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An Evaluation of Three Stimulus Media for Eliciting Verbal Language Samples from Educable Mentally Handicapped Children

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AN EVALUATION OF THREE STIMULUS MEDIA FOR ELICITING VERBAL LANGUAGE

SAMPLES FROM EDUCABLE MENTALLY HANDICAPPED CHILDREN

(TITLE)

BY

Shirley E. Baughman Mintun

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
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CHAPTER I

STATEMENT OF THE PROBLEM

INTRODUCTION

Investigators in several fields, including speech pathology, have studied the problem of evaluating the development of oral language in children. Specifically, they have attempted to evaluate a child's language output, compare it to normative data, classify it in terms of the child's level of language development, and design therapy enabling the child to understand and use language at a level consistent with his chronological age. To do this, an investigator must elicit a sample of the child's language. Several measures are used to evaluate the child's verbal output: the mean length of response, the mean of the five longest responses, the median number of one word responses, the structural complexity (Templin, 1957), the length-complexity index (Shriner, 1967) and the number of different words used. Each of the above measures is used to evaluate different aspects of the sample of language which has been elicited.

There is no standard method employed in eliciting the language sample, not even for comparison to given normative data. Various authors have described different methods used in obtaining responses. These include free play, semistructured test situations where the child is

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encouraged to talk about toys or pictures and conversation between the sub-
ject and examiner. Specific studies in which the above have been used
will be discussed later.

In the past, the child's verbal responses have been elicited and eval-
uated with little apparent attention given to the different methods of stimu-
lation. Research by Cowen, Weber, Hoddinott and Klein (1967), placed
focus on two variables which had been either inadequately studied or com-
pletely ignored, the stimulus and the examiner. Their findings indicated
that a child's verbal output is a function of both the method of stimulation
and the examiner. While they found differences in the verbal output elicited
by the different examiners, the differences were difficult to interpret since
the instructions were not standardized.

Fodor (1965) took issue with those who equate the terms "stimulus"
and "response" with objects which mediate a verbal response and the re-
sponse itself. He pointed out the inadequacies of single stage models
and denied that there was any evidence that verbal responses are responses
in the "strict sense" of acts correlated with the stimuli. Correlations be-
tween verbal utterances and external stimuli are, he said, slight or atypical.
In a following issue of the same journal, Berlyne (1966) answered his
objections:

> It is now generally agreed, both among psychologists identi-
> fiable with the S-R current and among others, that the nature of
> the overt response is not determined solely by the presence or
> absence of a particular kind of external stimulus object or stim-
> ulus condition but jointly by a large number of variables repre-
> senting external and internal conditions. The conception of a

stimulus-response association discussed above does not
imply that a particular stimulus condition can possess an
association with only one motor response. It can actually
possess associations with several distinct responses, just
as one motor response can be associated with several dis-
tinct stimulus conditions. Any stimulus condition is likely,
in fact, to be associated with several motor responses which,
in their overt versions, are mutually incompatible (in the
sense that no two of them can occur simultaneously) while
implicit versions of them are not incompatible.

The motor responses in question are, of course, more
properly regarded as response patterns or sets of competent
acts. In general, there will be no response pattern unique
to a particular stimulus condition. It is, however, conceiv-
able that either the union of the response patterns asso-
ciated with a particular stimulus condition (i.e., the set of
all component acts belonging to at least one of these re-
sponse patterns) or their intersection (i.e., the set of com-
ponent acts common to all of them) will be unique.

If a mediator corresponded to, and possessed a part-
whole relation with, this union or this intersection, it
could possibly correspond to a signified stimulus condi-
tion without corresponding to the overt response that is
performed on any particular occasion (p. 409).

Verbal responses, then, are one part of the response to the stimulus

situation. The verbal response to a given stimulation situation may be re-

corded. If the stimulation situation varies, the verbal response may vary

in accordance. The child's experiences, the situation, the stimulus, the

examiner and the resulting interactions, are all recognized as variables;

(Cowan e. al. 1967; Spradlin, 1963) however, when the examiner, the stimu-

lus materials and the instructions remain constant, the elicited verbal

output of the child should reflect the child's language performance in that

situation.

Research in the area of language behavior of mentally retarded child-

ren has been neglected until recent years. Special education programs

instituted by the public schools and public and private institutions for retarded children have created an urgent need for knowledge concerning the language development of mentally retarded children.

Spradlin (1963) has summarized the research concerning the language abilities of mentally retarded children. The conclusions are that: (1) language is learned behavior and subject to all principles that apply to learned behavior, (2) an objective instrument for predicting the amount of verbal output can be administered by a tester after approximately one week of training, (3) children who were judged to be "high level" in the amount of verbal output as assessed on the Parson's Performance Scale, consistently emitted greater and more complex verbal output than did "low level" children, (4) adults produce more verbal output when interacting with "high level" mentally retarded children, (5) reinforcement plays an important part in language learning, (6) more research is required in all of the mentioned areas with mentally retarded children.

There is widespread agreement that mentally retarded children, as a group, exhibit deficiencies in speech and language. Matthews (1957) cited several studies which describe the typical speech deficiencies accompanying mental retardation. He says further that there is no evidence to suggest that speech defects of the mentally retarded differ in kind from those of a nonretarded speech defective population.

The purpose of this investigation was to test the hypothesis that three different selected stimulus media would yield significant differences

in the amount and structure of the language samples elioited from educably

mentally handicapped children.

CHAPTER II

REVIEW OF THE LITERATURE

In 1957, Templin published a description of the language skills of children from three to eight years of age. Included in this work was a table of the "normal" mean length response for boys and girls of upper and lower socio-economic classes. These norms were determined on the basis of the testing of 480 children (sixty in each subgroup) and computing the mean for each subgroup. This table of norms has been used in speech clinics to ascertain the level of a given child's language skills. She described the stimulus situation as a "child-adult situation." The materials used in eliciting responses were similar to materials used by McCarthy (1930). These include an animal picture, illustrated Mother Goose rhymes and toys. The toys consisted of a "little red auto, a cat that squeaked, a telephone with a bell, a little tin mouse, a music box and a small ball." For older children she used a book containing group and situation pictures. Both Templin and McCarthy used toys and pictures interchangeably. The specific verbal directives are not recorded. If one is to compare the results of a language evaluation with a set of normative data, with validity, it seems that the procedure for obtaining

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the language sample should remain constant.

The subsequent literature contains references to various methods by which language samples were elicited. Davis (1937) evaluated the language of a population of only children, children with siblings and twins from 5.5 to 9.5 years of age. She preferred to include toys which had high appeal to boys, assuming that girls would enjoy them too. Included were "...a motly collection of little covered wagons with detachable oxen, lassoing cowboys, buffalo hunters, scouts, Indians in attitudes of hostility, flight or pursuit, and various animals or trees." Davis resorted to pictures only when toys failed to stimulate spontaneous speech. She reports her verbal directives as follows: "I wonder what you play with at home," or "Here are some animals that not many children know," or "now I'm going to show you something funny," or "Now we're going to look at some books, I want you to tell me about the picture," "I want you to take these toys out of the boxes and play with them any way you like, just as you would if you were at home by yourself. But you must tell me what you are doing while you play so I will know (p. 166)."

Menyuk (1964) elicited language samples in three stimulus situations; responses to a projective test, The Blacky Pictures, conversation with the experimenter generated by a prescribed set of questions, and conversation with peers generated by role playing in a family setting.

Cazden (1965) recorded language samples elicited during conversation with an adult and reactions to picture books. The procedure described by

Shriner (1967) consisted of his showing each child a picture stimulus and asking him about what he saw in the picture. Pictures of the Children's Apperception Test have been used by Minifie, Darley, and Sherman (1963). Many authors simply state language samples were elicited.

Language samples have been elicited from mentally handicapped children in the following manner: simple toys, such as crayons, paper, and small animals which the investigator used at his own discretion (Siegel, 1963), and conversation while arranging forms on a flannel board. (Siegel and Harking, 1963). Sessions in which the amount of a child's verbal output was measured in relation to the amount of adult verbalization were studied and compared to a situation in which the adult was instructed to "Engage in spontaneous verbalizing, without requiring the child to talk, to register approval when, the child indicated some desire to talk; and to allow the child's verbal behavior to direct the session as much as possible (p. 48). A few small toys were placed in the room to facilitate eliciting responses (Siegel, 1963). Verbal responses were obtained by Schlanger (1953) by showing pictures through a Viewmaster to mentally retarded children.

In a recent study using normal subjects, Cowan et al. (1967) studied the examiner and the stimulus materials as variables. "The test stimuli were ten pictures, approximately 5 x 7 inches, mounted on colored paper. All were taken from a popular magazine cover paintings. The pictures were chosen as ones which would probably be of interest to children and showed varying numbers of adults and children engaged in different activities.

The subject's chronological age, sex, socio-economic status and IQ were matched. Using the mean length response as the language measure to evaluate the evoked language samples, they found significant differences in the responses elicited from different pictures. The study revealed differences in the mean length response elicited by the different examiners using the same stimulus materials. Possible explanations suggested included: (1) the effect of each examiner scoring his own protocol, (2) the instructions were not completely standardized, (3) the responses were not recorded, hence, could not be studied for other possible examiner variables. The authors recommended additional research to control examiner and stimuli as variables.

In view of the wide variety of methods of obtaining language samples, further investigation is indicated.

CHAPTER III

SUBJECTS, PROCEDURES, EQUIPMENT

Selection of Subjects

The subjects were thirty children living in Illinois who had been placed in rooms for the educable mentally handicapped, primary division, in the cities of Charleston, Vermillion, Mattoon, and Cumberland.

Educably Mentally Handicapped--(EMH) in public schools in Illinois, means children between the ages of 4 and 21 years who, because of retarded intellectual development as determined by individual psychological examination, are incapable of being educated profitably and efficiently through ordinary classroom instruction but who may be expected to benefit from special educational facilities designed to make them economically useful and socially adjusted.

The rate of mental development of educable mentally handicapped children is approximately one-half to four-fifths that of children with average intelligence. This is generally interpreted to mean an I.Q. of 55 to 80 on an individual test of intelligence such as the Binet or Wechsler, except that other relevant factors must also be considered.

Retarded children found to be in the 50 to 60 I.Q. range may be classified by a qualified psychological examiner as either educably mentally

handicapped (EMH) or trainable mentally handicapped (TMH). These child-
ren will be referred to as (EMH) (Rules and Regulations to Govern the Ad-
ministration and Operation of Special Education, State of Illinois Rule 8.01
and 8.14 pp. 42, 44-1964).

The entire population of the above EMH rooms were given articulation
and hearing screening tests. Those students who met the criteria comprised
a pool from which subjects were randomly assigned to stimulus groups. Sub-
jects were selected on the basis of the following criteria:

A. Age. --Any child placed in above mentioned primary EMH room
was considered eligible to participate in this study. The mean chronologi-
cal age of all subjects was 8 years 6 months. Mean chronological age of
Group A was 8 years, Group B, 8.7 years and Group C, 8.8 years. Ages
of the subjects ranged from 6 years 10 months to 10 years 4 months.

B. Intelligence. -- Intelligence scores which had been obtained by
q   hool psychologists and placed on file in school cumulative
folders were utilized in this study. The mean I.Q. of all subjects was
69.6. The mean I.Q. of Group A was 70.6, Group B, 67.6, Group C, 70.6.
The range of I.Q. scores was from 50 to 84.

C. Sex. -- All of the children who qualified for inclusion on the basis
of the other criteria constituted a pool from which children were randomly as-
signed by lot to groups. Seventeen boys and thirteen girls participated.
Group A was composed of six males and four females, Group B had six males
and four females, and Group C had five males and five females.

D. Socioeconomic Status. -- The children who participated in the study were residents of towns of 20,000 population or less or dwelt in rural East Central Illinois. All of the children were from lower middle class and lower class families as judged by the investigator on the basis of occupation except one upper class professional family. Other occupations represented were factory workers, truck drivers, and farmers. Some of the families were receiving Illinois State Aid to Dependent Children.

E. Hearing. -- A pure tone audiometric sweep check at 500, 1000, and 2000 Hz speech reception frequencies at 30 dB ISO 1964 in both ears was administered to all of the children. Failure to respond at more than one frequency excluded the child from the study.

F. Neuromotor Status. -- Children who exhibited neuromotor disabilities in their cumulative records were excluded. Cleft palate children with or without repair were also excluded from the study.

G. Familial Background. -- Twins and children from bilingual homes were excluded from the study.

H. Articulation. -- The subject was required to have speech which was intelligible enough for the examiner to understand and transcribe. Consistent sound substitutions were accepted. A short test of words containing final /s/ and /z/ was administered. This was necessary so that the elicited sample could be properly scored for pluralization within the length complexity index measure. Each use of plural and possive forms

is scored as a more mature use of language. Children with no /s/ and /z/ sounds or acceptable equivalents were excluded.

Procedures

A. Examiner. -- Since the examiner has been described as a variable, (Cowan et al., 1967), the same examiner collected all of the language samples from the subjects. The investigator prior to this study had approximately 300 hours in eliciting language samples and applying the measures utilized in this study.

B. Method. -- Individual interviews were conducted in available rooms in the buildings in which the EMH rooms were housed. A training session was conducted with each child in each of the stimulus methods. The first three items were used as training instruments. The instructions were "Tell me all you can about this" (toy, picture, or film). During the practice session, the subject was asked a. What is it? b. What is it made of? c. What color is it? d. What do you do with it? e. Tell me a story about it. The responses elicited from the first three items were eliminated from the language corpus. The method of presentation and verbal directives remained constant for each medium

The subject was then presented with nine separate stimuli of the same mode of presentation. If the subject was in the group to be presented toys, he was stimulated by nine different toys. The subject was asked, "Tell me all you can about this," "Can you tell me more about this,"

"Can you tell me anything else." Encouraging remarks, such as "That was a good story," "I liked that story," "You're doing fine," and "Uh huh," were used by the examiner. Repetitions of the subject's response were occasionally used for clarification. The described procedure of presentation remained constant for all groups.

The responses were tape recorded, a procedure suggested by Winitz (1959). The language samples were then transcribed by the experimenter and subjected to the language measures described.

C. Stimuli. -- Three modes of stimulation were selected for presentation: toys, pictures, and single concept films. In an attempt to present widely unknown stimuli, the following items were utilized: horse, dog, airplane, doll, fire engine, iron, gun, cash register, tractor, car, piano, and telephone.

1. Toys-Group A -- The subject was presented with each item of the stimulus group and asked, "Tell me all you can about this." The children were permitted to play with the toy while the language sample was being elicited and recorded. Each toy was presented as long as the child continued to offer spontaneous verbalization. The order of presentation remained constant throughout the study. The order was: horse, dog, airplane, fire engine, cash register, tractor, telephone, car, and piano.

2. Pictures-Group B -- A professional photographer employed in the Audio-Visual Department at Eastern Illinois University photographed each of the toys. Eight by ten colored photographs mounted on heavy stock

depicting each toy were produced and presented to elicit verbal responses.
Pictures were presented to the subject as long as he continued to offer
spontaneous verbalizations.

3. Films-Group C. -- A professional photographer employed by the
Audio-Visual Department at Eastern Illinois University prepared a twenty
second, 8 mm, single concept color film of each of the actual items re-
presented by the toys. For example, a movie was made of a real horse.
These were presented to the subjects. During the practice items the films
were repeated when necessary in the judgment of the experimenter.

D. The Language Measures. -- The mean length response (MLR),
the total number of words used (TNW), the number of different words (NDW),
and the length-complexity index (LCI) were computed for each sample.

1. Mean Length Response. -- The mean length response was com-
puted according to rules in Johnson, Darley, and Spriestersbach (1963).
Traditionally, fifty responses are collected and analyzed. Recently, how-
ever, studies have raised questions about this widespread practice.
(Cowan et al., 1967: Cazden, 1965). In the present study, all responses
were collected and used in the various measures.

2. Semantic Word Count. -- A semantic word count was made. This
analysis yielded measures: (1) the total number of words uttered (TNW),
and (2) the number of different words uttered (NDW).

3. Length Complexity Index. -- The length-complexity-index (LCI)
is a linguistic measure designed to make a composite analysis of sentence

length and sentence complexity. Both length and complexity are considered together according to a numeric weighting system. It is a modified combination of two previous measures, the mean length of response (McCarthy, 1954) and the structural complexity score (Templin, 1957).

The length-complexity-index is computed by the following formula:

$$\frac{\text{Noun Phrase One Point / Verb Phrase Two Points / Additional Points}}{\text{Number of Sentences}}$$

Following is an example of the credit the same verbalizations would receive with the L.C.I. and the M.L.R.

"baby's toys" - M.L.R. = 2 points

"baby's toys" - L.C.I. = 5 points (nouns/possessive/noun/plural)

For a detailed description of the Miner (1968) modified L.C.I. see Appendix II.

E. Data Analysis. -- The data were punched on computer cards for the purpose of description and statistical analysis. Specific analyses performed are differences between and within media were analyzed by means of analyses of variance and chi square. All analyses were performed on a 1620 IBM computer at the Data Processing Center at Eastern Illinois University.

Equipment

A. Toys. -- The toys were purchased which were judged to be of universal appeal. They were colorful, durable, and inexpensive. The following toys were employed in the following order in all media.

Practice items were:

1. Electric play iron, aqua plastic and steel, with white cord and plug, #317, Wolverine Toy Company, Pittsburgh, Pennsylvania.

2. Baby doll in a pink blanket and pink plastic cradle.

3. Winchester "Shootin Shell" rifle, #0661, Mattel, Incorporated, Hawthorn, California. These items were chosen as practice items because of a possible sex bias.

Toys utilized in eliciting verbalizations were:

1. Brown plastic "Thundercolt," #2031B, Louis Marx and Company, Incorporated, GlenDale, West Virginia.

2. Collie dog, black and tan plastic, # 101, British Colony of Hong Kong.

3. Jet airliner, friction powered with jet sound, gray metal and plastic with red and white stripe, Frankonia, (Seal of Approval Toys) #7126.

4. Fire engine, red plastic, Engine No. 598, Processed Plastic Company, Aurora, Illinois.

5. Toy cash register, red plastic, push button. Model #1501, Tom Thumb, Western Stamping Corporation, Jackson, Michigan.

6. Toy tractor, red metal, #401, Carter Tru Scale Machine Company, Rockford, Illinois.

7. Toy telephone, realistic black desk, dial type, one of a set of Dial Phones #212 intercom set, Brumberger, Brooklyn, New York.

8.   Scale model car, 1968 blue Plymouth H-T, Jo Han Models, Incorporated, 17255 Moran, Detroit, Michigan.

9.   Toy piano, pink, 12 key "grand piano," Schoenhut, BS/12, Japan.

B. Pictures. --All photographic film, equipment and processing were provided by Eastman Kodak Company of Rochester, New York. Eight by ten colored photographs with matte finish were mounted on heavy tag board. Kodak film (CX-135) was used in a Nikon 35mm camera.

C. Films --The films were originally taken in 16mm, colored, moving picture type, then reduced to 8 mm moving picture type and loaded into 20 second single concept cartridges. Films were taken with a Bolex H-16 movie camera. A light meter was used. These 20-second single concept cartridges were presented to the subject on a Kodak Ektagraphic 8 projector.

D. - All responses were recorded on a Wollensak, Model T-1500 with standard length Scotch brand recording tape.

CHAPTER IV

RESULTS

Language samples were elicited from three groups of ten children each using three different stimulus media. There were approximately 20,646 words in 3,333 responses elicited. A summary of the means and standard deviations for each of the three language measures applied to the samples for each of the three media is shown in Table I.

Table I.--Summary of means and standard deviations for the measures, mean length response, length-complexity index, total number of words, and the number of different words for each of the three media, toys, pictures, and films. (N=10 in each group)

	Toys	Pictures	Films
LCI			
MEAN	6.149	5.237	6.149
SD	3.871	2.875	2.757
MLR			
MEAN	5.547	4.823	4.827
SD	3.391	2.730	2.018
TNW	10,978	2,995	6,673
NDW	1,198	515	817

While the length-complexity index means for toys and films are similar, they both differ from the mean LCI for pictures. In terms of the mean

length of response, pictures and films are similar, while the mean of the mean length response for toys is higher than that for either pictures or films. In terms of the total number of words and the number of different words, toys yielded the highest values, films next highest, and pictures the lowest values.

To determine the significance of the differences observed in Table I among the media, analysis of variance and chi square were applied. F ratios and chi square values significant at or beyond the .05 level are accepted as sufficient for the rejection of the null hypothesis.

Table II is a summary of the analysis of variance for the mean LCI measures obtained for each stimulus medium as shown in Table I.

Table II.--Summary of the analysis of variance of the LCI measures for three stimulus media, pictures, toys and films. (N=10 in each group)

	Source of variation	SS	df	MS	F
Pictures vs. Toys	Between	37.40	1	37.40	3.18
	Within	2092.91	178	11.75	
	Total	2130.31	179	11.90	
Pictures vs. Films	Between	37.36	1	37.36	4.66
	Within	1428.16	178	8.02	
	Total	1465.52	179	8.19	
Toys vs. Films	Between	.000015	1	.000015	.000001
	Within	2033.15	178	11.42	
	Total	2033.15	179	11.36	

.05 Level for 1 and 178 = 3.925

An F ratio significant at the .05 level was obtained for the pictures versus films comparison. The F ratios for the toys versus films comparison and the pictures versus films comparison and the pictures versus toys comparison are not significant.

In view of the significant difference between pictures and toys on the LCI measure it seemed appropriate to determine if there were significant differences in LCI measures among the items within each of the three stimulus media. An analysis of variance of the mean LCI's obtained for the items within a medium was carried out. Because of their length these summaries are reported as Appendix III. None of the F ratios between any two items within a given medium was significant at the .05 level.

Table III is a summary of the analysis of variance for the mean MLR measures for the three stimulus media.

None of the F ratios was significant at the .05 level indicating that the three media did not yield different scores on this measure. Again an item analysis as described above for the LCI measures was carried out for the item MLR measures. None of the resulting F ratios between items within a medium was significant.

Table IV is a summary of the chi square analysis for the measures total number of words and number of different words.

Table III.--Summary of the analysis of variance of the MLR scores for the different media: toys, pictures, and films. (N = 10 in each stimulus medium)

	Source of variance	SS	df	MS	F
Pictures vs. Toys	Between .	23.60	1	23.60	2.46
	Within	1705.69	178	9.58	
	Total	1729.29	179	9.66	
Pictures vs. Films	Between	.001	1	.001	.0001
	Within	1037.35	178	5.83	
	Total	1037.35	179	5.80	
Toys vs. Films	Between	23.34	1	23.34	2.97
	Within	1401.34	178	7.87	
	Total	1424.68	179	7.96	

.05 Level for 1 and 178 df = 3.925

Table IV.--Chi square analysis of the total number of words and the number of different words for pictures, toys, and film media. (N=10 in each stimulus medium)

	Observed frequency	Expected frequency	Chi square Chi square	Contingency co-efficient
Total Number of Words				
Pictures	2995	6982	4639.591	.999
Toys	110978			
Films	6673			
Number of Different Words				
Pictures	515	844	277.468	.994
Toys	1198			
Films	919			

.05 Level for 2 and 1 df = 5.991
.01 Level for 2 and 1 df = 9.210

The chi square for the observed frequencies for the three media show that both measures are significantly higher for toys than for either films or pictures and the films are significantly higher than pictures on both TNW and NDW. A word of caution is needed with regard to the interpretation of these data. The computer program used to derive these two measures contains an error such that on quantities of data of 1000 responses or greater each measure may be in error by two words. Since the comparisons shown in Table IV are really comparisons of proportions, the fact that the values are not absolute is probably not significant. It is assumed that the error is distributed through all three media. When the program is used on small language samples, however, the error is larger and it becomes more significant when comparing one small sample with another. The error is sometimes as large as five in a sample of fifty words. Therefore, an item analysis on these two measures was not performed. Such a procedure cannot reasonably be done by hand. The importance of this missing analysis is discussed on page 25 in the discussion section.

CHAPTER V

DISCUSSION

The principle conclusion to be drawn from the foregoing analysis is that these three stimulus media used to elicit language samples from educable mentally handicapped children are related to the language measure ultimately applied to the sample. The examiner must take into consideration whether his measure is one of response length, total word output or variety of word output.

For the three stimulus media suggested, a measure of sentence length plus grammatical complexity (LCI) shows that brief segments of moving pictures of a single object and an assortment of toys yield language samples that are equal and that both yield higher LCI's than an assortment of pictures of single objects. However, a measure of average response length (MLR) only does not differentiate these three media, i.e. the media do not yield different MLR scores. Evidently any one of the three could be used if this is the only parameter of language to be studied. If the measure of interest is simply quantity of output as measured by the number or words in a sample, toys will perhaps yield a significantly larger sample, followed by films and pictures in that order. The same statement applies if

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the measure of interest concerns the variety of word in a sample.

In this study an attempt was made to control the individual stimuli within a medium by using items that would be of universal appeal to males and females and that would be of essentially the same "stimulus" value. The fact that the statistical comparisons among items within a medium revealed no significant differences attests to their homogeneity in this respect. Unfortunately, an item analysis could not be carried out for the two measures total number of words and number of different words. An attempt will be made to do so at a later time when the computer program is re-written. This analysis for these measures is important to a complete understanding of differences in stimulus media. One cannot assume that because item differences were not found within media for the other language measures that no differences could be found on TNW and NDW since it is clearly demonstrated that the relative value of a stimulus medium is determined by the language measure applied to samples obtained by that medium.

While the length-complexity index's temporal reliability has been demonstrated (Barlow, 1968), further refinement and definition of this measure is needed. For example, more explicit instructions are needed for the division of sentences into units for analysis to insure uniform interpretation of this language measure. The directions in the manual (Miner, 1968), read, "Treat compound, complex and compound-complex sentences as separate base structure sentences (p. 19)." Difficulty is encountered when analyzing structures with dependent clauses and structures in spoken language

in which the subject or nominative fundtion are understood. The treatment of pronouns is not completely described. Nouns and pronouns with a nominative function are both symbolized as N. Nouns which are plural receive two points whereas no provision is made for plural pronouns to be considered as a more complex linguistic skill. Clarification is needed in terms of third person singular verbs since conflicting directions and examples are included in the manual. For example: "He gets it. gets = 1 point (gets is 3rd person, irregular, singular) (p. 14)." Further directions read, "Somebody jumps and bites, each verb receives 2 points (p. 15)." In these examples the word "jumps" is scored as V $\neq$ P (verb $\neq$ plural) for a score of two points (p. 16). Confusion arises, too, in reference to negatives in that four levels of negation are described. Level two examples, worth two points, include, "I no bite you, I can't catch you, and I don't know." This is described as, "Two auxiliary verbs appear in the negative form, can't and don't. The negative element now appears within the sentence, but may or may not be connected to an auxiliary verb (p. 16)." Descriptions at level four, worth four points, include, "You didn't eat supper with us and I can't see it (p. 17)." It is difficult to determine the difference in the level of complexity of the examples which include the word "can't."

Added research will be necessary to determine further internally consistant weighting of the complexity of language skills, perhaps transformational skills may be included in this measure (James, 1968).

The language samples obtained in this study were accompanied by some interesting and perhaps significant observable reactions by the children. In reaction to the toys, two of the children handled the toys gingerly and set them on the table. These children gave short simple responses which resulted in low LCI measures. In contrast, two children responding to the same medium played with the toys at length and related personal experiences about each item presented. These children, in part, account for the large measures for number of different words and total number of words attributed to that medium. It must be pointed out, however, that these responses were not significantly more complex as measured by the LCI. With few exceptions, the children responding to the picture medium handled the pictures quite carefully, holding the pictures around the edges and taking care not to touch the photographs. In response to the films, the children most often gave a running commentary concerning what was happening in the film. For example: "It's a doggie, The doggie is running, Now he is wagging his tail, The car is going to the fair," and "I think the airplane is taking off," were typical response items. The frequent use of the participle to describe the action in the film seems to account for the added complexity of the responses. Most of the children stopped verbalizing at the end of each film.

It must be remembered that this particular population is of educable mentally handicapped children so generalizations for the "normal population" must be made with care. A similar study with normal four and five year old children is in progress (Strandberg, 1968).

CHAPTER VI

SUMMARY

This study concerns the comparison of results from three selected stimulus media used for eliciting verbal language samples. The examiner and the verbal directions given to the subjects remained constant throughout the study. Subjects were selected and matched on the basis of criteria which included variables related to language ability: chronological age, intelligence and socio-economic status. The subjects were divided into three groups of ten subjects each. Each group was exposed to a separate stimulus medium. Toys, pictures of the toys, and films of actual objects represented by the toys constituted the stimulus media. The resulting language samples were then subjected to the following language measures: the length-complexity index, the mean length response, the total number of words, and the number of different words. Analysis of variance and chi square analysis were carried out on the above measures to determine: (1) If the three stimulus media yield significantly different scores within each language measure; and (2) If the items within each medium yield significantly different scores for each of the language measures.

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The results of the statistical analyses showed that the film medium yielded significantly higher LCI scores than pictures while both films and toys yielded essentially the same LCI scores. The individual items within each medium were not significantly different from each other on LCI scores.

The analyses showed that MLR scores were not significantly different among the three media nor among the items within any of the three media.

The toy medium elicited a significantly higher total number of words and a significantly larger number of different words than films and pictures. Films yielded significantly higher values for the two language measures than pictures. Because of an error in computer programming an item analysis of total number of words and number of different words could not be carried out.

These results suggest that the stimulus media used to elicit language samples from primary educable mentally handicapped children vary in stimulus value depending upon the language measure applied to the sample.

Some changes are indicated in the use of the LCI measure. Specifically, provision should be made for weighting plural pronouns, some clarification is needed for scoring third person singular verbs and the weighting of pronouns is not clear.

APPENDIX I

TABLE I

SUBJECTS, SEX, C.A., I.Q.

GROUP A – TOY MEDIUM

	Subject	Sex	I.Q.	C.A.
1.	M.L.W.	F	72	7 years 6 mo.
2.	J.W.	F	70	9 years 7 mo.
3.	C.G.	M	72	7 years 8 mo.
4.	J.C.	M	63	7 years 2 mo.
5.	C.A.S.	F	74	7 years 4 mo.
6.	C.N.	M	63	6 years 10 mo.
7.	D.G.	M	75	7 years 6 mo.
8.	T.B.	F	67	9 years 5 mo.
9.	F.Z.	M	80	9 years 6 mo.
10.	B.K.H.	M	70	8 years

I.Q. Range   63-80
I.Q. Mean   70.6

Age Range   6 years 10 mo. – 9 years 7 mo.
Age Mean   8 years

TABLE II

SUBJECTS, SEX, C.A., I.Q.

GROUP B - PICTURE MEDIUM

Subject	Sex	I.Q.	C.A.
1. R.F.	M	59	8 years 6 mo.
2. J.G.	M	70	7 years 10 mo.
3. J.S.	M	74	9 years 6 mo.
4. H.M.	M	81	9 years 4 mo.
5. B.H.	F	69	10 years
6. B.L.	F	59	8 years
7. C.D.	F	63	7 years 9 mo.
8. S.M.	M	65	8 years 3 mo.
9. B.B.	F	73	9 years 1 mo.
10. K.B.	M	63	8 years 10 mo.

I.Q. Range   59 - 81
I.Q. Mean   67.6

Age Range   7 years 9 mo. to 10 years

TABLE III

SUBJECTS, SEX, C.A., I.Q.

GROUP C - FILM MEDIUM

Subject	Sex	I.Q.	C.A.
1. J.D.	F	50	9 years
2. K.L.	M	78	8 years 10 mo.
3. S.F.	M	67	7 years 9 mo.
4. E.G.	M	78	7 years 9 mo.
5. K.W.	M	80	10 years 4 mo.
6. M.L.D.	F	75	7 years 5 mo.
7. R.R.	M	69	8 years 9 mo.
8. U.H.	F	66	9 years 9 mo.
9. S.J.P.	F	59	8 years 11 mo.
10. R.C.	F	84	10 years 2 mo.

I.Q. Range   50 - 84
I.Q. Mean   70.6

Age Range   7 years 5 mo. to 10 years 4 mo.
Age Mean   8.8 years

TABLE IV

SUBJECTS, SEX, C.A., I.Q.

GROUPS A,B, AND C - ALL SUBJECTS

Media	Mean I.Q.	Mean Age
Toys	70.6	8 years
Pictures	67.6	8.7 years
Films	70.6	8.8 years
	208.8	25.5 years

I.Q. Range of all Subjects   50 - 84
Mean I.Q. of all Subjects   69.6

Age Range of all Subjects   6 years 10 mo. to 10 years 4 mo.
Age Mean of all Subjects   8.5 years

APPENDIX II

PROCEDURE FOR SCORING THE LENGTH-COMPLEXITY INDEX

TRANSCRIBING THE RESPONSES. Record precisely, paying partic-
ular attention to inflected endings, pauses and repetitions. Mark off
each grammatical or ungrammatical sentence with hash marks (/).
Notice that the language segment under analysis is the sentence, not
the traditional "per breath utterance" as in MLR. The sentence may
be complete or incomplete and occasionally will extend across a
pause. Example: "My mother irons clothes--(slight pause)--every
day." While MLR would score this illustration as 2 separate responses,
it would be counted as 1 sentence according to LCI. The intent of the
LCI is to analyze a child's grammatical rules for his deep structure,
not his surface structure. Many times the sentence and the per
breath utterance will be the same language segment, but not always.
Analysis of the child's grammatical rules should reveal whether a
response is an immediate constituent of the preceding sentence.
Number each sentence consecutively beginning with number 1. In each
sentence underline the NP_1 with a single line and VP_2 with a double
line.

WORD COUNT. Subject and predicate contractions count as two
words (same as MLR procedure). Note, some contractions occur in
spoken English that are not considered grammatical in written English:
it's, it'll, we're, we'll, that's, that'll, what's, what'll, you've, you'll,

I'm, I'll, they're, they'll, she's, she'll, he's, he'll, who's, who'll, mine'll, mine's, where's, where'll, I'd, you'd, he'd, she'd, it'd, they'd, we'd.

Contractions of the verb and negative are counted as one word: didn't, aren't, won't, can't, ain't, wouldn't, couldn't, shouldn't, isn't. The verbs are counted in VP_1 with additional points given elsewhere for the negative element.

Hyphenated words and compound nouns, particularly proper nouns designating a single object, are counted as single words: merry-go-round, cowboy, bubblegum, Miss X, doughnut, ABC's, jack-0-lantern, kool-aid, Santa Claus, Mother Goose.

Starters are eliminated and not scored: oh, and, then, now, um, hey, cause, well, Miss X. However, if any of these words serve a sequencing function rather than as starters, they should be included and counted.

All prepositions are counted except in the following situations: (A) when it is considered part of the infinitive construction: I'm ready to eat; I like to read. (B) when it is the last word in a sentence and is elliptical: Me want to; I like to.

Omit word and/or phrase repetitions when (A) the same word is repeated several consecutive times; count the word only once. (B) when a phrase is repeated or revised, count it only once unless one or more words is different; in that case, count only the phrase with the highest LCI point value. (C) if a word repetition occurs within a phrase repetition,

count the word only once. (D) if a contraction is separated in a phrase repetition, count only the phrase repetition with the highest LCI score. (E) repetitions for emphasis or constituting a fluency failure should be excluded.

Proper names in apposition are eliminated: Joseph, what are you doing? Mister, you got a flat tire. Also, delete elliptical responses.

NOUN PHRASE. Adjectives which are functioning as nouns are counted as residing in the noun phrase: Some more red; big fat two. Adjectives and adverbs are symbolized as M (modifier).

Pronouns serving in the nominative function are counted as noun phrases: I don't know what to do; I see it. Nouns and pronouns with a nominative function are symbolized as N (noun or pronoun). On the other hand, pronouns serving a possessive function are counted as N+Poss. Count possessive pronouns only if the correct form is used. The intent here, according to Cazden (1965), is not to penalize for incorrectness, but to give credit only where the structure is clear: Your shirt = 2 points; you shirt = 1 point.

Noun phrases are not considered to extend across pauses. Pauses frequently make structures ambiguous. Furthermore, Brown and Bellugi (1964) present a strong case for the psychological unity of the NP as a sentence constituent. In the following sentence, count only the underlined word: This is ----- a dog.

N+N combinations are counted as single nouns on the NP index. Score as one point: picture stove, telephone bell, tree bird, wrist watch,

candy cane, department store.

A is not counted as an article when it is obviously a reduction of another word. It was considered a reduction of of in some a this and a reduction of it in take a back (Cazden, 1965).

Plural inflections are not counted separately for a few words which are frequently utilized only as pluralized nouns: scissors, pants.

Most nouns form their plurals by adding s, z, or iz. A few nouns change form: man, men; child, children. These should be considered appropriately as plural forms and scored as 2 points.

Noun phrase examples and assigned weights. Symbols: N (noun or pronoun), A (article), P (plural inflection), Poss (possessive inflection), Prp (preposition).

Symbols	Examples	Score
A	a, an, the	1
M	big, white, such	1
N	dog, dish	1
A+N	the dog	2
M+N	big dog	2
N+P	dogs	2
N+Poss	dog's, her	2
A+M+N	the big dog	3
A+N+P	the dogs	3
N+Poss+N	her dog	3
A+N+Poss	the dog's	3
M+N+P	big dogs	3
M+N+Poss	big dog's	3
Prp+A+N	by the dog	3
M+M+N	big white dog	4
A+M+N+P	the big dogs	4
A+N+Poss+N	the dog's dish	4
A+M+N+Poss	the white dog's	4

Symbols	Examples	Score
A+M+M+N	the big white dog	5
A+M+N+Poss+N	the big dog's dish	5
M+M+N+P	big white dogs	5
A+M+M+M+N	the great big old dog	6
A+M+M+N+Poss+N	a big old dog's dish	7
A+M+N+Poss+N+P	a big dog's dish	6

English verbs indicate 2 main tenses, present or past. For regular verbs, common suffixes are s, ed, or ing: jumps, jumped, jump'ng. Regular verbs form their past tense by adding +d or +ed to its infinitive form. Irregular verbs form their tenses different; go, went, gones run, ran, run. Irregular verbs form their past tense usually, but not always, by a vowel change within a verb. Score present tense verbs, regular and irregular form, as 1 point. Assign 2 points to past tense verbs for both regular and irregular forms. Study these examples where the ICI point values are indicated for the VP only: He gets it = 1 (gets is 3rd person, irregular, singular); I jump = 1; We ran = 2; It fell = 2.

In infinitive constructions, the word to is considered to be part of the verb and not a preposition. Thus, the word to in this case is not scored. Furthermore, the word to, when it is an elliptical expression standing for an infinitive, is not scored.

Only lexical verbs and connectives are counted. This procedure eliminates the problem of deciding when particular prepositions are considered part of the verb and when they are not, especially for cases other than the infinitive. For example, in the sentence, "Think up an idea," the question of whether the verb is think or think up would depend

on such factors as intonation, normal usage of the expression by the child
and other considerations not determinable through a tapescript. One
notable exception exists relative to the rule for counting only lexical verbs.
Preverbs are frequently observed in the verbal output of children. Since
they indicate the transitional development of a grammatical rule for verb
forms, credit for this performance should be given. Score all preverbs as
1 point: gonna, oughta, shoulda, coulda, woulda, and halffa.

Since pauses always contribute some ambiguity to syntectic structures,
a verb is counted only if it is on the same side of the pause as its subject.
In Mommy want me --- put this on, want receives a score of 1; similarly
wanna, in Her wanna --- hold this.

The verbs in each phrase are counted separately. In You saw we had
turkey, saw and had each receive 1 point.

In the case of a compound predicate, both verbs are counted if they
receive the same score; if not, only the verb closest to the subject is
counted. In Somebody jumps and bites, each verb receives 2 points. In
He's coming and get out, only the first verb is counted, for a score of 3.
This rule prevents any penalty for a correct usage of ellipsis.

No penalty is computed for errors. Only correct responses or
obvious approximations are tabulated. The verb phrase weights for some
unique constructions are indicated as follows: I dood; it broked. Each
verb is scored as two points (V+PsT). He's upped = 3(aux+V=PsT).

Scoring of verbs presents many complex and subtle problems. Regular
verbs usually form the past tense by adding +ed; jump - jumped, look - looked.

Each past tense suffix receives one point. Irregular verbs indicate tense differently: run-ran, come-came, think-thought. Score all irregular past tense verbs as 2 points. Frequent past tense irregular verbs include: went, fell, ran, swam, saw, and got.

Verb phrase examples and assigned weights. Symbols: V(verb), PrPt (present participle), Aux (auxiliary), P(plural), PsT(past tense), PreV (preverb), PP (past participle).

Symbols	Examples	Score
PreV	gonna	1
V	go, is, jump	1
V+P	jumps	2
PrPt	going, jumping	2
Aux+PrPt	is going	3
Aux+PP	had jumped	3
Aux+V	can jump	2
Aux+PreV+V	is gonna go	3
Aux+Aux+PP	could have gone	4
V+V	try to go	2
Aux+PrPt+V	am going to get	3
Aux+PP	have arrived	3
Aux+Aux+PP+PrPt	could have been going	6
Aux+PrPt+V+V	am going to try to fix	5

NEGATIVES. The following point system for negatives and questions was based on the research of Bellugi (1966). Four different point levels are operationally defined as regards the usage of negatives.

The negation appears either at the beginning or at the end of the utterance, not within, and consists of no or not and the rest of the sentence. Score as 1 point: no wash; no singing song; wear mitten no.

Two auxiliary verbs appear in the negative form, can't and don't. The

negative element now appears within the sentence, but may or may not be connected to an auxiliary verb. Score as 2 points: nominal +no, can't, don't+main verb. Examples: I no bite you; I can't catch you; I don't know. Furthermore, at this point level, the negative also appears in the demonstrative form at the beginning of a sentence in the imperative form. Demonstrative+no or not+nominal: That no mommy; that no fish school. Also observed is don't+main verb: Don't leave me.

When the negative form appears between the noun phrase and the present participle, assign a weighting value of 3 points. NP+Ng+PrPt: Me not crying; I no peeking.

The last level exemplifies the adult version of the negative. The sentence includes appropriate intonation. Score as 4 points: No, it isn't or No, I don't have the book. Auxiliaries are contraced with the negative n't: You didn't eat supper with us; I can't see it. These sentences are of the form: Nominal+Aux+Ng+V. In child language the verb be is often missing but is now optional. Nominal+(be)+not+nominal objective: That not a clown or I am not a doctor.

QUESTIONS. Questions are formed primarily by a rising intonation, with and without a wh word. Bellugi (1966) distinguishes two levels of questions. For the first level, there are no auxiliaries and no subject-verb inversion. There are a few negative questions. Score as 1 point: Mommy eggnog? I ride train? What cowboy see? Who dat? No ear?

At the second level, yes-no questions contain an auxiliary or some form of do. Score as 2 points: Aux+nominal+V+?; Is Mommy talking? Did I hit?

The auxiliary component can have an optional negative attachment. Aux+ Ng+nominal+V+?; Can't you work? Sometimes the auxiliaries are not inverted: What he can ride in? Why the kitty can't stand up? The auxiliary is option in _wh_ questions: What is he writing? What he is writing?

ANALYSIS OF LANGUAGE SAMPLES. The language samples can be analyzed by two different procedures depending upon the diagnostic needs of the clinician. The first approach consists of a numeric analysis of the NP and VP constructions. This yields quantitative information regarding sentence length and complexity which can be used for intra- or inter-group comparisons. The second method specifies the kind and frequency of generative rules observed in the child's utterances. This linguistic analysis will be particularly helpful to the clinician in planning language therapy. Both the numeric and linguistic techniques of analyzing the language samples should prove beneficial to the clinician and researcher.

NUMERIC ANALYSIS. Determine the assigned weights for each sentence according to the scoring rules listed above. Since examples may be more helpful than precepts, scrutinize the following sentences. In doing so, recall that NP_1 is the grammatical subject of the utterance. VP_1 consists of the main verb and auxiliaries, if any. NP_2 is the NP nested in the VP which predicates NP_1. VP_2 is the predicate of NP_1 and consists of VP_1+NP_2. According to the LCI procedure, additional points(AP) are given for the use of conjunctions(C), negatives (Ng) and questions(?).

	NP		VP		AP		
	NP$_1$	NP$_2$	VP$_1$	VP$_2$	C	Ng	?
1. A girl							
A+N	2	0	0	0	0	0	0
2. Playing with the ball							
PrPt+Prp+A+N	0	3	2	5	0	0	0
3. A bunny rabbit							
A+N+N	2	0	0	0	0	0	0
4. In our friends							
Prp+M+N+P	0	4	0	4	0	0	0
5. We play with trucks in it							
N+V+Prp+N+P+Prp+N	1	5	1	6	0	0	0
6. He's drawin							
N+Aux+PrPt	1	0	3	3	0	0	0
7. Sometimes we have dollies 'n 'n sometimes we don't*							
M+P+N+V+N+P+C	3	2	1	3	1	0	0
M+P+N+V+Ng	3	0	1	1	0	4	0
B. Well, we win'n get to go to the root stand							
N+V+C	1	0	1	1	1	0	0
N+V+V+Prp+A+N+N	1	3	2	5	0	0	0
9. We don't get to go to the ro-root stand							
N+Aux+Ng+V+V+Prp+A+N+N	1	3	3	6	0	2	0
10. But we wanna win							
C+N+PreV+V	1	0	2	2	1	0	0
11. A jack-in-the-box							
A+N	2	0	0	0	0	0	0
12. You wind it--you wind the thing around							
N+V+A+N+M	1	3	1	4	0	0	0

	NP		VP		AP		
	NP$_1$	NP$_2$	VP$_1$	VP$_2$	C	Ng	?

13. Well, if the girls give the man a
     ticket so the girl can get on the
     train

	NP$_1$	NP$_2$	VP$_1$	VP$_2$	C	Ng	?
Prp+A+N+P+V+A+M+A+N+C+	4	4	1	5	1	0	0
A+N+Aux+V+Prp+A+N	2	3	2	5	0	0	0

14. You know why?

N+V+N+?	1	1	1	2	0	0	0

15. Cause, so we won't fall out out
     the door

C+N+Aux+Ng+V+Prp+A+N	1	3	2	5	1	4	0

*Treat compound, complex and compound-complex sentences as separate
base structure sentences.

With this numeric analysis, three measures can be computed: noun

phrase index (NPI), verb phrase index (VPI), and length-complexity index (LCI).

Formula is NPI=No. of NP$_1$ points/ no. of NP$_1$'s. In the above example,

NPI=27/16, or NPI=1.69. The formula for the VPI=no. of VP$_1$ points/no. of

VP$_1$'s. In the above example, VPI=23/14 or VPI=1.64. Finally, LCI=NP$_1$ points

+ VP2 points + AP/no. of sentences. Usually 50 sentences are analyzed.

However, for the above example, LCI=27+57+17, or LCI=6.73.

APPENDIX III

PICTURES SUBJECT #1   R. F.

	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	4	4	1.000	6	9	1.500	12	21	2	7	3.857	4.750
Dog	6	6	1.000	6	8	1.333	11	19	2	6	4.500	4.500
Airplane	18	25	1.388	14	19	1.357	25	44	7	17	4.470	4.555
Firetruck	11	14	1.272	7	11	1.571	18	29	4	10	4.700	4.600
Cash-register	7	7	1.000	4	6	1.500	19	22	4	9	3.666	3.800
Tractor	6	10	1.666	6	6	1.000	15	21	1	8	4.000	4.750
Telephone	3	3	1.000	3	4	1.333	15	19	5	4	6.750	6.200
Car	9	14	1.555	2	4	2.000	13	17	2	10	3.300	3.500
Piano	9	12	1.333	9	14	1.555	22	36	2	12	4.166	4.461

PICTURES SUBJECT #2   J. G.

	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	6	11	1.833	4	11	2.750	11	22	7	6	6.666	5.666
Dog	7	13	1.857	1	1	1.000	10	11	1	7	3.571	3.428
Airplane	4	6	1.500	2	2	1.000	4	6	0	7	1.714	1.428
Firetruck	11	18	1.636	1	1	1.000	1	2	1	11	1.909	2.000
Cash-register	7	10	1.428	3	3	1.000	2	5	1	7	2.285	2.285
Tractor	6	13	2.166	0	0	0	0	0	2	6	2.500	2.333
Telephone	7	13	1.857	2	2	1.000	1	3	0	6	2.666	2.333
Car	10	18	1.800	3	3	1.000	6	9	2	10	2.900	2.400
Piano	5	8	1.600	4	9	2.250	1	10	3	8	2.625	2.875

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PICTURES SUBJECT #3   I. S.

	NP_1 #	Pts.	NPI	VP_1 #	Pts.	VPI	NP_2 Pts.	VP_2 Pts.	AP	Sent.	LCI	MLR
Horse	5	5	1.000	5	10	2.000	10	20	2	5	5.400	4.800
Dog	9	10	1.111	8	15	1.875	17	32	3	8	5.625	5.250
Airplane	6	6	1.000	6	11	1.833	14	25	1	6	5.333	5.166
Firetruck	5	6	1.200	5	10	2.000	21	31	0	5	7.400	7.800
Cash-register	4	4	1.000	5	8	1.600	21	29	3	5	7.200	4.857
Tractor	13	16	1.230	12	19	1.583	24	43	5	12	5.333	5.500
Telephone	6	8	1.333	6	13	2.156	26	39	2	6	8.166	7.666
Car	9	12	1.333	7	12	1.714	16	28	1	9	4.555	4.083
Piano	8	11	1.375	9	15	1.666	17	32	2	10	4.500	4.083

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PICTURES SUBJECT #4   H. M.

	NP₁ #	Pts.	NPI	VP₁ #	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	3	5	1.665	3	3	1.000	7	10	0	3	5.000	4.333
Dog	2	5	2.500	2	2	1.000	3	5	1	2	5.500	4.500
Airplane	4	9	2.250	4	4	1.000	8	12	0	6	3.500	3.000
Firetruck	2	3	1.500	3	3	1.000	5	8	0	3	3.660	3.666
Cash-register	2	4	2.000	2	2	1.000	2	4	0	3	2.666	2.000
Tractor	2	4	2.000	4	4	1.000	5	9	0	4	3.250	2.750
Telephone	2	3	1.500	2	2	1.000	6	8	0	2	5.500	5.000
Car	0	0	0	3	3	1.000	7	10	0	3	3.333	3.333
Piano	1	1	1.000	3	3	1.000	5	8	0	3	3.000	3.000

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PICTURES SUBJECT #5   B. H.

	NP₁ #	Pts.	NPI	VP₁ #	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	3	6	2.000	2	3	1.500	10	14	1	4	5.250	5.000
Dog	3	3	1.000	3	3	1.000	4	7	0	5	2.000	1.600
Airplane	4	8	2.000	3	3	1.000	8	11	1	4	5.000	4.500
Firetruck	1	2	2.000	3	4	1.333	9	13	2	3	5.666	4.750
Cash-register	2	3	1.500	3	3	1.000	11	14	0	3	5.666	5.000
Tractor	2	3	1.500	2	3	1.500	4	7	1	2	5.500	3.000
Telephone	3	4	1.333	5	6	1.200	7	13	0	5	3.400	3.200
Car	2	2	1.000	5	6	1.200	8	14	1	5	3.400	3.800
Piano	1	2	2.000	3	4	1.333	10	14	1	3	5.666	4.666

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PICTURES SUBJECT #6 B. L.

	NP$_1$ #	Pts	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	7	17	2.428	4	4	1.000	18	22	1	7	5.714	5.571
Dog	4	6	1.500	4	5	1.250	1	6	0	5	2.400	2.200
Airplane	8	11	1.375	5	5	1.000	14	19	0	8	3.750	3.875
Firetruck	4	4	1.000	2	2	1.000	3	5	0	4	2.250	2.250
Cash-register	4	5	1.250	3	5	1.666	9	14	2	4	5.250	5.250
Tractor	5	10	2.000	4	4	1.000	7	11	0	6	3.500	3.333
Telephone	7	8	1.142	6	7	1.166	10	17	1	7	3.714	4.142
Car	7	8	1.142	6	6	1.000	18	24	0	7	4.571	4.285
Piano	3	3	1.000	2	2	1.000	3	5	0	3	2.666	2.666

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PICTURES SUBJECT #7   C. D.

	NP₁ #	Pts.	NPI	VP₁ #	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	9	16	1.777	10	10	1.000	21	31	0	10	4.700	5.000
Dog	10	25	2.500	9	12	1.333	23	35	3	9	7.000	1.454
Airplane	12	30	2.500	9	12	1.333	25	37	4	11	6.454	4.692
Firetruck	5	8	1.600	8	11	1.375	20	31	1	11	3.636	3.363
Cash-register	8	16	2.000	14	17	1.214	26	43	0	13	4.538	3.733
Tractor	4	9	2.250	4	4	1.000	9	13	0	6	3.666	3.500
Telephone	4	11	2.750	8	10	1.250	14	24	2	8	4.625	4.250
Car	17	26	1.529	17	37	2.176	28	65	8	14	7.071	5.400
Piano	14	27	1.928	9	16	1.777	23	39	5	13	5.461	5.142

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PICTURES SUBJECT #8   S. M.

	NP₁ #	Pts.	NPI	VP₁ #	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	5	5	1.000	3	3	1.000	1	4	0	5	1.800	2.400
Dog	5	7	1.400	2	2	1.000	5	7	0	7	2.000	2.000
Airplane	9	13	1.444	2	2	1.000	2	4	0	9	1.888	1.666
Firetruck	10	10	1.000	6	6	1.000	14	20	0	10	3.000	2.833
Cash-register	7	7	1.000	4	6	1.500	9	15	0	11	2.000	1.769
Tractor	8	14	1.750	2	2	1.000	3	5	0	9	2.111	1.700
Telephone	5	16	3.200	3	7	2.333	4	11	0	7	3.857	3.250
Car	14	21	1.500	0	0	0	0	0	0	14	1.500	1.066
Piano	8	10	1.250	3	3	1.000	10	13	0	11	2.090	1.818

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	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	6	9	1.500	6	7	1.166	18	25	3	6	6.166	5.166
Dog	2	2	1.000	2	3	1.500	6	9	0	2	5.500	5.000
Airplane	7	12	1.714	6	6	1.000	20	26	2	6	6.666	5.125
Firetruck	6	10	1.666	6	8	1.333	22	30	3	5	8.600	9.600
Cash-register	5	9	1.800	5	5	1.000	19	24	0	5	6.600	6.400
Tractor	4	5	1.250	3	3	1.000	12	15	4	3	8.000	5.200
Telephone	8	10	1.250	9	13	1.444	42	55	1	8	8.250	6.600
Car	13	20	1.538	10	11	1.100	72	83	5	12	9.000	9.916
Piano	4	5	1.250	4	6	1.500	9	15	2	2	11.000	9.500

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PICTURES SUBJECT #10   K. B.

	NP$_1$ #	Pts	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	9	13	1.444	10	18	1.800	46	64	8	10	8.500	6.615
Dog	15	23	1.533	11	13	1.181	37	50	10	9	9.111	7.545
Airplane	11	16	1.454	9	16	1.777	33	49	7	6	12.000	11.428
Firetruck	11	14	1.272	12	15	1.250	50	65	11	7	12.857	13.142
Cash-register	14	21	1.5000	12	16	1.333	55	71	18	10	10.000	9.500
Tractor	6	8	1.333	11	20	1.818	62	82	13	7	14.714	11.666
Telephone	8	8	1.000	12	16	1.333	45	61	5	7	10.571	12.285
Car	5	5	1.000	4	8	2.000	41	49	2	4	14.500	14.000
Piano	4	6	1.500	8	11	1.375	36	47	4	5	11.400	11.600

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FILM SUBJECT #1   I. D.

	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	0	0	0	10	16	1.600	22	38	1	10	3.900	2.800
Dog	1	2	2.000	11	22	2.000	14	36	0	13	2.923	1.816
Airplane	3	5	1.666	8	16	2.000	15	31	0	12	3.000	2.333
Firetruck	7	9	1.285	5	7	1.400	8	15	0	9	2.666	2.555
Cash-register	5	5	1.000	5	8	1.600	12	20	0	10	2.500	1.750
Tractor	3	4	1.333	11	21	1.909	11	32	0	14	2.571	1.733
Telephone	1	1	1.000	5	10	2.000	3	13	0	6	2.333	1.333
Car	1	2	2.000	12	21	1.750	17	38	0	13	3.076	2.384
Piano	3	6	2.000	9	18	2.000	18	36	3	12	3.750	2.750

FILMS SUBJECT # 2   K.L.

	NP₁ #	Pts.	NPI	VP₁	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	10	13	1.300	14	39	2.785	35	74	9	14	5.057	5.133
Dog	12	18	1.500	17	50	2.941	59	100	8	15	8.400	6.117
Airplane	12	15	1.250	13	34	2.615	17	51	4	12	5.833	4.916
Firetruck	11	17	1.542	15	34	2.260	25	59	8	9	9.363	7.500
Cashregister	11	15	1.363	12	29	2.416	57	85	3	11	9.454	7.153
Tractor	13	19	1.461	16	37	2.312	56	93	17	12	10.750	6.866
Telephone	14	17	1.214	15	36	2.400	46	82	9	12	9.000	6.615
Car	13	17	1.307	12	30	2.500	21	51	3	12	5.916	4.692
Piano	10	13	1.300	10	31	3.100	29	60	9	6	13.666	9.500

FILMS SUBJECT # 3   S.F.

	NP₁ #	Pts.	NPI	VP₁	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	34	47	1.382	35	53	1.514	72	125	3	32	5.463	4.631
Dog	22	31	1.409	20	28	1.400	63	91	7	21	6.142	5.904
Airplane	17	30	1.764	18	31	1.722	93	124	10	16	10.250	6.440
Firetruck	28	43	1.535	27	40	1.481	117	157	6	26	7.923	6.709
Cashregister	17	21	1.235	18	34	1.888	65	99	5	16	7.812	5.380
Tractor	16	73	4.562	7	13	1.857	31	44	17	15	7.982	5.473
Telephone	15	24	1.600	16	30	1.875	34	64	8	15	6.866	4.227
Car	19	26	1.368	16	28	1.750	42	70	6	17	6.000	4.954
Piano	19	36	1.894	19	48	2.526	64	112	12	16	10.250	8.150

FILMS SUBJECT # 4   E.G.

	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	8	11	1.375	3	5	1.666	4	9	0	8	2.500	2.125
Dog	4	8	2.000	1	2	2.000	4	6	0	9	1.555	1.555
Airplane	4	4	1.000	3	4	1.333	4	8	0	6	2.000	1.833
Firetruck	4	5	1.250	4	5	1.250	11	16	0	8	2.625	2.500
Cashregister	5	7	1.400	3	3	1.000	5	8	0	7	2.142	1.500
Tractor	4	6	1.500	7	10	1.428	19	29	1	9	4.000	3.222
Telephone	4	4	1.000	4	8	2.000	4	12	0	6	2.666	2.000
Car	7	8	1.142	9	15	1.666	20	35	0	12	3.583	2.615
Piano	5	6	1.200	2	4	2.000	9	13	0	6	3.166	2.500

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	NP_1 #	Pts.	NPI	VP_1 #	Pts.	VPI	NP_2 Pts.	VP_2 Pts.	AP	Sent.	LCI	MLR
Horse	6	10	1.666	6	17	2.833	22	39	1	5	10.000	5.222
Dog	7	11	1.571	7	14	2.000	27	41	6	6	9.666	7.857
Airplane	6	7	1.166	9	20	2.222	45	65	2	8	9.250	7.000
Firetruck	10	14	1.400	10	28	2.800	41	69	2	8	10.625	11.428
Cashregister	11	19	1.727	12	26	3.000	53	79	4	10	10.200	7.769
Tractor	10	20	2.000	10	28	2.800	39	67	4	8	11.375	9.111
Telephone	8	13	1.625	7	16	2.285	29	45	1	6	9.833	7.857
Car	13	17	1.307	14	31	2.214	41	72	7	10	9.600	6.428
Piano	6	11	1.833	7	15	2.142	30	45	3	4	14.750	8.428

	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLU
Horse	15	16	1.066	15	32	2.133	36	68	5	13	6.846	5.266
Dog	13	14	1.076	14	36	2.571	37	73	10	15	6.466	4.722
Airplane	22	27	1.227	22	52	2.363	83	135	8	23	7.391	6.291
Firetruck	16	27	1.687	18	32	1.777	33	65	4	19	5.052	4.142
Cashregister	14	21	1.500	14	23	1.624	53	76	7	16	6.500	4.227
Tractor	27	51	1.800	27	46	1.703	90	136	5	25	7.680	6.133
Telephone	21	24	1.142	24	52	2.166	70	112	9	20	7.250	5.625
Car	22	26	1.181	23	45	1.956	60	105	13	20	7.200	4.600
Piano	25	37	1.480	23	35	1.521	76	111	12	20	0.000	5.625

	NP$_1$ #	Pts.	NP$_1$	VP$_1$ #	Pts.	VP$_1$	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	6	10	1.666	4	8	2.000	9	17	1	8	3.500	3.222
Dog	3	4	1.333	3	6	2.000	7	13	1	6	3.000	3.166
Airplane	5	6	1.200	5	8	1.600	23	31	3	8	5.000	4.875
Firetruck	6	7	1.166	4	7	1.750	20	27	3	5	7.400	6.333
Cashregister	2	5	2.500	8	13	1.625	33	46	3	9	6.000	5.222
Tractor	5	5	1.000	9	14	1.555	37	51	6	11	5.636	5.272
Telephone	11	18	1.638	7	11	1.571	13	24	1	13	3.307	3.307
Car	7	12	1.714	5	12	2.400	19	31	4	6	7.833	6.571
Piano	4	6	1.500	4	8	2.000	16	24	4	7	4.857	3.777

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FILMS SUBJECT # 8   V.H.

	NP₁ #	Pts.	NPI	VP₁ #	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	19	26	1.368	19	53	2.789	45	98	8	17	7.764	5.944
Dog	18	19	1.055	22	63	2.863	27	90	2	21	5.285	3.954
Airplane	16	18	1.125	18	59	3.277	7	66	4	17	5.176	4.529
Firetruck	9	9	1.000	10	28	2.800	12	40	3	13	4.000	4.000
Cashregister	11	11	1.000	20	53	2.650	64	117	0	20	6.400	5.900
Tractor	10	11	1.100	14	28	2.000	26	54	5	14	5.000	4.500
Telephone	17	18	1.058	22	53	2.409	39	92	1	18	6.166	5.736
Car	15	17	1.133	16	47	2.937	10	57	1	14	5.357	5.071
Piano	9	15	1.666	12	17	1.416	25	42	4	11	5.545	5.090

FILMS SUBJECT # 9   S.J.P.

	NP1 #	Pts.	NPI	VP1 #	Pts.	VPI	NP2 Pts.	VP2 Pts.	AP	Sent.	LCI	MLR
Horse	9	14	1.555	11	21	1.909	10	31	0	12	3.750	2.846
Dog	22	42	1.909	26	48	1.846	50	58	2	30	4.733	4.100
Airplane	15	22	1.466	20	40	2.000	26	66	4	25	3.680	2.960
Firetruck	26	42	1.615	33	50	1.515	87	137	15	35	5.512	4.750
Cashregister	14	21	1.500	14	19	1.357	55	74	10	19	5.525	3.363
Tractor	8	11	1.375	7	14	2.000	19	33	0	12	3.666	3.000
Telephone	11	18	1.635	16	23	1.437	28	51	6	18	4.166	3.525
Car	4	7	1.750	13	24	1.846	16	40	1	13	3.692	2.857
Piano	7	10	1.428	7	9	1.285	11	20	1	12	2.583	2.416

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FILMS SUBJECT #10 R.C.

	NP₁ #	Pts.	NPI	VP₁ #	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	14	16	1.142	16	36	2.250	53	89	0	16	5.937	5.000
Dog	20	24	1.200	22	48	2.181	79	127	8	18	8.833	7.500
Airplane	12	12	1.000	13	26	2.000	52	78	2	10	9.200	5.866
Firetruck	23	29	1.260	22	29	1.318	70	99	4	21	6.285	5.120
Cashregister	23	30	1.304	26	46	1.769	87	133	7	21	8.095	6.333
Tractor	19	30	1.578	17	27	1.588	60	87	3	17	7.058	5.571
Telephone	23	35	1.521	25	46	1.840	72	118	1	25	6.160	5.923
Car	22	24	1.090	22	30	1.363	65	95	9	21	6.095	5.347
Piano	13	24	1.846	10	10	1.000	23	33	4	13	4.692	4.000

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TOYS SUBJECT #1 M.L.W.

	NP$_1$			VP$_1$			NP$_2$	VP$_2$				
	#	Pts.	NPI	#	Pts.	VPI	Pts.	Pts.	AP	Sent.	ICI	MLR
Horse	20	24	1.200	19	24	1.263	62	86	8	14	8.428	7.800
Dog	14	21	1.500	13	18	1.384	47	65	7	15	6.200	4.647
Airplane	37	47	1.270	38	49	1.289	136	185	22	31	8.193	8.647
Firetruck	33	51	1.545	35	65	1.859	125	190	23	29	9.103	7.433
Cashregister	39	63	1.615	45	72	1.600	135	207	30	33	9.090	8.272
Tractor	40	55	1.375	42	70	1.666	144	214	15	35	8.114	7.945
Telephone	70	131	1.871	64	83	1.296	208	291	59	65	7.475	6.939
Car	59	105	1.779	60	119	1.848	208	327	43	56	9.500	8.102
Piano	136	191	1.404	139	267	1.920	508	775	76	116	8.982	7.409

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TOYS SUBJECT # 2   I.W.

| | NP$_1$ | | | VP$_1$ | | | NP$_2$ | VP$_2$ | | | | |
	#	Pts.	NPI	#	Pts.	VPI	Pts.	Pts.	AP	Sent.	LCI	MLR
Horse	4	6	1.500	4	8	2.000	11	19	2	4	6.750	6.500
Dog	7	9	1.285	7	10	1.428	6	16	1	6	4.333	5.000
Airplane	9	9	1.000	8	11	1.375	29	40	1	7	7.142	6.000
Firetruck	18	19	1.055	19	20	1.052	58	78	10	12	8.916	7.923
Cashregister	22	29	1.318	21	29	1.380	65	94	13	19	7.157	7.263
Tractor	7	11	1.571	7	7	1.000	21	28	7	7	5.571	4.875
Telephone	11	12	1.090	11	14	1.272	45	59	5	10	7.600	6.727
Car	16	22	1.375	14	17	1.214	56	73	4	11	9.000	8.272
Piano	8	8	1.000	8	14	1.750	32	46	3	6	9.500	8.500

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TOYS SUBJECT # 3   C.G.

	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent	LCI	MLR
Horse	3	3	1.000	2	3	1.50	3	6	0	4	2.250	2.000
Dog	2	2	1.000	2	2	1.000	1	3	0	3	1.666	2.000
Airplane	1	1	1.000	4	5	1.250	4	9	0	4	2.500	2.500
Firetruck	2	2	1.000	3	3	1.000	3	6	0	5	1.600	1.800
Cashregister	2	2	1.000	6	6	1.000	5	11	0	7	1.857	2.285
Tractor	6	7	1.166	6	6	1.000	6	12	0	8	2.375	2.125
Telephone	2	2	1.000	5	5	1.000	12	17	0	6	3.166	3.000
Car	3	5	1.666	3	3	1.000	3	6	2	6	2.166	2.000
Piano	3	3	1.000	5	5	1.000	3	8	0	7	1.571	1.571

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	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	3	3	1.000	1	1	1.000	1	2	0	4	1.250	1.250
Dog	1	1	1.000	4	4	1.000	7	11	0	5	2.400	2.200
Airplane	0	0	0.000	1	1	1.000	0	1	0	1	1.000	1.000
Firetruck	0	0	0.000	3	3	1.000	3	6	0	3	2.000	2.000
Cashregister	0	0	0.000	2	2	1.000	3	5	0	2	2.500	2.000
Tractor	5	5	1.000	1	1	1.000	0	1	0	6	1.000	1.000
Telephone	2	2	1.000	2	2	1.000	0	2	0	4	1.000	1.000
Car	0	0	0.000	4	4	1.000	5	9	0	4	2.250	2.250
Piano	1	1	1.000	2	3	1.500	0	3	0	3	1.333	1.000

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TOYS SUBJECT # 5   C.A.S.

	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	2	3	1.500	1	1	1.000	2	3	1	2	3.500	5.000
Dog	2	2	1.000	1	1	1.000	5	6	1	4	2.250	2.250
Airplane	2	3	1.500	3	3	1.000	8	11	0	5	2.800	2.400
Firetruck	5	8	1.600	5	5	1.000	7	12	1	10	2.100	1.600
Cashregister	1	1	1.000	3	3	1.000	7	10	0	4	2.750	2.500
Tractor	5	7	1.400	3	3	1.000	2	5	0	8	1.500	1.250
Telephone	5	5	1.000	5	9	1.800	3	12	6	7	3.285	2.285
Car	8	12	1.500	5	7	1.400	5	12	0	14	1.714	1.428
Piano	3	5	1.666	3	3	1.000	7	10	0	6	2.500	2.000

TOYS SUBJECT # 6 C.W.

	NP₁ #	Pts.	NPI	VP₁ #	Pts.	VPI	NP₂ Pts.	VP₂ Pts.	AP	Sent.	LCI	MLR
Horse	12	16	1.333	1	1	1.000	9	10	0	13	2.000	1.769
Dog	22	38	1.727	6	8	1.333	16	24	5	23	2.913	2.217
Airplane	16	25	1.562	17	19	1.117	49	68	4	28	3.464	3.214
Firetruck	27	45	1.666	19	27	1.421	55	82	12	38	3.657	3.263
Cashregister	9	13	1.444	12	12	1.000	40	52	0	18	3.611	3.388
Tractor	12	28	2.333	7	11	1.571	17	28	1	14	4.071	3.285
Telephone	16	20	1.250	5	6	1.200	13	19	1	16	2.500	2.062
Car	12	21	1.750	9	10	1.111	23	33	2	17	3.294	2.647
Piano	20	23	1.150	5	5	1.000	14	19	1	23	1.869	1.739

TOYS SUBJECT # 7   D.G.

	NP_1 #	Pts.	NPI	VP_1 #	Pts.	VPI	NP_2 Pts.	VP_2 Pts.	AP	Sent.	LCI	MLR
Horse	4	7	1.750	3	5	1.666	19	24	0	5	6.200	5.800
Dog	3	7	2.333	4	5	1.250	15	20	1	3	9.333	8.666
Airplane	10	10	1.000	11	19	1.727	31	50	1	9	6.777	6.300
Firetruck	12	17	1.416	11	18	1.636	26	44	2	8	7.875	8.675
Cashregister	8	11	1.375	8	17	2.125	30	47	3	5	12.200	13.333
Tractor	8	10	1.250	8	14	1.750	19	33	0	6	7.166	7.833
Telephone	13	23	1.769	13	18	1.384	62	80	11	10	11.400	11.300
Car	7	11	1.571	7	12	1.714	16	28	5	3	14.000	13.666
Piano	11	17	1.545	8	14	1.750	19	33	0	10	5.000	5.000

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TOYS SUBJECT # 8   T.B.

	NP$_1$ #	Pts.	NPI	VP$_1$ {	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	2	3	1.500	3	3	1.000	6	9	0	3	4.000	4.000
Dog	6	7	1.166	6	8	1.333	21	29	2	5	7.600	6.000
Airplane	7	12	1.714	8	14	1.750	31	45	0	11	5.181	4.750
Firetruck	6	10	1.666	9	15	1.666	40	55	2	8	8.375	7.555
Cashregister	17	28	1.647	20	23	1.150	38	61	6	14	6.785	6.000
Tractor	6	11	1.833	8	9	1.125	27	36	2	4	12.250	11.200
Telephone	14	15	1.071	14	17	1.214	35	52	5	10	?.200	7.583
Car	13	14	1.076	13	16	1.230	37	53	1	14	4.857	4.866
Piano	27	45	1.666	25	27	1.080	63	90	4	24	5.791	6.680

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	NP$_1$ #	Pts.	NPI	VP$_1$ #	Pts.	VPI	NP$_2$ Pts.	VP$_2$ Pts.	AP	Sent.	LCI	MLR
Horse	11	14	1.272	11	15	1.363	19	34	2	10	5.000	5.600
Dog	7	7	1.000	9	11	1.375	37	48	4	6	8.033	8.142
Airplane	22	32	1.454	20	30	1.500	49	79	10	19	6.368	5.450
Firetruck	28	42	1.500	23	36	1.565	63	99	13	28	5.500	5.000
Cashregister	22	49	2.227	19	30	1.578	67	97	11	23	6.826	6.782
Tractor	22	29	1.318	19	23	1.210	61	84	8	18	6.722	6.736
Telephone	28	39	1.393	22	35	1.590	115	150	12	15	13.400	12.375
Car	25	46	1.840	21	37	1.761	97	134	13	22	9.772	8.521
Piano	48	83	1.729	32	53	1.656	158	211	15	44	7.022	6.333

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	NP_1 #	Pts.	NPI	VP_1 #	Pts.	VPI	NP_2 Pts.	VP_2 Pts.	AP	Sent.	LCI	MLR
Horse	49	98	2.000	48	93	1.937	178	271	22	30	13.033	11.516
Dog	42	75	1.785	45	83	1.844	167	250	23	22	15.818	12.521
Airplane	66	158	2.393	69	114	1.652	223	337	29	38	13.789	12.051
Firetruck	64	106	1.656	66	123	1.863	209	332	34	43	10.976	9.500
Cashregister	58	93	1.603	62	130	2.096	218	348	33	37	12.810	11.027
Tractor	79	123	1.556	83	174	2.096	239	413	45	46	12.610	10.489
Telephone	39	66	1.692	38	78	2.052	101	179	12	19	13.526	11.150
Car	72	148	1.944	72	148	1.944	243	391	33	44	13.000	11.456
Piano	74	137	1.851	77	164	2.129	290	454	26	53	11.641	9.350

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APPENDIX IV

TABLE I. Summary of analysis of variance for <u>length-complexity index</u> measure for the individual items within the (picture medium).

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
horse vs. dog	1	18	1.71	4.22	0.41
horse vs. airplane	1	18	0.26	5.91	0.44
horse vs. firetruck	1	18	0.02	7.35	0.003
horse vs. cashregister	1	18	0.51	4.70	0.11
horse vs. tractor	1	18	0.01	8.53	0.001
horse vs. telephone	1	18	0.99	4.90	0.20
horse vs. car	1	18	0.58	8.99	0.006
horse vs. piano	1	18	0.01	7.18	0.002
dog vs. airplane	1	18	0.64	7.03	0.09
dog vs. firetruck	1	18	2.09	8.47	0.25
dog vs. cashregister	1	18	0.35	5.82	0.06
dog vs. tractor	1	18	1.44	9.66	0.15
dog vs. telephone	1	18	5.30	6.03	0.88
dog vs. car	1	18	2.40	10.12	0.24
dog vs. piano	1	18	1.44	8.30	0.17
airplane vs. firetruck	1	18	0.42	10.16	0.41
airplane vs. cashregister	1	18	0.40	7.51	0.005
airplane vs. tractor	1	18	0.16	11.35	0.01

TABLE I. (continued)

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
airplane vs. telephone	1	18	2.26	7.72	0.29
airplane vs. car	1	18	0.56	11.81	0.05
airplane vs. piano	1	18	0.16	9.99	0.02
firetruck vs. cashregister	1	18	0.72	8.95	0.08
firetruck vs. tractor	1	18	0.06	12.79	0.004
firetruck vs. telephone	1	18	0.73	9.16	0.08
firetruck vs. car	1	18	0.01	13.25	0.001
firetruck vs. piano	1	18	0.06	11.44	0.005
cashregister vs. tractor	1	18	0.37	10.14	0.04
cashregister vs. telephone	1	18	2.91	6.51	0.45
cashregister vs. car	1	18	0.91	10.60	0.09
cashregister vs. piano	1	18	0.37	8.79	0.42
tractor vs. telephone	1	18	1.21	10.34	0.12
tractor vs. car	1	18	0.12	14.44	0.01
tractor vs. piano	1	18	0.00	12.62	0.00
telephone vs. car	1	18	0.57	10.81	0.05
telephone vs. piano	1	18	1.21	8.99	0.13
car vs. piano	1	18	0.12	13.09	0.01

.05 level for 1 and 18 $\underline{df}$ = 4.41

TABLE II. Summary of analysis of variance for <u>length-complexity index</u> measure for the individual items within the (toy medium).

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
horse vs. dog	1	18	4.94	16.47	0.30
horse vs. airplane	1	18	1.15	13.08	0.09
horse vs. firetruck	1	18	2.96	12.36	0.24
horse vs. cashregister	1	18	8.68	14.09	0.62
horse vs. tractor	1	18	4.02	14.74	0.27
horse vs. telephone	1	18	16.46	16.80	0.98
horse vs. car	1	18	13.03	16.91	0.77
horse vs. piano	1	18	0.39	13.20	0.03
dog vs. airplane	1	18	1.31	16.87	0.08
dog vs. firetruck	1	18	0.25	16.15	0.02
dog vs. cashregister	1	18	0.52	17.88	0.03
dog vs. tractor	1	18	0.05	18.53	0.003
dog vs. telephone	1	18	3.37	20.59	0.16
dog vs. car	1	18	1.93	20.71	0.09
dog vs. piano	1	18	2.55	16.99	0.15
airplane vs. firetruck	1	18	0.42	12.76	0.03
airplane vs. cashregister	1	18	3.50	14.49	0.24
airplane vs. tractor	1	18	0.87	15.14	0.06

TABLE II. (continued)

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
airplane vs. telephone	1	18	8.90	17.20	0.51
airplane vs. car	1	18	6.43	17.32	0.37
airplane vs. piano	1	18	0.20	13.60	0.01
firetruck vs. cashregister	1	18	1.50	13.77	0.10
firetruck vs. tractor	1	18	0.08	14.42	0.01
firetruck vs. telephone	1	18	5.46	16.48	0.33
firetruck vs. car	1	18	3.57	16.60	0.22
firetruck vs. piano	1	18	1.20	12.68	0.09
cashregister vs. tractor	1	18	0.88	16.15	0.05
cashregister vs. telephone	1	18	1.23	18.21	0.07
cashregister vs. car	1	18	0.44	18.33	0.02
cashregister vs. piano	1	18	5.38	14.61	0.37
tractor vs. telephone	1	18	4.21	18.86	0.22
tractor vs. car	1	18	2.57	18.98	0.14
tractor vs. piano	1	18	1.90	15.26	0.12
telephone vs. car	1	18	0.20	21.04	0.01
telephone vs. piano	1	18	11.77	17.32	0.68
car vs. piano	1	18	8.90	17.44	0.51

.05 level for 1 and 18 df = 4.41

TABLE III. Summary of analysis of variance for length-complexity index measure for the individual items within the (film medium).

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
horse vs. dog	1	18	0.01	6.03	0.000
horse vs. airplane	1	18	0.90	6.69	0.14
horse vs. firetruck	1	18	1.21	6.29	0.19
horse vs. cashregister	1	18	3.29	6.14	0.54
horse vs. tractor	1	18	4.14	6.99	0.59
horse vs. telephone	1	18	0.08	6.02	0.01
horse vs. car	1	18	0.17	4.74	0.04
horse vs. piano	1	18	10.86	12.24	0.89
dog vs. airplane	1	18	0.72	7.76	0.93
dog vs. firetruck	1	18	1.00	7.36	0.14
dog vs. cashregister	1	18	2.92	7.21	0.41
dog vs. tractor	1	18	3.73	8.06	0.46
dog vs. telephone	1	18	0.03	7.09	0.00
dog vs. car	1	18	0.09	5.81	0.02
dog vs. piano	1	18	10.19	13.31	0.77
airplane vs. firetruck	1	18	0.02	7.69	0.000
airplane vs. cashregister	1	18	0.74	7.54	0.10
airplane vs. tractor	1	18	1.17	8.37	0.14

TABLE III. (continued)

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
airplane vs. telephone	1	18	0.46	7.42	0.06
airplane vs. car	1	18	0.29	6.14	0.05
airplane vs. piano	1	18	5.49	13.64	0.40
firetruck vs. cashregister	1	18	0.51	7.14	0.07
firetruck vs. tractor	1	18	0.87	7.99	0.11
firetruck vs. telephone	1	18	0.69	7.02	0.10
firetruck vs. car	1	18	0.48	5.74	0.08
firetruck vs. piano	1	18	4.81	13.24	0.36
cashregister vs. tractor	1	18	0.05	7.83	0.01
cashregister vs. telephone	1	18	2.37	6.87	0.35
cashregister vs. car	1	18	1.97	5.58	0.35
cashregister vs. piano	1	18	2.20	13.09	0.17
tractor vs. telephone	1	18	3.10	7.71	0.40
tractor vs. car	1	18	2.64	6.43	0.41
tractor vs. piano	1	18	1.59	13.94	0.11
telephone vs. car	1	18	0.02	5.46	0.00
telephone vs. piano	1	18	9.13	12.97	0.70
car vs. piano	1	18	8.33	11.69	0.71

.05 level for 1 and 18 df = 4.41

TABLE IV. Summary of analysis of variance for the mean length response measure
for the individual items within the (picture medium).

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
horse vs. dog	1	18	3.89	2.21	1.76
horse vs. airplane	1	18	0.75	4.42	0.17
horse vs. firetruck	1	18	1.11	7.24	0.15
horse vs. cashregister	1	18	1.11	3.33	0.33
horse vs. tractor	1	18	1.55	4.65	0.33
horse vs. telephone	1	18	1.58	4.84	0.33
horse vs. car	1	18	0.31	8.10	0.04
horse vs. piano	1	18	0.01	5.55	0.00
dog vs. airplane	1	18	1.23	5.45	0.23
dog vs. firetruck	1	18	9.15	8.26	1.11
dog vs. cashregister	1	18	0.85	4.35	0.19
dog vs. tractor	1	18	0.53	5.67	0.09
dog vs. telephone	1	18	10.44	5.87	1.78
dog vs. car	1	18	6.39	9.12	0.70
dog vs. piano	1	18	4.36	6.57	0.66
airplane vs. firetruck	1	18	3.67	10.48	0.35
airplane vs. cashregister	1	18	0.04	6.57	0.01
airplane vs. tractor	1	18	0.15	7.88	0.02

TABLE IV. (continued)

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
airplane vs. telephone	1	18	4.50	8.08	0.55
airplane vs. car	1	18	2.01	11.33	0.18
airplane vs. piano	1	18	0.96	8.78	0.11
firetruck vs. cashregister	1	18	4.43	9.38	0.47
firetruck vs. tractor	1	18	5.28	10.70	0.49
firetruck vs. telephone	1	18	0.04	10.89	0.00
firetruck vs. car	1	18	0.25	14.15	0.02
firetruck vs. piano	1	18	0.88	11.60	0.08
cashregister vs. tractor	1	18	0.37	6.79	0.01
cashregister vs. telephone	1	18	5.34	6.98	0.76
cashregister vs. car	1	18	2.58	10.23	0.25
cashregister vs. piano	1	18	1.36	7.69	0.18
tractor vs. telephone	1	18	6.26	8.30	0.75
tractor vs. car	1	18	3.24	11.56	0.28
tractor vs. piano	1	18	1.85	9.01	0.21
telephone vs. car	1	18	0.49	11.75	0.04
telephone vs. piano	1	18	1.31	9.20	0.14
car vs. piano	1	18	0.19	12.46	0.02

.05 level for 1 and 18 df = 4.41

TABLE V. Summary of analysis of variance for the mean length response measure for the individual items within the (toy medium).

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
horse vs. dog	1	18	0.29	11.10	0.03
horse vs. airplane	1	18	0.06	10.31	0.01
horse vs. firetruck	1	18	0.69	9.75	0.07
horse vs. cashregister	1	18	0.13	9.52	0.01
horse vs. tractor	1	18	1.51	11.83	0.13
horse vs. telephone	1	18	9.09	13.96	0.65
horse vs. car	1	18	7.18	14.16	0.51
horse vs. piano	1	18	0.14	9.82	0.01
dog vs. airplane	1	18	0.09	11.64	0.01
dog vs. firetruck	1	18	0.09	11.08	0.01
dog vs. cashregister	1	18	0.03	10.85	0.00
dog vs. tractor	1	18	0.48	13.16	0.04
dog vs. telephone	1	18	6.14	15.29	0.40
dog vs. car	1	18	4.58	15.49	0.30
dog vs. piano	1	18	0.82	11.15	0.07
airplane vs. firetruck	1	18	0.35	10.29	0.03
airplane vs. cashregister	1	18	0.01	10.06	0.00
airplane vs. tractor	1	18	0.98	12.37	0.08

TABLE V. (continued)

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
airplane vs. telephone	1	18	7.70	14.50	0.53
airplane vs. car	1	18	5.95	14.70	0.40
airplane vs. piano	1	18	0.37	10.37	0.04
firetruck vs. cashregister	1	18	0.22	9.51	0.02
firetruck vs. tractor	1	18	0.16	11.81	0.01
firetruck vs. telephone	1	18	4.77	13.95	0.34
firetruck vs. car	1	18	3.42	14.15	0.24
firetruck vs. piano	1	18	1.44	9.81	0.15
cashregister vs. tractor	1	18	0.76	11.59	0.07
cashregister vs. telephone	1	18	7.05	13.72	0.51
cashregister vs. car	1	18	5.37	13.92	0.39
cashregister vs. piano	1	18	0.53	9.58	0.06
tractor vs. telephone	1	18	3.19	16.03	0.20
tractor vs. car	1	18	2.10	16.23	0.13
tractor vs. piano	1	18	2.56	11.89	0.22
telephone vs. car	1	18	0.11	18.36	0.01
telephone vs. piano	1	18	11.46	14.02	0.82
car vs. piano	1	18	9.30	14.22	0.65

.05 level for 1 and 18 df = 4.41

TABLE VI. Summary of analysis of variance for the mean length response measure for the individual items within the (film medium).

	Degrees of Freedom		Mean Squares		F Ratio
	Between	Within	Between	Within	
horse vs. dog	1	18	1.01	3.26	0.31
horse vs. airplane	1	18	1.18	2.51	0.47
horse vs. firetruck	1	18	8.25	4.43	1.86
horse vs. cashregister	1	18	2.05	3.16	0.65
horse vs. tractor	1	18	3.78	3.13	1.21
horse vs. telephone	1	18	0.78	3.06	0.26
horse vs. car	1	18	0.58	2.00	0.29
horse vs. piano	1	18	5.05	4.35	1.16
dog vs. airplane	1	18	0.01	3.99	0.00
dog vs. firetruck	1	18	3.48	5.92	0.59
dog vs. cashregister	1	18	0.18	4.65	0.04
dog vs. tractor	1	18	0.88	4.61	0.19
dog vs. telephone	1	18	0.01	4.55	0.00
dog vs. car	1	18	0.06	3.49	0.02
dog vs. piano	1	18	1.54	5.84	0.26
airplane vs. firetruck	1	18	3.20	5.16	0.62
airplane vs. cashregister	1	18	0.12	3.90	0.03
airplane vs. tractor	1	18	0.74	3.66	0.19

TABLE VI. (continued)

| | Degrees of Freedom | | Mean Squares | | F Ratio |
	Between	Within	Between	Within	
airplane vs. telephone	1	18	0.04	3.80	0.01
airplane vs. car	1	18	0.10	2.73	0.04
airplane vs. piano	1	18	1.35	5.08	0.27
firetruck vs. cashregister	1	18	2.07	5.82	0.36
fireturok vs. tractor	1	18	0.86	5.78	0.15
firetruck vs. telephone	1	18	3.95	5.72	0.69
firetruck vs. car	1	18	4.45	4.66	0.96
firetruck vs. piano	1	18	0.39	7.00	0.06
cashregister vs. tractor	1	18	0.26	4.52	0.06
cashregister vs. telephone	1	18	0.30	4.45	0.07
cashregister vs. car	1	18	0.45	3.39	0.13
cashregister vs. piano	1	18	0.66	5.74	0.12
tractor vs. telephone	1	18	1.12	4.41	0.25
tractor vs. car	1	18	1.39	3.35	0.42
tractor vs. piano	1	18	0.09	5.70	0.02
telephone vs. car	1	18	0.02	3.29	0.00
telephone vs. piano	1	18	1.85	5.64	0.33
car vs. piano	1	18	2.20	4.57	0.48

.05 level for 1 and 18 df = 4.41

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