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ABSTRACT

This study examined the development of metaprocessing abilities in children with varying degrees of language abilities and sought to determine if the patterns of metaprocessing development that emerged were similar for these ability groups. Subjects were 141 children ages 4-5 at the beginning of the study, divided into a control group, a low average group, and a group with specific language impairment (SLI). Measures included initial standardized language intake measures, oral language metaprocessing measures given 6 months after the start of the study and then two more times at approximately 6 month intervals, and standardized reading measures at the end of the study. The language metaprocessing measures examined the children's comprehension; short term memory; and linguistic awareness at the phoneme, word, sentence, and discourse levels. The three groups performed significantly differently from one another at all three times, with the SLI group performing most poorly. However, there were no intergroup differences in the developmental trends or patterns that were emerging for overall metalinguistic development. Performance of each group on specific metalinguistic tasks is analyzed. The paper concludes that oral language skills and early reading abilities are related, and that SLI children do not "catch up" in terms of their metalinguistic abilities and appear to have great difficulty in the initial stages of reading. (JDD)

DEVELOPMENT OF METALINGUISTIC SKILLS IN CHILDREN OF VARYING LANGUAGE ABILITY

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There continues to be a great deal of effort expended to determine the causes of language disorders in children who have no overt evidence of intellectual or physical impairment, so-called SLI children. Aside from speculating about possible underlying neurological differences, a number of researchers have hypothesized that the way in which SLI children acquire language is different from children without a language disorder. The rate at which SLI children process language information, and the strategies that they use to attend to, encode and/or retrieve this information have all been pointed to as possible causes (Lahey, 1988; Menyuk, 1990, 1991; Tallal & Percy, 1978; Wiig & Semel, 1980). This search for causes has been motivated by the logical assumption that if these causes can be determined then appropriate intervention might be planned to overcome, or bypass the difficulties these children encounter while acquiring language.

Research has indicated that young preschool children are capable of bringing to awareness those aspects of language they intuitively master, whether it be phonological, morphological, syntactic, semantic, or pragmatic categories and relations. Several researchers have stated that language users can only become aware of, or be made aware of, those categories and relations of language that they understand and use in their spontaneous language. This conscious knowledge is built upon intuitive knowledge of the many parameters of language and has been referred to as "metalinguistic" abilities (Bialystok, 1986; Karmiloff-Smith, 1986; Menyuk, 1983).

It may be that children with language disorders simply display a pattern of delay in achieving awareness of aspects of language that is similar to their delay in acquiring oral language. Degree of language ability and degree of metalinguistic ability might be related in a highly regular fashion. SLI children may have difficulty in acquiring metalinguistic knowledge of all parameters of language (Johnston, 1988) or there may be specific aspects of language and meta-processing that cause difficulty.

The purposes of this study were to examine the development of meta-processing abilities in children with varying degrees of language abilities and to determine if the patterns of meta-processing development that emerged were similar for these ability groups. Subjects for this three year study were 141 children aged 4.6 to 5.6 years at the beginning of the study who were selected from groups of normal language learners, prematurely born, specifically language impaired, and children possibly at- risk for language problems. All of the children's performance IQ's were above 85 as measured by the Weschler Preschool and Primary Scales of Intelligence (Weschler, 1974) and had passed a hearing screen. The measures obtained from the children were 1) initial standardized language intake measures, and 2) oral language meta-processing measures given six months after the start of the study and then two more times at approximately six month intervals, and 3) standardized reading measures at the end of the study.

The standardized intake measures included the Token Test for Children (DiSimoni, 1978), the Peabody Picture Vocabulary Test-Revised (Dunn and Dunn, 1981) the Grammatical Closure subtest of the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, and Kirk, 1968), the Expressive One Word Picture Vocabulary Test (Gardner, 1980), and the Developmental Sentence Scoring Procedure (Lee, 1973)

On the basis of Ward's hierarchical cluster analysis, using the standardized intake measures, the children were assigned to one of three groups: a control group, a low average group, and a SLI group. There were 22 children in the control group, 84 in the low average group, and 35 in the SLI group.

The language meta-processing measures examined the children's comprehension, short term memory, and linguistic awareness of all levels of language: e.g. phoneme,

word, sentence, and discourse. These tasks were classified as phonological, lexical, syntactic, and discourse. The phonological segmentation tasks assessed both phoneme and syllable segmentation skills. The lexical tasks consisted of rapid automatized naming or RAN of colors, numbers, letters, and objects and two different word recall tasks. Words were presented randomly for one word recall task and "within categories" for the other recall task. The syntactic tasks assessed judgment and correction of non-grammatical sentences, comprehension of complex sentences, and an oral cloze procedure. Recall of an orally presented story was the discourse task

To examine the children's development of metalinguistic skills, all children's scores for each of the groups' metalinguistic tasks were converted to standard scores with a mean of 0 and a standard deviation of 1.

Analyses of variance were performed to determine whether the three groups performed differently in terms of their overall metalinguistic development as well as in their performance on the specific tasks at each administration of the tasks. When significant differences were found among the groups, Duncan's post hoc analyses were carried out to determine which group(s) differed. In addition to these statistical analyses, repeated measures analyses of variance were performed on the data to determine if the developmental trends of the groups were similar over the three administrations.

OVERHEAD

OVERALL METALINGUISTIC DEVELOPMENT

This overhead illustrates the three groups' performance in terms of overall metalinguistic ability, which was a cumulative score on all of the metalinguistic tasks. The three groups performed significantly differently from one another at all three times with

the SLI group performing most poorly. Even though the three groups performed significantly differently from each other at each administration, the results of the repeated measures analyses of variance indicated that there were no significant differences among them in the developmental trends or patterns that were emerging for overall metalinguistic development

OVERHEAD

PHONOLOGICAL SEGMENTATION DEVELOPMENT

This next overhead illustrates the three groups' performance on the phonological segmentation tasks. At times 1 and 2, the three groups were significantly different from one another in terms of these abilities. However, at time 3, the control and low average groups although different from each other, were performing similarly on these tasks. However, their performance was significantly different from the SLI group. Even though there were significant differences among the groups in their phonological segmentation abilities, the pattern of development for the groups was not significantly different.

OVERHEAD

LEXICAL DEVELOPMENT

This overhead illustrates the three groups' performance on the lexical tasks. At each of the administrations of these tasks, the control and low average groups were not significantly different from each other. However, the SLI group's performance was, again, significantly different from the other two groups. And again, even though the SLI group was different from the other two groups at each administration, the results of the repeated

measures analysis of variance indicated that the pattern of development that was emerging for the three groups was not significantly different.

OVERHEAD

SYNTACTIC DEVELOPMENT

This overhead illustrates the three groups' performance on the syntactic tasks. At each administration of these tasks the three groups were significantly different from one another with the SLI group performing most poorly. The results of the repeated measures analysis of variance for these tasks indicated that a different developmental pattern was emerging for the SLI group in terms of syntactic processing abilities when compared to the other two groups.

OVERHEAD

DISCOURSE DEVELOPMENT

This overhead shows the three groups' performance on the story recall task. The results of the analyses of variance indicated that the control and low average groups were not significantly different from each other at time one but were significantly different from one another at times two and three with the low average group performing more poorly than the controls. The SLI group's performance was significantly different from the control group at each administration of this task and was significantly different from the low average group at time one. However, the SLI and low average groups, were not significantly different from each other at the second and third administration of the discourse task. Difficulties on this task might be related to syntactic problems. Even though there were various differences among the groups at each of the administrations of the task, the pattern of development was not significantly different for the groups.

Overall, developmental changes in the metalinguistic skills that were examined were found among the groups regardless of their language ability. The children in the SLI group developed metalinguistic skills in all areas but, very slowly. On almost all of the specific metalinguistic tasks, the SLI group performed more poorly than the other two groups at each of the three administrations of the tasks. However, there were language processing tasks where these children encountered particular difficulty. These tasks involve processing of complex syntax with limited contextual support. These results indicate that the development of meta-processing skills appears to reflect a mixture of delay and difference. These difficulties may lead to problems in reading skills in the early grades.

Another question that we asked was whether there were differences among the groups in terms of their early reading performance as measured by their scores on the word recognition subtest of Wide Range Achievement Test, (Jastak and Jastak, 1976); the Gray Oral Reading Test, (Gray and Robinson, 1980); and the vocabulary recognition, paragraph reading, syntactic similarities, sentence sequencing, and reading directions for school work subtests of the Test of Reading Comprehension, (Brown, Hammill, and Weiderholt, 1978). The answer to that question is "yes." On almost all of the reading tests the SLI children performed significantly more poorly than the other two groups. In turn, the control group performed more successfully than the other two groups.

OVERHEAD

RESULTS OF READING TESTS

This overhead presents the results of the significant differences among the groups on the standardized tests of reading performance. When examining the results of the

reading tests, it is interesting to note which tests each group could or could not even begin to perform. Ninety-one percent of the children in the SLI group could do the word recognition task of the WRAT, 60% of them could read aloud on the GRAY, but only 34% of the children could do the various subtests on the TORC. This indicates that the SLI children on the whole had not learned to read proficiently enough to take a comprehensive reading test. The low average group had reading difficulties as well. Ninety-eight percent of the children in the low average group could do the WRAT reading test, 95% could perform on the GRAY, and 67% of these children completed the TORC subtests. Almost all of the children in the control group could perform on all of the standardized reading tests.

For those children within the three groups who could do the reading required on the tests, the results of the ANOVAs prove to be interesting. The group differences on the WRAT suggest that the SLI group is having significant difficulty with single word recognition. This group performed almost two standard deviations below the mean on this test whereas the other two groups' performance was average.

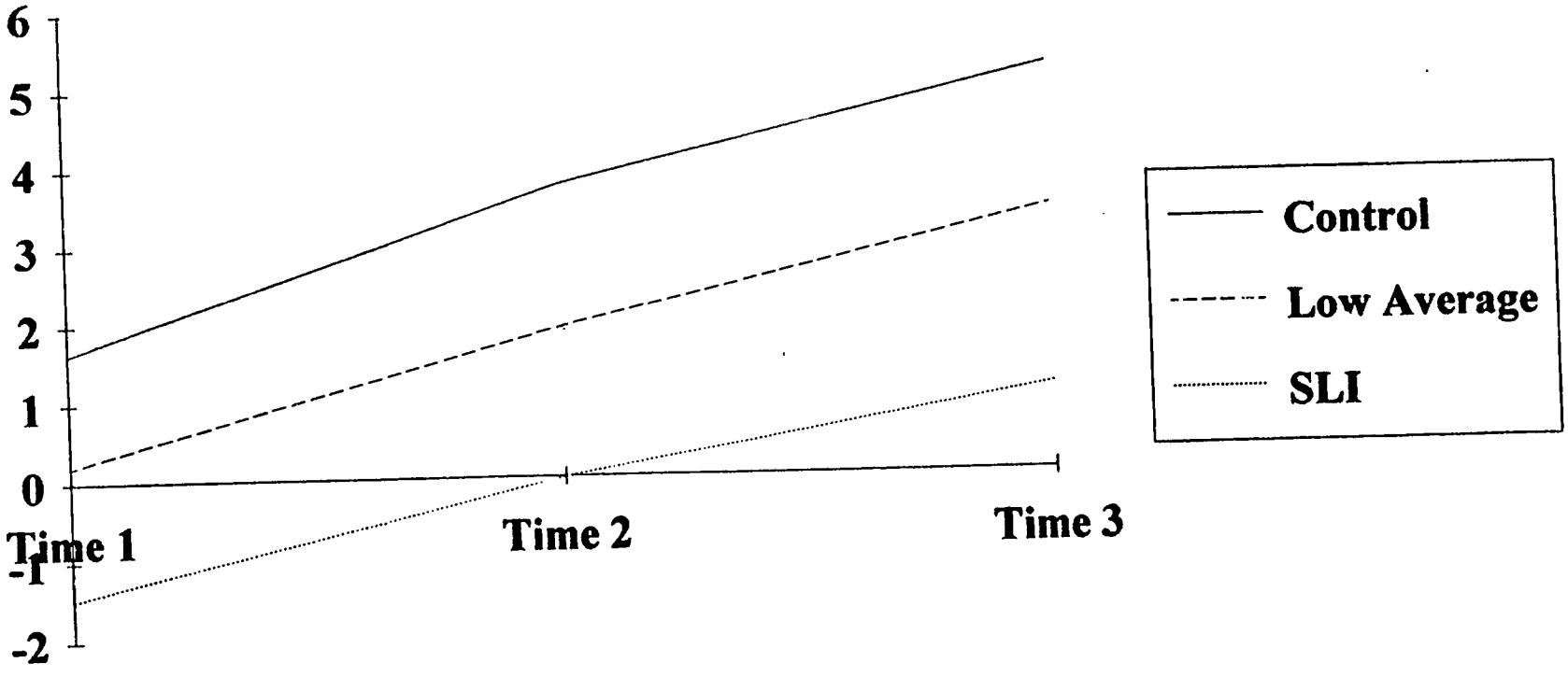
Although there were no significant differences among the three groups on the GRAY, the number of passages read by the three groups was different. On average, the control group successfully read six passages, the low average group read 4.8 passages, and the SLI group read only 3.8 passages. The fact that this version of the GRAY uses grade equivalent scores rather than standard scores may be the reason for the findings that no significant differences were found among the groups. It is not surprising that, of those children who could read, most were reading at grade level. The oral reading fluency that is required to read the paragraphs at these early grade levels does not differentiate the groups in terms of the grade equivalent scores but does so for the number of passages read.

SLI children who could read performed significantly differently from the control group on almost all of the subtests of the TORC. The similarities that were found in the groups' performance on the vocabulary and paragraph reading subtests are probably related to the fact that the information contained within these two subtests are graded, and the children were reading at grade level. In contrast, the differences found on the reading directions for schoolwork subtest, which is not graded, indicate that the low average and SLI groups had specific difficulty completing this task when compared to the control group.

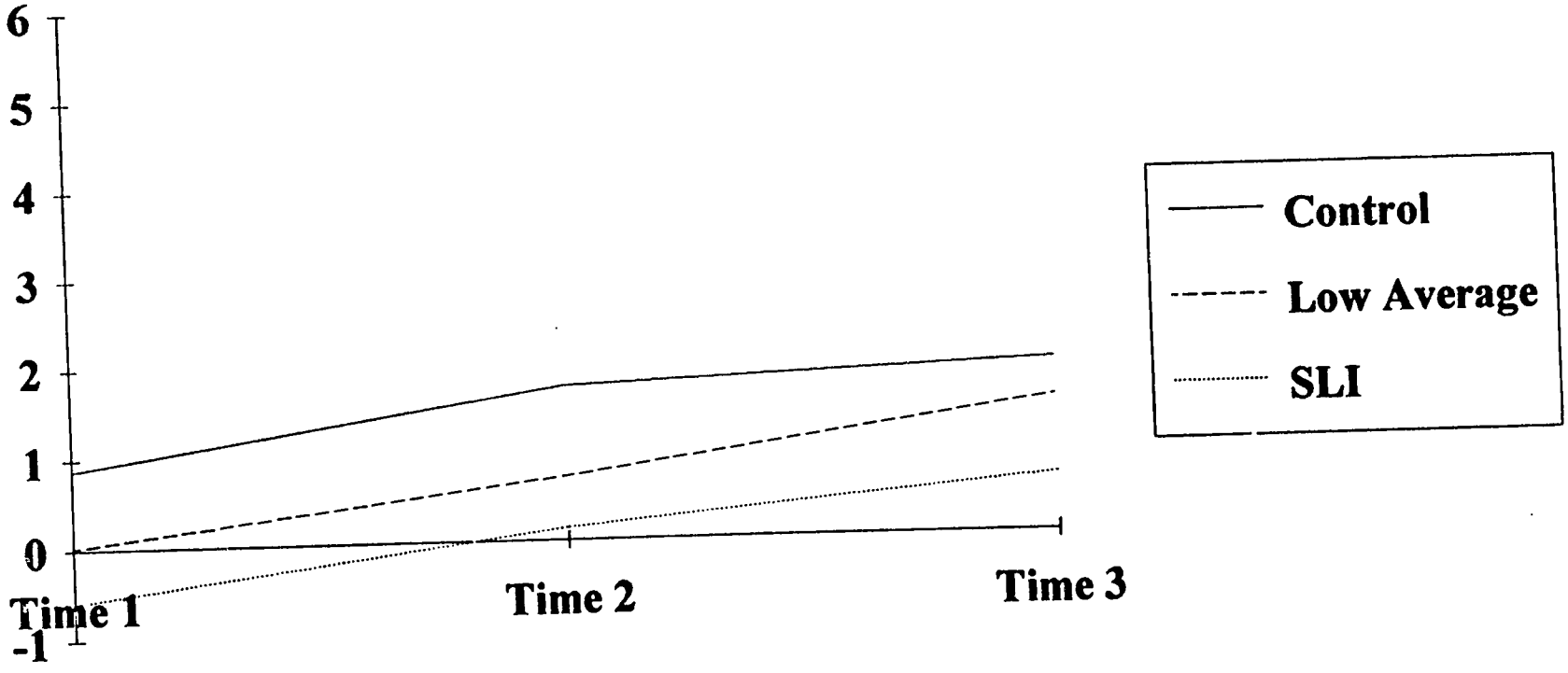
The SLI children also performed significantly differently from the other two groups on the sentence sequencing task. This difficulty with organizing and sequencing written information may be related to the fact that they also had difficulty recalling orally presented information as was seen in their performance on the discourse task. The group differences on the syntactic similarities subtest of the TORC further supports the finding that syntactic tasks, whether presented orally or in written form, are difficult and continue to be difficult for the low average and SLI groups.

These findings all together support the fact that oral language skills and early reading abilities are related. The data presented indicate that the SLI children do not "catch up" in terms of their metalinguistic abilities and appear to have great difficulty in the initial stages of reading. Since we do not see "catch-up" in their oral language skills and given their pattern of performance on all of the metalinguistic tasks during these early years of learning, we hypothesize that they will continue to have great difficulty with their reading abilities as well.

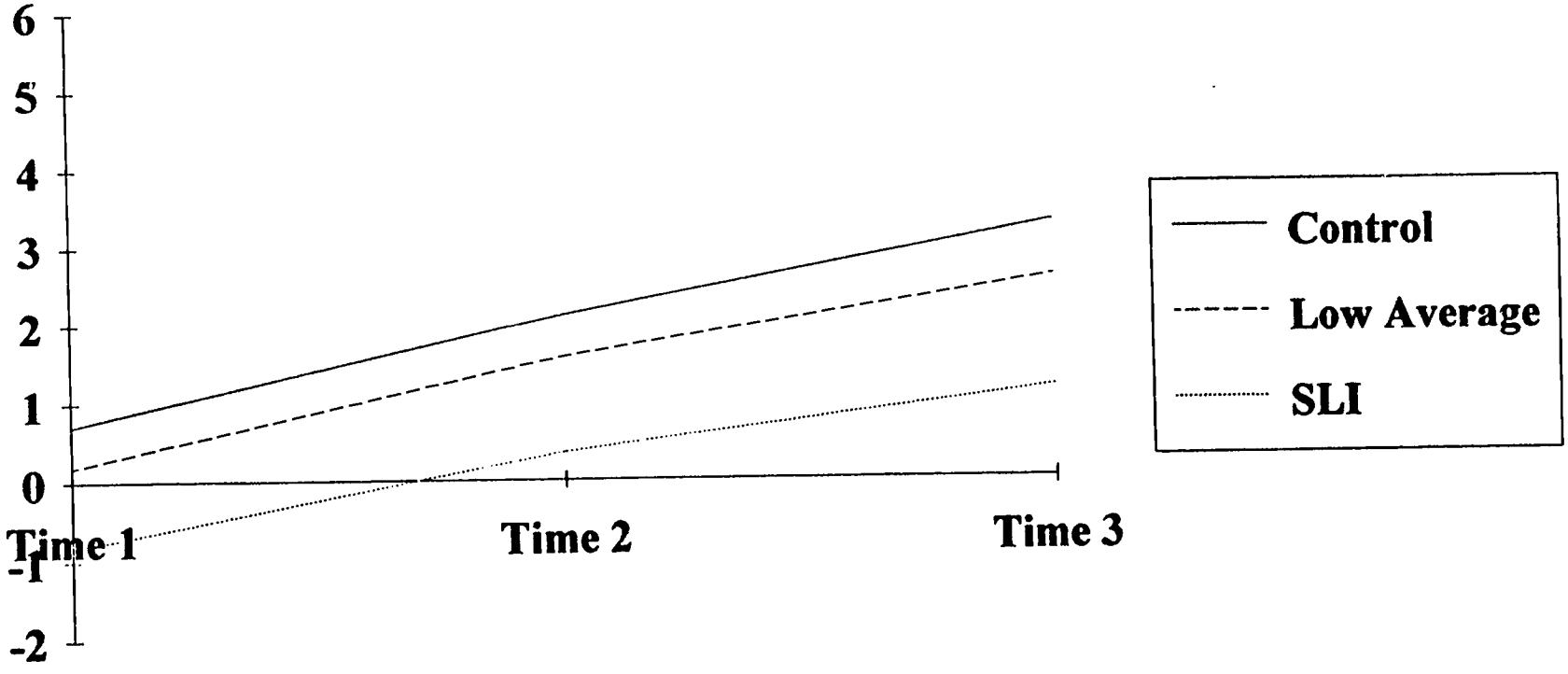
OVERALL METALINGUISTIC DEVELOPMENT



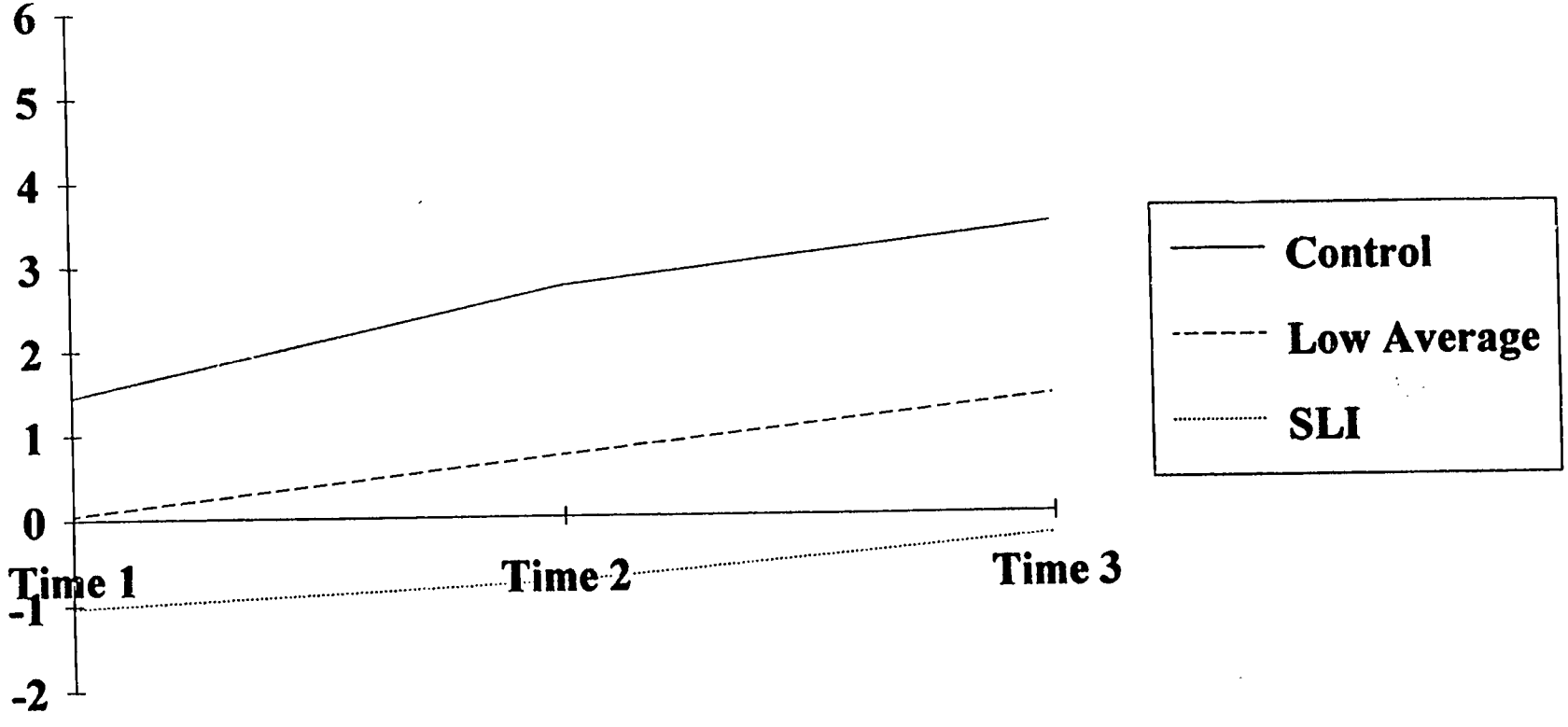
PHONOLOGICAL SEGMENTATION DEVELOPMENT



LEXICAL DEVELOPMENT



SYNTACTIC DEVELOPMENT



	Results of Reading Tests			
	Control	Low Average	SLI	F-value	P level
WRAT (standard reading score)	101.68	94.77	81.75	12.33	0.0001
TORC standard scores					
Syntactic similarities	10.70	8.96	6.92	7.49	0.0001
Sentence sequencing	10.31	10.05	8.25	2.97	0.0566
Overall Reading quotient (TORC)	105.55	100.11	85.08	8.25	0.0005