

# LEXIPHONE RE-EDUCATION FOR DYSLEXIA

## 1. Definition of Dyslexia

Dyslexia is a language impairment. It originates in difficulties in using linguistic abilities despite average or above average intelligence. In some cases of dyslexia, difficulties in oral expression (language learning delays, articulation difficulties, stuttering, etc.) can be found. However, it is most often characterized by difficulties in using written language (reading comprehension, written expression, spelling) and is not discovered until the child attends school. For a dyslexic, both oral and written language impairments originate in problems with phonological awareness. In this respect, oral and written language acquisition are two stages in over-all language development.

10% of the population is dyslexic. Most of the time, adults have learned to live with their difficulties, even though therapy could often still help them. Sooner or later, for young school aged children or adolescents, the symptoms of dyslexia disrupt their academic study. The impairment is more visible for them than for adults who often find ways to adjust their symptoms socially and professionally. Remediation is therefore imperative for school age dyslexics.

## 2. Causes of Dyslexia

Dyslexia is linked to early childhood difficulties in the acquisition of automatic processes necessary for acquiring language, even though the clinical symptoms may not appear until latter stages of linguistic development. For example, a child can be an excellent student until he or she reaches third grade, and then within a few months, become incapable of keeping up with the class despite all his or her efforts.

No consensus has been reached to explain the causes of dyslexics' deficit in the development of automatic linguistic processing. Neurological, genetic, psychological, and emotional etiologies have been proposed. There is a general consensus that the disorder is represented by a deficit in phonological awareness -- poor performance in the rapid and precise processing of the sound elements that make up language. These problems with phonological processing are reflected in inefficiencies in the sound-symbol processing. As a result, we see dyslexics' classic difficulties with reading, spelling, and composition.

### 3. Treatment of Dyslexia

Whatever the cause - or causes - of dyslexia, a fundamental principle in treating the disorder is the remediation of automatic processing abilities. For a child, language development is like constructing a building. The remedial process should consist of going back to the foundation of this "language building" to repair it, even though the child is already working on the construction of a much higher floor.

One understands why a construction defect appears so late: the difficulties only become visible when the "language building" has reached a certain height. In the lower floors the construction defect may not have been noticeable. Also, one understands why efficient repairs imply going back to the foundation. Finally this metaphor reflects the multiple causes of dyslexia: a defect in the foundation could be due to the terrain, the quality of the construction materials, the architectural blue prints, and so on.

For the above reason, effective treatment requires going back to the origins of language learning. The fact that language remediation is done with language complicates the problem. The child "hears" the language used by the therapist with the means available to his or her age. However, in order to "repair" language, the child must "hear" this language as he did when the structural foundation of his language was first being built. For example, focusing a child's attention on his

systematic confusion of the sounds "b" and "d" may, in some cases, prevent him from making that particular mistake again, however, the phonological basis of the confusion still persists. The confusion will only be eliminated when remediation directly addresses this structural problem.

There is a paradox in any treatment of dyslexia: far from curing the symptom, the treatment can have the effect of maintaining the disorder. For example, physical education teachers know how hard it is to stop a bad habit that was acquired quite early - like holding a tennis racket incorrectly. A coach can draw the student's attention to how the racket should be held, however, as soon as the tennis player's attention shifts to playing the game, the bad habit returns. At the same time, over-focusing a child's attention on his error prevents him from playing smoothly, in a way that integrates all of his skills. In other words, the attention that the child devotes to the problem has the paradoxical effect of maintaining it -- the attention the child gives to the error in effect sustains it. A paradoxical conclusion is that the child should be "re-educated" without drawing attention to his errors.

The above problem may explain an instructional problem we often encounter in children with Attentional Deficit Disorders (ADD). When the child's attention is focused on phonological difficulties, he has difficulty attending to the meanings in language. Conversely, when the child attends to the meanings in language, he is less able to control his phonological difficulties. Any remedial treatment can therefore have the paradoxical effect of amplifying attentional difficulties without solving the problem.

#### 4. Lexiphone Re-education

The Lexiphone method overcomes the above obstacles to treating dyslexia. An audio feedback device -- a Lexiphone -- uses different artificial means to re-educate fundamental automatic language processing without the awareness of the student.

The device allows the child's voice to be played back through headphones equipped with a built-in microphone creating an auditory feedback loop. It also allows the child to hear on-line voice and prerecorded texts. The Lexiphone works directly on the auditory feedback loop by enhancing prosodic and segmental (speech sound) features of the acoustic signal.

Lexiphone re-education requires between 90 and 150 forty-five-minutes to one hour sessions, each divided into two half-sessions. The results are evaluated by psychological tests taken before, during and after the re-education process.

During the first phase of Lexiphone re-education (around 20 sessions), the child's attention is attracted to entertaining activities (drawing, working on puzzles, etc.). In fact, during this phase, without being aware of it, the child is restructuring the elements that make up his language: suprasegmental features (rhythm, prosody) and intrinsic elements (lexical and phonemic segmentation).

During the second phase, the child learns to use these restructured linguistic elements in oral and written language. This phase, which is usually carried out independently, uses prerecorded texts.

The therapist can intervene indirectly, by giving the patient support (advice, discussion with parents and teachers, etc.) or directly by using the headphones and microphone at the therapist's disposal.

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