OTITIS MEDIA: ITS RELATIONSHIP WITH DELAYED READING AND ATTENTION DEFICIT DISORDER

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APPROVAL OF THE DISSERTATION

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ABSTRACT

OTITIS MEDIA: ITS RELATIONSHIP WITH DELAYED READING AND ATTENTION DEFICIT DISORDER

The purpose of this study was to examine the effect that otitis media (OME) has on reading achievement and Attention Deficit Disorder. A group of 20 children, ages 8-10 years, were identified by a pediatric otolaryngologist as having a history of OME involving more than four episodes of the disease before the age of three which is a critical time period for language acquisition. These 20 children were then matched by age, sex, and socio-economic status with a group of children who had no more than one known or documented episode of otitis media during the same time span. These children were administered an Informal Reading Inventory, the McGuffey Spelling Inventory, as well as other phonetic and language tasks. In addition, the Wechsler Intelligence Scale for Children-Revised (WISC-R) was administered. The results were tested for statistical significance using t-tests and the means and standard deviations were compared.

The results of these analyses indicate that:

(a) children with histories of OME are significantly behind in reading when compared to their control group.

(b) children with histories of OME are not statistically different from their controls on the Freedom From Distractibility (FFD) factor on the WISC-R. However, one subtest, Arithmetic, which relies heavily on language processing, was a problem for OME children on the FFD. There, the OME children scored significantly lower than their non-otitic controls.

It was concluded that the interruption in hearing because of OME during the critical language acquisition period (birth to three years) probably resulted in a significant delay in reading when the child reached school age. Conversely, children with histories of OME did not appear to have difficulty sustaining attention except on tasks that require specific attention to language.

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CHAPTER I

Otitis media with effusion (OME) is one of the most common childhood illnesses that pediatricians treat today. This infection of the middle ear cavity often results in a mild, transient hearing loss which can cause a disruption of language development in many children. In fact, there is a sizable body of research in education, medicine, and psychology linking OME to hearing loss, delayed speech production, language impairment, and even lower academic achievement. Children with frequent OME episodes in the preschool years are likely to experience a disturbance in language development. In addition, there is growing evidence that many such children display residual attentional deficits stemming from its early onset. Whether or not a temporary interruption in hearing and delayed language development during the preschool years negatively influences the acquisition of reading in later years remains to be investigated. But a plausible case can be made that learning to read is more difficult for the child with a history of repeated OME episodes. Indeed, a disproportionate number of the children tested at the McGuffey Reading Center of the University of Virginia who

presented with varied reading disabilities also had a history of OME in their preschool years.

During the preschool years, the physiology of the ear is such that the eustachian tube, which connects the middle ear and the throat area, is in a horizontal position. Any fluid that should occur in the middle ear has little chance of draining into the throat. Instead, it remains in the middle ear becoming a potential problem in two ways. One, it is an area ripe for infection. An upper respiratory infection (URI) is easily introduced into this stagnant fluid by the simple act of swallowing. Each swallow a child takes opens the eustachian tube which serves to aerate it but it can also serve as the conduit for germs associated with the URI to enter the middle ear cavity. Two, the fluid itself slows down the vibrations necessary to propel sound further into the ear. Hearing is diminished to some extent with the build-up of fluid in the middle ear cavity.

At some point in their development, the physiology of the child's ear and facial structure changes. The eustachian tube begins to descend so that at the point of entry to the throat, the eustachian tube is much lower than its opposite end. This shift from a horizontal to a more vertical presentation of the eustachian tube, as the child grows older, allows for proper drainage thus reducing or

eliminating the possibilities of both infection and sound impediment.

This study is concerned with that segment of the population that is affected with OME during the important, initial period of language acquisition (birth to three years). During this time it is crucial for children to be exposed to all the nuances of language in order that they might assimilate those nuances themselves and become adept at using them. If children with OME have diminished hearing during each episode because of the fluid build-ups in their middle ear, what effect might this have on language acquisition and subsequent use of language in the forms of reading, writing, and spelling? Further, do children with OME develop secondary attentional difficulties as a result of diminished hearing?

The main focus of the current research study, then, is to determine whether a significant history of Otitis media with effusion during that period when language is acquired so readily (birth to three years) will impair a child's ability to learn to read and sustain concentration.

Sequelae of Otitis Media

In this age of powerful antibiotics, OME is no longer as life-

threatening as it once was. There are reported cases of meningitis, profound deafness, and brain abscesses resulting from untreated cases of OME in the days before antibiotics (Roland & Brown, 1990). Although the sequelae of OME are no longer as obvious and as grave, there are tangible, yet often undiagnosed effects that can wreak havoc on the development of young children. The nature of the disease causes mild, fluctuating hearing losses that have been shown to negatively influence the language acquisition of children (Friel-Patti, 1990). This, in turn, can cause early language disruption which has an adverse effect on the child's ability to manipulate language in general. More specifically, it is my contention that this generalized language deficit jeopardizes a child's educational success in reading. In addition, there is evidence that attentional problems arise from a history of OME as well. All of these possible problems are enormously difficult to attribute to one cause since their genesis could be confounded by a variety of causes including heredity, socio-economic level, and home environment. Nevertheless, the link between OME and delayed reading and attention deficit disorder demands investigation.

Temporary hearing loss. Simply put, children who are experiencing OME are hearing the sounds of speech under difficult conditions. The pathology of OME is such that an accumulation of fluid is present in the middle ear which impedes sound from traveling through the ear appropriately. There is increasing evidence that otitis media is associated with mild to moderate hearing loss, especially in the 10-30 decibel range (Feagans, Sanyal, Henderson, Collier & Applebaum, 1987). Not surprisingly, a specific hearing loss of between 10 and 40 decibel associated with OME has been found to impair speech discrimination skills (Friel-Patti, 1990). Although such losses are temporary, they can also be lengthy. A residual hearing loss following each episode may last, in some cases, from 6 to 24 months. Such lengthy losses may adversely affect developing language skills (Bergstrom, 1980). Therefore, a child with several cases of OME during the initial language acquisition period (birth to three years) may have diminished hearing for most of those thirty-six months. The effect of OME, then, on a child trying to interpret sounds as a model for language can be profound.

Early language disruption. Failure to discriminate speech sounds during the early years may also disrupt the course of

language acquisition in general. A number of investigators have explored the effects of OME and language delay.

Long before normally developing infants can produce sounds themselves, they can make fine phonetic distinctions and distinguish speech sounds of language around them (Berko-Gleason, 1983). This suggests that normally developing children, at the earliest of stages, are preparing for the remarkable feat of acquiring language themselves. There is no direct instruction in language acquisition in normal children. It is acquired primarily by exposure to language in the world around them and the continued modeling and refining of that system by their parents and caregivers. If spoken language acquisition relies so heavily on its exposure through hearing for success, it is reasonable to assume that a disruption of hearing may very well impact on that language acquisition. The mild fluctuating hearing loss that accompanies episodes of OME can interrupt language acquisition because the child has no stable input base from which to infer the rules of language (Menyuk, 1989). Researchers concur that an inconsistent auditory signal resulting from such hearing losses may make the stream of speech difficult to segment and may impede the child's ability to form necessary linguistic categories (Berko-Gleason, 1983; Menyuk, 1989).

This disruption in language was observed in a study which followed a group of otitic and non-otitic infants up through eighteen months. A research team from the Callier Center for Communication Disorders at the University of Texas at Dallas found a significantly higher incidence of language delay in the otitic group (Friel-Patti, Finitzo, Formby & Brown, 1987). In the same vein, the acquisition of normal receptive language skills and verbal intelligence depends greatly on the ability to receive auditory input accurately (Zinkus, 1980). In a study looking at auditory deprivation and early conductive hearing loss, it was found that mild fluctuating hearing loss from OME in the first 18 months of life disrupted both expressive and receptive language at 12, 18, and 24 months as well as auditory brain stem response and cortical electrophysiology at 7 years (Finitzo, Gunnarson & Clark, 1990). Conversely, a Dutch study found that a history of OME between ages 2 and 4 did not have a negative consequence for language performance at 7 years of age (Grevink, Peters, van Bon & Schilder, 1993). This study, however, excluded children with histories of OME before the age of 2 when language is clearly being learned. In a study where auditory brain stem response on elementary-age children with early histories of OME was measured, a connection was found between recurrent OME and neurological development (Folsom, Weber & Thompson, 1983).

Similarly, in animal studies, sound deprivation and early conductive hearing losses resulted in significant physiological changes in the inner ear structure (Webster & Webster, 1977). It is not certain whether or not these changes are reversible. The implication from both animal and human studies is that the developing brain must receive sufficient sensory input from the periphery during crucial periods to develop normally (Finitzo, Gunnarson & Clark, 1990).

A number of researchers have found that the hearing loss associated with OME in the early years to be connected with difficulties in creating a stable language base and possible long-term effects in auditory processing. Still, other investigations fail to find such connections. While acknowledging that language testing in early childhood is difficult, one group of researchers tested their cohort of OME children at the age of two years and found that recurrent OME was not implicated as a cause of speech or language delay (Wright, Sell, McConnell, Sitton, Thompson, Vaughn & Bess, 1988). In a study looking at children with auditory processing deficits, assessing chronic OME as the cause of language delay was difficult. Nevertheless, when compared with another group of learning-disabled students, the incidence of language delays occurred with greater than twice the frequency in the auditory processing deficit group. Whether those language delays were

associated with OME remains unproven in that study (Gottlieb, Zinkus & Thompson, 1979). It appears fair to say that the connection between OME and delayed language development remains suggested but not entirely substantiated. In point of fact, my own son, whose early and frequent episodes of OME piqued my interest in this topic, reached all the developmental language milestones on time or early. To this day he has an exceptional vocabulary and a keen ability to use language far beyond his years.

Known effects on later development. To test whether the hearing loss associated with OME affects the child when he/she reaches school-age, otitic and non-otitic school-age children were compared (Holm & Kunze, 1969). It was found that the group with no history of OME was superior to the chronic OME group on most measures of auditory processing and language development.

The connection between auditory processing difficulties and children with histories of OME shows up repeatedly in the literature. Auditory processing is defined as the identification, interpretation, and organization of sensory data received through the auditory channel (Quick & Mandell, 1983). In one study, SRA (Science Research Associates) composite scores were found to be higher in children who had no history of OME in the first eighteen months of life when

compared with otitic children (Howie, Jensen, Fleming, Peeler & Meigs, 1979). Children with documented early language delay were followed to determine how many of the group became successful readers. All but one became poor readers. Their reading scores were more than one year behind those of their control group (Scarborough & Dabrich, 1990). Otitic children in still another study were found to be deficient in auditory processing and performed poorly on tasks designed to test auditory sequential memory (Zinkus, 1978). This same researcher (Zinkus, 1980) found that OME children consistently had lower verbal scores than performance scores on the Wechsler Intelligence Scale for Children-Revised (WISC-R) which suggests an overall depression of language acuity. In another study, children with conductive hearing loss evidenced normal IQs when tested with nonverbal instruments but their verbal IQs tended to be lower than those children with normal hearing (Rapin, 1979). OME children were also found to require frequent repetitions, have difficulty recalling auditory information, and were characterized as inattentive (Gdowski, 1986).

OME children were found to exhibit difficulty with narrative skills when they reached school (Feagans, 1987). Feagans, however, believes that this is not necessarily due to auditory processing

problems as much as attentional problems also displayed by OME children.

Otitis Media and Early Schooling

Reading is a complex, multi-faceted endeavor. Nevertheless, in his work on dyslexia, Vellutino argues that reading is primarily a language-based activity (Vellutino, 1977, 1982, 1987). Reading draws on many skills children have acquired in their early language acquisition explorations such as the interpretation of phonologic, semantic, and syntactic rules. Indeed, a causal relationship between phonological awareness and reading was established by Bradley and Bryant (1983) in their work on the categorization of speech sounds.

Similarly, Wolf (1984) asserts that reading is language-based in her work on automaticity in language retrieval (i.e., naming). She says the naming process plays a role in the acquisition, development and/or breakdown of reading. Naming requires the utilization of certain cognitive and linguistic subprocesses including perceptual, conceptual, lexical, and motor operations as does reading. If letter recognition is automatized (that is, recognized, categorized, and retrieved quickly), more complex tasks like word recognition are possible. It is the earlier stages of reading that incorporate and depend upon lower-level processes and share more connections with

naming than later strategies. The beginning reader who is without a substantial number of sight words, often must laboriously decode each word encountered. In contrast, a child who has automatized word recognition to some degree is freed to pursue the primary goal in reading of comprehending what is read. Wolf goes on to say that within lexical operations are the development and organization of semantic and phonological functions and the ability of the total system to be accessed through either phonological or semantic pathways. Otitic children who have access to an unstable language base because of a transient hearing loss may well have deficient phonological pathways that interfere with their naming ability. Wolf further states that the ability to process automatically is the basis of fluency in both naming and reading. Indeed, in a later study, she found that impaired readers performed significantly slower than average readers in name retrieval speed for letters, numbers, objects, and colors.

As Vellutino and Wolf show, reading is an extension of language and the tacit use of the systems that comprise language. Reading is a highly sophisticated use of language which requires bringing to conscious awareness knowledge of the categories and rules in the oral language (Menyuk & Flood, 1981). Simply put, text is language written down. However, in order to access that text fully,

one must tacitly understand the conventions (phonetic, semantic, etc.) of language to do so successfully. Most children manage to pick up the alphabetic principle without much explicit instruction. They are able to discover the commonalities between similarly spoken and written words (Liberman, Shankweiler & Liberman, 1989). Conversely, for some children it is a laborious process. Their poor decoding skills reflect a lack of phonological awareness which is caused by a wider deficit in phonological processing (Shankweiler, 1989).

In the book Beginning To Read, it is asserted that an awareness of phonemes is a prerequisite to reading (Adams, 1990). The importance of phonology to naming and reading is mentioned again and again in the literature. Indeed, Adams offers a model (see Figure 1) that illustrates the way in which the phonological processor is related to the rest of the system as it is involved in reading.

Adams sees reading as an interaction of a number of systems that rely on both the orthographic and phonological input. Without these, it would be impossible to extract meaning from text. Children can automatically recognize words that they have encountered in print repeatedly (especially if their underlying naming skills are strong enough to support that level of lexical access) but unknown words depend significantly upon phonological processing for

decoding. Children with a deficient or delayed phonological system would be at a clear disadvantage when it comes to reading.

Similarly, Read and fellow researchers emphasize the connection of language to reading in their work on phonemic segmentation (Read, Yun-Fei, Hong-Yin, & Bao-Qing, 1986). He defines phonemic segmentation as the ability to conceive of spoken words as sequences of phonemic segments within words and syllables. Not only can poor reading be predicted from poor segmentation skills but the skilled reader uses the phonological structure of words and therefore must be able to segment (Liberman, 1982). This ability to segment clearly relies on a firm grasp of the underlying structures of language which, according to researchers like Menyuk and Berko-Gleason, is something OME children often do not have. Chomsky's notion of linguistic competence (one's capacity to use a language) and linguistic performance (the actual application of this competence in speaking or listening) is applicable to OME children. The language development of OME children has been characterized as follows: (a) they produce normal sounding speech, (b) their speech is delayed, but not deviant, and (c) they have limited vocabulary and difficulty in reading (Berko-Gleason, 1983). In other words, OME children have their linguistic competence compromised early on which in turn affects their later linguistic performance.

Part of that linguistic performance is clearly developing reading skills.

Attention deficit disorder. Another effect of OME reported in the literature is a connection between it and attentional problems. Certain OME children, probably because of an unstable language base, may never develop the habit of attending and listening because it is so hard for them to do so (Feagans, 1987). Feagans notes that attending and listening is particularly problematic in a noisy setting such as a classroom. As mentioned earlier, she found that a history of OME impacted on the child's ability to develop narrative skills when they reached school-age. Feagans posits that children can more easily recover their basic skills in syntax, semantics, and phonology after OME subsides but the mediating process which may remain is a lack of attention to language.

Task orientation and the ability to work independently was found to affect children with histories of OME (Roberts, Burchinal, Collier, Ramey, Koch & Henderson, 1989). These characteristics are hallmarks of children with attention deficit disorder. In addition, current and early incidence of OME were prevalent among learning-disabled children, many of whom exhibit attentional problems (Bennett, Runska & Sherman, 1980). Another study found that OME

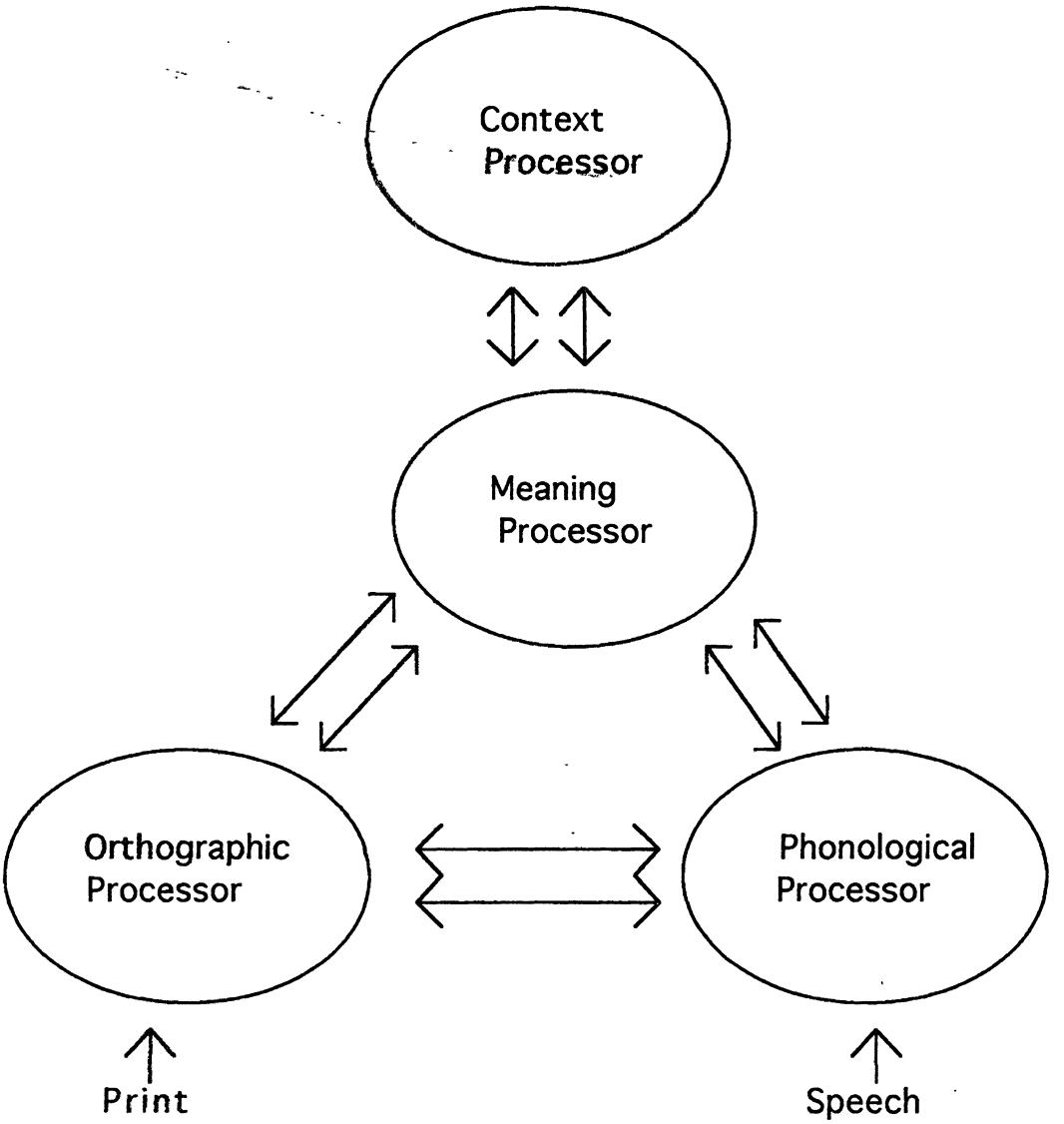

Figure 1.
(Adams, 1990)

was associated with developmental and attentional problems in children (Silva, Kirkland, Simpson, Stewart & Williams, 1982). The connection between ADD and OME was further advanced by two separate studies that found that learning-disabled children have almost twice as much middle ear pathology as normal children (Masters & Marsh, 1978; Reichman & Healey, 1983). It would be interesting to know how many children are designated learning-disabled owing to a developmental delay associated with OME rather than a true learning disability.

Finally, parents of the OME children in one study reported that their children had shorter attention spans and a variety of behavior problems (Silva et al., 1982). They were described as more restless, fidgety, destructive, less popular, and more often disobedient. Clearly, all of these described behaviors can adversely effect success in school.

Reading delay. While there is considerable evidence suggesting that otitis media impedes hearing and consequently language development, there is little research done on the effects of OME on the acquisition of reading and spelling. Yet, if reading is a language-based endeavor, it seems logical to expect that an interruption in

language in the early years would have an effect upon the later acquisition of reading. Any reduction of the language base will have an adverse effect on the ability to learn new language skills such as reading. Certainly poor readers score less well on pseudoword decoding tasks than normal readers (Vellutino, 1982). That is, their phonological base is diminished to such an extent that they are less able than good readers to figure out made-up words that follow conventional phonological rules. Similarly, a relationship has been established between naming latency and reading ability (Denckla & Rudel, 1974, 1976). Denckla and Rudel's Rapid Automatized Naming Test (R.A.N.) measured the speed and accuracy with which subjects named randomly presented colors, letters, and objects. Poor readers tend to be slower and less accurate than normal readers. Intuitive oral knowledge alone is insufficient for the reading task. Rather, reading requires bringing to conscious awareness one's oral language knowledge (Menyuk & Flood, 1981).

Despite the overwhelming evidence of a strong reading/language connection, not all researchers have found a significant correlation between OME and delayed reading. In one study, the reading skills of otitic and non-otitic children were compared at age eight years and again at age nine. No significant correlations were found (Lous & Fiellau-Nikolajsen, 1984).

However, the conclusions of this study are limited because it used children whose OME was documented at age three and above, far beyond the primary period of language acquisition. Such children's language skills were already substantially developed, so the impact of OME likely would be quite small. On the other hand, the association between OME and spelling and decoding skills was investigated in another study and a positive correlation was found (Zinkus, Gottlieb & Schapiro, 1978). Nevertheless, while a positive correlation was found, their work relied exclusively on standardized tests and involved no qualitative assessment of linguistically-based reading and writing behaviors. There is much evidence to suggest that name retrieval, spelling, and word recognition differentiate achieving and non-achieving readers. Yet this line of inquiry has yet to be applied to otitic and non-otitic populations.

Objectives of the Current Investigation

It has been documented that children with a history of otitis media during the important period of early language acquisition experience a transient hearing loss that potentially confounds their ability to process and manipulate language. This difficulty with language has been shown to influence their overall level of academic

achievement due to language delay, possible attentional problems, and poor reading skills.

The purpose of this study is to determine if early onset otitis media with effusion does indeed alter the child's ability to use and manipulate language and if that impairment affects the child's ability to learn to read. Without question, a child's ability to read has a decided impact on that child's success in school. Reading is the conduit of knowledge and children without access to that conduit suffer tremendously in school. Indeed, a reading disability can have an enormous effect on a child's life in terms of self-confidence and overall goals. The purpose of this study is to examine the long-term effects of otitis media, especially in terms of reading achievement and attentional difficulties.

At present, pediatricians who see children for OME are aware of the possibility of the disease impacting on the child's language acquisition. When a child begins experiencing chronic or recurrent OME, it is routine for that child to be referred to a pediatric otolaryngologist for evaluation and consideration of tubes being inserted. While tubes present some risk, they aerate the middle ear sufficiently to allow the canal to become clear of fluids which, in turn, allows for better sound conductivity. Some pediatric otolaryngologists refer OME children to speech therapists to help

remediate their obvious speech problems. Although numerous studies in the medical literature (Zinkus, 1980; Roberts et al., 1989; Howie et al., 1979; Bennett et al., 1980; Holm & Kunze, 1969; Rapin, 1979) have made connections between learning-disabled children, children with attentional problems, lower-achieving students, and OME, the risk factor of OME is still not widely known in the medical community. Likewise, researchers like Menyuk, Feagans, Friel-Patti, and Berko-Gleason have been sounding the alarm about OME and its association with linguistic and academic problems for years and the educational community has yet to intervene with these children. Most case histories required for LD (learning disability) placement do not even include questions on the history of OME for the child applying for services.

The goal of this study, then, is to determine the extent of the connection between OME and reading and attentional problems. If such a connection can be established then intervention programs may be undertaken for these at-risk children. At-risk children who are identified and admitted into the Head Start Program, for example, are given a chance for success, a chance to remove obstacles that stand in their way, a chance to begin school on an equal footing with their classmates. Identifying children with histories of otitis media

as at risk for reading and other language-related activities early on might help them in much the same way.

By examining each facet of reading and attentional skills and ascertaining where OME children may falter, this study should provide insight as to what the proper intervention might be for these children and when it might be most effective. At present, teachers of OME children know them to be delayed in their reading and spelling but often consider them lazy and describe them as behavior problems in their classrooms. Because little is known about their history of OME, these children often languish in classrooms where their specific linguistic needs are not understood and therefore not met. Most have not had early intervention of any kind and are starting school with an undiagnosed disability. It is only through the identification of the problem that appropriate remediation and recommendations can be made.

Given the body of research on OME and the potential for residual effects on language and the acknowledged connection between language and reading, the following research hypotheses are proposed:

I. Children with four or more episodes of OME during the primary language acquisition period (birth to 3 years) will experience more difficulty learning to read when they reach school

age than their age peers who have had no such difficulty. That is to say, such children should do worse on measures of reading and phonology.

II. These same children, due to reduced hearing during the OME episodes, will demonstrate more difficulty sustaining concentrated attention when they reach school age than their age peers who have not had the same history of OME. That is to say, these children should do worse on the WISC-R Freedom From Distactibility factor.

CHAPTER II

METHOD

As discussed in Chapter 1, otitis media is a common infection of the middle ear cavity which impedes sound vibrations traveling through the middle ear enroute to the inner ear and auditory nerves. Most children have at least one infection before the age of one but many have recurrent infections that have a deleterious effect on language acquisition. It has been shown in numerous studies that children with chronic or recurrent otitis media often experience some kind of language delay. The purpose of this study, then, is to look at what effect this potential language delay has on the acquisition of reading skills and attentional abilities when the child reaches school age. To accomplish this, a group of 40 children, between the ages of 8 and 10 years, were tested on a variety of reading, language, and intelligence measures. By the age of 8, most normally achieving students will have moved from the beginning reading stage into a definite instructional level. By allowing time

for reading to become solid, it was felt that any delay in reading picked up by testing would indeed be a true delay.

Participants

A group of 20 children (age 8-10) from a small, suburban community in central Virginia was identified by a pediatric otolaryngologist as having a history of OME involving more than four episodes of the disease before the age of three. Approximately two-thirds or more of those parents contacted, agreed to have their children participate in the study. A query letter, which also served as a consent form, was sent to each participant (see Appendix F). These 20 children were then matched as closely as possible by age, sex, socio-economic status (using the Hollingshead Scale) with a group of children who had no more than one known or documented episode of otitis media during that same time span. The study included 28 boys and 12 girls whose socio-economic status ranged from "1" through "6" on the Hollingshead Scale (see Table 1). With the exception of one African-American male, all the participants were Caucasian. Sixteen children in the study were identified as falling into the upper socio-economic range, sixteen more were identified as falling into the middle socio-economic range, and 8 were identified as falling into the lower socio-economic range.

Table 1

Socio-Economic Status as a Function of OME or Non-OME Group Membership

	OME	Non-OME
Boys		
Lower	3	3
Middle	6	6
Upper	5	5
Girls		
Lower	1	1
Middle	2	2
Upper	3	3

Any children with emotional or physical complications were excluded from the study. One girl was discovered to have mild cerebral palsy and another girl recently suffered an emotionally traumatic blow at the hands of her father. Both children were tested but their results were not included in this study.

Measures

Wechsler Intelligence Scale for Children-Revised. Each child was tested with the Wechsler Intelligence Scale for Children-Revised (WISC-R) to assess the child's overall intellectual strengths and weaknesses. Since many children who suffer repeated episodes of OME at early ages are suspected of having a concomitant hearing loss, the Verbal IQ, in particular, was examined. Further, to test one of the hypotheses in this study concerning the OME child and associated attentional difficulties, it was necessary to look at the Freedom From Distractibility quotient.

The WISC-R yields individual subtest scores, a Verbal score, a Performance score, and an overall Full Scale IQ score. In addition, factor scores including Freedom From Distractibility, Verbal Comprehension, and Perceptual Organization are obtained. Administration of this test requires trained psychometricians and follows the format established during the norming of this

instrument. The standard scores from this norm-referenced test are reported.

The reliability of the WISC-R is reported in its manual (Wechsler, 1974). The test/retest reliability coefficient for the ages represented in this study (ages 8- 10) ranges from .95 to .96 for the Full Scale IQ. For the Verbal Scale IQ, the range is from .92 to .94. Lastly, for the Performance Scale IQ the range is from .89 to .91. Individual subtest test/retest reliability coefficients, for the same age groups, fall within the .64 to .86 range.

Informal Reading Inventory. Each child was administered an Informal Reading Inventory (IRI) that was devised by the faculty and graduate students of the McGuffey Reading Center (see Appendix A). It uses graded passages from the Houghton Mifflin basal reading series and employs comprehension questions created following Stauffer's guidelines for inferential, factual, and vocabulary questions (Stauffer, Abrams, & Pikulski, 1978). The IRI yields a variety of scores of interest in this study including Word Recognition in Isolation (both timed and untimed), Word Recognition in Context, Comprehension, Hearing Capacity, and overall Reading Level.

The IRI directly tests the child's ability to decode words (along with a variety of other skills) and as such has a high degree of content validity and therefore does not require norming. Instruments such as the IRI, that measure skills directly, are not psychometric in nature. For this reason, reliability in the conventional sense (e.g., test/retest, internal consistency, etc.) would not provide meaningful information. Similarly, because it is not psychometrically designed, information regarding its empirical validity would not be meaningful. Nevertheless, while an overall reliability rating is not available on the IRI, its content validity is sound since it uses Houghton Mifflin's graded passages which are accepted within the educational community as representative for each grade level.

Spelling. The Schlagal Spelling Inventory (Form A) was administered to each child. This inventory contains words culled from basal readers on each grade level and are chosen based upon certain orthographic features the words offer. Each child was started at Level I and progressed until their score slipped below 50%. The cumulative count of correctly spelled words was reported (see Appendix B). The Schlagal Spelling Inventory consists of both a Form A and a Form B. The two forms were compared to establish the

reliability of the alternate forms (Zutell, 1994). The correlation between forms ranged from .86 to .91. Further, the stability over time was examined in a longitudinal study with children in third grade and again when they reached fifth grade (Zutell & Fresch, 1990). The reliability proved to be .91.

Parent Interview. The parent or parents of each child took part in a two hour interview regarding the child's reading habits, behavior in school, the possible existence of a family history of reading disability, as well as questions about the child's general physical and emotional development. The information elicited from this interview was qualitative in nature and was designed to be exclusionary as well as to provide insight into each child's overall development. It was based on information gleaned during this extensive interview that two children were excluded from the study since confounding medical and emotional problems might possibly make the OME differences less distinct (see Appendix C).

Rapid Automatized Naming Test. The R.A.N. test was designed by Martha Denckla and Rita Rudel to determine the degree of automaticity that a child has in naming random colors, letters, and objects. Denckla and Rudel's study, from which the R.A.N. test

came, tested 180 children (90 boys and 90 girls of average intelligence) on a variety of automatized naming tasks. These data supported their hypothesis that the swift naming of colors in kindergarten is a valid predictor of reading readiness in school. The children in this study are clearly beyond kindergarten age and the age where the R.A.N. test is considered a predictor of reading readiness. Nevertheless, the R.A.N. was administered to determine whether or not children who show substantial delays in reading somehow have a concomitant delay in automaticity of word retrieval.

The R.A.N. test is constructed so that each child is required to name a random series of five colors as quickly as possible without errors. After completing the color chart, the child is asked to do the same thing with both objects and letters. The total time was converted to seconds for purpose of analysis.

A detailed description of this instrument is also presented in Coulter, 1988.

Diagnostic Test of Phonic Skills. This test, also known as the Bryant Pseudoword Decoding Test (see Appendix D), requires the child to apply the phonetic principles of English to nonsense words (Bryant, 1963). A child's ability or inability to correctly sound out

each word reflects on that child's degree of skill using phonics. Thus, this task, and others like it, test what experts think of as phonetic capability. It is plausible to suppose, then, that success on this task would mean a firm understanding of the underlying phonetic system of English. Conversely, failure on this task may mean a weaker concept of how words work phonetically.

A series of nonsense words, beginning with monosyllabic and progressing to polysyllabic, are presented to the child. Each syllable correctly identified is counted cumulatively towards the total. It is that cumulative total that is reported. Separate scores were obtained for monosyllabic and polysyllabic pseudowords. There is no reliability information available on this task. However, like the IRI, this task is not psychometric in nature and, as such, reliability information is not considered meaningful.

Detroit Tests of Learning Aptitude. Each child was also administered a subtest from the Detroit Tests of Learning Aptitude (DTLA-2) called Sentence Imitation (Hammill, 1985). This subtest is useful in determining whether or not a child might have difficulty correctly repeating a sentence back to the examiner. Incorrect imitation might indicate problems that are attentional, syntactical, or auditory in nature. The standard scores from this norm-referenced test are reported. The test/retest reliability of the

Sentence Imitation subtest on the DTLA-2 is .82 (Hammill, 1985). Evidence for the content validity, criterion validity, and construct validity are presented in the testing manual along with normative information and reliability (Hammill, 1985).

Procedures

Each child was tested at the McGuffey Reading Center at the University of Virginia by graduate students and faculty at the Center. The testers were already practicing clinicians well-schooled in administering all the tests included in this study. Nevertheless, the testers were instructed in the methodology of this research and the manner in which it would be conducted.

Each child was seen in two sessions during a one-day period for a variety of reading, spelling, and psychometric tests. In addition, a parent interview was conducted. One session was entirely taken up by the Wechsler Intelligence Scale for Children-Revised (WISC-R) and the Sentence Imitation task from the Detroit Tests of Learning Aptitude (DTLA-2). The other session included the Informal Reading Inventory (IRI), a writing sample, a spelling test, the Bryant Pseudoword Decoding Test and the R.A.N. Each session lasted between one and a half and two hours. During one of the child's two sessions, the parent interview was conducted using the

interview typically used at the McGuffey Reading Center in their reading evaluations.

Each examiner received a packet of test materials and a list containing the order in which they would be administered. The examiners were unaware at the time of testing whether they were testing an otitic or non-otitic child to eliminate the possibility of affecting their objectivity. The principal investigator was present at all testings to answer any questions that might arise. All of the test scoring was double-checked by the investigator for accuracy.

A grade level score for sight word vocabulary, oral reading fluency, comprehension, and hearing capacity was obtained from the child's performance on the IRI to help in determining the overall reading level of the child. In addition, each above-mentioned facet of the IRI yielded its own quantitative score to aid in comparing the OME and control children.

Word Recognition in Isolation: Timed and Untimed. On the IRI, sight word vocabulary is tested in two ways. The child is presented with graded lists of words taken from a computer pool of words at each grade level in the Houghton Mifflin reading series. All children start at the Primer level and continue until they score less than 75% on any given level. First, the child is shown the words, one at a time,

in a flashed presentation (approximately 1/4 of a second presentation), and is asked to identify the word. This tests a child's automatic sight word vocabulary. The resulting score, a cumulative score of all words correctly identified, is called Word Recognition in Isolation-Flashed (WRIF). Next, the child is shown any missed words in an untimed presentation, allowing the child ample time to figure out the same words he or she misidentifies or does not know in the flashed presentation. This is called Word Recognition in Isolation-Untimed (WRIU) and it tests the child's ability to decode isolated words. This, too, is scored cumulatively beginning with the Primer level counting all words correctly identified.

Word Recognition in Context. Oral reading fluency, or Word Recognition in Context (WRC), is tested by listening to the child as he or she reads aloud the passages on the IRI. The child is asked to begin reading at the lowest grade level where he or she scored 75% or more correct on the WRI. A score of 75% or higher on the WRI indicates that the child has enough word power in isolation to read with some degree of success at that level. Notations are made as to errors, substitutions, or omission of words as the child reads aloud. In short, any deviation from text is noted and then scored according to Stauffer's guidelines (Stauffer, Abrams, & Pikulski, 1978). This

yields information about the child's ability to identify words using not only decoding skills but also the context of the sentence or passage as an additional clue. The grade level at which the child achieves a score of 90% or more is reported. A score below 90% would mean the child is missing more than 10% of the words in the passage and that is insufficient for adequate comprehension.

Comprehension. Comprehension is measured by asking inferential, factual, and vocabulary questions following each passage on the IRI and scoring them as either correct or incorrect. While the child's score on the comprehension portion of the IRI is used in determining an overall reading level which is examined in this study, individual comprehension scores are not reported in this study.

Hearing Capacity. When each child finally reaches a level where his or her reading skill is insufficient for the demand, a passage from the IRI is read aloud to them and the comprehension questions are asked. This Hearing Capacity (HC) test demonstrates how well a child can understand a given passage when freed from the constraints of print. It also shows how well a child might do if reading materials on certain levels were read aloud to him or her if

in fact they could not read it themselves. The score reported is the grade level at which the child achieves a comprehension score of 70% or more. A score of 70% or more indicates that the child is able to understand adequately what is read to him at that level.

Reading Level. Reading level was determined by a committee of three (two Reading Education professors and the investigator), acting independently, who individually interpreted all of the above evidence and ascertained an overall reading level. The committee then met and agreed on reading levels, by grade level, for all of the children involved in the study. The inter-rater reliability ranged from .98 to .99.

R.A.N. Each child was presented with a series of three boards: one consisting of random letters, another consisting of random colors, and, finally, one consisting of random objects. After making sure that the child was familiar with each of the colors, letters, and objects being used, the child was told to name them in order as fast as they could. The child 's performance was timed and that time (in seconds) was reported.

Diagnostic Test of Phonic Skills. In this test, also known as the Bradley Pseudoword Decoding Test, each child was shown a nonsense word on a card and was required to sound it out (Bradley, 1963). All sounding-out attempts were noted by the examiner and scored as correct or incorrect. Although the word was one without meaning, thereby eliminating the possibility of any sight word identification, it did comply with the phonetic principles of English and, as such, could be sounded out. Some examples of pseudowords are BAC, POY, and JUKTION. The test begins with monosyllabic words and progresses into polysyllabic words. The cumulative score of correctly pronounced syllables was reported.

CHAPTER III

RESULTS

In this study I offered two major hypotheses for examination. First, that children with four or more episodes of OME during the primary language acquisition period (birth to 3 years) will experience difficulty learning to read when they reach school age. Second, these same children, because of their reduced hearing during the OME episodes, will demonstrate difficulty sustaining concentrated attention when they reach school age.

Hypothesis I

To test the first hypothesis, the data were sorted according to the presence or absence of OME in the subjects. Since reading is a complex procedure, comprised of a variety of facets, the data for each individual facet of reading was tested and the mean scores for each group were compared. The mean of the OME population was compared to the mean of the control population, on all the facets of

reading, and the differences were tested for significance using t-tests. For example, I was interested in knowing if Reading Level was affected by OME. To test this hypothesis, the reading level of each child was determined and the means and standard deviations were computed and compared. All remaining facets of reading were tested in like fashion. Accordingly, each of the scales of the study related to reading were t-tested. The means, standard deviations, and t-ratios are shown in Table 1.

Informal Reading Inventory. On the Informal Reading Inventory (IRI), the children with histories of OME performed significantly less well than their normal counterparts on all tasks. OME children were unable to automatically recognize words on the Word Recognition in Isolation-Flashed (WRIF) as well as normal children. Further, when allowed ample time to decode the same words, OME children still were less able than their counterparts to do so successfully on the Word Recognition in Isolation-Untimed (WRIU) task. While words in isolation offer no contextual clues to aid in decoding, the Word Recognition in Context (WRC) task does. Normal children performed significantly higher than the OME children on the WRC task. The magnitude of the difference in the means between the OME and control children is worth reporting. The OME children were

approximately two-thirds of a standard deviation lower than the control children in their ability to both automatically decode isolated words (WRIF), decode words in isolation with no time limit (WRIU), and decode words in context (WRC).

When the subjects in this study reached a grade level passage where they could no longer read adequately, the passage was read aloud to them. This Hearing Capacity (HC) task helps to determine whether the child can comprehend what is read aloud to him or her. On HC, OME children were significantly less able than the control group to comprehend material read aloud to them. Even freed from the constraints of print, these children have trouble making sense of what they hear. The means of the OME children were .82 of a standard deviation below their controls on this task.

The overall Reading Level (READL) of both groups of children was determined, taking into account each child's performance on all the above-mentioned tasks, and the OME children were found to be significantly lower than their normal counterparts. In fact, the means of the OME children were approximately two-thirds of a standard deviation behind their controls. In response to the first hypothesis, then, the results support the view that the OME children did indeed experience difficulty in learning to read when they reached school age.

Table 2

Means, Standard Deviations, and t-ratios as a Function of OME or Non-OME Group Membership for Each Literacy Task

Task	OME	Non-OME	Difference	t-ratio
WRIF	76.35 (62.18)	115.35 (65.57)	-39.00	-1.93*
WRIU	93.05 (65.67)	140.30 (66.95)	-47.25	-2.25*
WRC	3.22 (3.11)	5.20 (2.96)	-1.98	-2.05*
HC	4.23 (2.82)	6.05 (2.21)	-1.82	-2.24*
READL	2.41 (2.54)	4.30 (2.92)	-1.89	-2.18*
PSEUDO1	16.85 (9.21)	22.80 (8.05)	-5.95	-2.18*
PSEUDO2	5.40 (5.02)	9.25 (4.26)	-3.85	-2.61**
SPELLING	41.20 (37.44)	63.80 (46.55)	-22.60	-1.69*
RANC	55.85 (17.72)	53.30 (17.41)	2.55	.46
RANO	54.30 (13.99)	51.95 (12.21)	2.35	.57
RANL	34.20 (11.09)	30.35 (8.20)	3.85	1.25

Note: Standard deviations are in parentheses.All statistical tests are one-tailed.

***$p < .001$
**$p < .01$
*$p < .05$

Spelling. Although spelling is not always thought of as a reading task, it does afford us a look at what the child knows about the phonetic sense of words and how they work. Since OME children often have experienced an interruption in language and may have some concomitant language delay, it is interesting to see their sound/symbol knowledge reflected in their spellings. Children in both groups were given graded lists of words and their cumulative scores were compared. The normal children were significantly better spellers than their OME counterparts. The means of the OME children were approximately one-half of a standard deviation lower than their controls on the spelling task. This suggests that the normal children have more tacit understanding of the phonetic structure of words than OME children.

In a similar vein, both sets of children were given the Bryant Pseudoword Decoding Task which also looks at the tacit phonetic knowledge children apply to decoding words. On the monosyllabic portion of the test (PSEUDO1), the OME children performed significantly behind the control group. On the second portion of the test involving the decoding of polysyllabic words (PSEUDO2), the OME children performed even further behind their peers. These children know very little about how words work and cannot apply

what they do know successfully to either real or pseudowords. The means of the OME children on both of these tasks were lower than their controls. On the PSEUDO1 task, the OME children were .73 of a standard deviation lower than their controls and .90 of a standard deviation lower on the PSEUDO2 task. This is not surprising since PSEUDO1 is a simpler task requiring recognition of only monosyllabic words.

In response then to my first hypothesis, the OME children did indeed experience difficulty in learning to read when they reached school age. In fact, they scored significantly behind their normal counterparts on each and every facet involved in reading and spelling that was administered.

The automatic recognition of sight words is necessary for successful, fluent reading. Research has shown that children who can automatically recognize colors, letters, and objects in kindergarten tend to be the children who later become successful readers. Although the children in this study were well beyond kindergarten age, the Rapid Automatized Naming Test (R.A.N.) was administered to determine if the OME children were different from normals, even at this late stage, in automatically recognizing these same items. For colors (RANC), letters (RANL), and objects (RANO), there were no significant differences between the two groups. If

there had been a difference when they were of kindergarten age, it certainly was not in evidence at the time of this testing.

Hypothesis II

The second hypothesis is that OME children, because of their reduced hearing during the OME episodes, will demonstrate difficulty sustaining concentrated attention when they reach school age. To test this hypothesis, all subtests of the Wechsler Intelligence Scale for Children-Revised were administered and the factor scores were examined. Of particular interest was the Freedom From Distractibility factor (FFD) which is made up of three subtests from both the Verbal and Performance Scales that require sustained concentration for success. They are Coding and Digit Span from the Performance Scale and Arithmetic from the Verbal Scale. Also of interest was the difference between the two groups in their Full Scale IQ (FSIQ) as well as their comparative scores on Verbal Comprehension IQ (VC) scores and Perceptual Organization IQ (PO) scores. The mean of the OME population was compared to the mean of the control population and the differences were tested for significance using the t-test. For example, I was interested in knowing if the Full Scale IQ (FSIQ) was affected by OME. To test this hypothesis, the FSIQ of each child was determined and the means and

standard deviations were computed and compared. All remaining subtests and factor scores were tested in like fashion. Accordingly, each of the scales of the study related to IQ and attentional difficulties were t-tested. The means, standard deviations, and t-ratios are shown in Table 2.

Wechsler Intelligence Scale for Children-Revised. Both the experimental and control groups were administered the WISC-R and Full Scale IQ scores were determined. Surprisingly, the results showed that the OME children had significantly lower FSIQ scores than the control group. The means of the OME children were .80 of a standard deviation lower than their controls. It seems that a random group of children would not differ to such an extent simply by chance. Having controlled for age, sex, and socio-economic level, it suggests that the difference is associated with the history of OME in these children.

The FSIQ was broken down into three factor scores that separate out the different strengths and weaknesses in the subjects. The Verbal Comprehension factor contains four subtests and each of them was examined. These subtests (Information, Similarities, Vocabulary, and Comprehension) require that the child formulate an answer and deliver it verbally. Typically, children that are skilled

with language fare better than children who are less verbal. The Perceptual Organization factor (Picture Completion, Picture Arrangement, Block Design, and Object Assembly) deals primarily with the child's gestalt of objects and ability to perceive spatial relationships. The final factor, Freedom From Distractibility (Arithmetic, Digit Span, and Coding), examines the child's ability to sustain concentration during rote, meaningless tasks.

Verbal Comprehension Factor. The Information (INFO) subtest assesses the child's general knowledge of the world around him. The OME children were not significantly different from their controls on this task. However, the difference between the means is in the predicted direction, but it is not significant. In fact, the means of the OME children were over one-half of a standard deviation lower than their controls. The magnitude of that difference is not to be ignored.

Conversely, the OME children scored significantly lower on the three remaining subtests that compose the Verbal Comprehension (VC) factor. The Similarities (SIM) subtest assesses the child's ability to examine two seemingly disparate things and label what is common between them. On this verbal, critical thinking subtest, the OME children scored significantly lower than their controls. On the

Vocabulary (VOCAB) subtest, which tests the child's knowledge of the meaning of words, the OME children again scored significantly lower than their controls. Finally, the Comprehension (COMP) subtest assesses a child's sense of not only how the world works but their understanding of their own role in it. The OME children again scored significantly less well than their controls. The means of the OME children on Similarities, Vocabulary, and Comprehension ranged from .76 to .90 of a standard deviation lower than their controls.

As mentioned above, these four subtests, when factored together, yield a composite score that reflects the child's overall verbal aptitude. The OME children were significantly lower than the normal children on the Verbal Comprehension (VC) factor. Their mean scores were almost a full standard deviation (.96) lower than their controls. This suggests that the verbal aptitude of children is affected by the presence of OME.

Perceptual Organization Factor. The second factor score, Perceptual Organization (PO), reflects the child's overall perception of spatial relationships and understanding the gestalt of certain objects. The Perceptual Organization factor contains four subtests and each of them was examined.

Table 3

Means, Standard Deviations, and t-ratios as a Function of OME or Non-OME Group Membership for each IQ, Attentional, or Language Task

Task	OME	Non-OME	Difference	t-ratio
FULL SCALE IQ	109.75 (12.91)	119.45 (12.07)	-9.70	-2.45**
VERBAL COMPREHENSION	114.40 (14.55)	126.10 (12.13)	-11.70	-2.76**
Information	11.50 (2.98)	2.85 (2.34)	-1.35	-1.59
Similarities	12.50 (3.20)	15.40 (3.22)	-2.90	-2.86**
Vocabulary	12.70 (3.31)	14.60 (2.39)	-1.90	-2.08*
Comprehension	12.95 (2.30)	14.80 (2.41)	-1.85	-2.48**
PERCEPTUAL ORGANIZATION	110.25 (11.28)	113.55 (12.87)	-3.30	-.86
Picture Completion	11.75 (2.31)	11.80 (2.04)	-.05	-.07
Picture Arrangement	11.25 (3.04)	12.15 (2.81)	-.90	-.97
Block Design	11.90 (2.75)	12.40 (3.77)	-.50	-.48
Object Assembly	11.50 (2.64)	12.05 (2.81)	-.55	-.64

FREEDOM FROM DISTRACTIBILITY	95.35 (12.08)	100.15 (9.92)	-4.80	-1.37
Arithmetic	9.75 (2.57)	11.60 (2.54)	-1.85	-2.29*
Digit Span	9.70 (2.08)	9.70 (1.83)	0.00	0.00
Coding	8.40 (3.45)	8.75 (3.27)	-.35	-.33
SENTENCE IMITATION	10.90 (2.71)	10.40 (1.84)	-.50	.68

Note: Standard deviations are in parentheses.All statistical tests are one-tailed.

***$p < .001$
**$p < .01$
*$p < .05$

Picture Completion (PC) requires the child to examine pictures that have an obvious piece left out of the whole. There were no significant differences between the two groups on this task. Picture Arrangement (PA) requires that the child construct a sequenced story out of cartoon-like panels offered to them in no apparent order. There were no significant differences between the two groups on this task. Another subtest, Block Design (BD), requires the child to construct a three-dimensional, geometric pattern using multi-colored blocks from a one-dimensional picture shown by the examiner. There were no significant differences between the two groups on this task. The last subtest, Object Assembly (OA), requires the child to put together puzzle pieces to form a whole. There were no significant differences between the two groups on this task.

As mentioned above, these four subtests, when factored together yield a composite score that reflects the child's overall aptitude for perceptual tasks in general. There were no significant differences between the two groups on the Perceptual Organization factor.

Freedom From Distractibility Factor. The third and final factor score, Freedom From Distractibility (FFD), reflects the child's overall ability to sustain concentrated attention. The

Freedom From Distractibility factor contains three subtests and each of them was examined.

In the Arithmetic (ARITH) subtest a word problem is read aloud and the child is required to solve it without pencil or paper. On this subtest requiring verbal mental manipulation and the execution of arithmetic operations, OME children performed significantly lower than their controls. The means of the OME children were more than two-thirds of a standard deviation (.72) lower than their controls on this task. Nevertheless, on the Digit Span (DSPAN) subtest which requires a child to repeat back a string of rote, meaningless digits in both a forward and backward presentation, the OME children held their own. Despite the high degree of concentration and mental manipulation required, the OME children were not significantly different from their controls on this subtest. Finally, the child is supplied a code in the Coding (CODING) subtest and is required to fill in the appropriate code substitution for symbols. This rote, meaningless task yielded no significant differences between the two groups.

The Freedom From Distractibility quotient is arrived at by factoring together the three above-mentioned subtests. Despite a weaker showing for the OME children, relative to the control subjects, on the Arithmetic subtest on the FFD factor, there were no

significant differences between the OME and control children on the FFD. Nevertheless, the means of the OME children were approximately one-half (.48) of a standard deviation lower than their controls.

Overall, the WISC-R results supported the notion that, relative to age peers, children with histories of OME are not as strong verbally . Conversely, the WISC-R results did not directly support the notion that children with histories of OME are necessarily more distractible or less able to sustain concentration than normal children.

Detroit Tests of Learning Aptitude-2. One particular subtest on the Detroit Tests of Learning Aptitude (DTLA-2), Sentence Imitation (SI), was pertinent to this study and consequently was administered to each child. Sentence Imitation requires the child to repeat back to the examiner a sentence read aloud. The child must be able to hear and retain the sentence and then be able to repeat it back. This requires verbal memory skills, an ability to sustain concentration, and a grasp of the semantic and syntactic structure of sentences. There was no significant difference between the OME and control children on this task.

Summary

The first hypothesis concerning whether OME children are at risk for a reading delay when they reach school-age is supported by the results of this testing. OME children scored lower than their controls in all reading tasks. This overall reading delay is further supported by the results from the WISC-R testing where the OME children scored lower than their controls on the Verbal Comprehension factor.

The second hypothesis concerning the possible inability of OME children to sustain concentration was not supported by the data. In fact, OME children were not significantly different from their controls in this regard.

CHAPTER IV

DISCUSSION

In this study, the effect of OME on children during the first three years of life when they are acquiring language was examined. If, as the literature suggests, hearing is impaired to some extent with each episode of OME, it is not unreasonable to expect that the language base might be impaired as well. Since reading is a language-based endeavor, the purpose of this study was to determine if reading was affected by early onset OME. In addition, attentional problems have been linked with OME in the literature. This study set out to determine if children with OME exhibited characteristics of attention deficit disorder. It is clear that the data reported thus far support the first hypothesis regarding OME and delayed reading but not the second hypothesis regarding OME and attention deficit disorder. I will explore the reasoning behind these findings.

Hypothesis I

When the non-otitic children were compared with the otitic

children on all the measures of reading, the data supported the hypothesis that the OME children would experience delays in reading when they reached school-age. This hypothesis was based on the idea that OME children are left to infer the rules and sounds of language from an unstable language base because of impaired hearing during OME episodes. As mentioned earlier, these episodes can result in diminished hearing for up to three months for each episode. This sometimes lengthy period of impaired hearing during the important time for language acquisition (birth to three years) can make the OME children less able to manipulate language. In addition, OME children have been found to exhibit language delays. This comes as no surprise in light of their struggle to make sense out of language when their primary conduit, hearing, is impaired to some extent. Given an unstable language base and possible language delays, it is not surprising to find that these same children experience difficulty learning to read. As cited earlier, researchers such as Vellutino (1977, 1982, 1987) and Wolf (1984), as well as others, describe reading as a language-based skill. Reading is, simply put, language written down. A child, then, who is unskilled at language to begin with would logically be expected to find reading, a language-based task, difficult.

The children in this study were administered the Informal Reading Inventory which was broken down into a number of subtests.

The first aspect of reading that is addressed in the IRI is the ability of the child to automatically recognize words. Researchers like Denckla and Rudel (1974) and Wolf (1984) have claimed that strong relationships exist between the ability to automatically retrieve words and reading skill. The children were asked to recognize words in a flashed presentation (WRIF) where they were shown the word for a mere 1/4 of a second. In such a swift presentation, the child either knows the word or does not. They do not have the time to apply word attack strategies to sound out the word. Rather, these are words they have likely already encountered in print and can recognize swiftly by the orthographic configuration alone. The OME children fared poorly on the WRIF when compared to the controls in this study. It is not clear exactly why this is so. It could be that they are unpracticed readers who have not had enough exposure to print to automatically recognize words at this point. Perhaps, since they are delayed in reading, their reading instruction has been beyond their capabilities. In situations like that, children rarely develop the sight word vocabulary they need. OME children, whose language base has been compromised, may very well have difficulty grasping the overall structure of words and therefore

might have difficulty identifying them readily. Whatever the exact reason, the OME children were approximately two-thirds of a standard deviation lower than the controls, this is a sizable difference.

The ability to automatically recognize words is the hallmark of a fluent reader. Such a reader does not have to stop and sound out each and every part of a word to identify it. Fluent readers see a word, note the beginning element, and chunk the remainder of the word by the vowel and what comes after it. All of this happens extremely quickly. If an average reader reads approximately 250 words per minute, each word is given approximately 1/4 of a second consideration. This efficient method of word recognition is lost to the delayed readers who have not yet developed the strategies necessary to access words speedily. Unfortunately, this lack of automaticity can impede comprehension and ultimately make reading a chore. When reading becomes a chore, the child reads less and automaticity continues to be a problem.

When a child does not correctly identify a word in the flashed presentation, they are given ample time to identify the word at that point (WRIU). The child then has the opportunity to bring to bear all that he or she knows about how words work to attempt to solve the word recognition puzzle. The child attempts to decode the word

using his or her knowledge of phonics or structural analysis. Keeping in mind that OME children have had disruptions in language development and that their phonological awareness may be somewhat compromised, it is not surprising to find that decoding was also difficult for them. In fact, the OME children were again approximately two-thirds of a standard deviation lower than their controls. Clearly, their phonological abilities were such that, given all the time they needed, they were unable to apply effective word attack strategies such as phonemic segmentation, sound blending, structural analysis or the like. Without a substantial sight word vocabulary and an inability to decode phonetically, these children are clearly at a disadvantage when they encounter print. In some cases, a child who has an insufficient sight word vocabulary can still read reasonably well if they are able to decode unknown words. Their pace will be slow but they can keep themselves afloat in print. Eventually, sight words will come for a child in this predicament. But a child without a substantial sight word vocabulary and an inability to decode phonetically is bound to fail as a reader.

The children were then given graded passages to read aloud from the Houghton Mifflin reading series, based on the grade levels at which they demonstrated reasonable accuracy on the WRIF and WRIU. As each child read aloud, errors were recorded and a WRC was

determined. The Word Recognition in Context is very different from WRIF and WRIU because the child has context to rely on when automatic recognition and/or word attack strategies fail. Nevertheless, the OME children had trouble even with the support of context. Their phonological abilities cannot support them sufficiently even in text. Shankweiler (1989) reports that phonological information has to be extracted by orthographic decoding routines that, until highly practiced, are inaccurate and slow. Decoding skills remain inadequate as a consequence of deficiencies in phonological ability. Because the decoding is so laborious with poor readers, they quickly lose sense of what they are reading. The story line which helps the strong reader infer meaning is less useful to the poor reader whose energies are expended on the arduous task of decoding word by word. Consequently, they are unable to capitalize on any of the clues that strong readers use like syntactic redundancy or story structure. The weak phonological base exhibited by the OME children serves to undermine them in every facet of reading. On WRC, the OME children scored approximately two-thirds of a standard deviation below their controls.

Given the showing of OME children on these three facets of reading, Word Recognition in Isolation-Flashed, Word Recognition in

Isolation-Untimed, and Word Recognition in Context, it is clear that these children are at a true disadvantage when they reach school-age and begin the learning-to-read process. Their abilities to automatically recognize words, to decode what they cannot automatically recognize, and to use context as a support in decoding unknown words are significantly different from non-OME children. According to the results of this study, learning to read may be more difficult, in general, for children with repeated episodes of OME in their early years.

Once each child could no longer read a grade level passage adequately, the passage was read aloud to them. The purpose of this is to see if a child could comprehend material above his or her actual reading level. The OME children were significantly lower than their controls even on this task (HC). In fact, they scored .82 of a standard deviation below their controls.

It is unclear why exactly the OME children were less able to listen and comprehend than their controls. Certainly there have been links in the literature between OME and auditory processing problems (Quick & Mandell, 1983; Zinkus, 1978; Gdowski, 1986). In addition, Feagans (1987) has found that OME children never develop the habit of attending and listening as young children. These children often are unable to hear well enough to make sitting and listening to

a story worthwhile. Also, in the case of WRIF, WRIU, and WRC, it seems apparent that the underlying phonological base of OME children is weak and cannot support them sufficiently. If their phonological base is weak, it is not unreasonable to assume that that same weakness undermines their ability to make sense of what they hear. An inability or deficiency in phonology can mean that a child has difficulty segmenting the sounds that he or she hears read aloud. If a difficulty exists at this level, overall comprehension of a passage seems unlikely at best. These children are not proficient readers and it is reading itself that fosters the development of factors important in reading comprehension such as vocabulary and an increased general knowledge fund (Blachman, 1989). Limited exposure to new and different words and a limited knowledge of the world around them could also mean it is less likely for the child to gain meaning from print. Another possibility is that listening requires sustained attention to language which these children may be unaccustomed to doing and, in fact, may be unable to do. Whatever the source of the problem, the problem is a big one for OME children. It is clear from the data that they have difficulty understanding what is read aloud to them. The implications for the classroom are serious. These children are delayed in reading and are experiencing difficulty in understanding the material even if it is read aloud to

them. Learning, itself, then becomes a problem.

Finally, each child's reading level (READL) was found by factoring in all of the components of the IRI. Given their weak performance on all of the facets of the IRI, it goes without saying that their reading levels were significantly lower than their controls. Their means were approximately two-thirds of a standard deviation behind the non-OME children. Clearly, these children are facing an uphill battle when it comes to reading.

In addition to the IRI, other facets of reading were examined. All the children were administered a spelling inventory and the mean scores were compared. Spelling is interesting as part of a reading evaluation because it provides a direct window into how a child thinks words work. When they have to construct a word themselves, their knowledge of phonetics is completely apparent. Spelling requires knowledge of letter-sound correspondence as well as the ability to segment speech into smaller units which are then matched up with the appropriate letter or letters. Clearly, phonological awareness is crucial for a child to spell accurately. As expected, the OME children scored lower than their controls on this task. In fact, the means of the OME children were one-half of a standard deviation lower than their controls. This result certainly fits in with what has already been reported. These children appear to have a weaker

facility with phoneme segmentation and automatic retrieval of grapheme-phoneme correspondences. Their showing on the spelling task confirms that weakness. Their sound/symbol knowledge is consistently weaker than their non-otitic peers. In further research, it would be interesting to delve more deeply into the spelling of the OME children to ascertain their exact stage of orthographic development and what particular features are problematic for them. It is likely that sounds which are phonetically complex, such as liquids and glides, would be more troublesome for OME children to learn to represent.

To examine the phonetic abilities of OME children in this study, all the participants were given the Diagnostic Test of Phonic Skills. In this test, the child is shown a nonsense word and is asked to say it. In spite of it being a nonsense word, each word complies with the phonetic rules of English. That is to say, these were non-words which were spelled with allowable and regular orthographic patterns. To say the word correctly, the child must be facile with letter-sound correspondences and be able to apply these to each word. On the monosyllabic portion of the test (PSEUDO1) which contained words such as "maun," "wox," and "peke," the OME children were again significantly behind their peers. The OME children were almost three-quarters of a standard deviation lower

than their controls. It is evident from the results that OME children are not facile with letter-sound correspondences. Not only are they unable to apply phonics as they read but the results from PSEUDO1 suggest they cannot generalize phonetic information to nonsense words as well. Given their weak phonological base as evidenced on all the above-mentioned facets of reading, it seems apparent that nonsense words make even less sense to these children than "real" words do.

The children were also administered PSEUDO2 which contains only polysyllabic words. Words such as "unfute," "juktion," and "phaying" were shown to the children. It would have been startling had the OME children done well with this task since all the evidence up to this time suggests otherwise. In addition to facility with letter-sound correspondences and high frequency orthographic patterns, PSEUDO2 also requires structural analyses and the application of syllable stress. Stress assignment is a complex phonological skill so it is not surprising that their mean scores were .90 of a standard deviation below their controls. The more complex the phonological task is, the more difficult it is for the OME children.

The children were also administered the R.A.N. even though they are all well beyond the age where this test is a valid predictor

of reading readiness in school. Indeed, these children were all in school at least three years. Nevertheless, it was administered to determine whether or not children who show substantial delays in reading, like the OME children were suspected of having, might also show a problem with speed of word retrieval. When prompted with pictures of objects, letters, and colors, there were no significant differences between the two groups on this task. While there may very well have been a difference when these children were in kindergarten, as Denckla and Rudel's (1974) research has borne out, there was none at the time of this testing. This is in keeping with the research of Walsh, Price, and Gillingham (1988) who found that rapid naming tasks ceased to be correlated with reading achievement beyond the kindergarten years. Automaticity at the printed word level is still at issue with the OME children as their performance on the WRIU demonstrates but, clearly, they are able to retrieve the names of colors, letters, and objects without difficulty. This lends credence to the notion that these children are, in fact, delayed, not deviant.

With regard to Hypothesis I, children with histories of repeated OME episodes during the first three years of life clearly have difficulty learning to read when they reach school-age. The results of this study indicate that the OME children are significantly

behind their peers in every facet of reading and spelling. Overall, tasks that rely upon a solid phonological base appear to be especially problematic for these children. This is not surprising since OME children have experienced some transient hearing loss as they were beginning to learn all the systems of language such as semantics, syntax, and phonics. If those systems are interfered with and therefore unstable themselves, it is reasonable to expect those deficits to show up when these children are asked to learn to read. In particular, if the phonological base is weak, this would directly affect a child's reading ability. The data from this study indicate OME children are significantly lower than their controls in all facets of reading, all of which rely upon various aspects of phonological coding, storage, and retrieval.

Hypothesis II

The second hypothesis was that OME children would have difficulty sustaining attention when they reached school-age. The Wechsler Intelligence Scale for Children-Revised (WISC-R) was administered for two reasons. One, was to look at the factor score for Freedom From Distractibility which is typically used when diagnosing children with Attention Deficit Disorder (ADD). Two, was to look at the overall verbal abilities of the OME children. In terms

of the distractibility/attention issue, the results of this study do not support the idea that OME children are any more distractible than normal children. Surprising, however, was the difference between the OME children and non-OME in overall verbal ability.

First, the Full Scale IQ (FSIQ) on the WISC-R was computed for all the children. Because there were no prior indications that OME and non-OME children might differ in this regard, I was surprised to find that the FSIQ for the OME children was significantly below their controls. The means of the OME children were .80 of a standard deviation lower than their controls. This difference in FSIQ seemed anomalous at first until I looked further and saw exactly where the differences lay.

The FSIQ is made up of three factor scores which look at three very different facets of intelligence: Verbal Comprehension (VC), Perceptual Organization (PO), and Freedom From Distractibility (FFD). On the Verbal Comprehension factor, the OME children were significantly lower than their controls. In fact, their mean scores were almost a full standard deviation (.96) lower than their peers. When put into the context of OME and the effect it has on language development, this poor showing on VC is not surprising after all. The subtests that comprise VC are all dependent on language which is a potential problem for OME children.

On the Similarities (SIM) subtest where the child is asked to examine two seemingly disparate things and label what is common between them, the OME children were significantly behind the controls. This is a critical thinking task which requires the naming of a relationship. While the R.A.N. scores for the OME children were not significantly different from the non-OME subjects, perhaps the process of naming a relationship requires more language processing than naming overlearned stimuli.

On the Vocabulary subtest, children are asked to define words. The OME children again were significantly behind the non-OME children. Vocabulary learning is dependent upon two things. One, cumulative language acquisition, and two, reading where exposure to new words is a constant. OME children have been shown to be poor readers so reading will not provide the exposure to new vocabulary that they need. Their language acquisition has been adversely affected by OME in their early years so their cumulative language is not as substantial as non-OME children as these results indicate. The OME may have set them back in terms of phonological awareness which in turn makes them poor readers. Poor reading then begins to limit their language and cognitive growth which becomes a cycle of failure.

In a 1986 article, Stanovich refers to the "Matthew effect" of reading. The "Matthew effect" refers to the biblical story about how the rich keep getting richer and the poor keep getting poorer. Stanovich maintains that a certain amount of phonological skill and spelling-to-sound ability must be in place early in a child's development in order for that child to learn to read successfully. When a child does not have that level of phonological awareness, perhaps because of OME in the early years, a causal chain of negative side effects can occur. The child will be unable to decode sufficiently so reading will be neither fun nor rewarding. Therefore, the child avoids reading resulting in a lack of practice. Poor readers by the middle of first grade read approximately 16 words per week in school versus 1,933 for the strong readers (Stanovich, 1988). The poor readers are typically placed in texts that are too difficult for them which means they are less involved not only in reading but in reading related activities that go on in the classroom. Consequently, poor readers, have delays in the development of automaticity and speed of word recognition.

Stanovich maintains that reading itself contributes to the development of many cognitive and language skills. For example, reading boosts a child's fund of general information, exposes the child to complex syntactic structures, and extends their vocabulary.

By the time a child is in middle school, the poor reader reads approximately 100,000 words per year in school. The high readers read upwards of 10,000,000 per year in school. This snowballing disparity results in motivational and attitudinal problems along with a shrinking rather than a broadening of cognitive abilities. Just as the old adage says, "the rich keep getting richer, and the poor keep getting poorer," and so it goes with reading. A child whose innate abilities are impaired because of OME has difficulty learning to read and because he is never properly remediated, his vocabulary keeps getting worse and worse and worse.

The Comprehension subtest asks the child questions about how the world works and their place in it. To score well on this subtest, it is not enough to know the correct response but children must be able to compose and express their thoughts verbally. The OME children were again significantly behind their non-otitic peers. In fact, their mean scores on these subtests ranged from .76 to .90 of a standard deviation lower than their controls.

Interestingly, on the Information subtest which assess the child's general knowledge of the world around him, the OME children were not significantly different. However, the means of the OME children were over one-half of a standard deviation lower than their controls. While not significant, the difference in the means is in the

predicted direction. The Information subtest is, in a way, the least verbal of the VC. That is, it relies upon the child having been exposed to the world around him and, unlike the comprehension subtest, the child's answer can be a single word. It does not require an elaborate verbal response. Therefore, a child who has had rich life experiences can do well on this subtest even if language is not a forte for him. The other subtests on VC, described above, all require some manipulation of language and verbal expression which Information does not.

The results suggest that the verbal aptitude of children is affected by OME. The magnitude of the difference between the two groups could not be attributed to chance. These otherwise normal children could not all coincidentally be less skilled at verbal tasks than non-otitic children. OME which impairs hearing and disrupts language can reasonably be thought to contribute to the lower verbal scores of these children.

Overall, the OME children fared well when compared to their non-otitic counterparts on the Perceptual Organization factor (PO). On each of the subtests, there were no significant differences between the two groups. The OME children performed well on Picture Completion, Picture Arrangement, Block Design, and Object Assembly. When they are outside of the verbal realm, they are as

adept as any other child.

The final factor, Freedom From Distractibility, is the important factor in regards to Hypothesis II. This is the factor that is scrutinized when diagnosing children with ADD. It consists of three subtests, all of which are susceptible to attentional problems. Yet each one looks at somewhat different capabilities. The Arithmetic (ARITH) subtest requires the child to listen to a mathematical problem being read aloud and then to decide what mathematical operation it requires, and to execute it without benefit of paper or pencil. For an OME child who has been shown to have difficulty understanding what is read aloud to him (Hearing Capacity on the IRI), this is a daunting task. The questions on Arithmetic often involve dependent clauses and other complex sentence constructions which must be processed auditorily. In addition, the child has to decide which mathematical operation to use and then do it completely in his head. These operations require an impressive amount of mental manipulation and language processing which, it seems, OME children are not particularly good at. Whether it is an attentiveness to language or an inability to manipulate language to the extent needed, the OME children performed significantly lower on Arithmetic than their peers. In fact, the means of the OME children were more than two-thirds of a

standard deviation (.72) lower than their controls. This is the only subtest in the FFD factor that is dependent on language ability to such an extent.

On Digit Span, the child is asked to repeat back a series of rote, meaningless digits first in a forward presentation and then in a backward presentation. Clearly, this requires a fair amount of attention, memory, and some mental manipulation as well. Surprisingly, the OME children were not significantly different from their controls on this task. They were able to sustain concentration and even reverse the order of the digits they were presented. The reverse presentation, while a difficult task, is sometimes seen by children as a particular challenge and some children can actually score better in the backward presentation than the forward. The task that started out rote and meaningless has now become a challenge to the child. Nevertheless, the ability of the OME children to sustain attention and manipulate the digits was surprising at first. However, digit repetitions do not entail any other language construct such as dependent clauses or the like. What is to be repeated is simply digits, not sentences or phonological segments that must be manipulated. This may make the task more manageable in general. While Digit Span and Arithmetic both are part of the FFD factor, the tasks themselves differ greatly. It is true that both require some

measure of sustained concentration for success. Yet, even a child with strong attentional abilities might not be able to succeed at Arithmetic because of the complex syntactic component.

The last subtest of FFD is Coding. Coding requires the child to look at a code where one symbol stands for another and then fill in the blanks below where one symbol awaits its coded match. There were no significant differences between the two groups on this task. While Coding does require attention, it is not language-based. It requires only memory for visual symbols and fine motor coordination to accurately copy the correct symbol into the box. Coding, like Digit Span, differs from Arithmetic in that there is no complex language component to surmount.

From the results of the FFD, it appears that attention, in general, is not a problem for OME children. However, there is some evidence to suggest that attention to language structures, specifically, is the attentional problem peculiar to OME children. On the subtests in the FFD factor, the OME children fared well when the task was not linguistically-based. When a linguistic component is added, as it is on the Arithmetic subtest, the OME children scored significantly behind their controls. Researchers like Feagans (1987) suggest that OME children have difficulty developing the skills to listen because of the transient hearing loss associated with OME.

Vellutino (1987) suggests that a large part of auditory processing is behavioral and may be nothing more than habitual inattention. Whatever the case, Attention Deficit Disorder is not associated with OME in this study. However, on FFD factor tasks that require specific attention to language, OME children falter.

On the Detroit Tests of Learning Aptitude, the Sentence Imitation subtest was administered to determine whether OME children had difficulty listening to a sentence read aloud and then repeating it back to the examiner. This task primarily requires memory skills and an ability to sustain concentration. A grasp of the semantic and syntactic structures of sentences is useful but not necessary for success. There was no difference between the two groups on this task. As with Digit Span and Coding, OME children seem to do well when asked to simply memorize something and give it back. Without the linguistic component that Arithmetic demanded with processing and understanding dependent clauses and other complex syntactical structures, Sentence Imitation is simply a memory task. It is a memory task involving words but it does not require the processing of grammatical structures. The OME children were able to remember the sentences without difficulty suggesting that attention, even in this seemingly language-based context, is not a problem for them.

Toward Future Research

In concluding this study, there are two limitations that need to be addressed. The first is an audiometric concern. It is well documented in the literature that children experiencing episodes of OME experience transient hearing losses. It is this transient hearing loss that is the crux of my argument that the language development of OME children is at risk and this affects their later reading achievement. Yet, this study has offered no proof of its own that these particular children did, indeed, experience such hearing losses. No audiometric testing was done on these children during this study. Nevertheless, the results of this study indicate a disruption in phonological development which surfaced on many of the reading and literacy tasks reported heretofore which suggests some audiological interference prior to this testing.

The second concerns the intercorrelation of the measures. It must be remembered that the dependent variables were moderately to highly correlated. For this reason, discussing each individually is somewhat misleading in that it is impossible to demonstrate that the effects are independent. In any case, some methodologists will argue that repeated univariate tests tend to capitalize on chance.

Summary

OME children are clearly at risk for delayed reading when they reach school-age. Their problems begin with the transient hearing loss associated with OME which appears to interfere with their forming a stable language base. Their linguistic competence is compromised early on which, in turn, affects their later linguistic performance. They are delayed in automatically recognizing words, at decoding words, and at decoding words in context. Overall, their sense of word knowledge and how phonics works is delayed. This is evident not only in their spelling but in their attempts at decoding pseudowords as well. Their phonological base, the foundation of all language learning, is clearly not as adequate as their non-OME peers. Among the many consequences discussed here, OME children have difficulty adequately understanding what is read aloud to them, suggesting a generalized inattention to language. Not surprisingly, their overall reading levels are lower than normal children.

According to the results of this study, there is no evidence that Attention Deficit Disorder is associated with otitis media. If an attentional problem exists, it is likely rooted in the processing of specific language structures such as sound segments, syntactical constructions and relationships, all of which build on a firm foundation of phonological awareness.

These children are bright children whose mean IQ is currently at the uppermost end of the Average range. The results of this study suggest that their Verbal IQ score was depressed by OME. It is likely that their IQ would have been in the Average to Above Average range had they not been subjected to repeated bouts of OME. This remains consistent with Stanovich's "Matthew effect" cited earlier in this chapter. A child with normal cognitive abilities can have their phonological abilities compromised by OME which, in turn, can cause language delays. This can manifest itself in weaker vocabulary skills and understandings of syntactical structures which all cumulatively contributes to a reading delay. The weaker reading skills then serve to limit vocabulary growth and knowledge of syntactical structures which contribute to lower IQ scores. What a child like this needs is an expanding world, not a constricting one. Reading remains a problem which can carry far-reaching consequences for them, not only in school, but in life.

Implications for instruction

Since the evidence is so strong that OME affects a child's ability to learn to read when they reach school-age, it is important to note the implications for instruction. Prior to that, it must be mentioned that the first order of business for parents is to make

sure that the child's otitis media is treated. Most doctors require that the child return for another otoscopic examination two weeks after antibiotics are prescribed to ensure that the infection has responded to treatment. Often it has not and another round of a stronger antibiotic is necessary. If ear infections continue unresolved, referral to an otolaryngologist for insertion of tubes is recommended. If the disease itself is not brought under control, the medical and educational problems will persist indefinitely.

The major hole in the preschool learning for OME children appears to be phonological awareness. Therefore, working on awareness of sounds seems important. This can be embedded in the simple, daily ritual of reading books to young children. This often underestimated activity can increase the child's awareness that words are comprised of sounds, that stories are exciting, and that reading is important. Eventually the child will begin to see that reading is fun as well.

Another important aspect of "teaching" phonology is the simple act of engaging children in language play and conversation. Mother Goose nursery rhymes and children's songs like "The Itsy-Bitsy Spider" that have pleasing rhymes embedded in them should be part of every young child's preschool experience. There are a vast array of good children's books that are written for the purpose of

exposing children to the prosody of speech in print. Books like Brown Bear, Brown Bear, What Do You See? and Polar Bear, Polar Bear, What Do You Hear? by Bill Martin, Jr., Over In The Meadow adapted and illustrated by Paul Galdone, I Went Walking by Sue Williams, and Each Peach Pear Plum by Janet and Allan Ahlberg are wonderful examples of the type of book that immerse the child in the rhyme and cadence of language.

Conversation is another underestimated tool of language teaching. Children learn language through listening to others talk and trying to reproduce it for themselves. Engaging young children in conversation has been shown to be extremely important to language development (Heath, 1983). Too often, children are not spoken to but are relegated to the television set. To be sure, some exposure to language exists there. Nevertheless, nothing compares to the child getting his questions repeatedly asked and answered in the context of a parent-child conversation. It is that interactive communication that the child needs to develop his or her language fully. Speech and language is what the OME child needs to hear more and more of so that he can begin to make up what he has lost to OME.

Some children can benefit from speech therapy in the preschool years. Speech therapy can be an enormous help since speech therapists are trained in helping children listen to and

reproduce sounds. Their work on place of articulation within the mouth is often invaluable to those children whose temporary hearing loss has left them confused about how to make sounds. Programs such as The Lindamood Method for Teaching Phonemic Awareness (Lindamood & Lindamood, 1975) may be helpful for children with auditory discrimination problems and weak phonological skills. This program works on associating sounds with letters and categorizing them by place of articulation in the mouth. Sounds that are associated with "b" and "p" are introduced to children as "lip-puckers." This makes them concentrate on where their lips should be in order to articulate the sound properly. Likewise, the sound associated with the letter "t" is introduced as "tip-tappers" to draw attention to the tip of the mouth where the "t" will be articulated. Methods that help children make the connection between letters and sounds and discriminate between certain sounds may help them improve phonologically which would, in turn, help them achieve as readers and learners.

Once the OME child reaches school-age, the child is at-risk for delayed reading and both the parent and the classroom teacher need to be aware of the child's specific needs. Children with specific phonological and language weaknesses can benefit from a curriculum that begins in preschool or kindergarten, immersing the child in all

facets of language. One such curriculum developed by a group of Danish researchers is designed specifically to stimulate phonological awareness in children (Lundberg, Frost, & Petersen, 1988). This simple program uses games that center around language that are designed to be used on a daily basis in classrooms. They begin with listening games that sensitize the child to sounds in general. Next, rhymes are introduced and the rhyming words themselves are stressed. Children are encouraged to try other words that might rhyme with the exemplar word. Children eventually move on to the word and sentence level where they continue to use rhymes to illustrate the concept of sentence and word. From there the children learn that words, like sentences, are composed of smaller units and they practice clapping out syllables. Initial sounds are addressed next by playing with word families which, essentially, are reliant on rhyme. If the word is "ring," the children have to come up with words that sound like "ring" but are different. They soon learn that what makes them different, of course, is the initial element. Phonemes are the next concept and they are introduced with colored blocks, one for each sound in the word. Nothing in the program is particularly new in terms of preparing children to read, but the program, as a whole, brings attention to the importance of phonology

and segmentation in reading. OME children may very well benefit from the intense focus on phonology that this program provides.

The OME child does not necessarily need an intensive program such as Lundberg and associates offer. In a regular classroom, heightened awareness to phonology can be achieved. Books should surround the child in the classroom and words should be everywhere labeling everything around them. Read aloud times should be a part of every day life in the classroom with children writing and retelling the stories to each other. Acting stories out, composing group dictations, reciting rhymes, and drawing and labeling pictures should all be a part of a language-rich classroom. Specific word study focusing on beginning sounds would help the OME child begin to understand what a word is and where it begins and ends. A teacher who is enthusiastic about reading and the world of books, who takes every opportunity to point out letter-sound relationships, and who understands that the OME child is starting at a disadvantage can make a difference.

It is important to know that the results of this study show that OME children are delayed as readers and language learners but there was no evidence to suggest that their learning is in any way deviant. Knowing that the OME child's difficulties lie in the realm of phonology and language processing will aid both teachers and

parents in planning effective instruction and strategies for the child. For example, fill-in skill and drill phonics worksheets is clearly not what the OME child needs. Instead, a language-rich classroom full of books, reading, writing, and language are just what these children need.

REFERENCES

Adams, Marilyn J. (1990). Beginning to read. Massachusetts: The MIT Press.

Ahlberg, Janet and Allan. (1978). Each peach pear plum. New York: Viking Penguin Inc.

Bennett, Forrest C., Ruuska, Susan H., and Sherman, Roberta. (1980). Middle ear function in learning-disabled children. Pediatrics, 66 (2), 254-260.

Bergstrom, Lavonne. (1980). Continuing management of conductive hearing loss during language development. International Journal of Pediatric Otorhinolaryngology, 2, 3-9.

Berko-Gleason, Jean. (1983). Workshop on effects of otitis media on the child: Otitis media and language development. Pediatrics, 71 (4), 639-652.

Blachman, Benita A. (1989). Phonological awareness and word recognition: Assessment and intervention. In A.G. Kamhi & H.W.. Catts (Ed.), Reading Disabilities: A developmental language perspective (pp. 133-158). Needham Heights, MA.: Allyn & Bacon.

Bradley, L. and Bryant, P.E. (1983). Categorizing speech sounds and learning to read-A causal connection. Nature, 301, 419-421.

Bryant, N.D. (1963). Diagnostic Test of Phonic Skills. New York: Author.

Coulter, Phyllis. (1988). Naming and reading: Developmental trends. Unpublished doctoral dissertation. The University of Virginia.

Denckla, M.B. and Rudel, R. (1976). Rapid "automatized" naming (R.A.N.): Dyslexia differentiated from other learning disabilities. Neuropsychologia, 14, 471-479.

Denckla, M.B. and Rudel, R. (1974). Rapid "automatized" naming of pictures, objects, colors, letters, and numbers by children. Cortex, 10, 186-202.

Feagans, Lynne. (1987). Middle ear disease in infancy and early childhood: Does it affect development? Paper presented to Society for Research in Child Development, Baltimore, MD.

Feagans, Lynne, Sanyal, Margaret, Henderson, Frederick, Collier, Albert, and Applebaum, Mark. (1987). Relationship of middle ear disease in early childhood to later narrative and attention skills. Journal of Pediatric Psychology, 12 (4), 581-594.

Finitzo, T., Gunnarson, A.D., and Clark, J.L. (1990). Auditory deprivation and early conductive hearing loss from otitis media. Topics in Language Disorders, 11 (1), 29-42.

Folsom, R., Weber, B., and Thompson, G. (1983). Auditory brainstem responses in children with early recurrent middle ear disease. Annals of Otology, Rhinology, and Laryngology, 92, 249-253.

Friel-Patti, Sandy. (1990). Otitis media with effusion and the development of language: A review of the evidence. Topics in Language Disorders, 11 (1), 11-22.

Friel-Patti, Sandy, Finitzo, Terese, Formby, Ellen, and Brown, Karen. (1987). A prospective study of early middle ear disease and speech-language development. Tejas, 13 (1), 39-43.

Galdone, Paul. (1986). Over in the meadow. New York: Prentice Hall.

Gdowski, Betty S., Sanger, Dixie D. and Decker, T. Newell. (1986). Otitis media: Effect on a child's learning. Academic Therapy, 21 (3), 283-291.

Gottlieb, Marvin I., Zinkus, Peter W., and Thompson, Anne. (1979). Chronic middle ear disease and auditory perceptual deficits: Is there a link? Clinical Pediatrics, 18 (12), 725-732.

Grevink, Eefje H., Peters, Sylvia A.F., van Bon, Wim H.J., and Schilder, Anne G.M. (1993). The effects of early bilateral otitis media with effusion on language ability: A prospective cohort study. Journal of Speech and Hearing Research, 36, 1004-1012.

Hammill, Donald D. (1985). Manual for the Detroit Tests of Learning Aptitude (DLTA-2). Texas: Pro-Ed.

Heath, Shirley Brice. (1983). Ways with words. New York: Cambridge University Press.

Hollingshead, A. (1957). Two factor index of social position. New Haven: Wiley and Sons.

Holm, Vanja A. and Kunze, LuVern H. (1969). Effect of chronic otitis media on language and speech development. Pediatrics, 43 (5), 833-839.

Howie, Virgil M., Jensen, Norma J., Fleming, James W., Peeler, Milton B. and Meigs, Stanley. (1979). The effect of early onset of otitis media on educational achievement. International Journal of Pediatric Otorhinolaryngology, 1, 151-155.

Liberman, I. Y. (1982). A language-oriented view of reading and its disabilities. In H. Mykleburst (Ed.), Progress in learning disabilities, 5. New York: Grune & Stratton.

Liberman, I.Y., Shankweiler, D., and Liberman, Alvin M. (1989). The alphabetic principle and learning to read. In D. Shankweiler & I.Y. Liberman (Ed.), Phonology and reading disability: Solving the reading puzzle (pp. 1-33). Ann Arbor, MI: The University of Michigan Press.

Lindamood, Charles, H.L. and Lindamood, Patricia C. (1975). The Lindamood method for teaching phonemic awareness. Texas: Pro-Ed.

Lous, Jorgen and Fiellai-Nikolajsen, Mogens. (1984). A 5-year prospective case-control study of the influence of early otitis media with effusion on reading achievement. International Journal of Pediatric Otorhinolaryngology, 8, 19-30.

Lundberg, I., Frost, J., and Petersen, O.P. (1988). Effects of an extensive program for stimulating phonological awareness in preschool children. Reading Research Quarterly, 23, 264-284.

Martin, Bill, Jr. (1967). Brown bear, brown bear, what do you see?. New York: Henry Holt and Company.

Martin, Bill, Jr. (1991). Polar bear, polar bear, what do you hear?. New York: Henry Holt and Company.

Masters, Lowell and Marsh III, George E. (1978). Middle ear pathology as a factor in learning disabilities. Journal of Learning Disabilities, 2, 54-57.

Menyuk, Paula. (1989). Effects of persistent otitis media on language development. Recent Advances in Otitis Media with Effusion, 3, 257-263.

Menyuk, Paula and Flood, James. (1981). Linguistic competence, reading, writing problems and remediation. Bulletin of the Orton Society, 31, 13-28.

Quick, Carol and Mandell, Colleen. (1983). Otitis media and learning disabilities: More than a relationship? Paper presented at the

Annual International Convention of the Council for Exceptional Children, Detroit, MI.

Rapin, Isabelle. (1979). Conductive hearing loss: Effects on children's language and scholastic skills. The Annals of Otology, Rhinology, and Laryngology, 5 (2), 3-12.

Read, C., Yun-Fei, Z., Hong-Yin, N., and Bao-Qing, D. (1986). The ability to manipulate speech sounds depends on knowing alphabetic writing. Cognition, 24, 31-44.

Reichman, Julie and Healey, William C. (1983). Learning disabilities and conductive hearing loss involving otitis media. Journal of Learning Disabilities, 16 (5), 272-278.

Roberts, Joanne E., Burchinal, Margaret R., Collier, Albert M., Ramey, Craig T., Koch, Matthew A., and Henderson, Frederick W., (1989). Otitis media in early childhood and cognitive, academic, and classroom performance of the school-aged child. Pediatrics, 83 (4), 477-485.

Roland, Peter and Brown, Orval. (1990). Tympanostomy tubes: A rational clinical treatment for middle ear disease. Topics in Language Disorders, 11 (1), 23-28.

Scarborough, Hollis S. and Dobrich, Wanda. (1990). Development of children with early language delay. Journal of Speech and Hearing Research, 33, 70-83.

Shankweiler, Donald. (1989). How problems of comprehension are related to difficulties in decoding. In D. Shankweiler & I.Y. Liberman (Ed.), Phonology and reading disability: Solving the reading puzzle (pp. 35-68). Ann Arbor, MI: The University of Michigan Press.

Silva, Phil A., Kirkland, C., Simpson, A., Stewart Ian A., and Williams, Sheila M. (1982). Some developmental and behavioral problems associated with bilateral otitis media with effusion. Journal of Learning Disabilities, 15 (7), 417-421.

Stanovich. K.E. (1986). Matthew effects in reading: Some consequences of individual differences in the development of reading fluency. Reading Research Quarterly, 21, 32-71.

Stauffer, Russell G., Abrams, Jules C., and Pikulski, John J. (1978). Diagnosis, Correction, and Prevention of Reading Disabilities. New York: Harper & Row.

Vellutino, Frank R. (1977). Alternative conceptualizations of dyslexia: Evidence in support of a verbal-deficit hypothesis. Harvard Educational Review, 47, 334-354.

Vellutino, Frank R. (1982). Assessments of disorders in formal school language: Disorders in reading. Topics in Language Disorders, 2 (4), 20-33.

Vellutino, Frank R. (1987). Dyslexia. Scientific American, 256 (3), 34-41.

Vellutino, Frank R. and Scanlon, Donna M. (1987). Phonological Coding, Phonological Awareness, and Reading Ability: Evidence from a longitudinal and experimental study. Merrill Palmer Quarterly, 33, 321-363.

Walsh, D.J., Price G.G., and Gillingham, M.G. (1988). The critical but transitory importance of letter naming. Reading Research Quarterly, 23 (1), 108-122.

Webster, D. and Webster, M. (1977). Neonatal sound deprivation affects brain stem auditory nuclei. Archives of Otolaryngology, 103, 392-396.

Wechsler, D. (1974). Manual for the Wechsler Intelligence Scale for Children-Revised. New York: Psychological Corporation.

Williams, Sue. (1990). I Went Walking. New York: Harcourt Brace Jovanovich.

Wolf, Maryanne. (1984) Naming, reading, and the dyslexias: A longitudinal overview. Annals of Dyslexia, 34, 87-115.

Wright, Peter F., Dell, Sarah H., McConnell, Kathryn B., Sitton, Ann B., Thompson, Juliette, Vaughn, William K., and Bess, Fred H. (1988). Impact of recurrent otitis media on middle ear function, hearing, and language. Journal of Pediatrics, 74, 282-287.

Zinkus, Peter, Gottlieb, Marvin, and Schapiro, Mark. (1978). Developmental and psychoeducational sequelae of chronic otitis media. American Journal of the Disabled Child, 132, 1100-1104.

Zinkus, Peter and Gottlieb, Marvin. (1980). Patterns of perceptual and academic deficits related to early chronic otitis media. Pediatrics, 66 (2), 246-253.

Zutell, Jerry. (1994). Establishing the reliability of alternate forms of the qualitative inventory of word knowledge. Paper presented to the National Reading Conference, San Diego, CA.

Zutell, Jerry and Fresch, Mary Jo. (1990). Reading and spelling connections in elementary school students: A longitudinal study at third and fifth grade. Paper presented to the National Reading Conference, Miami, FLA.

APPENDIX A

CHECKLIST FOR TESTING

_____ **Word Recognition in Isolation**

_____ **Informal Reading Inventory**

_____ Word Recognition in Context

_____ Comprehension

_____ Words Per Minute

_____ Hearing Capacity (We need to get an instructional level on HC. Stop when the child's comprehension score is approximately 75%).

_____ **Writing Sample:** Write me a story about something you did with your family that you will always remember. It could be a movie you saw, a vacation you took, or something you do all the time that you think is kind of neat. Write the story as best you can.

_____ **Pseudoword Decoding Test**

_____ **Rapid Automatized Naming**

_____ **Fill out Case Summary Sheet <u>FULLY</u>**

_____ Please feel free to make any **additional comments** that you think are important about the child you tested.

REMEMBER QUALITATIVE COMMENTS THROUGHOUT!

MCGUFFEY READING CENTER — CASE SUMMARY SHEET

NAME _____ CASE NO. _____ TESTING DATES _____

GRADE _____ AGE _____ EXAMINERS _____

CAPACITY	ACHIEVEMENT									
General	Hearing	F.W.K.	Word Recognition		Spelling	Words In Context	Comprehension		Rates	
			Flashed	Untimed			Oral	Silent	Oral	Silent

CASE HISTORY	Spelling Errors	SPECIAL CAPACITIES

Type Case:

RECOMMENDATIONS:

REFERRALS:

Reading Levels:
Independent
Instructional
Frustration

WORD RECOGNITION INVENTORY
Primer

WRI F:
U:

Form D1	Flash	Untimed	Form D2	Flash	Untimed
was			down		
open			feet		
make			sale		
old			things		
put			red		
all			some		
found			story		
tell			said		
ask			who		
myself			pound		
eat			grow		
surprise			her		
very			came		
new			airplane		
tree			over		
there			sleep		
friend			scare		
nothing			better		
smile			sad		
market			hairy		

WORD RECOGNITION INVENTORY

First

WRI F:
U:

Form D1	Flash	Untimed	Form D2	Flash	Untimed
wings			I've		
well			cook		
give			use		
learn			side		
paints			clean		
paste			face		
us			sat		
anyway			note		
lost			even		
gone			yellow		
would			cold		
ears			wise		
fast			soon		
near			shook		
meaning			sentence		
other			sorry		
as			cave		
birthday			peeped		
cow			moo		
crazy			quiet		
umbrella			ate		
early			happy		
colors			walk		
round			far		
sleepy			been		

WORD RECOGNITION INVENTORY
Second

WRI F:
U:

Form D1	Flash	Untimed	Form D2	Flash	Untimed
vacation			flat		
strange			straight		
losing			draw		
voice			buttons		
tying			filled		
shade			sound		
hit			probably		
belonged			suddenly		
money			coin		
six			spring		
high			yet		
football			mud		
elevator			city		
blossoms			cloudy		
chirping			south		
suit			pay		
since			worth		
terror			distance		
closet			doghouse		
lid			thin		
giants			angry		
bend			knees		
lying			single		
flew			mountain		
sail			storm		

WORD RECOGNITION INVENTORY
Third

WRI F:
U:

Form D1	Flash	Untimed	Form D2	Flash	Untimed
stutter			perfect		
task			demand		
object			grimly		
excitement			sprout		
odor			impress		
dusty			ceiling		
uncover			wonder		
annoyed			examination		
diet			remember		
sneakers			gasoline		
thriller			young		
sternly			fold		
fold			pulley		
entrance			picnic		
blender			ignore		
scent			piglet		
constant			earthquake		
hurl			accompany		
chuckled			nation		
cell			digesting		
dollar			survival		
behold			confidence		
cobra			magnificent		
desert			scurry		
puddle			timidly		

WORD RECOGNITION INVENTORY
Fourth

WRI F:
U:

Form D1	Flash	Untimed	Form D2	Flash	Untimed
captivity			preserves		
court			skimming		
fiddling			shrill		
sulphur			thread		
contest			astronaut		
enormous			salad		
shatter			browsing		
deserting			panting		
navigation			loping		
broadcast			garage		
hailstones			rosewood		
sympathizing			rumpled		
drapes			interrupt		
descendant			flavoring		
coast			stage		
homesick			beckon		
evidence			slight		
spurs			conceited		
prohibiting			frame		
bachelors			glacier		
creek			blundered		
gully			dignity		
flushed			discouraging		
signal			anxiously		
moisten			windshield		

WORD RECOGNITION INVENTORY

Fifth

WRI F:
U:

Form D1	Flash	Untimed	Form D2	Flash	Untimed
adjourned			precious		
errand			consumer		
bleak			spitefully		
chanted			emphasize		
parasite			dialect		
civilization			spectacle		
lava			sketched		
streak			leisure		
abuse			tackle		
span			matured		
spasm			sentimental		
churning			intervening		
barracuda			plunge		
toothpick			column		
tardiness			frantic		
hostage			reality		
irritating			fretting		
allergy			ravine		
migrating			lazily		
cheerleader			element		
lawyer			resenting		
element			generation		
prey			transparent		
youth			contractors		
humane			captivate		

WORD RECOGNITION INVENTORY

Sixth

WRI F:
U:

Form D1	Flash	Untimed	Form D2	Flash	Untimed
hydrofoil			musician		
revolution			deceive		
murmur			portrait		
constitution			torture		
parachute			admiration		
aluminum			grease		
occur			superior		
universe			banquet		
whisper			excitement		
swollen			senior		
twiddle			dyed		
destruction			appearance		
diameter			forehead		
respectful			appeal		
microscopic			surrender		
museum			community		
poison			immortal		
orphan			soldier		
impression			difference		
sequence			replacement		
inquire			capable		
nephew			limited		
ordinary			instruction		
ostrich			proclaim		
annoy			confident		

(69 words, 1.45 per word)
Frustration level = 7 errors or more

Case #:
Rate:
WRC:
Comprehension:

Houghton-Mifflin, Parades, p. 139

PRIMER, REVISED FORM E
ORAL

Turn to page 134, My Dog and the Key. Set prediction from title and picture. This is a story about a girl named Jenny and her dog, My Dog. Turn to page 139.

My Dog pushed me with her nose. She wanted me to ask Susan more about the key. So I asked her.

"I was in my house when my mother gave me the key," Susan said.

"But I don't know what I did with it."

This time I didn't wait for My Dog to poke me.

"Take us to your house," I said. "My Dog will find the lost key."

Questions:

1. Why did My Dog push Jenny with her nose?
2. What is Susan's problem?
3. Where was Susan when she lost her key?
4. What does "poke" mean?
5. Does Jenny think My Dog can help Susan? What did Jenny say in the story that makes you think that?

(69 words, 1.45 per word)
Frustration level = 7 errors or more

Houghton-Mifflin Parades, pp. 161-162

Case #:
Rate:
WRC:
Comprehension:

PRIMER, REVISED FORM E

SILENT

Turn to page 156, Willaby. Willaby is the name of a litle girl. Set prediction from picture on page 160. Turn to page 161 to begin.

Willaby didn't know what to do. She had not made a get-well card for Miss Finney. Now there was no time to make one. Willaby decided to give her drawing to Miss Finney.

On her way home that day, Willaby thought, "I didn't put my name on my drawing! Now Miss Finney will not know that I made something for her. She may think I don't like her."

Questions:

*Follow up on prediction.

1. At the beginning of the story, what was Willaby's problem?
2. What did Willaby decide to do about it (the problem)?
3. On the way home that day, Willaby thought of something she forgot. What did Willaby forget?

Willaby PAGE 2

4. Why is that a problem? (What is Willaby really worried about?) Oral Re-reading: Find the sentence that tells what Willaby is really worried about.
5. Why do you think the children were making cards anyway?
6. What is a "get-well" card?
7. Do you think Miss Finney will know who drew the picture? Why or why not?

(98 words, 1.3 per word) Case #:
Frustrational level= more than 10 errors Rate:
WRC:
Houghton-Mifflin, Carousels, pp. 209-210 Comprehension:

FIRST, REVISED FORM E
ORAL

Examine picture and title, "Good as New", page 209. Set prediction.

I thought Grandpa could fix anything. But then one day K.C. came over. He started crying as soon as his father went away.

Nobody could make him happy, not even Grandpa.

The only thing K.C. wanted was my bear.

I said, "Huh-uh. Nobody plays with my bear but me."

K.C. cried some more.

Mom said, "Grady, do you think K.C. wishes he had his bear?"

Dad said, "Do you think he would feel better if you just let him hold your bear?"

Before I could say, "OK, you can HOLD him," K.C. pulled my bear away from me.

GOOD AS NEW PAGE 2

Comprehension: ***Follow up on prediction.**

1. What is the first thing that happened when K.C. came over?
2. What was the only thing that would make K.C. happy?
3. Why didn't Grady (the boy) want K.C. to have his bear? (Probe: What did he say to K.C.?)
4. What did K.C. do when Grady (the boy) wouldn't give him the bear?
5. What do you think Grady's (the boy's) mom and dad want Grady to do?
6. Why do you think K.C. wants the bear so much? (Probe for what Grady's mom said.)
7. Did Grady (the boy) change his mind about letting K.C. hold the bear? What did it say in the story that makes you think that?
8. What happened next?
9. What do you think will happen to the bear? (not scorable)
10. Who do you think Grady (the boy) will ask to fix his bear?

(105 words, .96% per word)
Frustration level= more than 11 errors

Case #:
Rate:
WRC:
Comprehension:

Houghton-Mifflin, Carousels, pp. 213-214

FIRST, REVISED FORM E
SILENT

Examine picture and title, page 208, "Good as New". Set prediction. Turn to page 213 to begin.

Grandpa and I sat down to fix my bear. But when I saw what he was going to do, I said, "Wait, Grandpa. Are you sure you can fix my bear?"

"Sure I can," said Grandpa.

Then he opened up my bear--and then--he pulled out all the stuffing!

My bear's head went flat. Soon he was wrinkled up all over. I said, "Grandpa, are you sure this is the right way to fix my bear?"

Grandpa just went on working. I said, "Grandpa! Are you sure?"

He said, "Never you mind now. We'll have this bear as good as new in no time."

Good as New

Comprehension: *Follow up on prediction.

1. What was Grandpa trying to do?
2. What did Grandpa do first? (probe for stuffing)
3. What is "stuffing" (in this story)?
4. What happened when Grandpa pulled out the stuffing?
5. What was the little boy worried about? What did the little boy say which makes you think that?
6. What did Grandpa say to the little boy?
7. Why is this story called "Good As New"?

(154 words, .65 per word)
Frustration level = 16 errors or more

Houghton-Mifflin Adventures, pp. 262-263

Case #:
Rate:
WRC:
Comprehension:

SECOND, REVISED FORM E
ALTERNATE

Turn to page 258, Katy No-Pocket. Set prediction from title and picture. If needed, read first paragraph, p. 258. Turn to p. 262.

When Mrs. Crocodile saw Katy, she said, "Why, Katy Kangaroo! What can I do for you today?"

"Please, Mrs. Crocodile, I'm so sad," said Katy. "I have no pocket, and Freddy has to walk wherever we go. He gets so tired. How do you carry little Catherine Crocodile?"

"I carry her on my back, of course!" said Mrs. Crocodile. "That is the right way to carry babies."

Katy was very pleased. Now she knew how to carry Freddy. As soon as she got to a good place, she bent down and said, "Hop up on my back, Freddy. From now on, it will be easy for us to get around."

But it wasn't easy. When Freddy finally did get up on Katy's back, it was hard for him to hold on. When he did manage to hold on for a few seconds, and Katy gave a long hop, he fell off--bump, bump...bump!

Katy No-Pocket page 2

Questions:

1. What is Katy's problem? Why is it a problem?
2. Who is Freddy?
3. Who does Katy go to for help?
4. What does Mrs. Crocodile suggest?
5. Mrs. Crocodile says, "That is the right way to carry babies." Why does she say that?
6. Is Mrs. Crocodile correct? Why or why not?
7. Does Katy follow Mrs. Crocodile's advice? Does it work for her?
8. What happens to Freddy?
9. When he manage to hold on for a few seconds, What does "manage" mean?
10. What do you think Katy will do next?

(141 Words, .71 per word)
(Frustration level = 15 errors or more)

Case #:
Rate:
WRC:
Comprehension:

Holt Basic Readers, Special Happenings p. 96

THIRD, REVISED FORM E
ORAL

Turn to page 96 to read the title,"Kiya the Gull". Examine the pictures on page 98 and make a prediction about the story. Begin reading here.

The harder Kiya tried to free himself, the tighter the wire pulled. At last he freed his wings, but a loop of wire bound his back and one leg so tightly that he could not move it.

A boy was sitting in his boat watching the gulls. When he saw Kiya's trouble, he got out and ran toward the bird. The frightened Kiya flapped his wings and rose out of reach, even though the wire cut into his back leg.

The bird glided over to the sandy beach and made a clumsy landing on one foot. He hopped along the cool. hard sand near the water, dragging part of the wire that bound him.

People were already gathering on the beach for a day in the sun.

"Look at the sea gull!" someone called. "He's all tangled up in something."

People ran toward Kiya. Hands reached out for him. Beating his wings, Kiya managed to raise himself again.

"Kiya the Gull" page 2

He flew to the high dune where the sea gulls perch at noon. The other gulls were still away looking for their morning meal. Hungry as Kiya was, it hurt him too much to fly. He wanted only to be left in peace.

Questions

1. What is this story about?
2. What was Kiya's problem?
3. What does "bound" mean as in "a loop of wire bound his back and one leg"?
4. Who tried to help the bird first?
5. How did Kiya react to this?
6. How do you know the bird was hurt?
7. Who tried to help him next?
8. Did Kiya understand what they were trying to do? What did he do which makes you say that?
9. Where did Kiya go next?
10. Why do you think he wanted to be left alone?

(168 Words, .60 per word)
(Frustration level = more than 16 errors)

Case #:
Rate:
WRC:
Comprehension:

Holt Basic Readers, Special Happenings p. 103

THIRD, REVISED FORM E
SILENT

Turn to page 96 to read the title,"Kiya the Gull". Examine the pictures on page 98 and make a prediction about the story. If the oral passage from the same story was read, modify the prediction procedure accordingly. Begin reading on page 103.

During the night Kiya woke to find the fire still burning low. At dawn the fire had gone out, but the boy was still asleep in his sleeping bag. Now was the time for Kiya to get away, before the boy woke and found him. He threw his weight against the wire and beat his poor lame wings against the bush. "Kiya-kiya-kiya," he cried.

The uproar woke the boy. He climbed the hill and stood above Kiya. They looked at one another, bird and boy. Kiya knew his time had come. He opened his bill to bite at the reaching hand, but the boy closed it over his head.

"Easy now!," said the boy as he tried to free the bird from the wire.

Kiya gave up trying to fight and lay still. At last the boy was able to lift the loop of wire from the bird's back and to wind it off his leg. Then two hands lifted him gently and set him on his feet.

Follow up on Prediction

QUESTIONS:

1. What happened in this part of the story?

2. What was the boy doing when Kiya first saw him?

3. What did Kiya try to do when he saw the boy asleep?

4. How did the boy find out what Kiya was trying to do?

5. What do you think the boy was thinking as he stood and looked at the injured seagull.

6. The story said that "Kiya knew his time had come." What does this mean?"

7. What happened then?

8. Why did Kiya fight the boy?

9. The boy tried to "free" the bird. What does "free" mean?

10. What happened in the end? Did Kiya get free or not? What do you think will happen to Kiya?

Oral Re-reading: Find the sentence which tells whether or not Kiya got free of the wire.

(297 words, .34 per word)
Frustration level = 30 errors or more

Houghton-Mifflin, Flights, pp. 456-457

Case #:
Rate:
WRC:
Comprehension:

FOURTH, REVISED FORM E
ORAL

Turn to page 444, Bicycle Rider. Use title, picture and sentence to set prediction. Start reading on p. 456.

Then Marshall crossed the line. Mr. Hay hurried over to help Marshall stop.

"You came in number seven. That's great!" said Mr. Hay.

"It wasn't very good," said Marshall. "Six people beat me."

"But your beat over forty people. And you've never even been in a race before. You're good enough to try the ten-mile race."

"Oh, no," said Marshall. "I could never win that."

"No," agreed Mr. Hay. "You couldn't win. But I think you could finish. Try it, Marshall. If you get too tired, you just stop. Many racers will drop out before the fifty laps are done."

During the next race, Mr. Hay spoke to the judges again. Marshall rested with the other riders in the grassy center of the track.

"Good news," said Mr. Hay, joining Marshall. "You can try the ten-mile race."

Marshall wheeled his bicycle over to the starting line.

"Don't try to go too fast at first," said Mr. Hay. "Just keep up

Bicycle Rider **(page 2)**

"What is a sprint?" asked Marshall.

"A sprint means going extra fast for one lap. Whoever passes the finish line first gets points toward winning."

Fourth, Form E, Silent

"How will I know when it's time to sprint?"

"The bell rings at the start of the fifth lap. Each mile there will be a sprint race on the fifth lap."

Marshall looked at the riders lining up. "Whew!" he said. "It looks as if all the racers entered this race."

Mr. Hay nodded. "A hundred and seventeen bike racers are in the ten-mile race."

Marshall's bicycle wobbled a little as Marshall bent down to clip his feet onto the pedals. Mr. Hay steadied it.

Marshall could feel his heart thumping hard. His hands felt slippery on the bicycle handles.

Bicycle Rider **Page 3**

Questions:

1. Did Marshal win his first bicycle race? How did he feel about it?
2. What did Mr. Hay think about Marshall's first race?
3. What did Mr. Hay suggest to Marshall?
4. Did he think Marshall could win? Why do you think he wanted Marshall to try?
5. What advice does Mr. Hay give Marshall about the race?
6. What is a "sprint"?
7. How will Marshall know when it is time for a sprint?
8. Is the ten-mile race a small event? How do you know?
9. Marshall's bicycle "wobbled" as he got ready for the race. What does "wobbled" mean?
10. Do you think Marshall is excited about this race? What from the passage makes you think that?

(167 words, .60 per word)
Frustration level = 17 errors or more

Houghton-Mifflin, Flights, p. 457

Case #:
Rate:
WRC:
Comprehension:

FOURTH, REVISED FORM E
SILENT

Turn to page 457, Bicycle Rider. Look at the picture at the top and make a prediction about what is going to happen in the story.

Marshall could feel his heart thumping hard. His hands felt slippery on the bicycle handles.

"Here," said Mr. Hay. "use my handkerchief to dry your hands."

The whistle blew. Marshall's legs felt shaky.

"One!" shouted the man. "Two! Three!"

Bang!

Mr. Hay shoved Marshall's bicycle so hard, Marshall could smell the dust that flew up. Marshall pushed his legs down. Around and around went the wheels.

The riders rode in a close pack. Two bicycles bumped and one fell. Marshall swerved around the fallen bicycle and rider. He almost hit another bicycle. Marshall swerved again. It was George Pepper's bicycle.

"Hey, runt," souted George. "out of my way."

Ding, ding, ding! The bell lap!

Bicycle Rider Page 2

Marshall pulled ahead of the pack for the sprint.

George Pepper passed him. Three more riders passed him.

Then two more. Marshall pushed his legs hard. He passed one rider, then another. He crossed the finish line.

The first sprint was over. He could hear the crowd cheering. Nine more miles to go!

Questions *Follow up on prediction.

1. Why was Marshall's heart thumping hard?
2. What are some other signs that he is nervous?
3. Why did Mr. Hay shove Marshall's bike?
4. What happened when the riders rode in a close pack?
5. What does "swerve" mean?
6. What did George Pepper say to Marshall? Why?
7. What is a "runt?"
8. What did Marshall do when riders the passed him?
9. How did the crowd react?
10. How many more miles does Marshall have to go?

(293 words, .35 per word)
Frustration level = 29 errors or more

Case #:
Rate:
WRC:
Comprehension:

Houghton-Mifflin, Explorations, pp. 400-401.

FIFTH, REVISED FORM E
ORAL

Turn to page 396, The Stormy Rescue. Read title and paragraph to set prediction. Begin reading on page 400.

Uncle Fred went into the shed, returned, and snapped a lock over the cage latch.

"You think somebody's going to steal your fox?" Aunt Millie laughed.

"I wouldn't put it past a fox to open up an unlocked cage to get her baby."

Aunt Millie shook her head in amazement, then said, "Well, you men have got to get washed up for supper."

We went into the house, and I said to Uncle Fred, "What are you going to do with the baby fox?"

"That's my bait. Every hunter alive has got some way to get a fox. They've got some special trap or something. Mr. Baynes down at the store makes up a special mixture that he says foxes can't resist. My way is to set up a trap, using the baby fox for bait. I'll sit out on the back porch tonight and watch for her."

"Oh."

"It never fails. That is one bait a fox can't resist."

The Stormy Rescue Page 2

Are you getting sick?" Aunt Millie asked at supper that night.

"I guess I'm a little tired."

"Well, I should think so! Helping with the pump out in the broiling sun all morning and then tracking that fox all afternoon. It's a wonder you don't have heat stroke. You eat something though, hear? You have to keep up your strength."

"I'm just not hungry."

"It's the heat. But, listen, you drink your tea. You will have heat stroke sure enough if you let your body get dried out."

I finished my tea and went up to my room. I did not even look out the window, because I knew I could see the rabbit hutch by the garage, and I never again wanted to see that baby fox cowering against the wall.

The Stormy Rescue Page 3

Questions:

Follow up on predictions

1. **Why does Uncle Fred put a lock on the cage?**

2. **Who does he think will try to open the cage?**

3. **How does he plan to use the baby fox?**

4. **What does "bait" mean? What is Uncle Fred's bait?**

5. **Why does he think the fox won't be able to resist his trap?**

6. **Why does Aunt Millie think Tommy isn't hungry?**

7. **What do you think "heat stroke" is?**

8. **Why do you think Tommy isn't hungry?**

9. **Why doesn't Tommy want to look out his window?**

10. **How does Tommy feel about the fox? How do you know?**

(249 words, .41 per word) Case #:
Frustration level= 25 or more errors Rate:
WRC:
Houghton-Mifflin, Explorations, pp. 484-485 Comprehension:

FIFTH REVISED FORM E
SILENT

Turn to page 478, Riding the Red Cycle. To set a prediction say, "Jerome is an eleven year old boy unable to walk because of a disease that had weakened his muscles. What do you think is going to happen in this story?" Begin reading on p. 484.

He had been able to get around by himself in the wheelchair, but now he often got stranded on his cycle. The kids would go in and leave him around the corner or down the street, and he couldn't follow them. When dinner time came, Mama or Tilly had to go looking for him.

Then something exciting happened. One day he was turning the handlebars and weaving back and forth, as some boys ran behind, pushing him. After one sharp turn, the red cycle fell over. Mama fussed about the bump on his forehead and his scraped knees, but Jerome felt happy and victorious.

"Look, Papa," he called later, when Papa came in from work. "I got a bandage. I hurt my knee."

He had had calluses on his hands and knees from crawling, but he'd never had a good hurt knee before. Now he had joined all those other kids who got to wear bandages on their knees. Somehow it

Riding the Red Cycle Page 2

made him feel as if he was really learning to ride. Other kids fell off bicycles when they were learning to ride, and he had fallen too. That night he thought and thought and came up with a plan.

"Hey, Tilly," he called the next day. "Take me up by the alley where it slants to the street."

"Trucks come in the alley by the factory, Jerome. You've gotta stay on the sidewalk," Tilly told him.

"But Tilly, you'll be with me," he begged. "I can ride there."

Questions:

1. Is Jerome able to use his cycle as well as his wheelchair? Why or why not?
2. What happens because of this?
3. What does stranded mean?
4. What "exciting" thing happens to Jerome on his cycle? Do you agree that it is exciting?
5. The story says that Jerome had never had a "good hurt knee" before. In what way is a hurt knee good to Jerome?
6. Did Jerome's mother feel the same way? How do you know?
7. But Jerome felt "victorious." What does victorious mean?
8. How did Jerome get his calluses?

Riding the Red Cycle Page 3

9. What is Jerome's plan?

10. In what ways did Tilly help Jerome? What does Tilly say about the alley?

11. Do you think Jerome's plan is a safe one? Why or Why not?

(226 words, .45 per word)
Frustration level = 18 errors or more

Case #:
Rate:
WRC:
Comprehension:

Houghton Mifflin, Celebrations, pp. 272-274

SIXTH, REVISED FORM E
Oral

Turn to page 270. Artic Fire. Read title and sentence. Set prediction. Begin reading on page 272.

"Come on," said Kayak. "We have to keep on moving!"

The crack stretched like a long ragged tear in a piece of white paper for as far as Matthew could see.

"Look over there." Kayak pointed. "There is our only chance."

Matthew saw his friend run forward and reach out for a four-foot chunk of ice that had cracked away from the main ice. Kayak caught it with his snow knife and slowly drew it to him.

I'll go first," he said, putting one foot on the ice pan.

Matthew saw it shudder and sink a little.

"It should hold me," Kayak said

As though he were treading on eggs, he carefully eased one knee and then the other onto the trembling pan of ice.

"Now push the ice," he said to Matthew. "Not so hard you'll tip me in, but hard enough to float me over to the other side."

Matthew lay on his stomach and with both hands gave the ice a steady push. Kayak was on his hands and knees. A light breeze

Artic Fire Page 2

whipped across the ice and caught him like a sail, so the ice pan turned half around. Matthew closed his eyes.

"Thanks a lot," he heard Kayak shout, and when Matthew opened his eyes, he saw Kayak scrambling onto the ice on the other side of the widening crack.

Questions:

1. Where are Kayak and Matthew and what is the danger they face?
2. Why do you think Kayak and Matthew must keep moving?
3. What does Kayak mean when he says the chunk of ice is their only chance?
4. From reading the passage, what do you think an "ice pan" is?
5. What did Kayak use to catch the chuck of ice? How does Kayak plan to use the ice chunk?
6. What does the passage mean by "as though he were treading on eggs"?
7. What does "shudder" mean?
8. Why does Matthew close his eyes?
9. How would you describe Kayak's character?
10. Do you think Matthew will use the ice pan to cross to the other side? Why/why not?

(306 words, .33 per word)
Frustration level = 31 or more errors

Case #:
Rate:
WRC:
Comprehension:

Houghton Mifflin, Celebrations, p. 276

SIXTH, REVISED FORM E
SILENT

Turn to page 277, Arctic Fire. Look at the picture and set a prediction. Begin reading on p. 276.

"Don't move," answered Kayak in a whisper. There was terror in his voice.

Cautiously Matthew turned and saw a white head with black beady eyes move snakelike through the icy water. When it reached the small ice pan on which they stood, the huge polar bear heaved its bulk out of the water and shook itself like an immense dog. It looked yellow against the stark white snow.

Matthew saw the great bear swing its head back and forth, sniffing the air suspiciously. Its huge blue-black mouth hung open, showing its terrible teeth. With a rumbling growl, the giant bear lowered its head and came shambling toward them.

Matthew and Kayak lay as still as death on the ice, their heads turned so that they could watch the bear. Matthew clutched the snow knife like a dagger and trembled inside as he felt the wet salt water seep up from the snow and soak his clothing.

The bear did not even pause to look at them as it stalked past.

Artic Fire Page 2

They saw it crouch down flat against the snow.

Matthew looked ahead and saw a seal's dark head, alert and motionless in the water. The bear was watching it intently.

Seeing nothing move to frighten it, the seal relaxed and let its back float to the surface as it drew a large breath of air into its lungs and dove beneath the ice in search of food.

The bear snaked forward cautiously until it reached the very edge of the ice where it had seen the seal. It reached out its paw and scratched against the ice.

The seal must have heard the sound beneath the water, and being curious, it once more raised its head above the surface. Seeing nothing but a yellowish heap of snow, it swam along the edge of the ice.

Questions: *Follow up on prediction.

1. What is Kayak's advice to Matthew after he sees the bear? Why does he suggest that?
2. Is the boys' idea successful? How do you know?
3. How is the bear described in this passage?

Artic Fire Page 3

4. The polar bear is compared to a dog in this passage. How is it like a dog?
5. What is the polar bear interested in?
6. The passage says, "The bear snaked forward." What does snaked mean?
7. How does the bear attract the seal?
8. What does "cautiously" mean?
9. Do you think the bear will be successful? Why or why not?
10. How do you think the boys will escape?

APPENDIX B

McGUFFEY QUALITATIVE SPELLING INVENTORY

Form B

LEVEL I	LEVEL II	LEVEL III	LEVEL IV
1. bump	1. batted	1. find	1. square
2. net	2. such	2. paint	2. hockey
3. with	2. once	3. crawl	3. helmet
4. trap	4. chop	4. dollar	4. allow
5. chin	5. milk	5. knife	5. skipping
6. bell	6. funny	6. mouth	6. ugly
7. shade	7. start	7. fought	7. hurry
8. pig	8. glasses	8. comb	8. bounce
9. drum	9. hugging	9. useful	9. lodge
10. hid	10. named	10. circle	10. fossil
11. father	11. pool	11. early	11. traced
12. track	12. stick	12. letter	12. lumber
13. pink	13. when	13. weigh	13. middle
14. drip	14. easy	14. real	14. striped
15. brave	15. make	15. tight	15. bacon
16. job	16. went	16. sock	16. capture
17. sister	17. shell	17. voice	17. damage
18. slide	18. pinned	18. campfire	18. nickel
19. box	19. class	19. keeper	19. barber
20. white	20. boat	20. throat	20. curve
	21. story	21. waving	21. statement
	22. plain	22. carried	22. collar
	23. smoke	23. scratch	23. parading
	24. size	24. tripping	24. sailor
	25. sleep	25. nurse	25. wrinkle
			26. dinner
			27. medal
			28. tanner
			29. dimmed
			30. careful

McGuffey Spelling Inventory cont.

LEVEL V	LEVEL VI	LEVEL VII	LEVEL VIII
1. enclosed	1. absence	1. illiteracy	1. meddle
2. piece	2. civilize	2. communicate	2. posture
3. novel	3. accomplish	3. irresponsible	3. knuckle
4. lecture	4. prohibition	4. succeed	4. succumb
5. pillar	5. pledge	5. patience	5. newsstand
6. confession	6. sensibility	6. confident	6. permissible
7. aware	7. official	7. analyze	7. transparent
8. loneliest	8. inspire	8. tomatoes	8. assumption
9. service	9. permission	9. beret	9. pennant
10. loyal	10. irrelevant	10. unbearable	10. boutique
11. expansion	11. conclusion	11. hasten	11. wooden
12. production	12. invisible	12. aluminum	12. warrant
13. deposited	13. democratic	13. miserable	13. probable
14. creature	14. responsible	14. subscription	14. respiration
15. revenge	15. description	15. exhibition	15. reverse
16. awaiting	16. accidental	16. device	16. olympic
17. unskilled	17. composition	17. regretted	17. gaseous
18. installment	18. relying	18. arisen	18. subtle
19. horrible	19. changeable	19. miniature	19. bookkeeping
20. relate	20. amusement	20. monopoly	20. fictional
21. earl	21. conference	21. dissolve	21. overrate
22. uniform	22. advertise	22. equipped	22. granular
23. rifle	23. opposition	23. solemn	23. endorse
24. correction	24. community	24. correspond	24. insistent
25. discovering	25. advantage	25. emphasize	25. snorkel
26. retirement	26. cooperation	26. scoundrel	26. personality
27. salute	27. spacious	27. cubic	27. prosperous
28. treasure	28. carriage	28. flexible	28. impurities
29. homemade	29. presumption	29. arctic	
30. conviction	30. appearance	30. necessary	

APPENDIX C

OTITIS MEDIA: ITS RELATIONSHIP TO ATTENTION DEFICIT DISORDER AND DELAYED READING

PARENT INTERVIEW

Name_____ Code #_____

Date of Birth_____ Grade_____

THE PRESCHOOL YEARS

Any problems during pregnancy?

Infant's condition at birth?

When did your child learn to walk?

When did your child:

say his first word?

use two or more words?

speak in sentences?

Were there any articulation problems?

When was your child able to name:

colors?

the letters of the alphabet?

the days of the week?

Did your child have difficulty sitting still and remaining focussed on a task? (Ex. plays with Play-Doh for a few minutes and abandons it to go play with another toy that has caught his eye.)

Did your child enjoy being read to as a preschooler?

Was he able to sit still for the length of a storybook?

Can you tell me your child's favorite book or story from those years?

Do you yourselves read? What do you read? (i.e., books, magazines, newspapers, etc.)

Illnesses

Did your child suffer from:

allergies?

persistent colds and runny noses?

febrile illnesses?

any injuries to the head?

ear infections?
how often?

was an ear infection ever found on a routine office visit?

how long did the infections tend to last?

were follow-up ear checks recommended following antibiotic treatment? Did you do so?

were tubes ever inserted? If so, when? How long were they in?

was a hearing test ever administered to your child? Gross or full? Where? When?

what was the outcome?

at what age did the ear infections disappear?

Is there a history of reading disability in your family? (uncles, aunts, grandparents, cousins, etc.)

Have your child's teachers ever remarked on his/her inability to concentrate?

SCHOOL HISTORY Details about the child's overall success in school, evidence of distractibility, as well as their reading progress.

Grade	Age	School	Remarks

Does your child miss much school?

Father's occupation_____

Mother's occupation_____

Interviewer_____

APPENDIX D

BRYANT PSEUDOWORD DECODING TEST INSTRUCTIONS

SAY: "I am going to show you some cards with words on them. Some will be real words and some will be made up words. As soon as I show you the card and you know how to pronounce that word, say it out loud for me. Remember, it doesn't have to be a real word. Just tell me how you think it sounds."

PRESENT first card. If the child names the letters, clarify the task again by stressing that he should say the whole word. DO NOT CORRECT THE PRONUNCIATION, but be sure the subject understands and tries to follow directions. Repeat with the next card. Point out that some words will be easy and some will be hard and sound funny.

PRESENT stimulus cards one at a time. IF AFTER 15 SECONDS A RESPONSES HAS NOT BEEN GIVEN, SAY "Let's go on to the next one." If he wants more time to figure out a pronunciation, let him have the time. TRY NOT TO FRUSTRATE HIM.

RECORD. A correct response is indicated by circling the stimulus word on the record form. A phonetic transcription of an incorrect response is recorded next to the particular word. No response is recorded as a slash (/) through the word. A corrected response is recorded as correct by a check mark next to the originally incorrect response.

DO reassure the child by indicating that some words are unusual and difficult. DO NOT correct a response or indicate whether a response is correct or not. Rather, if asked, SAY "That's a good guess."

NOTE if a child makes reversals by writing LR (letter reversal) or WR (word reversal) next to the word or letter in question.

SCORE. Total number of correct single syllables divided by the total number of possible correct syllables (35), i.e., 16/35. Count 7 multi-syllabic words separately, i.e., 11/15. Put both scores at the top of the page.

ANSWER & SUMMARY SHEET FOR PSEUDOWORD DECODING TEST

		Sounds like:
1.	bac ( )_____	back
2.	cib ( )_____	sib
3.	cod ( )_____	
4.	duh ( )_____	
5.	firl ( )_____	furl
6.	gel ( )_____	jell
7.	gof ( )_____	golf w/o "l"
8.	hig ( )_____	
9.	urj ( )_____	urge
10.	juk ( )_____	juck
11.	ker ( )_____	handkerchief
12.	lam ( )_____	
13.	maun ( )_____	rhymes with faun
14.	nep ( )_____	nepp
15.	poy ( )_____	rhymes with boy
16.	quar ( )_____	as in quart or rhyming with far
17.	rus ( )_____	russ
18.	ort ( )_____	as in sort
19.	soi ( )_____	as in soil
20.	tev ( )_____	
21.	vaw ( )_____	rhymes with saw
22.	wox ( )_____	as in fox
23.	yaz ( )_____	as in jazz
24.	zin ( )_____	as in sin
25.	fute ( )_____	as in futile

26. kaje ( )_____ cage

27. nime ( )_____ rhymes with mime

28. voe ( )_____ as in vocational

29. peke ( )_____ peak

30. nue ( )_____ new

31. thi ( )_____ thigh or thy

32. sho ( )_____ show

33. whe ( )_____ wee

34. choo ( )_____ as in choose

35. phay ( )_____ fay

Multi-syllabic words

36. gofnep ( )_____

37. bactev ( )_____

38. ciblamwox ( )_____

39. unfute ( )_____

40. phaying ( )_____

41. juktion ( )_____

42. zinny ( )_____

APPENDIX E

APPENDIX E

RAPID AUTOMATIZED NAMING (RAN)

Name: Date:

Birth Date: Examiner:

COLOR TEST

SAMPLE: blue red green black yellow

red	black	yellow	green	blue	black	red	yellow	blue	green
yellow	green	black	blue	green	red	black	blue	yellow	red
black	red	yellow	black	yellow	green	blue	red	green	black
green	yellow	blue	red	green	yellow	black	yellow	red	blue
yellow	black	green	blue	black	blue	red	black	blue	yellow

NORMS: (age)	5.0-5.5	5.6-5.11	6.0 6.5	6.6-6.11	7	8	9	10	11(M)	12(M)	13(M)
MALES											
Mean Score	78	69	59	57	56.3	54.7	46.5	42.3	39	35	33
+1sd	110	97	76	73	67	62	58	50	47	39	38
FEMALES											
Mean Score	74	61	61	53	52.4	49.0	40.4	41.1			
+1sd	94	76	78	69	61	60	47	47			

NUMBERS

SAMPLE: 2 6 9 4 7

6	4	7	9	2	4	6	7	2	9
7	9	4	2	9	6	4	2	7	6
4	6	7	4	7	9	2	6	9	4
9	7	2	6	9	7	4	7	6	2
7	4	9	2	4	2	6	4	2	7

NORMS: (age)	5.0-5.5	5.6-5.11	6.0 6.5	6.6-6.11	7 (M+F)	8 (M+F)	9 (M+F)	10 (M+F)	11 (M)	12 (M)	13 (M)
Males											
Mean Score	75	62	49	44	34	31	26	24	21	18	18
+1sd	107	89	71	59	41	37	34	28	26	22	22
FEMALES											
Mean Score	64	49	44	37							
+1sd	93	62	56	47							

Revised 9/83

USE OBJECTS

SAMPLE: ball hand chair dog star

ball	star	chair	dog	hand	star	ball	chair	dog	hand
star	dog	hand	ball	chair	dog	star	hand	ball	chair
dog	hand	ball	chair	star	ball	hand	chair	dog	star
hand	ball	star	dog	chair	hand	dog	star	chair	ball
chair	star	dog	hand	ball	chair	hand	ball	star	dog

NORMS: (age)	5.0-5.5	5.6-5.11	6.0-6.5	6.6-6.11	7 (M+F)	8 (M+F)	9 (M+F)	10 (M+F)	11 (M)	12 (M)	13 (M)
MALES											
Mean Score	104	86	75	72	70	62	48	50	47	42	42
+1sd	139	118	92	95	94	75	59	61	59	48	49
FEMALES											
Mean Score	94	76	73	63							
+1sd	120	97	94	76							

SMALL LETTERS - HIGH FREQ.

SAMPLE: s o m t i

s	m	t	i	o	t	s	m	o	i
m	i	o	t	s	o	m	t	i	s
t	o	s	m	i	m	o	t	s	i
o	m	t	i	s	m	i	s	t	o
i	s	m	o	t	i	s	m	o	t

NORMS: (M&F, age)	5.0-5.5	5.6-5.11	6.0-6.5	6.6-6.11	7 (M+F)	8 (M+F)	9 (M+F)	10 (M+F)	11 (M)	12 (M)	13 (M)
MALE											
Mean Score	67	59	45	42	33	31	25	24	22	18	18
+1sd	95	82	66	60	40	38	30	26	27	23	21
FEMALES											
Mean Score	61	47	43	37							
+1sd	83	64	61	47							

APPENDIX F

McGUFFEY READING CENTER CURRY SCHOOL OF EDUCATION

28 March 1990

Dear Parent:

I am currently working towards a doctorate in Reading through the Curry School of Education at the University of Virginia. I am involved in dissertation research which looks at whether ear infections during the early years may influence how well a child learns to read when he or she begins school. I am working with children who were free of ear infections from birth to three years as well as children who have significant histories of ear infections during that same time.

I am planning to test these children during the week of April 16th which coincides with their spring break. If that week does not suit, another time, at your convenience, can be arranged. The testing will include a full Reading evaluation, a brief parent interview, and a Wechsler IQ Test and can be completed in a day. This otherwise expensive testing will be at no cost to you and is entirely confidential. Once the testing is completed and reported to you, your child's name reference and other identifying characteristics will be destroyed. Your child's name, then, will not appear in any fashion in the subsequent dissertation.

You will receive a brief report outlining your child's Reading level and their performance on the Wechsler IQ test. I will be available for consultation should any questions arise from this testing. Please be advised that you may withdraw your child from the study at any time.

I appreciate your cooperation. The information from this research should prove helpful to doctors who treat children with ear infections as well as teachers who work with these children when they reach school age. Results of the study will be available should you like to see them.

RUFFNER HALL, 405 EMMET STREET, CHARLOTTESVILLE, VIRGINIA 22903-2495
(804) 924-3111

Please call me at 973-4484 if you have any questions. Please complete the consent below and return at the time of testing.

Sincerely,

Joan Kindig, M.Ed.
McGuffey Reading Center

I give my consent for _____ to participate in the above-mentioned study.

Signed: _____

Relationship to Child:_____

Date _____.