphrases in this document are obviously offered out of context of fuller academic articles which is why they are carefully cited for those who would like to explore the fuller picture. Sentences within quotation marks are direct quotes. Sentences without quotation marks are paraphrases.*

*The ideas quoted within this document formed the foundation for hypothesis-generation for informal practitioner research by members of #OnwardHebrew’s 2023-2024 Decoding Think Tank. For more information on their process, see the bottom of page 7 of the resource, “Conquering the Challenge of Hebrew Decoding,” available for download, along with all other related documents, here:*

<https://www.onwardhebrew.org/conquering-the-challenge-of-decoding.html>

# SECTION 1

**Quotes, paraphrases and citations from research findings**

**Organized by theme**

## RESEARCH FINDINGS RELATED TO HEARING A LANGUAGE'S "SOUNDS"

- The ability to distinguish phonemes has a significant and durable impact on later reading ability *though this relationship might not be as powerful for Hebrew, as English.* (Share and Levin, 1999)
- "... speech is seamless on the surface, with no breaks signaling phonemic units. Special experiences are needed to engage the brain in deciphering print." (Ehri, 1998) AND "They must learn how to find the invisible seams in the flow of speech in order to segment words into phonemes." (Ehri, 1998)

## RESEARCH FINDINGS SPECIFICALLY ON HEBREW LETTERS AND VOWEL SIGNS

- The vast majority of Hebrew words contain consonants and vowels that could be spelled with alternative letters and vowels. *This has implications for teaching the names of the letters and vowel signs, not just referring to them as the "V" sound.* (Share and Levin, 1999)
- Hebrew letters are less distinctive than English - they are block-like, have fewer curves, diagonals and fewer of them go above or below the line. "Not only are letters less distinctive, but word length and word shape are also quite uniform." (Share and Levin, 1999)
- "The vowel signs were developed as a response to the increase in reading matter and in the number and range of readers for whom Hebrew was not their mother tongue. The signs are called *t'nu-ot* (movers) because they move the consonants. A *Bet* by itself could be *ba bi beh bo* or *bu*. The vowel signs tell us which one it is. The vowel signs do not have sounds by themselves." (Schachter, 2010)
- "Students have more difficulty remembering the vowel signs than the letters. To make this easier, the names of the vowel signs should be taught. Naming them gives these symbols significance. They provide an additional clue to the sound shaped by the sign. The first syllable of the name of the sign tells us the sound that will be indicated by the vowel sign under any letter. Using the names of the vowel signs allows the teacher to talk about the symbols and manipulate them while teaching. This is preferable to talking about the two dots, the three dots, and the like." (Schachter, 2010)
- In a 1995 study of Israeli 2nd graders, "79% of reading of the errors [were of vowels] in unpointed script and 62% in pointed script...This bears out Feitelson's (1988) claim that a major source of difficulty in mastering Hebrew decoding in the diacritical system." (Share and Levin, 1999)
- Vowel signs that represent the same sound should be taught simultaneously (for example the *Kamatz*, *Patah* and *Hataf Patah*). Vowel signs that are visually similar (for example, the *Kamatz* and *Sehgo*) should be taught in lessons separated from each other. (Maiben, 2003)

- “Preschoolers’ knowledge of the names of printed letters has long been known to be among the strongest predictors of future success in learning to read.” (Share, 2004b)
- “... labeling letters by their sounds would, in many situations, create considerable confusion for young learners and almost certainly require constant and cumbersome qualification by speakers referring to the ‘s’ letter verses the ‘s’ sound.” (Share, 2004b)
- On entry to school (age 6), Israeli students are generally not introduced to individual letters, but to an “integral CV syllable block.” (Share, 2017)

## RESEARCH FINDINGS ON WHAT LEADS TO ORTHOGRAPHIC MAPPING

- “It turns out that the ability to read words in isolation quickly and accurately is the hallmark of being a skilled reader. This is now one of the most consistent and well-replicated findings in all of reading research.” (Hanford, 2019)
- Children must, “learn how written letters represent spoken sounds, recognize patterns of letter sounds as words, match those to spoken words whose meaning they know.” (Schwartz and Sparks, 2019)
- “Orthographic mapping is the process of storing a word permanently in memory for instant retrieval — and key to effortless, accurate, and fluent reading.” (Reading Rockets website; retrieved 4/26/2024)
- For readers to achieve orthographic mapping they need:
  - Letter-sound proficiency
  - Phoneme awareness
  - Vocabulary/meaning ... and knowledge of how to pronounce the words(Murray, 2017)
- Per the science of reading, sight words are words that pop - “one can’t help but read them.” (Murray, 2017)
- English language learners with disabilities: They need to “have English words stored in phonological long-term memory, even if they do not yet know the meaning of those English words.” (Kilpatrick, 2015)

## RESEARCH FINDINGS ON TEACHING STRATEGIES

- “We usually address the lack of fluency in education by having kids read and reread words and texts hoping for word memorization. BAD NEWS: It’s not very effective.” What works is practicing with words that are new, just not drilling. (Murray, 2017)
- “... one of the most robust findings from 100+ years of cognitive science research is that a significant amount of learning occurs when students pull information “out” by using a strategy called retrieval practice. As charming as multiplication songs are – I have a soft spot for School House Rock and my editor fondly recalls her Billy Leach multiplication records – they are unlikely to be as effective as flashcards because they don’t involve retrieval practice ...” (Barshay, 2023)

**FOR LETTERS:**

- "... substantial research by Sanocki and his colleagues has shown that letter recognition relies on defining a set of features whose membership relies on distinctiveness as well as commonalities. In addition, commonalities may be important for defining a category of letter, while distinctiveness may help to process sub-ordinate categories, such as typeface or font." (James and Engelhardt, 2012)
- "Using what are referred to as 'embedded mnemonics,' that is pictures that remind the children of the letter sound, actually improve learning. Across various studies it has been found that such embedded mnemonic pictures can reduce the amount of repetition needed for kids to learn the letters and sounds, with less confusion, better long-term memory, and greater ability to transfer or apply this knowledge in reading and spelling." (Shanahan, 2021)
- A study of Israeli children learning to read Hebrew concluded that students introduced to letters that were similar in shape (e.g., the Hey, Het and Tav), better remembered the distinctiveness of each letter when there was ample time between the introduction of each. When they were taught simultaneously, learners had a harder time distinguishing between them. The same study demonstrated that letters with similar sounds (e.g., the *Mem* and *Mem Sofit* or the *Samekh* and *Sin*) were better remembered when taught in the same lesson. (Maiben, 2003)
- "... We and others have proposed that it is the creation of letter forms in writing that allows children to gain an understanding of which perceptual properties are crucial for identity and which are not." (James and Engelhardt, 2012)
- "...the experience of producing accurate copies of letters by tracing or typing does not contribute to the child's knowledge of letters like the experience of printing less accurate copies of letters does—that in fact, the highly variable output of early free-form printing may be a crucial component of emerging letter recognition and understanding." (James and Engelhardt, 2012)
- "Letter learning includes recognizing the shapes of letters as well as recalling and writing letter shapes from memory. It includes learning the names of letters as well as the most frequent sounds they symbolize." (Ehri, 1998)
- "We know that writing by hand is excellent brain stimulation for people of all ages. The careful forming of the required letters by hand is a fine sensorimotor skill that activates most of the brain ... When we write by hand, important neural networks are formed that promote learning and remembering. Many people believe that we have a brain to think or feel and are surprised to learn that the brain evolved mainly to control movement. Such widespread brain connectivity is known to be crucial for memory formation and for encoding new information and, therefore, is beneficial for learning." (White, 2024).

**FOR WORDS:**

- "Learning to read words on flashcards was easier for native and nonnative speakers when words were learned in isolation (without sentences) than with sentences, and both groups significantly improved their performance over the three trials." (Miles, 2015)
- Phonics learning is more effective when "teachers explicitly tell students what sounds correspond to what letter patterns, rather than asking students to figure it out on their own and make guesses." (Schwartz and Sparks, 2019)

- If a student gets stuck, one strategy is to cover up the word and analyze the sounds verbally before looking again at the print. Another strategy is to show the word, pronounce a segment and ask the student to identify the letters that represent those sounds. These techniques go beyond just telling the student what the word is or asking them to “sound it out.” However, no technique should be used every time a learner gets stuck. It is okay just to offer the word’s pronunciation. (Kilpatrick, 2015)
- “Slow, laborious, letter-by-letter decoding may leave little capacity for attending to multiletter and word-level graphemic detail. (Bowers, 1989)” (Share, 2004a)
- “Reading researchers have verified that memorization of sight words has not been proved to increase reading fluency (i.e., the speed with which a reader can read and comprehend text).” (*Reading Horizons*, accessed 11/2023)
- “If [the student] cannot pull apart the sounds in words, he cannot align those sounds to the order of the letters.” (Kilpatrick, 2015)
- Helping learners focus on letters, rather than whole words, predicts more skilled reading. “In one series of experiments, ... [t]hose who had focused on letter sounds had more neural activity on the left side of the brain, which includes visual and language regions and is associated with more skilled reading. Those who had been taught to focus on whole words had more activity on the right side of the brain, which has been characteristically associated with adults and children who struggle with reading. Moreover, those who had learned letter sounds were better able to identify unfamiliar words.” (Schwartz and Sparks, 2019)
- “... because Hebrew syllables are highly regular, Hebrew lends itself quite well to a synthetic approach to phonetic decoding ... [in which] students are taught to focus on individual syllables, drilling them as units, rather than first learning to break them down into their smallest grapheme-phoneme correspondences.” (Maiben, 2003)  
Take the word “bat.” In synthetic phonics, students would first learn the /b/ sound, then the /a/ sound, then the /t/ sound and blend them together to sound out “bat.” In analytic phonics, students would learn the word “bat” alongside words like “cat,” “mat,” and “hat,” and would be taught that all these words end in the “at” sound pattern.” (Schwartz and Sparks, 2019)

### IMPACT OF FONT SIZE AND VISUAL LAYOUT OF THE PAGE:

- “... our study [*conducted with English words*] demonstrates that, similar to results from adult studies, large point sizes are more legible for young children. While this pattern was not obtained for children in grades 2 through 4 using the point sizes studied here, younger children did perform significantly better when viewing the larger of the two point sizes. Also of significant interest is that Arial, a sans-serif font, was shown to be more legible than Times New Roman, a serif font, for all grades. The implications of this finding are of particular interest, given the ongoing debate concerning the “better” font style: a serif or sans serif. Our study supports the use of a sans serif font for young children.” (Wood, Davis, Scharff, 2005)

- “Among young [*Israeli Hebrew*] readers in second grade, reading comprehension became more impaired when a text was made less fluent by decreasing font size or increasing line length, whereas in fifth grade, reading comprehension benefited from the increased disfluency brought on by decreased font size. Interestingly, line spacing did not have an effect on both grades, indicating that perhaps it is not a contextual cue that children rely on in retrieving information.” (Katzir, Hershko, Halamish, 2013)
- “Visual aids and formatting involve small changes to a presentation that can have a big impact on the reader.” Ross (the author) offers the following list of techniques to facilitate reading:
  - Font size and style: A larger font is typically easier to read while a clear and simple font style makes sure that text is understandable but still leaves your design visually appealing.
  - Line spacing: Amending the space between lines can reduce visual clutter which can make a piece of text easier and clearer to read. Wider line spacing can reduce the chances of someone skipping or rereading sections.
  - Bulleted or numbered lists: Presenting information in a list format can improve a reader’s understanding of information by breaking up large blocks of text and organising text in a clear, concise manner. Numbered lists in particular can help a reader rank the importance of the information in front of them.
  - Headers and subheaders: Clear and specific headers can break up long sections of text to make it easier for readers to navigate and understand the content. This helps readers quickly locate the relevant key information they need.
  - Colour contrast: using appropriate colours to contrast between the text and background can enhance readability by making the text stand out clearly. High-contrast colours, such as black text on a white background, are usually easier to read than low-contrast alternatives.”

(Ross, 2023 – *The spelling, above, honors (hmm, “honours”) the author’s writing conventions as practiced in the UK. Also this is not specifically “science of reading” research*)

- “Most studies have not demonstrated a significant effect of font size on adults’ memory, but a recent, meta-analysis of these studies revealed a subtle memory advantage for large font words. The current study extended this investigation to elementary school children. First and fifth–sixth graders studied words for a free recall test presented in either large or small font and made judgments of learning (JOLs) for each word. As did adults, children predicted they would remember large font size words better than small font size words and, in fact, actually remembered the large font size words better. No differences were observed between the two age groups in the effect of font size on memory or metamemory. These results suggest that the use of font size as a cue when monitoring one’s own learning is robust across the life span and, further, that this cue has at least some validity.” (Halamish, Nachman and Katzir, 2018)



# SECTION 2

**Bibliography of research findings that support teaching strategies  
for “Conquering the Challenge of Hebrew Decoding”**

**Organized by author**

*Includes hyperlinked URLs to the cited resources.*

*With apologies: No consistent citation system was used in this section of the document.*

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# SECTION 3

**Quotes, paraphrases and citations**

**for “Conquering the Challenge of Hebrew Decoding”**

**Organized by Challenge**

These add depth of understanding  
to the “Because” column  
on the Challenge charts.

## CHALLENGE: Hebrew Letters

- The vast majority of Hebrew words contain consonants and vowels that could be spelled with alternative letters and vowels. (Share and Levin, 1999)
- "... labeling letters by their sounds would, in many situations, create considerable confusion for young learners and almost certainly require constant and cumbersome qualification by speakers referring to the 's' letter verses the 's' sound." (Share, 2004b)
- Hebrew letters are less distinctive than English - they are block-like, have fewer curves, diagonals and fewer of them go above or below the line. "Not only are letters less distinctive, but word length and word shape are also quite uniform." (Share and Levin, 1999)
- "Preschoolers' knowledge of the names of printed letters has long been known to be among the strongest predictors of future success in learning to read." (Share, 2004b)
- "... substantial research by Sanocki and his colleagues has shown that letter recognition relies on defining a set of features whose membership relies on distinctiveness as well as commonalities. In addition, commonalities may be important for defining a category of letter, while distinctiveness may help to process sub-ordinate categories, such as typeface or font." (James and Engelhardt, 2012)
- "Using what are referred to as 'embedded mnemonics,' that is pictures that remind the children of the letter sound, actually improve learning. Across various studies it has been found that such embedded mnemonic pictures can reduce the amount of repetition needed for kids to learn the letters and sounds, with less confusion, better long-term memory, and greater ability to transfer or apply this knowledge in reading ...." (Shanahan, 2021)
- "... We and others have proposed that it is the creation of letter forms in writing that allows children to gain an understanding of which perceptual properties are crucial for identity and which are not." (James and Engelhardt, 2012)
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## CHALLENGE: Vowel Signs

- “Students have more difficulty remembering the vowel signs than the letters. To make this easier, the names of the vowel signs should be taught. Naming them gives these symbols significance. They provide an additional clue to the sound shaped by the sign. The first syllable of the name of the sign tells us the sound that will be indicated by the vowel sign under any letter. Using the names of the vowel signs allows the teacher to talk about the symbols and manipulate them while teaching. This is preferable to talking about the two dots, the three dots, and the like.” (Schachter, 2010)
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- Phonics learning is more effective when “teachers explicitly tell students what sounds correspond to what letter patterns, rather than asking students to figure it out on their own and make guesses.” (Schwartz and Sparks, 2019)
- “... our study [*conducted with English words*] demonstrates that, similar to results from adult studies, large point sizes are more legible for young children. While this pattern was not obtained for children in grades 2 through 4 using the point sizes studied here, younger children did perform significantly better when viewing the larger of the two point sizes. Also of significant interest is that Arial, a sans-serif font, was shown to be more legible than Times New Roman, a serif font, for all grades. The implications of this finding are of particular interest, given the ongoing debate concerning the “better” font style: a serif or sans serif. Our study supports the use of a sans serif font for young children.” (Wood, Davis, Scharff, 2005)
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- "Most studies have not demonstrated a significant effect of font size on adults' memory, but a recent, meta-analysis of these studies revealed a subtle memory advantage for large font words. The current study extended this investigation to elementary school children. First and fifth–sixth graders studied words for a free recall test presented in either large or small font and made judgments of learning (JOLs) for each word. As did adults, children predicted they would remember large font size words better than small font size words and, in fact, actually remembered the large font size words better. No differences were observed between the two age groups in the effect of font size on memory or metamemory. These results suggest that the use of font size as a cue when monitoring one's own learning is robust across the life span and, further, that this cue has at least some validity." (Halamish, Nachman and Katzir, 2018)



## CHALLENGE: Similar Looking Letter Mix-Ups

- “... substantial research by Sanocki and his colleagues has shown that letter recognition relies on defining a set of features whose membership relies on distinctiveness as well as commonalities. In addition, commonalities may be important for defining a category of letter, while distinctiveness may help to process sub-ordinate categories, such as typeface or font.” (James and Engelhardt, 2012)
- “... We and others have proposed that it is the creation of letter forms in writing that allows children to gain an understanding of which perceptual properties are crucial for identity and which are not.” (James and Engelhardt, 2012)
- “... the experience of producing accurate copies of letters by tracing or typing does not contribute to the child's knowledge of letters like the experience of printing less accurate copies of letters does...” (James and Engelhardt, 2012).
- “Letter learning include[s] recognizing the shapes of letters as well as recalling and writing letter shapes from memory. It includes learning the names of letters as well as the most frequent sounds they symbolize.” (Ehri, 1998)
- “We know that writing by hand is excellent brain stimulation for people of all ages. The careful forming of the required letters by hand is a fine sensorimotor skill that activates most of the brain ... When we write by hand, important neural networks are formed that promote learning and remembering. Many people believe that we have a brain to think or feel and are surprised to learn that the brain evolved mainly to control movement. Such widespread brain connectivity is known to be crucial for memory formation and for encoding new information and, therefore, is beneficial for learning.” (White, 2024).
- “Learning to read words on flashcards was easier for native and nonnative speakers when words were learned in isolation (without sentences) than with sentences, and both groups significantly improved their performance over the three trials.” (Miles, 2015)
- “If [the student] cannot pull apart the sounds in words, he cannot align those sounds to the order of the letters.” (Kilpatrick, 2015)
- If a student gets stuck, one strategy is to cover up the word and analyze the sounds verbally before looking again at the print. Another strategy is to show the word, pronounce a segment and ask the student to identify the letters that represent those sounds. These techniques go beyond just telling the student what the word is or asking them to “sound it out.” However, no technique should be used every time a learner gets stuck. It is okay just to offer the word’s pronunciation. (Kilpatrick, 2015)
- Helping learners focus on letters, rather than whole words, predicts more skilled reading. “In one series of experiments, Stanford University neuroscientist Bruce McCandliss and his colleagues made up a new written language and taught three-letter words to students either by asking them to focus on letter sounds or on whole words. Later, the students took a reading test of both the words they were taught and new words in the made-up language, while an electroencephalograph monitored their brain activity. Those

who had focused on letter sounds had more neural activity on the left side of the brain, which includes visual and language regions and is associated with more skilled reading. Those who had been taught to focus on whole words had more activity on the right side of the brain, which has been characteristically associated with adults and children who struggle with reading. Moreover, those who had learned letter sounds were better able to identify unfamiliar words.” (Schwartz and Sparks, 2019)

- “... our study [*conducted with English words*] demonstrates that, similar to results from adult studies, large point sizes are more legible for young children. While this pattern was not obtained for children in grades 2 through 4 using the point sizes studied here, younger children did perform significantly better when viewing the larger of the two point sizes. Also of significant interest is that Arial, a sans-serif font, was shown to be more legible than Times New Roman, a serif font, for all grades. The implications of this finding are of particular interest, given the ongoing debate concerning the “better” font style: a serif or sans serif. Our study supports the use of a sans serif font for young children.” (Wood, Davis, Scharff, 2005)
- “Among young [*Israeli Hebrew*] readers in second grade, reading comprehension became more impaired when a text was made less fluent by decreasing font size or increasing line length, whereas in fifth grade, reading comprehension benefited from the increased disfluency brought on by decreased font size. Interestingly, line spacing did not have an effect on both grades, indicating that perhaps it is not a contextual cue that children rely on in retrieving information.” (Katzir, Hershko and Halamish, 2013)
- “Visual aids and formatting involve small changes to a presentation that can have a big impact on the reader.” Ross (the author) offers the following list of techniques to facilitate reading:
  - Font size and style: A larger font is typically easier to read while a clear and simple font style makes sure that text is understandable but still leaves your design visually appealing.
  - Line spacing: Amending the space between lines can reduce visual clutter which can make a piece of text easier and clearer to read. Wider line spacing can reduce the chances of someone skipping or rereading sections.
  - Bulleted or numbered lists: Presenting information in a list format can improve a reader’s understanding of information by breaking up large blocks of text and organising text in a clear, concise manner. Numbered lists in particular can help a reader rank the importance of the information in front of them.
  - Headers and subheaders: Clear and specific headers can break up long sections of text to make it easier for readers to navigate and understand the content. This helps readers quickly locate the relevant key information they need.
  - Colour contrast: using appropriate colours to contrast between the text and background can enhance readability by making the text stand out clearly. High-contrast colours, such as black text on a white background, are usually easier to read than low-contrast alternatives.”

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- “Most studies have not demonstrated a significant effect of font size on adults’ memory, but a recent, meta-analysis of these studies revealed a subtle memory advantage for large font words. The current study extended this investigation to elementary school children. First and fifth–sixth graders studied words for a free recall test presented in either large or small font and made judgments of learning (JOLs) for each word. As did adults, children predicted they would remember large font size words better than small font size words and, in fact, actually remembered the large font size words better. No differences were observed between the two age groups in the effect of font size on memory or metamemory. These results suggest that the use of font size as a cue when monitoring one’s own learning is robust across the life span and, further, that this cue has at least some validity.” (Halamish, Nachman and Katzir, 2018)

## CHALLENGE: Siddur Decoding

- “Learning to read words on flashcards was easier for native and nonnative speakers when words were learned in isolation (without sentences) than with sentences, and both groups significantly improved their performance over the three trials.” (Miles, 2015)
- “... our study [*conducted with English words*] demonstrates that, similar to results from adult studies, large point sizes are more legible for young children. While this pattern was not obtained for children in grades 2 through 4 using the point sizes studied here, younger children did perform significantly better when viewing the larger of the two point sizes. Also of significant interest is that Arial, a sans-serif font, was shown to be more legible than Times New Roman, a serif font, for all grades. The implications of this finding are of particular interest, given the ongoing debate concerning the “better” font style: a serif or sans serif. Our study supports the use of a sans serif font for young children.” (Wood, Davis, Scharff, 2005)
- Phonics learning is more effective when “teachers explicitly tell students what sounds correspond to what letter patterns, rather than asking students to figure it out on their own and make guesses.” (Schwartz and Sparks, 2019).
- If a student gets stuck, one strategy is to cover up the word and analyze the sounds verbally before looking again at the print. Another strategy is to show the word, pronounce a segment and ask the student to identify the letters that represent those sounds. These techniques go beyond just telling the student what the word is or asking them to “sound it out.” However, no technique should be used every time a learner gets stuck. It is okay just to offer the word’s pronunciation. (Kilpatrick, 2015)
- “Among young [*Israeli Hebrew*] readers in second grade, reading comprehension became more impaired when a text was made less fluent by decreasing font size or increasing line length, whereas in fifth grade, reading comprehension benefited from the increased disfluency brought on by decreased font size. Interestingly, line spacing did not have an effect on both grades, indicating that perhaps it is not a contextual cue that children rely on in retrieving information.” (Katzir, Hershko and Halamish, 2013)
- “Visual aids and formatting involve small changes to a presentation that can have a big impact on the reader.” Ross (the author) offers the following list of techniques to facilitate reading:
  - Font size and style: A larger font is typically easier to read while a clear and simple font style makes sure that text is understandable but still leaves your design visually appealing.
  - Line spacing: Amending the space between lines can reduce visual clutter which can make a piece of text easier and clearer to read. Wider line spacing can reduce the chances of someone skipping or rereading sections.
  - Bulleted or numbered lists: Presenting information in a list format can improve a reader’s understanding of information by breaking up large blocks of text and organising text in a clear, concise manner. Numbered lists in particular can help a reader rank the importance of the information in front of them.

- Headers and subheaders: Clear and specific headers can break up long sections of text to make it easier for readers to navigate and understand the content. This helps readers quickly locate the relevant key information they need.
- Colour contrast: using appropriate colours to contrast between the text and background can enhance readability by making the text stand out clearly. High-contrast colours, such as black text on a white background, are usually easier to read than low-contrast alternatives.”

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- “Most studies have not demonstrated a significant effect of font size on adults’ memory, but a recent, meta-analysis of these studies revealed a subtle memory advantage for large font words. The current study extended this investigation to elementary school children. First and fifth–sixth graders studied words for a free recall test presented in either large or small font and made judgments of learning (JOLs) for each word. As did adults, children predicted they would remember large font size words better than small font size words and, in fact, actually remembered the large font size words better. No differences were observed between the two age groups in the effect of font size on memory or metamemory. These results suggest that the use of font size as a cue when monitoring one’s own learning is robust across the life span and, further, that this cue has at least some validity.” (Halamish, Nachman and Katzir, 2018)

## CHALLENGE: Torah Decoding/Chanting

- Phonics learning is more effective when “teachers explicitly tell students what sounds correspond to what letter patterns, rather than asking students to figure it out on their own and make guesses.” (Schwartz and Sparks, 2019).
- For readers to achieve Orthographic Mapping they need:
  - Letter-sound proficiency
  - Phoneme awareness
  - Vocabulary/meaning ... and knowledge of how to pronounce the words(Murray, 2017)
- "Reading and phonemic awareness are mutually reinforcing: Phonemic awareness is necessary for reading, and reading, in turn, improves phonemic awareness still further." (Shaywitz, 2003)
- *About English language learners with disabilities:* They need to “have English words stored in phonological long-term memory, even if they do not yet know the meaning of those English words.” (Kilpatrick, 2015)
- Phonics learning is more effective when “teachers explicitly tell students what sounds correspond to what letter patterns, rather than asking students to figure it out on their own and make guesses.” (Schwartz and Sparks, 2019).
- If a student gets stuck, one strategy is to cover up the word and analyze the sounds verbally before looking again at the print. Another strategy is to show the word, pronounce a segment and ask the student to identify the letters that represent those sounds. These techniques go beyond just telling the student what the word is or asking them to “sound it out.” However, no technique should be used every time a learner gets stuck. It is okay just to offer the word’s pronunciation. (Kilpatrick, 2015)
- “Learning to read words on flashcards was easier for native and nonnative speakers when words were learned in isolation (without sentences) than with sentences, and both groups significantly improved their performance over the three trials.” (Miles, 2015)
- “If [the student] cannot pull apart the sounds in words, he cannot align those sounds to the order of the letters.” (Kilpatrick, 2015)
- Helping learners focus on letters, rather than whole words, predicts more skilled reading. “In one series of experiments, Stanford University neuroscientist Bruce McCandliss and his colleagues made up a new written language and taught three-letter words to students either by asking them to focus on letter sounds or on whole words. Later, the students took a reading test of both the words they were taught and new words in the made-up language, while an electroencephalograph monitored their brain activity. Those who had focused on letter sounds had more neural activity on the left side of the brain, which includes visual and language regions and is associated with more skilled reading. Those who had been taught to focus on whole words had more activity on the right side

of the brain, which has been characteristically associated with adults and children who struggle with reading. Moreover, those who had learned letter sounds were better able to identify unfamiliar words.” (Schwartz and Sparks, 2019)

- “... our study [*conducted with English words*] demonstrates that, similar to results from adult studies, large point sizes are more legible for young children. While this pattern was not obtained for children in grades 2 through 4 using the point sizes studied here, younger children did perform significantly better when viewing the larger of the two point sizes. Also of significant interest is that Arial, a sans-serif font, was shown to be more legible than Times New Roman, a serif font, for all grades. The implications of this finding are of particular interest, given the ongoing debate concerning the “better” font style: a serif or sans serif. Our study supports the use of a sans serif font for young children.” (Wood, Davis, Scharff, 2005)
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  - Headers and subheaders: Clear and specific headers can break up long sections of text to make it easier for readers to navigate and understand the content. This helps readers quickly locate the relevant key information they need.
  - Colour contrast: using appropriate colours to contrast between the text and background can enhance readability by making the text stand out clearly. High-contrast colours, such as black text on a white background, are usually easier to read than low-contrast alternatives.”

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- “Most studies have not demonstrated a significant effect of font size on adults’ memory, but a recent, meta-analysis of these studies revealed a subtle memory advantage for

large font words. The current study extended this investigation to elementary school children. First and fifth–sixth graders studied words for a free recall test presented in either large or small font and made judgments of learning (JOLs) for each word. As did adults, children predicted they would remember large font size words better than small font size words and, in fact, actually remembered the large font size words better. No differences were observed between the two age groups in the effect of font size on memory or metamemory. These results suggest that the use of font size as a cue when monitoring one’s own learning is robust across the life span and, further, that this cue has at least some validity.” (Halamish, Nachman and Katzir, 2018)



## CHALLENGE: Recitation vs. Decoding

- For readers to achieve Orthographic Mapping they need:
  - Letter-sound proficiency
  - Phoneme awareness
  - Vocabulary/meaning ... and knowledge of how to pronounce the words(Murray, 2017)
- "Reading and phonemic awareness are mutually reinforcing: Phonemic awareness is necessary for reading, and reading, in turn, improves phonemic awareness still further." (Shaywitz, 2003)
- *About English language learners with disabilities*: "They need to "have English words stored in phonological long-term memory, even if they do not yet know the meaning of those English words." (Kilpatrick, 2015)
- "Learning to read words on flashcards was easier for native and nonnative speakers when words were learned in isolation (without sentences) than with sentences, and both groups significantly improved their performance over the three trials." (Miles, 2015)
- Phonics learning is more effective when "teachers explicitly tell students what sounds correspond to what letter patterns, rather than asking students to figure it out on their own and make guesses." (Schwartz and Sparks, 2019)
- If a student gets stuck, one strategy is to cover up the word and analyze the sounds verbally before looking again at the print. Another strategy is to show the word, pronounce a segment and ask the student to identify the letters that represent those sounds. These techniques go beyond just telling the student what the word is or asking them to "sound it out." However, no technique should be used every time a learner gets stuck. It is okay just to offer the word's pronunciation. (Kilpatrick, 2015)

## CHALLENGE: Slow and Laborious Decoding

*See also the research quotes in the section, above, "Recitation vs. Decoding."*

- "The combination of deficient decoding skills, lack of practice and difficult materials results in unrewarding early reading experiences ..." (Schwartz and Sparks, 2019)
- "Slow, laborious, letter-by-letter decoding may leave little capacity for attending to multiletter and word-level graphemic detail. (Bowers, 1989)" (Share, 2004a)
- If a student gets stuck, one strategy is to cover up the word and analyze the sounds verbally before looking again at the print. Another strategy is to show the word, pronounce a segment and ask the student to identify the letters that represent those sounds. These techniques go beyond just telling the student what the word is or asking them to "sound it out." However, no technique should be used every time a learner gets stuck. It is okay just to offer the word's pronunciation. (Kilpatrick, 2015)
- "If [the student] cannot pull apart the sounds in words, he cannot align those sounds to the order of the letters." (Kilpatrick, 2015)
- Helping learners focus on letters, rather than whole words, predicts more skilled reading. "In one series of experiments, Stanford University neuroscientist Bruce McCandliss and his colleagues made up a new written language and taught three-letter words to students either by asking them to focus on letter sounds or on whole words. Later, the students took a reading test of both the words they were taught and new words in the made-up language, while an electroencephalograph monitored their brain activity. Those who had focused on letter sounds had more neural activity on the left side of the brain, which includes visual and language regions and is associated with more skilled reading. Those who had been taught to focus on whole words had more activity on the right side of the brain, which has been characteristically associated with adults and children who struggle with reading. Moreover, those who had learned letter sounds were better able to identify unfamiliar words." (Schwartz and Sparks, 2019)
- For readers to achieve Orthographic Mapping they need:
  - Letter-sound proficiency
  - Phoneme awareness
  - Vocabulary/meaning ... and knowledge of how to pronounce the words(Murray, 2017)
- Per the science of reading, sight words are words that "pop" - one can't help but read them. (Murray, 2017)

## CHALLENGE: “Fossilized Errors”

- Phonics learning is more effective when “teachers explicitly tell students what sounds correspond to what letter patterns, rather than asking students to figure it out on their own and make guesses.” (Schwartz and Sparks, 2019)
- “Learning to read words on flashcards was easier for native and nonnative speakers when words were learned in isolation (without sentences) than with sentences, and both groups significantly improved their performance over the three trials.” (Miles, 2015)
- “If [the student] cannot pull apart the sounds in words, he cannot align those sounds to the order of the letters.” (Kilpatrick, 2015)
- If a student gets stuck, one strategy is to cover up the word and analyze the sounds verbally before looking again at the print. Another strategy is to show the word, pronounce a segment and ask the student to identify the letters that represent those sounds. These techniques go beyond just telling the student what the word is or asking them to “sound it out.” However, no technique should be used every time a learner gets stuck. It is okay just to offer the word’s pronunciation. (Kilpatrick, 2015)
- “Reading and phonemic awareness are mutually reinforcing: Phonemic awareness is necessary for reading, and reading, in turn, improves phonemic awareness still further.” (Shaywitz, 2003)
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- Hebrew lends itself quite well to teaching the learners to focus on segments, rather than focusing only on letters and vowel signs. (Maiben, 2003)
- “... our study [*conducted with English words*] demonstrates that, similar to results from adult studies, large point sizes are more legible for young children. While this pattern was not obtained for children in grades 2 through 4 using the point sizes studied here, younger children did perform significantly better when viewing the larger of the two point sizes. Also of significant interest is that Arial, a sans-serif font, was shown to be more legible than Times New Roman, a serif font, for all grades. The implications of this finding are of particular interest, given the ongoing debate concerning the “better” font

style: a serif or sans serif. Our study supports the use of a sans serif font for young children.” (Wood, Davis, Scharff, 2005)

- “Among young [*Israeli Hebrew*] readers in second grade, reading comprehension became more impaired when a text was made less fluent by decreasing font size or increasing line length, whereas in fifth grade, reading comprehension benefited from the increased disfluency brought on by decreased font size. Interestingly, line spacing did not have an effect on both grades, indicating that perhaps it is not a contextual cue that children rely on in retrieving information.” (Katzir, Hershko and Halamish, 2013)
- “Visual aids and formatting involve small changes to a presentation that can have a big impact on the reader.” Ross (the author) offers the following list of techniques to facilitate reading:
  - Font size and style: A larger font is typically easier to read while a clear and simple font style makes sure that text is understandable but still leaves your design visually appealing.
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  - Headers and subheaders: Clear and specific headers can break up long sections of text to make it easier for readers to navigate and understand the content. This helps readers quickly locate the relevant key information they need.
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## CHALLENGE: Middle-of-Word Mistakes

- "... one of the most robust findings from 100+ years of cognitive science research is that a significant amount of learning occurs when students pull information "out" by using a strategy called retrieval practice. As charming as multiplication songs are – I have a soft spot for School House Rock and my editor fondly recalls her Billy Leach multiplication records – they are unlikely to be as effective as flashcards because they don't involve retrieval practice ..." (Barshay, 2023)
- For readers to achieve Orthographic Mapping they need:
  - Letter-sound proficiency
  - Phoneme awareness
  - Vocabulary/meaning ... and knowledge of how to pronounce the words(Murray, 2017)
- "Reading and phonemic awareness are mutually reinforcing: Phonemic awareness is necessary for reading, and reading, in turn, improves phonemic awareness still further." (Shaywitz, 2003)
- *About English language learners with disabilities:* They need to "have English words stored in phonological long-term memory, even if they do not yet know the meaning of those English words." (Kilpatrick, 2015)
- *For language speakers:* "learning to read words in isolation (like on word cards) allows attention to be paid to the orthographic identity of a word." (Miles, 2015)
- Phonics learning is more effective when "teachers explicitly tell students what sounds correspond to what letter patterns, rather than asking students to figure it out on their own and make guesses." (Schwartz and Sparks, 2019)
- If a student gets stuck, one strategy is to cover up the word and analyze the sounds verbally before looking again at the print. Another strategy is to show the word, pronounce a segment and ask the student to identify the letters that represent those sounds. These techniques go beyond just telling the student what the word is or asking them to "sound it out." However, no technique should be used every time a learner gets stuck. It is okay just to offer the word's pronunciation. (Kilpatrick, 2015)
- "Learning to read words on flashcards was easier for native and nonnative speakers when words were learned in isolation (without sentences) than with sentences, and both groups significantly improved their performance over the three trials." (Miles, 2015)
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students took a reading test of both the words they were taught and new words in the made-up language, while an electroencephalograph monitored their brain activity. Those who had focused on letter sounds had more neural activity on the left side of the brain, which includes visual and language regions and is associated with more skilled reading. Those who had been taught to focus on whole words had more activity on the right side of the brain, which has been characteristically associated with adults and children who struggle with reading. Moreover, those who had learned letter sounds were better able to identify unfamiliar words.” (Schwartz and Sparks, 2019)

- Reading researchers have verified that memorization of sight words has not been proved (sic) to increase reading fluency (i.e., the speed with which a reader can read and comprehend text). (*Reading Horizons*; accessed 11/29/2023)

**CHALLENGE: Getting Lost in the *Siddur***

- “Learning to read words on flashcards was easier for native and nonnative speakers when words were learned in isolation (without sentences) than with sentences, and both groups significantly improved their performance over the three trials.” (Miles, 2015)
- “... our study [*conducted with English words*] demonstrates that, similar to results from adult studies, large point sizes are more legible for young children. While this pattern was not obtained for children in grades 2 through 4 using the point sizes studied here, younger children did perform significantly better when viewing the larger of the two point sizes. Also of significant interest is that Arial, a sans-serif font, was shown to be more legible than Times New Roman, a serif font, for all grades. The implications of this finding are of particular interest, given the ongoing debate concerning the “better” font style: a serif or sans serif. Our study supports the use of a sans serif font for young children.” (Wood, Davis, Scharff, 2005)
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