

# Modifications for Classroom Instruction for Children with Landau-Kleffner Syndrome

## Introduction

Landau-Kleffner Syndrome (LKS) is a rare form of acquired childhood aphasia, characterized by abnormal electroencephalographic (EEG) findings in the speech cortex and language deterioration.

Onset, which may be accompanied by overt seizures, is between 2 1/2 and 6 years of age, after normal cognitive and language development. Since the initial report by Landau and Kleffner (1957), there have been numerous articles written regarding the characteristics of LKS, concomitant behavioral findings, the pathophysiology, and the course and prognosis of the disease (Bishop, 1985; Cooper and Ferry, 1978; Deonna, 1991; Gordon, 1990; Marescaux, et al., 1990; Pacquier, et al., 1992; Rapin, et al., 1977; Van de Sandt-Koenderman, et al., 1984).

Treatment for LKS is either pharmacological (anticonvulsants or corticosteroids) or surgical intervention to control epileptiform activity. The surgical procedure, multiple subpial transection (MST), was developed due to the location of epileptiform activity in the speech cortex which involves speech, memory, and primary motor and sensory function. This procedure severs the horizontal intracortical fibers, while preserving the vertical fiber connection of both incoming and outgoing nerve pathways and the penetrating blood vessels (Morrell, Whisler, and Bleck, 1989). The results of this procedure, with the exception of detailed language outcomes, were reported in *Brain* by Morrell et al., 1995. Grote, Van Slyke, and Hoepfner (1999) report on the language findings, pre- and post-surgical intervention, of 14 children with LKS.

One of the primary characteristics of LKS is auditory verbal agnosia (Rapin, et al., 1977), which significantly affects the child's ability to process the verbal input of language. During pharmacological treatment and/or after surgical intervention, these children display continued deficits in the processing of verbal language for some time. Thus, the challenge to maximize language recovery and academic learning in the classroom.

## Purpose

The primary focus of this presentation is to provide case study reports of two children with LKS who have had pharmacological and/or surgical intervention with regard to the various instructional methods and curriculum changes that were of benefit to them. Current functioning levels in language and academics support the instructional methods utilized.

## Method

### Participants

B1 was diagnosed at 4 years, 11 months and subsequently began pharmacological treatment (anticonvulsants) for seizure activity. B1 is a 5 year, 11 month old male. B1 spoke Polish until the age of 4 when he went to an ESL Preschool Program. At age 5 years, 6 months, he spoke only English. He is in a regular elementary school in kindergarten/first grade, half the day in each program. He is not receiving speech and language therapy.

N3 was diagnosed at 7 years, 1 month with LKS, but was diagnosed with Attention Deficit Disorder without Hyperactivity and placed on Ritalin three months prior to the diagnosis of LKS. He was treated pharmacologically with anticonvulsants and corticosteroids at the time of diagnosis. He was treated surgically at the age of 9 years, 9 months. N3 is a 10 year, 11 month old male and is in an Inclusion Program in a private parochial school (5th grade). Support services include: speech and language therapy, sign language for two years prior to this grade level, and a 1:1 aide in the classroom.

## Procedure

### Data Collection

The author evaluated and observed each of these children multiple times at Rush Presbyterian St. Luke's Medical Center. Reports from classroom teachers, speech language pathologists, and parents working with each of these children were compiled. Telephone interviews were also conducted with teachers and support personnel. In addition, classroom observations and/or videotapes of classroom activities were reviewed.

## Results

### Case Study B1

B1 was assessed at 5.6 and 5.11 years of age. The test results for each of those data points are in Table 1 and Table 2.

Table 1

Age	Test	Raw Score	S.S.	%	Age Equiv.
5.6	PPVT-III <sup>1</sup>	72	99	47	5.6
5.6	EVT <sup>2</sup>	47	90	25	4.9
5.6	PLS-3 (AUD) <sup>3</sup>	43	93	32	4.11
	PLS-3 (EXP)	40	83	13	4.6

5.6 Expressive language consisted of sentences that were from five to ten words in length, with only minimal dysfluencies noted. Dysfluencies were predominantly initial sound or syllable repetitions and did not interfere with the communication message.

5.6 Articulation was characterized by simple articulation shifts on/th/ and /v/ sounds. Impreciseness was not noted on other sounds. Intelligibility was significantly improved.

Table 2

Age	Test	Raw Score	S.S.	%	Age Equiv.
5.11	PPVT-III	63	88	21	4.10
5.11	EVT2	50	90	25	5.1
5.11	PLS-3 (AUD) <sup>3</sup>	45	103	58	5.8
	PLS-3 (EXP)	44	98	45	5.1

5.11 Expressive language remains intact. Typical utterances included: "He like to run and he likes to eat"; "Because some are big and some are little"; and "He was little but now he grewed". Morphological markers were occasionally deleted or overgeneralized. Dysfluencies were minimal and included small word repetitions and filler words, as well as some sounds and syllable repetitions. Dysfluencies did not interfere with speech intelligibility.

5.11 Articulation was characterized by minimal articulation shifts, which did not interfere with speech intelligibility.

### Curriculum Modifications

B1 has shown steady improvements over time with ESL programming the first year of preschool. The second modification was to place him in a split kindergarten/first grade, as he was not ready for first grade academics. B1 had not received speech therapy.

### Case Study N3

N3 was assessed at 9.4, 9.9, 10.4, 10.11 years of age. At 9.4 years of age, the PPVT-III and the EVT were attempted via sign language. Due to severe auditory verbal agnosia, N3 pointed to two pictures on the PPVT-III. He expressively approximated the signs for house, ball, book, watch, dad, run and eat. Verbal language consisted of "ma ma" and "da". When presented with the printed directive of 'write your name' and 'touch eye, nose, ear, and/or mouth', he successfully did so. He signed numbers 1-10, but did not sign or write the alphabet.

Assessment at 9.9 years of age, just prior to surgical intervention, resulted in basically the same skills as noted at 9.4. He demonstrated severe auditory verbal agnosia, limited babbling with two true words, and relied on gestures and non-verbal interaction to communicate.

Assessment results seven months post-surgical intervention at the age of 10.4 years is in Table 3. All tests were completed via verbal language, as sign was not needed for understanding. The test results at 10.11 years of age are in Table 4.

### Curriculum Modifications

- Use computer decoding programs to teach decoding skills.
- Continue with EAROBICS Program.
- Move from strictly a point system for behavior modification to 'time to reflect' on behavior to create an internal self-control of behavior.
- Reduce the amount of time the 1:1 aide provides support as the language and understanding of the language has improved significantly.
- The language of the classroom is modified significantly for the science and social studies.
- Sign language was used for two years and is not appropriate now.
- Previously, used picture symbols (Mayer-Johnson) and drawings to communicate in the classroom. Initially, used an FM system in the classroom.
- Storyboards were initiated in the second grade and utilized through fourth grade for scheduling.

Table 3

Test	Raw Score	S.S.	%	Age Equiv.
PPVT-III	97	75	42	7.2
EVT	69	74	2	7.0
TOLD-P:3 <sup>4</sup>				
Relational Voc.	18/30			
Oral Voc.	12/28	Cannot compute scores further as he is above the age level of the normative data for this instrument		
Grammatical	21/25			
Undert.				

**Expressive language:** Communicated in complete, simple compound and complex sentences. Some errors noted in the morphological markers. Typical utterance: "We had to come and do all these appointments and stuff" and "No, but I know about sharks because I have a shark book".

Dysfluency in his expressive language, in the form of hesitations and revisions, was noted.

**Reading:** Wrote the alphabet as 'ABCE', but could identify all upper and lower case letters. Demonstrated knowledge of most sound/symbols for the letters, but does not have decoding skills. Oral reading is of simple sight words.

Table 4

Test	Raw Score	S.S.	%	Age Equiv.
PPVT-III	109	82	12	8.3
EVT	77	80	6	7.10
SDRT				
Word Recog:				
Primer	20/20			
1st Grade	16/20			
2nd Grade	14/20			
3rd Grade	13/20			
Comprehen.				
1st Grade	100%			
2nd Grade	100%			

N3 knows the sound/symbol letter correspondence, but does not have decoding skills. If he does not know a word, he uses word calling of a word he does know that is similar (i.e., cold/could, cost/couch, and late/letter).

Mathematics is at a third grade level and science and social studies are at a fifth grade level for concepts; however, major adaptations are made due to the second grade reading level.

## Discussion

The profiles of these children with LKS demonstrate how unique each of their learning styles is. Based on the disorder, a teacher or clinician can use some general guidelines in instructional methodology. Those guidelines might include:

1. A small language based classroom
2. Intensive speech and language therapy
3. Sign language as an alternative method of communication due to the auditory verbal agnosia
4. Utilize the visual input with pictures, schedules, color coding etc.
5. Computer programs to assist in learning decoding skills
6. Highly supportive teaching environment, which might include a 1:1 aide in the classroom
7. Functional approach to communication in the early stages of the disorder when the child has severe auditory verbal agnosia and limited understanding of verbal language
8. Exploration of reading and mathematics programs that are best suited to the child's needs

The key to successful teaching with the child with LKS is focused around building the language skills to a level that he/she will be successful in the academics being taught.

1. Peabody Picture Vocabulary Test-III
2. Expressive Vocabulary Test
3. Preschool Language Scale-3
4. Test of Language Development-Primary: 3