

END OF AWARD REPORT

Effects of auditory training to reeducate language processing among subjects with specific learning difficulties (dyslexia)

Background

Research into specific learning difficulty (dyslexia) has expanded considerably in the past twenty years and important theoretical advances have occurred. In particular the recognition that reading difficulties are underpinned by language learning problems is now well established (Catts and Kamhi, 1999). Relatively little research, however, has been directed at evaluating methods of treating children with dyslexia. Although children who are diagnosed with reading disorders typically obtain special support in schools, which is informed by an understanding of the nature of the deficit, the approaches used are generally not well validated. The research reported here is an attempt to conduct such a validation with an approach **that** has been in use in France for more than 20 years. The approach builds on the claim that early phonological problems account for impairment and is designed to re-educate auditory attention and speech awareness during selected listening, speaking, reading and writing activities.

Objectives

The main aim of the research was to test the efficacy of the 'semiophonic' approach to dyslexia therapy pioneered by the French psychiatrist, Dr Isi Beller. A group of diagnosed dyslexic children were to be given the auditory re-education programme and their progress compared with matched controls. This aim was achieved and the results are reported.

A number of ancillary objectives were only partially realised. It was hoped that some advances in psycholinguistic screening procedures in this domain would be achieved. The project has provided some pointers in this respect but the demands of the main programme were such that little time could be given to this objective.

It was originally envisaged that the therapy would be given to university students diagnosed with dyslexia as well the main sample of primary school aged children. Pressures of time prevented this option taking place. It was also hoped that the therapy would be offered in a school based setting as well as a clinical setting which mimicked the circumstances of Dr Beller's clinic in Paris. The logistics of setting up facilities in two places proved impossible to resource in terms of equipment and therapist's time.

The Semiophonic Method of Auditory Re-education (Lexiphone)

Auditory re-education uses a special device • the lexiphone • to produce acoustically modified auditory input (via headphones) which is designed to re-educate structural elements of early language, that is, the detection and processing of acoustic signals at

the intrasyllabic (phoneme) and intersyllabic (word) levels. The device affects prosodic sensitivity by highlighting acoustic differences at the syllable level.

The lexiphone essentially does two things:

1. It acoustically highlights the melodic contour of speech with something known as parametric sound which transforms variations in amplitude and pitch to produce a high pitched warbling tone.
2. By a process known as alternation, it draws attention to phonemic, morphologic and word level segments of speech through periodic use of an intermittent speech signal.

These structural elements of early language acquisition are the perceptual deficiencies implicated in the child with dyslexia and the rehabilitative focus of this method. It seeks to re-educate auditory attention and speech awareness during selected listening, speaking, reading and writing activities. Therapy is a graduated process with a recommended minimum of **80 - 100** one hour sessions.

The method has a number of other features that arise **from** Dr Beller's experience as a child psychiatrist:

1. It is regarded as necessary to take the dyslexic individual back to the point where language first became a significant influence in order to encourage the patient to perceive language in the way that **s/he** did as an infant.
2. He recognised that the dyslexic child, with a history of being obliged to engage in activity that he or she increasingly found repellent, needs to be removed from the confrontational style that even the most enlightened teacher-therapist will be perceived as adopting. In other words, on the **socio-emotional** plane the dyslexic is frequently suspicious, embarrassed and therefore negative to any further attempts to expose their area of major weakness.
3. He appreciated the importance of the fact that the mechanics of reading must be regarded as an automatic process which then frees up the cognitive system to attend to things like meaning, style and occasionally grammatical errors including spelling and punctuation. Even these, however, are automatic most of the time and it is comprehension that is most important. The dyslexic's problem is that they never achieve the required level of automaticity. Reading remains a highly **effortful** process - decoding the grapheme - which leaves little cognitive space for determining meaning.
4. He realised that the way into remediation for dyslexics was via the auditory route. Although reading is a visual activity - looking at marks on a page - Beller is in line with most current thinking in believing that it is the sounds of language (the phonology) that hold the key to reading. If you cannot segment the acoustic stream effectively then it is unlikely that you will ever learn to read properly and you will probably have impaired language as well.

How Beller incorporated these ideas into his method.

1. It is known that from a very early age babies will respond to particular sounds in their mother's voice such as rising pitch, changes in volume and stress. Babies can also discriminate between speech sounds such as *ba* and *pa* (voiced and unvoiced phonemes) long before they have any language at their disposal. It is also known that the way in which adults talk to babies (whether their parents or not) is special. So-called "baby talk" has properties which seem to assist the child's acquisition of language; it is slower, higher, has exaggerated intonation, etc. Beller has used this knowledge and attempted to capture it in his auditory re-education through the mediums of **parametric sound** and **alternance** (segmentation).
2. Beller tackled the socio-emotional, interpersonal problems that many dyslexic children have in an ingenious way. If the issue is an unwillingness to engage in something that exposes you as a failure, then remove the figure who constantly reminds you of that fact. The therapist is a tangential rather than central figure in Beller's approach. Remediation is predominantly in the hands of the participants themselves. Sitting in the private worlds of their lexiphone cubicles, wearing a very acceptable form of contemporary culture (the Walkman!), they are apparently in charge of their destiny. They work at the pace they prefer in the way that they want such as choosing what they play with and what they read. Of course, the therapist is there but s/he is largely an unobtrusive figure who communicates mainly via the headphones. Thus, the learning experience and expectations are very different **from** those usually encountered by the child.
3. The crucial automatic aspect of reading is addressed by deliberately discouraging children **from** attending to the **auditory** re-education process especially during the early stages. Instead subjects are encouraged to engage in quite different activities such as puzzles, lego and drawing while they are listening to the tapes. The aim here, therefore, is to establish the "primitive" elements of language processing at a level that does not impinge on focal attention. This allows the cognitive system to function effectively when it is required in activities like imitating sounds and reading.
4. Beller's route into the auditory system is principally via his invention of the lexiphone. At an early stage in his work he recognised the significance of the phenomenon later known as phonological awareness and saw it as one of the keys to unlocking reading **difficulties**. Parametric sound serves to mark the critical features of language (or music) by highlighting them through what happens to the sound form. But, because this acoustic input carries no meaning it is absorbed unconsciously. The claim is that it provides the substrate which the child needs to relate language to the written form. Later, through the medium known as alternance, the child is alerted to the important similarities and differences between words and their structure. In this way phonological awareness, a concept common to most contemporary theories of reading, is re-educated.

Dr Beller's approach, therefore, is grounded in scientific and educational principles. An essential assumption is that any one or two of the features described is insufficient. It is the whole package that is important and that represents the unique nature of the semiophonic method of auditory re-education.

Phases of the re-education process

The recommended 100 sessions are divided into two parts, each lasting approximately 30 minutes. Seven phases are involved.

First phase

- Parametric sound (1st half hour)

The child hears the variations of the parametric sound produced by a story on the cassette which sounds like bird song. This directs the child's processing system to the rhythm of language but without their **focal** attention being drawn to it. While listening the children do puzzles, draw or engage in any preferred activities.

- Music and parametric sound (2nd half hour)

The child listens to music accompanied and highlighted by parametric sound. At intervals the microphone attached to the headphones is switched on. Any speech or sound produced by the child is relayed via the lexiphone to create parametric sound in the child's headphones. Children will discover that parametric sound follows the modulation of the music as well as the human voice.

Second phase

Parametric sound continues with two other features.

- Syllabic alternance (1st half hour)

The objective is to re-introduce the phonological element of language but still without the interference of meaning. This is achieved by using fragmented language in which verbal components are removed in a regular but random manner. To give a synthetic example, the child might hear:

the la en her co bis

In this example every other syllable has been removed from the sentence: The old lady enjoyed her chocolate biscuit. Parametric sound accompanies the alternance and is not subject to editing. It serves to continue training in language prosody. During this phase the child works progressively on different tempos of segmentation: syllabic, phonemic and later lexical and syntactic segmentation.

- Word repetition (2nd half hour)

From the beginning of the second phase, the child will begin the active phase of the re-education process, starting with word repetition and continuing with double word

repetition, text and book repetition, 'free' reading (the child reads alone, no tape is involved) and finally spelling. Parametric sound is continually present systematically accompanying the voice on the cassette and the voice of the child.

Word repetition is done from a list of words (followed by blanks for repetition) that have been recorded on cassette. The same principle holds for double word and text repetition. Working with an audio-phonatory loop encourages self-correction by the child. The general rule is for the therapist not to correct the child.

At the second phase the meaning of words is not important. The therapy creates a natural tendency for children to imitate the pronunciation, rhythm and intonation of what they hear. The fact that the child's attention is often on their manual activity causes them to repeat words in an automatic manner which puts a premium on the intonative contours and rhythm of words.

Third phase

- Phonemic or lexical alternance (1st half hour)
- Double word repetition (2nd half hour)

Double word repetition is the same as word repetition with two words being presented together. It marks the beginning of language and a steady move towards meaning.

Fourth phase

- Single word or double word repetition (1st half hour)
- Text repetition (2nd half hour)

Extracts from books have been recorded with silent spaces between phrases (segmented according to syntax). A wide range of stories are available to maintain motivation. Repetition of phrases, using the auditory loop and parametric sound, helps the child's memory (verbal short-term memory is typically poor in dyslexics). Children can work at their own pace and select texts to repeat as preferred.

Fifth phase

- Text repetition (1st half hour)
- Guided reading (2nd half hour)

For the first time in the re-education process, the child is confronted with a book. Guided reading is a gentle way to re-introduce reading. The procedure is similar to text repetition but follows the text in a book with segments of phrases to be repeated highlighted.

Sixth phase

- Guided reading (1st half hour)
- Free reading (2nd half hour)

The child is asked to read aloud a chosen book into the microphone with the child's voice still accompanied by parametric sound.

Seventh phase

- Free reading (1st half hour)
- Written repetition (2nd half hour)

The child listens to a recording of a poem, segmented according to syntax. Initially the child is presented with the poem on paper but with a number of blanks which the child must try to fill in. Over time the number of blanks increases until finally they write the whole poem. The child is encouraged to re-read what they have written and to self correct. Correction and guidance are also provided by the therapist.

UK (Manchester) Validation Project

Method

Participants. 18 children, 10 males and 8 females, aged between 7:0 (7 years 0 months) and 10:4 years (average age 8: 1 years) living in the North West region of England, were recruited. These came from a total of 23 children who were interviewed. Sixteen of the children were registered with the Dyslexia Institute and two were referred via their local education authority who were aware of the project.

Diagnostic tests and screening. Before intervention all children were given the Wechsler Intelligence Scale for Children (**WISC-IIIUK**), the Wechsler Objective Reading Dimensions (**WORD**), the Phonological Assessment Battery (**PhAB**) (Frederickson, Frith and Reason, 1997), the Neale Test of Reading Ability (Revised British Edition, 1989) and The Dyslexia Screening Test (Fawcett and Nicholson, 1996). All children and their parents were interviewed and completed a clinical and educational history questionnaire. Children were selected for the programme according to their performance on the above tests, having been diagnosed as having moderate or severe dyslexia. IQ scores ranged from 88 to 118 with a mean of 102 (SD 10.33). Eleven of the children had three or more highlighted scores on the **PhAB** where highlighted scores reflect "at risk" in the area of language and literacy. Reading ages were, on average, 2: 1 years below chronological age (Neale) and 1:6 below, on average, for **WORD**.

Intervention procedure. It was made clear to parents that participation in the lexiphone auditory re-education programme was a major commitment involving two visits to the centre a week over 10 months. At the same time it was pointed out that

children could withdraw from the programme at any time. In the event, all children remained for the duration of the therapy.

The physical set-up consisted of a large room with four individual “cubicles” at one end of the room containing a table and chair. These were each linked via audio headphones to a remote lexiphone. The lexiphones were under the control of the therapist who was at a desk in another part of the room and was also able to monitor, by headphones what individual children were listening and responding to. The therapy room was well equipped with books, games, drawing and modelling materials and attractively decorated. It also contained over 100 cassette tapes used in the lexiphone therapy programme. The intervention followed the programme used in Dr Beller’s clinic in Paris as faithfully as possible. The phases have already been outlined.

Design. Following the practice of Dr Beller, measures of reading and spelling ability were taken only at the start and finish of extended therapy. The exception was phonological ability since the **PhAB** test was administered half way through therapy as well as at the end. A comparison group of dyslexic children matched for age, sex, geographic region, IQ, and reading and spelling ability was tested on the same measures as the treatment group over the same time period. The comparison group were all registered with the Dyslexia Institute and were receiving varieties of “standard” intervention as recommended by the Institute. It proved possible to obtain good matches for 11 of the 18 children in the treatment group.

Results

Group data

Two sets of data are reported. The gains (or losses) on the various reading and phonetic measures between Time 1 (start of treatment) and Time 2 (end of treatment). This period was approximately 10 months and involved 100 sessions of lexiphone therapy. The second set of data comprises comparisons between the Lexiphone group and the matched group of dyslexic children.

Changes in reading scores during the course of treatment

Table 1. *Composite scores on WORD reading test for Lexiphone treatment group (n=18) for beginning (Time 1) and end of therapy (Time 2).*

WORD composite score	Mean	Standard Deviation
Time 1	77.39	11.75
Time 2	82.89	15.51

There is an increase in the WORD composite score of 5.5 standard points between Time 1 and Time 2 (see Table 1). This difference is significant ($t = 2.36$, $p = .031$) and shows that there is a substantive gain in reading ability during the period of treatment. The breakdown of scores for the three components of the WORD test is shown in Table 2. The difference of 2.56 standard points between T1 and T2 for reading just

failed to reach significance ($t = -1.87, p = .08$). The increase in spelling score (3.78) was not significant while that for comprehension (6.89) was ($t = -2.54, p = .021$).

Table 2 *WORD standard scores (Time 1 and Time 2) for Reading, Spelling and Comprehension.*

Test	Mean	Standard Deviation
Reading: T1	82.83	10.65
T2	85.39	11.35
Change	2.56	5.81
Spelling: T1	80.72	9.35
T2	84.83	12.69
Change	3.78	11.55
Comprehension: T1	80.83	11.97
T2	87.72	16.68
Change	6.89	11.51

Table 3 *WORD reading ages (Time 1 and Time 2) for Reading, Spelling and Comprehension*

Test	Mean	Standard Deviation
Reading: T1	6.9	11.61
T2	7.7	18.75
Change	11.39	10.74
Spelling: T1	6.8	8.44
T2	7.7	18.96
Change	11.39	13.50
Comprehension: T1	6.7	10.09
T2	7.8	21.35
Change	12.33	12.39

When expressed in reading ages (Table 3) all the increases are significant: reading (11.4 months, $t = -4.58, p = .000$), spelling (11.4 months, $t = -3.61, p = .002$), comprehension (12.3 months, $t = -3.99, p = .001$).

The data for the Neale test in Table 4 show that the mean increase in reading age on all three measures was at 12 months or better. The changes were all significant: 'Accuracy, $t = -4.33, p = .000$; Rate, $t = -3.36, p = .004$; Comprehension, $t = -7.17, p = .000$.

Table 4 Reading age scores (in months) on the Neale reading test for Time 1 and Time 2.

Test	Mean	Standard Deviation
Accuracy: T1	6.0	14.06
T2	6.11	19.26
Change	12.00	10.35
Rate: T1	6.2	17.36
T2	7.2	24.96
Change	12.61	16.14
Comprehension: T1	6.3	13.26
T2	7.6	20.00
Change	15.00	9.62

Phonological measures

The Phonological Assessment Battery (PhAB) was administered at the start of the project, halfway through treatment and at the termination of the therapy. The standard scores for Time 1 and Time 2 (end) are given in Table 5.

Table 5 PhAB standard scores for Time 1 and Time 2

Test	Mean	Standard Deviation
Highlighted Scores: T1	3.00	1.85
T2	1.33***	1.33
Alliteration: T1	88.06	10.10
T2	92.61*	7.36
Rhyme: T1	88.06	8.83
T2	92.89*	10.27
Spoonerisms: T1	87.50	6.34
T2	98.83***	11.50
Non-Word Reading: T1	93.94	4.95
T2	96.39	5.45
Naming Speed (Pictures): T1	81.61	12.96
T2	95.06***	10.19
Naming Speed (Digits): T1	82.44	11.44
T2	89.28**	11.28
Fluency (Alliteration): T1	94.39	16.16
T2	95.56	11.98
Fluency (Rhyme): T1	93.44	16.67
T2	106.56**	14.01
Fluency (Semantic): T1	107.67	10.30
T2	106.00	9.18

*P < .05 **P < .005 ***P < .000

The first item in Table 5, **Highlighted Scores**, refers to the number of areas in which the child has recorded a score that puts it in the ‘at risk’ category, that is, demonstrating moderate or severe delay with respect to the standardised norm. It can be seen that the average number of highlighted scores (out of 6) was 3 at the start of the project. This had reduced to 1.33 by the end of the treatment. This difference is significant ($t = 5.15$, $p = .000$) which indicates that one of the effects of the lexiphone treatment was to raise the level of phonological awareness, a recognised critical component of literacy. All of the subtests making up **PhAB** showed an increase in performance with the exception of **Semantic Fluency**. This was appropriate since this is a non-phonological measure related to IQ which would be expected to stay more or less constant. Six of the eight relevant components showed significantly increased scores (**Alliteration**, **Rhyme**, **Spoonerisms**, **Naming Speed Pictures**, **Naming Speed Digits** and **Rhyme Fluency**). This again, allows us to confidently assert that the lexiphone treatment is having a significant and positive effect on phonological awareness.

It should also be noted that these effects were apparent at the midpoint of the treatment. Highlighted scores, **Alliteration**, **Rhyme**, **Spoonerisms**, **Naming Speed Pictures** and **Naming Speed Digits** were all significantly changed after six months of lexiphone therapy.

Lexiphone group and matched controls compared

Table 6. *Mean differences between time 1 and time 2 for reading standard scores and age equivalents (WORD test) for the Lexiphone therapy (n = 18) and dyslexic comparison group (n = 11).*

Test – WORD	Lexiphone group (18)	Control group (11)
Reading (standard scores)	2.6	-4.6
Spelling (standard scores)	3.8	-5.1
Comprehension (standard scores)	6.9	-5.4
Reading Age (months)	11.4	6.8
Spelling Age (months)	11.4	4.9
Comprehension Age (months)	12.3	2.2

The effect of the lexiphone therapy can be further assessed by comparing the results of the lexiphone group with a group of matched controls referred to as the Comparison Group. Table 6 provides a breakdown of the three **subtests** that comprise the **WORD** test: reading, spelling and comprehension. It can be seen that on standard scores, the group which had lexiphone therapy improved by between 2 and 4 standard scores, on average, in reading and spelling and by nearly 7 standard points in comprehension. In contrast the comparison group suffered a drop in score of between 4 and 6 standard scores. This means that the difference between the two groups at the end of the treatment period was 7.11 standard scores on reading, 8.87 standard scores on spelling and 12.3 on comprehension. These differences are all significant (Reading, $t = 3.51$, $p = .002$; Spelling, $t = 2.41$, $p = .023$; Comprehension, $t = 3.16$, $p = .004$).

A similar picture is apparent on reading age where the differences are respectively: 4.6 months (reading); 6.5 months (spelling) and 10.1 months (comprehension). Only the latter of these differences is significant ($t = 2.41$, $p = .023$).

Table 7. Mean differences between time 1 and time 2 for reading standard scores, reading ages, spelling standard scores and spelling ages (WORD test) for the Lexiphone therapy ($n = 11$) and dyslexic comparison groups.

WORD test	Lexiphone group (11)	Control group (11)
Reading (standard scores)	3.6	-4.6
Spelling (standard scores)	4.3	-5.1
Comprehension (standard scores)	7.1	-5.4
Reading Age (months)	14.9	6.8
Spelling Age (months)	13.6	4.9
Comprehension Age (months)	15.0	2.2

Table 7 presents the data for the eleven children from the Lexiphone treatment group that had exact matches in the Manchester dyslexic comparison group. Larger differences between the groups, from T1 to T2, are now demonstrated. The difference in reading standard scores is 8.2 standard points ($t = 3.3$, $p = .004$), for spelling it is 9.4 points ($t = 2.2$, $p = .038$) and for comprehension, 12.5 points ($t = 2.69$, $p = .014$). As indicated all these differences in standard score points are significant. The reading age differences are 8.2 months in reading age, 8.7 months in spelling age and 12.8 months in comprehension which is also a significant difference ($t = 2.54$, $p = .019$).

Individual data

Using the WORD standard scores tables, the sample was divided into two groups: those whose scores went down or remained the same (0 or minus = Stable) and those who improved (Improvers).

Table 8 Distribution of lexiphone treatment group as a function of their change in standard score points between T1 and T2 on the WORD test.

Test	Improvers	Stable
WORD Basic Reading	Roger, David, Gordon, Robert, Chris, Jenny, Brenda, Nancy	James, Trevor, Shirley, Sarah, Toby, John, Amanda, Carla, Patrick, Susan
WORD Spelling	James, Roger, David, Gordon, Chris, Sarah, Carla, Susan, Brenda, Nancy	Trevor, Shirley, Robert, Toby, John, Amanda, Patrick, Jenny
WORD Comprehension	Roger, David, Gordon, Shirley, Robert, Chris,	James, Trevor, John, Amanda, Carla, Susan

Jenny, Sarah, Toby,
Patrick, Brenda, Nancy

In Basic Reading, 10 regressed or stayed still, 8 improved. In Spelling, 8 were Stable and 10 Improvers. In Comprehension, 6 were Stable and 12 were Improvers.

Across the group as a whole, six children were in the Improvers group for all three measures: Roger, David, Gordon, Chris, Brenda and Nancy.

Three children were in the Stable group for all three measures: Trevor, John and Amanda. Two others, Susan and Shirley, were in the Stable group for two out of three measures and only made improvements on 1 or 2 standard scores in the third measure. A similar pattern emerges when reading age is used as the measure (Table 9) but with a higher proportion of Improvers in Reading and Spelling.

Table 9 *Distribution of lexiphone treatment group as a function of their change in reading age between T1 and T2 on the WORD test.*

Test	Improvers	Stable
WORD Basic Reading	Roger, David, Trevor, Gordon, Robert, Chris, Jenny, John, Patrick, Susan, Brenda, Nancy	James, Shirley, Sarah, Toby, Amanda, Carla,
WORD Spelling	James, Roger, David, Gordon, Chris, Jenny, Sarah, Toby , Amanda, Carla, Susan, Brenda, Nancy	Trevor, Shirley, Robert, John, Patrick
WORD Comprehension	Roger, David, Gordon, Robert, Chris, Jenny, Sarah, Toby , Susan, Brenda, Nancy	James, Trevor, Shirley, John, Amanda, Carla, Patrick

On the Neale test, an arbitrary split was made with children improving 6 months or more being counted Improvers and below six months as Stable (Table 10). Although there is some discrepancy between the measures, notably on Comprehension, the same general pattern is observed.

Table 10 *Distribution of lexiphone treatment group as a function of their change in reading age between T1 and T2 on the Neale test of reading ability*

Test	Improvers	Stable
Neale Accuracy	Roger, David, Trevor, Gordon, Robert, Chris, Jenny, Sarah, Carla, Patrick, Brenda, Nancy	James, Shirley, Toby, John, Amanda, Susan
Neale Rate	Roger, David, Robert, Chris, Jenny, John, Carla, Patrick, Susan, Brenda	James, Trevor, Gordon, Shirley, Sarah, Toby, Amanda, Nancy
Neale Comprehension	James, Roger, David, Trevor, Gordon, Shirley, Chris, Jenny, Sarah, John, Amanda, Patrick, Susan, , Brenda, Nancy	Robert, Toby, Carla

Another way of viewing performance is to classify the children according to how many times they fall into the Improvers or Stable category in each of the nine measures that appear in Tables 8 -10. The arbitrary division is 2-3; 4; and 6-9. The justification for this is that 2-3 represents one-third or less of "Improver" status. These children could be said, therefore, to have demonstrated a degree of progress in literary abilities as a result of intervention. 4 is less than one-half of the measures but suggests that a reasonable amount of change is evident. In the case of children who are Improvers in most or all of the measures (6 - 9), they represent a **successful** level of advance over the level at which they entered therapy.

Table 11 *Children categorised by frequency of appearances in Improver category of literary change.*

Number of appearances in Improvers category	Children
2 - 3 [2.7]	James, Trevor, Shirley, Toby, John, Amanda
4 [4]	Carla
6 - 9 [7.6]	Roger, David, Gordon, Robert, Chris, Jenny, Sarah, Patrick, Susan, Brenda, Nancy

As Table 11 shows, none of the children fail to get into at least two of the Improver categories which suggests that the intervention has had some impact for all children. Furthermore, nearly two-thirds of children can be said to have derived considerable benefit from the therapy and one-third to have achieved moderate or slight improvement. This "rate" of success compares very favourably with all other intervention procedures of which we are aware.

Conclusions

The semiophonic method of auditory re-education has been given to a group of young dyslexic children and clear benefits demonstrated. Gains in reading and spelling, as measured on standardised tests, were two to three times those of the matched controls. In addition, large and significant improvements in phonological awareness were found. The commitment of parents and children was shown by the total absence of any attrition during the study and all participants reported substantial improvement in self-esteem and in educational attainment. Many questions remain concerning the precise mechanisms that account for change. It is also premature to evaluate Dr Beller's claims for rehabilitation in the absence of long-term follow-up data. Nevertheless, the findings show promise and support the setting up of a unit that can administer the therapy and allow further monitoring of results to take place.

Activities

A presentation of the semiophonic approach and interim results of the validation study were presented to the Biennial Meeting of the Royal College of Speech and Language Therapists in Birmingham, April, 2001.

The Research Assistant (Joanne Nicholson) engaged on the project participated in the International Conference on Reading and Language Disorders, York, April 2001.

Regular meetings were held with Dr Beller and colleagues in Manchester and Paris including representatives from the Dyslexia Institute. Regular meetings were also held with parents and newsletters issued.

outputs

The very recent completion of the project has not allowed publications at this point but it is intended to submit the findings for publication in the academic and practitioner media. A paper on the semiophonic method was presented at the Biennial Conference of The Royal College of Speech Therapists, Birmingham, April, 2001. Details have been given to REGARD.

Impacts

As a result of the project, Lexiphone International is in discussion with the Dyslexia Institute with a view to setting up a pilot therapy unit in the United Kingdom.

Future Research Priorities

An analysis of the semiophonic method to identify the critical components of the approach and to explain the mechanisms that might account for change in behaviour. This would represent a large-scale programme. In addition, the long-term effects of the therapy need to be assessed through a range of follow-up studies.

Acknowledgements

The contribution of the principle research assistant, Joanne Nicholson, and invaluable support from Caroline Foster, research assistant on an associated ESRC grant, far exceeded the usual degree of commitment to a research project. It is no exaggeration to say that without the enthusiastic dedication of these young researchers, who worked extra time in the evenings and Saturdays throughout the year, this project could not have succeeded. The project itself, and the children who were an integral part of it, owes an enormous debt to Joanne and Caroline. I also wish to acknowledge the contribution of a number of part-time assistants in both reception duties and testing: Helen Ferris, Vicky Friedman, Lucy Ann O'Malley, Lindsay Robertson, Ceri Savage and Simon Smith. The considerable help of Mrs Maureen Wheeler of the Dyslexia Institute is greatly appreciated. We are grateful to John Rack for allowing access to data from the Spell It project. The support and advice of Dr Isi Beller and his colleagues throughout the project was vital to its success.