



By Jason McGowan - Doctor of Education – Literacy and Learning Disability

### **Orthographic Processing (OP)**

OP is a complex skill which includes all aspects of visual perception. A letter must be coordinated with a particular sound (e.g. “dge” as ‘j’ in the word *bridge*) and a sequence of letters must be coordinated with the name of the word (eg. the name code *bridge*) and further coordinated with the meaning of the word from the mental dictionary (eg. *bridge* and not *fridge*). Thus, OP not only has aspects of sound symbol relationships but it includes syntactic and semantic applications. It also includes the eidetic imagery ability. This refers to the ability of vividly remembering a whole word, particularly phonetically implausible and orthographically unique words like “*said*” or “*laugh*”. OP does not embrace the ocular system. Vision system problems are distinct and unrelated to all forms of neurodevelopmental based learning problems.

OP problems make detecting spelling errors and making correcting spelling choices very difficult; e.g. using ‘oa’ instead of ‘oe’ such as spelling ‘goat’ as ‘goet’. OP may also explain errors such as omissions and visually alike substitutions like ‘of’, ‘for’, ‘from’ and ‘off’ as well as /b/, /d/, and /p/. Students with OP may spell ship as ‘shiq’ and chop as ‘choq’ and be unable to detect the error.

Unusual substitutions like ‘eight’ for ‘nine’ or ‘sister’ for ‘mother’ where the semantics of a word is in conflict with the pattern code (despite the obvious connection between the words) is also symptomatic of OP problems. It can explain other errors that may appear at first to be ocular based like tracking, accommodation or convergence. It can also explain perceptual weaknesses such as the symbol reversal or foreshortening. For example a student may be able to say the word ‘animal’ but consistently spell it as ‘anmal’ or be able to say and decode ‘remember’ but consistently spell it as ‘rember’

OP difficulties can also result in a child choosing correct letters but being unsure about the order of letters even after several attempts at writing the word down. For example he/she may spell the word ‘hatch’ as; *hacth* or *hacht*. In one case (William-2008), ‘who’ was spelled as ‘hoo’, ‘hwo’, ‘who’ and then finally ‘how’.

A very pronounced evidence of OP difficulty is the inability to choose between common vowel cluster spelling choices and vowel-consonant /e/ spelling choices. For example a child can spell the word *rate* as *rait* or *rayt*. Therefore they achieve a correct phonological outcome but an incorrect orthographic outcome. In William’s case he spelled ‘food’ as ‘fode’ and ‘pile’ as ‘pial’ and then ‘pille’.

Phonetically non plausible words are almost always hard for students with OP difficulties. Words like ‘said’(sed), ‘were’(wer), *laugh*’(larf) and ‘yacht’(yot), are very common errors.

## ***Phonological Processing:***

Phonological processing consists of the three composite areas of *Phonological Awareness*, *Phonological Memory* and *Automatic Rapid Naming*.

### *Phonological Awareness*

Phonological awareness refers to an individual's awareness of and access to the sound structure of his or his oral language (Mattingly, 1972). The spoken words of a language represent strings of phonemes that signal differences of meaning. The spoken word *sit* has three phonemes, each of which happens to correspond to the sound made by the three letters of the printed word SIT. Change the first sound from "s" to "b" and you have the spoken word *bit*. Children who have some awareness of this structure seem to have an advantage learning to read the printed forms of a language.

### *Phonological Memory*

Phonological memory refers to coding information phonologically for temporary storage in working or short-term memory. When you attempt to remember a phone number you have looked up, as you make your way to the phone, you are storing the number temporarily in working memory. You probably do so not by storing a visual representation of the sequence of digits (although you may be able to do this if you try), but rather by storing a phonological representation of the sounds of the digit names.

The part of memory most involved in storing, phonological information is called the phonological loop. The phonological loop provides a brief, verbatim storage of auditory information (Baddeley, 1986, 1992; Torgesen, 1996). The phonological loop consists of two parts working together. The first is a phonological store, which can be thought of as a tape recording loop that retains the most recent 2 seconds worth of auditory information that has been recorded. The second is an articulatory control process that provides input to the phonological loop initially and also can refresh information already in the loop so that it can be stored for longer than 2 seconds.

### *Automatic Rapid Naming*

The third kind of phonological processing is automatic rapid naming (ARN). ARN of objects, colours, digits, or letters requires efficient retrieval of phonological information from long-term or permanent memory. When reading, young readers presumably retrieve (a) phoneme associated with letters or letter pairs, (b) pronunciations of common word segments, and (c) pronunciations of whole words. The efficiency with which children are able to retrieve phonological codes associated with individual phonemes, word segments, or entire words should influence the degree to which phonological information is useful in decoding printed words (Baddeley, 1986; Wolf, 1991).

Measures of ARN require speed and processing of visual as well as phonological information. Some researchers who study ARN suggest that ARN tasks assess the operation of a precise timing mechanism that is important for the developing knowledge of common letter patterns in printed words (Bowers & Wolf, 1993; Wolf, 1991). Consequently, individuals who show poor performance on ARN tasks are expected to have difficulty reading fluently. Individuals who have double deficits—that is, deficits in both ARN and phonological awareness—appear to have greater difficulty learning to read than do individuals with deficits in either ARN or phonological awareness alone (Bowers & Wolf, 1993).

### ***A Short Word on Educational Diagnoses***

In all learning conditions the diagnosis is clinical. This means that no one test or set of tests including any biomedical test is able to definitively diagnose a disorder of learning. Therefore the diagnosis of such is the result of a synthesis of information which includes a combination of the child's history (this includes medical, educational, social and family history), clinical insight and awareness gained during testing by the practitioner as well as quantitative and qualitative test results collected on the test occasions.

Whatever the belief is about the nature and severity of a child's difficulty the most important point is that if there is a basic conviction that a child needs reading help then such help should be arranged as a matter of urgency. Therefore the emphasis must always be on formulating intervention not on defining or diagnosing pathology or attaching labels.

However it is still very worthwhile to describe a condition diagnostically so as to deliberately convey some sense of the nature and severity of the difficulty with literacy. Furthermore an elucidation of the difficulty should be made in the hope that it will better inform potential instruction and intervention.

### ***A short Word on Interventions***

Keep in mind that whatever designed system is chosen the researched principles of program implementation are integral to success. Even when the best program is used and implemented by a well trained professional if the basic principles of program delivery and implementation are violated then outcomes will be compromised. One should also remember that programs and interventions should not be treated like cookie cutters. One size does not fit all. A designed system should be flexible enough to allow for pedagogical change on the basis of student response.

Teachers and educators must always remember that they teach students not programs.