

Fun with Sounds: Strategies for Developing Pre-Schooler Literacy Based on the Science of the Reading Brain

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How a child first learns to read is a tale of either magic and fairies or missed chances and unnecessary loss.

Maryanne Wolf (2007)

All parents and teachers want children to become good readers, but *how* and *when* should the concepts of reading, writing and spelling be introduced to very young children? The way we “teach” our Little Ones often reflects the way we were taught ourselves and we often default to familiar strategies based on what we believe to be true about reading. Using teaching strategies based only on familiarity and ideology, however, can impede children’s literacy acquisition. Strategies must also be chosen based on how the brain learns to read.

Thankfully, neuroimaging technologies such as the fMRI no longer leave room for pure conjecture about how the brain learns to read. We know what grey-matter areas of the brain are involved and we know that white-matter (connective) pathways need to be developed in order to connect them to form a reading circuitry (Ozernov-Palchik & Gaab 2016). See Figures 1 and 2. We also have a better understanding of how genetic anomalies in brain regions associated with reading, or with the pathways connecting them, makes learning to read more laborious. The fact that humans learn to read at all is a testimony of the neuroplasticity of the brain which “permits it to go beyond the original design of its structures” (Wolf, 2007).

We no longer operate under the illusion that becoming literate is similar to learning to walk or learning to speak. We are not born with specific *reading* and *writing* genes. Reading does *not* develop naturally just by watching others read, looking at books and being read to. In order to read, older brain structures involved with *spoken language* and *vision* need to become robustly connected (Dehaene, 2009) and those connections do not form without human intervention. We can make the process easier through systematic, synthetic and cumulative instruction and by ensuring we are not by-passing crucial steps that inevitably short circuit the reading brain.

Notes:

The next part of this article is designed to walk you through what is happening naturally in the language areas of the brain as they interact with human speech, and what needs to happen, in terms of human intervention (teaching) to transform the language brain into a literate brain. At the end of each section, there will be practical teaching strategies for facilitating each stage of the brain's journey towards literacy.

Figure 1: Language areas that develop naturally in response to speech and word play.

1. Superior Temporal Area
(Hearing)
2. Temporo Parietal Area
(Receptive Language)
3. Inferior Frontal Area (meaning)
(Phonological and Phonemic Awareness)
4. Broca's Motor Speech Area
(Expressive Speech)

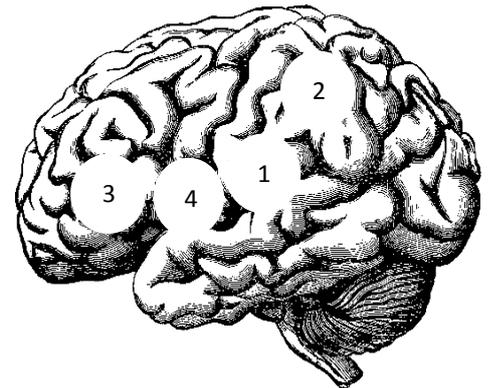
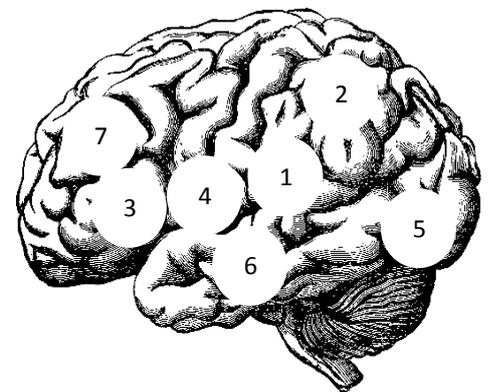


Figure 2: Further brain regions needing to be connected through instruction in order to read, write and spell.

5. Occipito Temporal Area
(Visual System)
6. Middle Temporal Lobe and Inferior Frontal Gyrus
(Meaning and Memory Centres)
7. Pre-Frontal Lobe (Executive Functions- Working Memory, Impulse Control, Cognitive Flexibility, Background knowledge)



Natural Development of Language in Utero

The emergence of language structures starts as early as sixteen weeks of pregnancy when the auditory system in the *Left the Superior Temporal area* of the brain is stimulated by the hearing of muffled noises and speech sounds (Fetal Hearing, 2013). By Week 24 of pregnancy, babies in utero have been known to turn their heads and experience a change in heart rate in response to familiar voices, songs and nursery rhymes (Austin and Bradshaw, 2016). They can also distinguish between speech sounds and non-speech. In short, the human brain is hardwired for language and is sensitive to the nuances of the sounds of

speech. Natural interaction with speech sounds develops the brain's phonological processor located in the *Temporo Parietal* area.

Practical Teaching Strategies

Expectant parents don't need to do anything extraordinary other than to go about their daily lives engaging in natural conversation. Knowing that babies in utero hear and respond to speech, why would we not take the time throughout the pregnancy to read stories and sing nursery rhymes to them?

Natural Development of Language in Infancy

At around six months of age, babies can tell the difference between their native speech and a foreign language (Kuhl et al., 2006). At around eighteen months, through repeated hearings of the sequences of sounds that make up a word, infants learn to associate a spoken word with something in their immediate world. These might be associations with other humans e.g. /m//u//m/, a food item or a favourite toy. This happens as a result of the brain's increasing ability to connect phonological processing systems in the *Left Temporo Parietal Area* with cognitive systems, located in the *Inferior Frontal area* (Pease et al., 1993). Infants begin to realise that people and things can be named. Professor of Child Development, Maryanne Wolf (2007) says this is a time for "Serious Wordplay". Humans naturally seem to have an innate ability to encourage *wordplay* in young children. We enthusiastically point to an object and name it over and over again until a child makes a meaningful connection with the name of it.

Read-Alouds play a crucial role *in Serious Wordplay*. Books introduce children to broader universal concepts through pictures and story and expose them to a wider vocabulary and syntax than what might otherwise be encountered in everyday interactions. They also teach children about concepts of print. The very act of regularly sitting curled up in the safe arms of a loved one with a book or Device provides a Limbic "Container" so that positive associations can be made with the process of reading and learning in general (Raimundo, 2002).

Practical Teaching Strategies

Be confident that Infants are hardwired to absorb language and have an innate desire to communicate with you and others. Speak frequently to your baby. Describe what you're doing, point things out and ask questions. As tempting as it is, avoid using baby talk; just speak naturally (BabyCenter, L.L.C. 1997-2016). Children mimic what they hear, so if you ask, "*buh buh?*" instead of "*Would you like a bottle?*" or say "*Tah*" instead of "*Thank you*", expect them to use the dummed-down versions. Your child learns to speak well by hearing you speak well

Continue Reading with your children. Include nursery rhymes, informational texts as well as stories in your Read-Alouds. Point to the words and track the lines of print as you read so

that children understand that you are engaging in a decoding system that requires us to start from the top of the page and to read sentences from left to right. It also demonstrates that the story, rhyme or information is coming from the words, not the illustrations.

When you are writing a shopping list, an email, or an SMS, think out loud. Separate the sounds of the word as you as you form/type the letter(s). This helps children understand that writing is just “talking with a pencil, pen or keyboard”.

Attend to any hearing and speech difficulties immediately. If, by the age of three, a child is not using two- or three-word phrases, doesn't follow simple instructions, speaks incoherently, or is difficult to understand, seek out a speech therapist. Delayed intervention can result in a delay in the brain's development of phonological and phonemic awareness which is the foundation for reading, writing and spelling acquisition.

Developing Phonemic Awareness

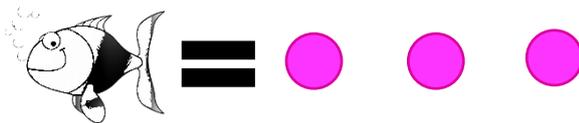
To better understand why Phonemic Awareness is so important, we need to first understand its relationship to the English writing system. Writing arose out of the desire for humans to find a way to communicate with others without being physically present. It was a way to have tangible records of contracts, transactions and historical events. Early writing systems used pictographs, ideograms and logograms (like Chinese characters and hieroglyphs). Later, the Phoenicians and Greeks created systems by which the individual sounds (phonemes) in a spoken word could be represented (encoded) by agreed-upon symbols (letters). The Alphabetic System is extremely efficient because people do not have to memorise the look of thousands of pictures in order to read and write; they just need to learn how to *hear* the individual *sounds* in spoken words and then attach the corresponding letter or letter pairs/groups to each of the sounds.

It takes time for infants to learn how to distinguish, separate and manipulate the individual sounds in a spoken word, but this is a skill that must be taught. It is called *Phonemic Awareness*. Phonemic Awareness must be mastered before phonics is ever introduced. In the past, we have ignored this reality to the detriment of our Little Ones. Without phonemic awareness, reading, writing and spelling become an exhausting visual memory exercise; especially for our dyslexic children.

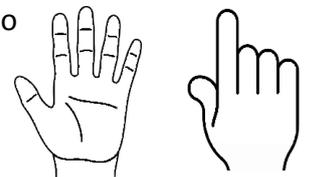
Before playing with the sounds in a word, that word should be familiar to the child. It is also important that the words don't have more than two or three sounds in them to start with. The following poster (See Figure 3) was created for very young children as part of a *Fun with Sounds* programme for Pre-Schoolers (Ruthven, 2006). It was designed to build naming skills and then to provide a bank of words with which to practise phonemic awareness. There is a picture for each consonant, short vowel and basic digraph in the alphabet. Free PDF copies of the poster are available by contacting the author: [E: rosemaryruthven@bigpond.com](mailto:E:rosemaryruthven@bigpond.com).

**Practical Teaching Strategies
to use with the *Playing with Sound in Words* Poster**

1. Rapid Naming - Be sure the child can identify the items on the poster.
2. Rhyming Games – “Find a word on the poster that rhymes with *man*.”
3. Chant Initial sounds of the words on the poster. “ant, ant” /ă/.
4. Play *I spy* with initial sounds of the items - “I spy with my little eye something beginning with /n/”.
5. Phoneme Blending - “I’m going to break a word into little sounds, see if you can guess what it is.../t/, /a/, /p/.
6. Phoneme Segmentation - Use counters, magnets or something else tactile to represent the sounds (not letters) in words. For example, the word “fish” /f/- /i/-/sh/ would be represented with three counters. Move the counter into place *as you say each sound*.



7. Teach your child to Finger Spell a word (J. Clements, IMSLE Associate Orton Gillingham MSL Training Course June 24-28, 2013). Right-Handers use their left hand to count sounds. Left-Handers use their right hand, palm down, to tap the sounds. This ensures all students are hearing and seeing the left to right sequence of sounds as they break a word into its separate sounds.



8. Phoneme Identification- Invite the children to count the phonemes in a word and to identify the first, last and middle sounds – (Pointing to an Item)

“What’s this?”

“That’s right, it’s a *hat*. Let’s finger spell it- *hat* /h//a//t/.”

“How many sounds are in *hat*?”

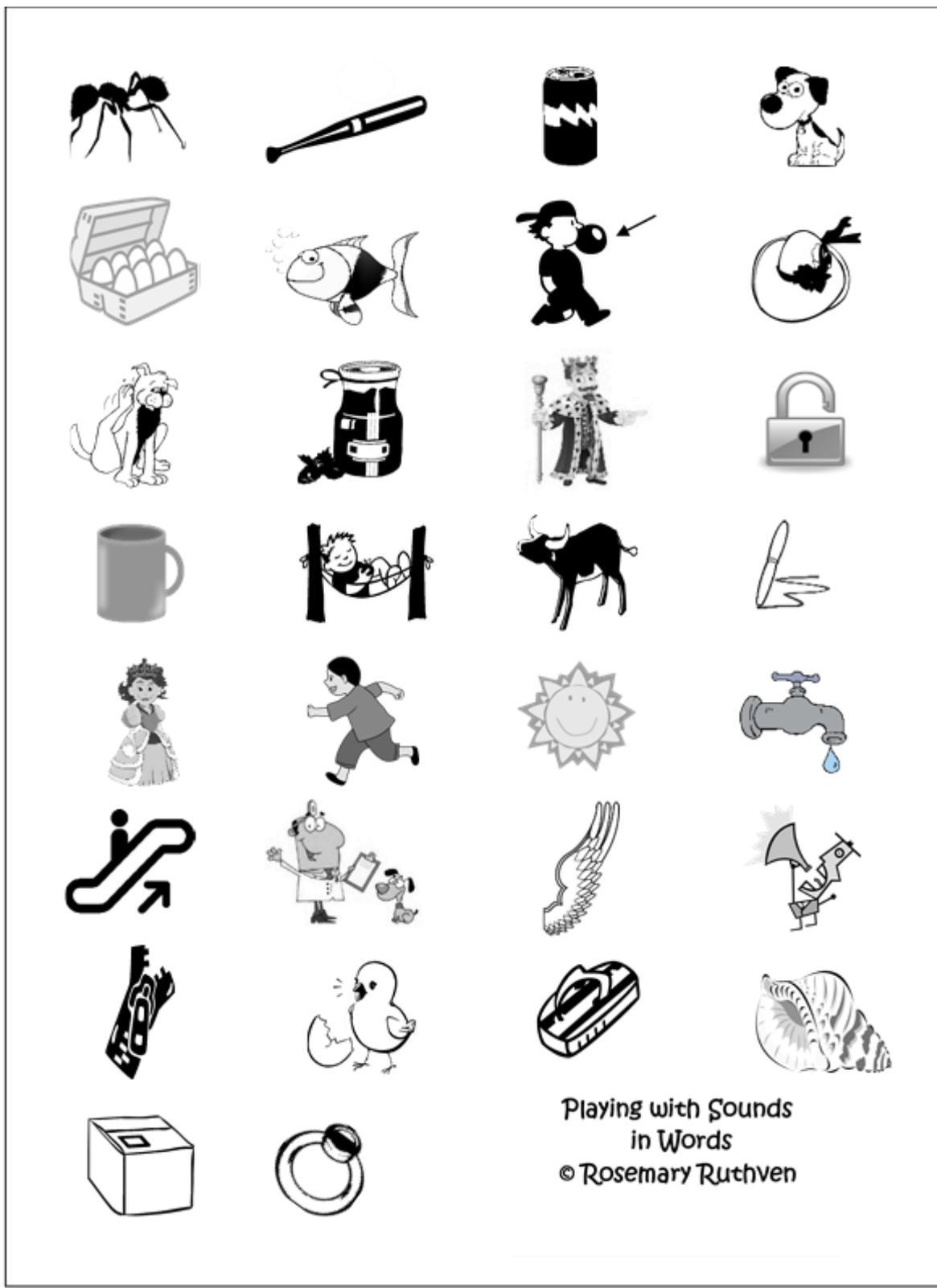
“What’s the first little sound in *hat*?”

“What’s the last little sound in *hat*?”

“What’s the middle sound in *hat*?”

9. Phoneme Substitution – Those children ready for more challenging tasks, invite them to substitute the first sound with another sound. For example, “Say *sun*. What’s the first little sound you hear in *sun*? That’s right, it’s /s/. Say it again but this time take out the /s/ and put in /r/.”

Figure 3



ant, bat, can, dog, eggs, fish, gum, hat, itch, jam, king, lock, mug, nap, ox, pen, queen, run, sun, tap, up, vet, wing, yell, zip, chick, thong, shell, box, ring.

Introducing Phonics to Young Children

Phoneme (sound) + Grapheme (letter) = Phonics

As the previous section has demonstrated, it is vital for a child to understand through practise, that a phoneme is the smallest unit of sound in a spoken word. The next step is to introduce the concept that each phoneme can be represented by a grapheme letter(s). The action of linking a sound with a letter is what we call “Phonics”. Some have elected of late to use the word “Phonetics”. Whatever you choose to call it, phonics should only be introduced once the child can successfully demonstrate proficiency in *all* of the nine strategies mentioned in the previous section on phonemic awareness. To have *one* of the nine (for example the ability to rhyme) in no way indicates a child’s readiness for *phonics*, *onset and rime* or any kind of *whole-word* reading instruction.

To remember the visual representation that corresponds with a sound, the brain needs to connect its phonological systems with the *Occipito Temporal area*. It then needs to link that perceptual information to the meaning areas of the brain; the *Middle Temporal Lobe and the Inferior Frontal Gyrus*. Don’t be under the illusion that we can fast-track the development of this brain circuitry by sticking up store-bought “Alphabet charts”, teaching infants the ABC song, sending home “sight words” or labelling items of furniture. These well-intentioned actions only serve to give children the impression that reading is about remembering the look of entire words and the memorisation of letter names. Nothing could be further from the truth. English is an *Alphabetic* reading-writing system and the letters that correspond with the sounds in our vernacular must be introduced one by one. Which one should we introduce first? Ideally, it should be the initial sound of an item the child gravitates towards. It might be an item on the poster or something in real life. If, for example, the Infant regularly points to the picture of ant on the poster, articulating its name, it stands to reason that this item would be the ideal word with which to develop phonemic awareness and later to introduce the letter that represents the initial sound in the word.

Whatever sound the child elects to focus on first, ensure that you, as parent or teacher, *simultaneously* demonstrate how the letter is formed. This simultaneous Visual + Auditory + Kinaesthetic (VAK) approach to the teaching of phonics anchors sound-symbol concepts into long-term memory.

Practical Teaching Strategies

When children can hear the separate sounds in words, help them understand that each little sound in their mouth can be represented by a letter . Always teach how to form the letter as you introduce what it looks like *simultaneously*. The following script may be helpful.

Script

1. *Pointing to a picture* - What's this?



2. Let's Finger Spell "ant" - / ă /- /n/ - /t/

3. What's the first sound you hear in ant?

Direct the child's attention to the part of the mouth/throat forming the sound.

4. When you hear the sound / ă /, it looks like this. *Demonstrate correct letter formation as you say the sound:*



5. Trace over the letter and say / ă /. *Immediately help the child adjust incorrect pencil grip.*

6. Do one by yourself. *Assist the child make the correct letter formation and repeat the sound. / ă /."*

7. Close your eyes and write / ă /.

Allow Little Ones to absorb the short vowel- and consonant sounds first. Introduce letter names later. The names of the letters do not assist decoding; in fact, they impede initial decoding. When letter names are retrieved before the sounds they make, children end up reading "cat" as *see-ay-tee* and "wing" as *double-u-igh- en-gee*.

Always introduce lowercase letters before upper case letters. Lower case letters are the tools we use to represent most sounds in written words. The capitals have a function that can be explained later in the context of the representation of their own name.

Eventually, help your child create a personalised alphabet chart by letting him/her choose something meaningful to draw (or for you to draw) next to each letter. Don't be afraid to include digraphs like sh, ch, th and ng on your chart. There's no magic order in which to draw the pictures. Start with using words in the child's existing vocabulary. Play with the sounds of the words represented on the chart.

Information is Power

It's an exciting time in the world of early reading instruction. It behoves each one of us as Parents, Caregivers and Teachers to be aware of the science of the reading brain so that we can enhance what is happening naturally in a child's language development and, after that, explicitly and sequentially teach the Phonological, Phonemic and Phonetic skills necessary to become proficient in reading, writing and spelling. Together we can make a child's journey from language to literacy logical and enjoyable.

References

Austin, N. (Director) & Bradshaw, G. (Producer). (2016). *The Extraordinary Making of You: The Final Push*. UK: BBC

Dehaene, S.C. (2009) *Reading in The Brain: The New Science of How We Read*. New York, NY: Penquin.

Kuhl, P.K., Stevens, E., Hayashi, A., Deguchi, T., Kiritani, S., & Iverson, P. (2006). *Infants show a facilitation effect for native language phonetic perception between 6 and 12 months*. *Developmental Science*, 9(2), F13-F21.

Fetal Hearing: When (and What!) Your Baby Can Hear (December 30, 2013). Retrieved from What to Expect: <http://www.whattoexpect.com/pregnancy/fetal-hearing/>

Ozernov-Palchic, O. & Gaab, N. (2016) *Tackling the Early Identification of Dyslexia with the Help of Neuroimaging*. *Perspectives on Language and Literacy Winter Ed.* 42(1), 13-14.

Pease, D.M., Gleason, J.B. & Pan, B.A. (1993) *The Development of Language, 3rd ed.* New York, NY: Macmillan.

Raimundo, C.A. (2002) *Relationship Capital*. Sydney, Australia: Penguin

Ruthven, R. (2008) *Fun with Sounds! Essential Components of Pre-School Literacy Instruction*. Retrieved from http://media.wix.com/ugd/eccd77_9681d7d062d34753a1eefc63217e4cc1.pdf

Morin, A. (2015, June 19) *At a Glance 8 Key Executive Functions*. Retrieved from Understood. <https://www.understood.org/en/learning-attention-issues/child-learning-disabilities/executive-functioning-issues/key-executive-functioning-skills-explained>

When Do Babies Start Talking? (2016, June 17). Retrieved from Baby Centre.Co, L.L.C http://www.babycenter.com/0_baby-milestone-talking_6573.bc#articlesection2

Wolf, M. (2007) *Proust and the Squid: The Story and Science of the Reading Brain*. New York, NY: HarperCollins

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