A DEVELOPMENTAL STUDY OF ERRORS OF COMMISSION IN RECALL

by

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INTRODUCTION

This is a developmental study of a memory style or mode of remembering. Its main objective is to examine the relationship between a fundamental aspect of development--globality of cognitive functioning--and the errors of commission in recall that Paul (1959, 1966) has described. A more general objective is to elucidate the developmental aspects of the way that children learn and remember connected and extended verbal material, with particular attention to the errors of commission (intrusions, inventions, elaborations and importations) that they make.

Errors of commission--variously called intrusions, inventions, elaborations or importations--are regularly found in a person's recall of connected as well as unconnected verbal material. Their prevalence can be interpreted in a variety of ways: for example, they can be understood as the product of previous associations (Underwood, 1954; Postman, 1954), or as a reflection of cognitive schemas (Paul, 1959, 1966; Reiff and Scheerer, 1959), they can be viewed as the products of Gestalt organizational

principles such as closure (Koffka, 1935; Alport and Postman, 1947), or of active seeking after meaning and fit (Bartlett, 1932; Northway, 1940). In any case, they reflect an important aspect of the process of learning and recalling, one that can be expected to follow a developmental sequence.

There is a good deal of theory and research pertaining to the role of development and personality in memory. Some of the earliest work in this field was done by Bartlett, who conceptualized remembering not as a mechanical revival of static engrams but as an active process of reconstruction. It was his point of view that cognitive functioning cannot be understood unless it is studied in the light of a person's interests, affects, goals and attitudes. In support of this theory, he proposed the concept of schema instead of memory trace.

These schemas he conceptualized as internal organizations of past reactions and experiences and which function as unified and active organs. Remembering is essentially active reconstruction based on schemas, and Bartlett proposed that "every human cognitive reaction--perceiving, imagining, remembering, thinking and reasoning --is an effort after meaning." There is abundant reason to expect that the younger a person is the more actively he

needs to strive for meaning. Not only are his schemas more meager in respect to facts and knowledge, but they are less differentiated and articulated. Development can involve two processes: the enrichment of schemas and their articulation, processes that Paul (1959) has conceptualized as "recruitment" and "fractionation."

Following Bartlett, Rapaport (1942) concluded that

> In the literature of psychology today there /is/ an ever increasing realisation that memory /is/ not merely a process of mechanical imprinting and of isolated resuscitation of the material thus registered and retained. There appears to be considerable agreement that memory processes are subject to the activity of selected forces related to deep strata of personality and to the field conditions under which registration and remembering takes place and which exists in the retention period /p. 136/.

According to Rapaport, there appears to be an integration of affective and cognitive forms of ego functions as the important context for retention.

There has been increasing empirical evidence that memory can be attributed to the organization and differentiation of cognitive structures that are developmentally determined. Scheerer has concluded that: "If we want to assess the role of learning for personality formation, we have to first determine the cognitive field of the child for each developmental stage. It is the developmental stage

which determines the characteristics of the cognitive structuring of the child's life space [Reiff and Scheerer, 1959, p. 12]."

Perhaps the most powerful conception in the theory of development--whether cognitive, emotional, or biological --is the notion that development proceeds from the global to the differentiated. Such theorists as Werner (1948), Piaget (1952), and Witkin (1954, 1962), among many others, have formulated the developmental sequence in these terms. According to Werner (1948):

> Development cannot be symbolized by a continuous mathematically conceived line, but rather must be thought of in the form of typical mental patterns with the relatively higher levels being understood as innovations emerging from the lower,...[and] each higher level represents a new entity with respect to the one preceding it and is understandable in terms of itself [pp. 15, 22].

He concludes, therefore, that "an increasing differentiation and refinement of mental phenomena and functions and a progressive hierarchization may be accepted as a basic principle....Differentiation never indicates a complete discontinuity of higher and lower functions, a self-subsistent status in each [pp. 51-52]."

The concept of differentiation has also become central in the theory and research of Witkin (1954, 1962). The crucial difference among individuals is an evaluation

of their reliance upon differentiation as it is reflected in a global as compared with an analytic way of cognitive functioning. In his extensive follow-up studies, Witkin (1962) found that younger children tend to perceive in a relatively global-undifferentiated fashion, whereas with chronological development the shift is to a more analytic style. But Witkin also observed that individuals function in characteristically different ways that appear based on personality differences as well. Though cross-sectional and longitudinal studies show that young children tend to be relatively global and that analytic thinking occurs as they grow older, nevertheless, within the context of their own personality, the mode of field approach remains stable even as they become older. Field approach is conceptualized by Witkin to describe the manner in which a person will respond to a given situation. Depending on the mode of field approach, a person can be classified as field independent or field dependent. In discussing the differences between field independent and field dependent persons, Witkin concludes that those with a more field independent way of perceiving tend to experience surroundings analytically with objects experienced as discrete from their backgrounds. A person with a more field dependent way of perceiving will experience the stimuli in a relatively

global fashion passively conforming to the influence of the prevailing field or context. Individuals were evaluated as being more differentiated or less differentiated according to whether their field approach was global (field dependent) as compared with analytic (field independent).

The central hypothesis of the present study derives from this point of view. It proposes that errors of commission in recall may reflect a global orientation in cognitive functioning. The global orientation in learning and remembering verbal material takes the form of intolerance for gaps and the need for closure. Errors of commission are made to close the gaps. They can be viewed as additions of material that may be extraneous but which are seldom conceptually unrelated and which reflect the basic schema process of recruitment. They are evidence of an effort after meaning and the need for fit which are probably a function of the subject's cognitive style. It has been shown by Paul (1959, 1966) that importations reflect stylistic variations and degrees of structured coherence. This investigation of the way that children differ systematically in retention and reproduction of verbal material will attempt to answer the question whether there are differences in the mode of recall as a function of developmental differentiation.

Paul demonstrated that the majority of intrusions and importations clearly serve to close gaps and lessen ambiguities, thereby promoting continuity and enhancing meaning. And he found that there are important individual differences among subjects in their reliance upon them. He noted that "Certain subjects seem to strive after meaning or structure of the stimulus while others strive primarily for detail," and he suggested that this reflects what might be termed a global versus a specific style. (Paul, 1959, pp. 145-146)

Not all errors of commission are in the service of globality. It is likely that an intrusion or an importation can serve to articulate an experience in the service of differentiation. On the whole, however, the majority of intrusions and importations probably serve to merge the material into a unified and continuous whole, i.e., are in the service of a global tendency.

Paul's work indicates that a schema process can be inferred from direct observation of the data by examining the ways in which the gaps and ambiguities are resolved by the subjects in their use of intrusions and importations. He found that this tendency on the part of certain persons to make use of intrusions and importations for this purpose was a stable and general individual difference parameter.

Paul's research raised the question of variations in memory styles which may be related to chronological age as well as to developmental differentiation. In discussing the results of studies using adolescent boys, he writes:

> Many importations...seemed clearly to reveal and express the subject's personal schemas in terms of their understanding of the events in the story based on their own conceptions and experiences....Perhaps this was due to the fact that the subjects were younger and less sophisticated; hence they relied more on recruitment in their schema formation and functioning and were less critical of their own cognitions /Paul, 1959, pp. 135-136/.

In a series of studies conducted by Northway (1940), the results show that as the material (poems) presented to the children of different ages and different social groupings became more difficult there was an increase in the use of "inventions and substitutions" in their recall. Northway found that the older children (14-15 years) retained more of the presented material than did the younger ones (10 years) who "imported and substituted their own ideas." Northway proposed that what the subject makes out of the material might be called schematic differences which reflect the characteristics of the groups as they are incorporated by the individual. She states that "Members of heterogeneous groups show more diversity in their schemata than do those of the stabilized groups, the younger children more originality than the older ones. And finally, using the

term schema in this sense conveys the significance that age and social group do not influence the quantity of the material remembered but the form the activity takes."

Northway's studies were limited to investigating the differences in remembering which occurred when children of different ages and social groups were asked to recall what they remembered of four poems they had been asked to learn, or to tell what story the poem told. Her concerns were for the relevance these differences in remembering may have for education. The present research aims to provide evidence that bears on Northway's conjecture that there are differences in remembering at different ages by examining the incidence of intrusions and importations for three different age groups. At the same time, it extends the scope of Northway's researches by showing how age differences in remembering are related to developmental differentiation.

While there is evidence that memory styles reflect varying degrees of development, more significant inferences can be made if the evidence is correlated with other measures of development. In this study, measures of globality derived from the Rorschach and the T.A.T. were used as independent assessments of differentiation.

Many studies have been done to measure differences in developmental patterns for different age groups using the

Rorschach and the T.A.T.. These studies have been reported by Witkin (1954, 1962), Ames, Metraux and Walker (1952, 1959), Hertz (1933, 1938, 1941, 1943), McFate and Orr (1949), Hertzman and Margulies (1943), Thetford, Molish and Beck (1951), and Suares (1938). It has been shown that there are factors relevant to development which shape the test responses to both the Rorschach and the T.A.T.. The measures used in this study as derived from Witkin (1954, 1962) were used to demonstrate that there is, both within age groups as well as across age groups, a correlation between development and a global orientation on projective tests that reflects a similar correlation between development and a global orientation in memory styles as revealed by errors of commission.

The central hypothesis of the present study is that globality is reflected in errors of commission. Therefore, they will decrease with age and will correlate with a test measure of globality at different age levels. Age groups will differ systematically and there will be individual differences within each age group. This hypothesis was tested by examining the relationship between a measure of global functioning in the perceptual-personality sphere (derived from projective test performances) on the one hand, and a measure of errors of commission in remembering

(intrusions and importations in the recall of story material) on the other hand.

PROCEDURES

Subjects

The subjects in this study are three groups of boys drawn from the 5th, the 8th, and the 11th school grades. Aside from the choice of grade level, the subject's participation in the study was based on two factors: his voluntary agreement to be part of the study, and the written permission of his parents. Roughly 95% of each of the three classes participated. The consent and co-operation of the school was also obtained.

The oldest group (N=23) ranges in age from 16 years and 6 months to 18 years and 11 months, with a mean age of 17 years; the middle group (N=23) ranges in age from 13 years and 2 months to 14 years and 4 months, with a mean age of 13 years and 11 months; the youngest group (N=21) ranges in age from 10 years to 11 years and 4 months, with a mean age of 10 years and 9 months. There is 3 years' difference between the mean ages of adjacent age groups, who will be referred to as the 17-year-olds, 14-year-olds,

and 11-year-olds. The total number of subjects to be compared within and across groups is 67.

The boys were students at a private boys' school in New York City. Boys must have a minimum IQ of 115 to be accepted by this school, and scholastic requirements are high. Socio-economic factors are quite homogeneous in that all the boys come from high income, upper middle class, white families.

Procedures

Paul's Manual (1966) was used as a guide for both the presentation of the memory material to the subjects and the scoring procedures outlined in it.

Each boy was given two memory tests: The Theme List ("The Monkey") and the Twin Story. Each boy was also given the Rorschach Test and 10 selected T.A.T. cards.

Theme List Administration

A list of seven sentences, themes, was presented aurally to the subjects. These themes are loosely connected and form the plot outline of a story called "The Monkey." They are terse sentences. They contain ambiguities, some gaps and some plot twists. Following are the themes presented to the subjects.

1. The general had polished his medals that spring morning.
2. Nursery-rhymes filled the air.
3. The children circled round begging for music.
4. A coin rolled among their feet.
5. The lady heard the frenzied scramble.
6. A hairy paw scooped it up.
7. Tears were seen on the animal.

Administration of the Theme List was preceded by instructions which insure full intentional and expectational sets. Each theme was presented twice in succession. Subjects were then asked to give a reproduction of the set of seven themes after a three to five minute concentration task to wash out recency. In the instructions, which are given below, accuracy was strongly emphasized. The next task revolved around a realization of the story that is outlined in the Theme List. The intervening story provides for further errors of commission in the reproduction that is next given by the subjects. Following the story, the subjects gave a second reproduction of the original Theme List and the instructions again emphasized accuracy.

The point of this technique is that a comparison between the initial reproduction--the learning reproduction --and the intervening story and the final reproduction--the

recalling reproduction--will yield an index of the subject's importation style. Observations of the information that appears in the final or recalling reproduction are made and it is ascertained that this new material derives from the interpolated story. Measures of accuracy are also scored.

Following Paul's instructions, the Theme List was given aurally and the boys were instructed as follows:

> Now I am going to read you a list of themes of a story called The Monkey. I would like you to listen carefully as I read this list of themes because I want you to get to know it. Later, I will ask you to recall the themes from memory. I will read you each of the items twice in succession. Please listen closely and get to know them. Do you have any questions? O.K. Let's start. There are seven themes and I will read each one twice. The story is called The Monkey.

After finishing presentation of the seven themes, the subjects' attentions were diverted for several minutes to minimize recency and to wash out immediate memory by asking them to note on a sheet of paper provided for them the hours and days of their study hall periods. This information was used to set up future individual appointments with each boy in order to administer the Rorschach and T.A.T. tests.

After writing down their available free periods, the subjects were then told:

> Now I would like you to write out, as accurately as you can recall that list of themes, the seven themes that I read to you. Please try to recall them as accurately as you possibly can. It's probably impossible for you to recall them word for word but try to be as precise and as word perfect as you can. Any questions? Remember, be as precise as you can. Please go ahead.

The next step in the procedure was the presentation of the interpolated story. The story (see Appendix A), as given by Paul in his Manual, was read to the boys with the following instructions in advance.

> Now I would like you to listen to the story upon which that list of themes was based. This is the story to which that theme list is the plot outline. I am NOT going to ask you to recall it from memory or anything like that. Still, it's important that you listen to it carefully. O.K.? This is the story called The Monkey.

The final step in the procedure was the post story recall, the recalling reproduction. It was stressed to the subjects that it was not the story, but the original theme list that was to be recalled. Instructions, again following Paul's Manual, were read.

> Now I want you to reproduce the original list of themes again. This is really a repetition of the first recall you gave. As accurately as you can now recall, please write out the list of themes that I read to you at the beginning. Do you understand what I want? Another recall, from memory, of the original list of themes. Any questions? Again, please be as precise and as accurate as you can.

The Theme List was presented to the subjects in groups and not individually. The Twin Story was also presented to the subjects on another day. This was also done in group and not individual sessions. The Twin Story was also given to the subjects following the instructions as set forth in Paul's Manual.

Although the Twin Story does not allow the important distinction to be made between intrusions and importations, it provides another means of studying errors of commission. Therefore, in order to determine how these subjects recalled a connected story rather than a list of themes, the Twin Story was given. The Twin Story was read to the subjects as was the Theme List. The instructions provide full expectational and intentional sets and are given below:

> I will read you a story. Later you'll be asked for your memory of it. You will be asked to reproduce the story as accurately as you possibly can. I will read the story twice at my usual reading speed. Now, it will not be possible for you to remember it completely, because it is 121 words long and has about 12 sentences. Nevertheless, try your best to remember as much of it as possible. Any questions?

The Twin Story

> An American boy named Douglas entered the American Navy, and his twin brother Horace entered the Navy. They separated from each other for the first time in their lives, and Douglas became a radar technician.
>
> During a Navy exercise in Greenland, he became separated from a twenty-three man squad, and he was

lost. Nine days later, some natives who were hunting seals in a river discovered him. He was alive, and he was delerious. The natives returned him by dog sled to a Navy base.

Even after he was discharged from the general hospital, Douglas forever remained convinced that he was his twin borther Horace, and he remained convinced that he never had a brother by the name of Douglas.

Now, your memory of the story. As accurately, as completely and as faithfully as you can, please write out for me the story that I read to you. Any questions? ... If anything occurs to you at the end, say some stray facts, write them down. Write as quickly as you can. I am good at deciphering handwriting. Please go ahead.

Projective Testing

Individual appointments were made for each boy after the Twin Story and the Theme List had been administered to the groups. Arrangements were made to see all the boys privately (during a pre-arranged study hall period at the school) in a private room that was placed at the disposal of the investigator by the school. A tape recorder was set up in the room and the boys were aware of its presence. Each boy was first presented the T.A.T. cards in the following order: Card 1, Card 2, Card 4, Card 5, Card 6BM, Card 7BM, Card 8BM, Card 10, Card 13, and Card 14. The stories given by the subjects for these cards were recorded on the tape recorder and later transcribed verbatim by the

investigator.

Instructions and procedures were identical for each boy. Before presenting the cards, each boy was asked to identify himself on the tape and state his age and birth-date. Instructions for the T.A.T. as outlined by Murray (1943) were given when the first card was presented, and these instructions were not repeated unless the subject did not understand what was required of him. Murray's instructions are as follows:

> This is a test of imagination. I am going to show you some pictures, one at a time; your task will be to make up as dramatic a story as you can for each. Tell what has led up to the event shown in the picture, describe what is happening at the moment, what the characters are feeling and thinking; and then give the outcome. Speak your thoughts as they come to your mind. Do you understand?

After the T.A.T. cards had been given, the subject was told he would be shown some other cards. Standard instructions for the administration of the Rorschach were given. It was also stressed at this time that instead of making up a dramatic story, the cards were to elicit descriptions of what they looked like or what impressions they evoked.

Presentation of the cards was kept as simple as possible, and an inquiry was done after each card (since the responses were being recorded on tape and it was deemed the

problems of transcription would be diminished if this procedure were followed). Questions of location and non-leading questions were asked during the initial presentation. A record was kept (out of sight of the subjects) on separate location sheets that contain reproductions of all ten cards in black and white. These were used to pinpoint location and other data such as position of the cards, details, outline, etc.. When it was necessary to get additional information to clarify scoring and aid scoring, these questions were withheld following completion of the entire series of ten cards and reserved for a final inquiry session. This is standard procedure used by many psychodiagnosticians and is the kind of administration recommended by Hertz, Halpern, Ames, et al., as a preferred method of administering the Rorschach to younger children and adolescents.

Scoring

The central hypothesis of this study is to show that globality is reflected in errors of commission. These errors should decrease with age and correlate with a test measure of globality at different age levels. The rationale for using structure as an indication of globality is in many ways similar to the rationale used in the Witkin study. In that study, high level subjects were seen as more mature,

more integrated and more differentiated. Their scores correlated well with subjects who were classified as analytic. The opposite was true for low level subjects who were classified as global.

The criteria used in scoring the T.A.T. stories measures structuring ability as evidenced in the T.A.T. productions. Following Witkin (1962), who states that "Productivity and effectiveness of integration of ideas are the main criteria used in judging organizational levels," four categories of classification were assigned with a rating of 1 for Category A (lowest), a rating of 2 for Category B, etc.. The criteria for the four categories are as follows:

A. Stories involving no organization at all are included here. They are, in a literal sense, not stories but simply descriptions of objects, people, scenes, usually very briefly stated, with no attempt at interpretation of what is going on, or what the people in the cards (picture) are feeling. Omission of important parts of the cards may occur. Also included here are highly illogical stories. Such stories usually have a plot, but the material is contradictory and a sequence of ideas is chaotic.

B. Stories are placed in this category if there is some attempt to give direction to the material and to go beyond sheer description. However, the relation of the characters to each other, or the feelings of the characters is barely touched upon in such stories. Stories at this level are primarily impressionistic and descriptive but differ from Level A in that they contain a small amount of interpretation. Also included are stories with characteristics of Level C which contain illogical elements or of Level D which contain some seriously illogical elements.

C. These stories involve some greater elaboration of the motives or feelings of the characters in the story, of the relationships between people, and of some sort of theme. Popular stories and their variations (e.g., current movies) are placed here, as are stories with characteristics of Level D which contain some illogical (slightly) elements.

D. These stories involve elaborate but consistent plots or extensive considerations of inner motives of characters, or a high level of awareness and productive use of most of the outstanding features of the card, or of the creation of characters not pictured on the card who played an important role in the story.

The total level of organization was computed for each subject by adding the scores for all his stories and finding the mean. Because these scores were based on a four point rating scale and the Rorschach scores are based on a five point rating scale, the T.A.T. scores were adjusted for each subject so that they could be compared with the Rorschach scores.

The Rorschach protocols were evaluated following Witkin (1962) in which a rating scale for judging percepts was established by Witkin for the subjects used in that study. This method is similar to the one used for evaluating the T.A.T. stories which has been discussed above. The subjects' responses were rated on a one to five rating scale. A rating of five was assigned to a high level of structure, and a rating of one was assigned to subjects at the opposite extreme.

Ten cues which are listed below were used as definitional guides. Each of the Rorschach cards was evaluated separately and scored. As with the T.A.T., the scores for the ten cards were then added, and a mean Rorschach score was computed for each subject. The ten cues that were used to judge the Rorschach cards are as follows:

1. Definiteness of percepts (Form Level).

2. Passive acceptance vs active dealing with specific blot characteristics. This involves the ability to actively use or eliminate or rationalize or deal with the characteristics of the blot. High level attitude is one of active coping.

3. Stability of percepts.

4. Handling of alternatives with an absence of indiscriminate alternatives for high level structuring.

5. Ability to respond differently to changing stimulation. High level subjects show an absence of perseveration or perseverative attitudes.

6. Confusion in elaborating percepts missing in high level structuring.

7. Special aspects of verbalization with precision of language noted in high level subjects.

8. Handling of W's.

9. Interest in card coverage. Marked interest in accounting for or getting an answer for all the parts of the blot, whether these are organized in combinatorial W's or not.

10. General impression of competence and adequacy of resources in dealing with the task. Lack of evidence of helplessness or perplexity in dealing with task noted by high level subjects.

A more complete description of the above ten cues and the rationale underlying their use is presented in Witkin (1962). These were used as guides in making the evaluations.

Because of the investigator's familiarity with the subjects and the material, to avoid the possibility of contamination and bias, two outside judges were asked to score the T.A.T. and the Rorschach data independently of the investigator.[1] Both judges received copies of the T.A.T. stories and the Rorschach protocols given by the subjects. These had been coded and randomized so that neither of the judges knew to which age group each subject belonged.

The scores were tabulated according to the Witkin procedures, namely the four categories of classification for the T.A.T. and the ten cues listed as definitional guides for the Rorschach as described above.

Because both judges were well trained in interpretation of the T.A.T. and Rorschach protocols and techniques, no additional training was necessary on the part of the investigator. Each judge was briefed, however, concerning

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[1] I would like to thank Michael Bramante and Nicholas Papouchis for their painstaking work and efforts in serving as judges on this study. I am grateful to them for their excellent services and for their dedication.

the criteria and the scoring systems used for this study. The correlations obtained among the judges and the investigator are shown in Table 1. It is clear that scoring reliability is entirely satisfactory in that the intercorrelations are not only significant but very substantial.

Scoring for the Theme List was according to Paul (1966). Accuracy was scored on a two-point basis (two points for word perfect information units, one point for an adequate synonym). Intrusions and importations were tallied on an information unit basis. Three main scores for each subject were derived from the Theme List technique. The first is a score of accuracy and completeness of recall. The second is a measure of intrusions, and the third is a measure of the importations.

Scoring for the Twin Story was based on accuracy and on the number of intrusions. As in the Theme List, accuracy was scored on a two-point basis and intrusions on an information unit basis, so that each subject had two main scores derived from the Twin Story.

TABLE I

CORRELATIONS (PEARSON PRODUCT MOMENT) AMONG THE JUDGES ON THE RORSCHACH INDEX AND THE T.A.T. INDEX

	Judges 1 & 2	Judges 1 & 3	Judges 2 & 3
Rorschach	.90	.83	.91
T.A.T.	.94	.89	.95

RESULTS

The Rorschach and T.A.T. Indices of Globality

The score that was derived from each of the projective tests has a range of one to five, with the low end of the scale denoting greater globality and the high end denoting least. Table 2 presents the means and standard-deviations of the Rorschach and T.A.T. scores of the three age groups. Table 2 shows that the 17-year-old group achieved the highest scores on both indices; since they are the oldest group this finding conforms to expectation: the oldest Ss evidence the least globality. At the same time, the 11-year-old group, the youngest Ss, can be expected to show the most global functioning; but the finding is that this group does not achieve the lowest scores. Instead, the 11-year-old group and the 14-year-old group are almost identical in their globality indices.

It is clear from an inspection of the results in Table 2 that the 11-year-olds and the 14-year-olds do not differ significantly on either the Rorschach or the T.A.T.. The differences are small in relation to the standard-

TABLE 2

RESULTS ON THE RORSCHACH AND T.A.T. INDICES FOR THE THREE AGE GROUPS

		Group		
		11-year olds N = 21	14-year-olds N = 23	17-year-olds N = 23
Rorschach	Mean	2.91	2.86	3.21
	Standard-deviation	0.41	0.47	0.65
T.A.T.	Mean	2.93	2.99	3.27
	Standard-deviation	0.40	0.42	0.72

deviations, and the t-ratios for the differences are both less than one. The 17-year-old group, however, differs quite substantially from the other two groups on both indices, and t-ratios indicate that three of the four differences achieve statistical significance. On the Rorschach the difference between the 17-year-olds and the 14-year-olds achieves a t-ratio of 2.05, which is significant at beyond the .05 level; while on the T.A.T. the difference falls somewhat short of significance (t-ratio is 1.45). The difference between the 17-year-olds and the 11-year-olds is significant on both indices at the .07 level (t-ratio is 1.80 and 1.82 for the Rorschach and the T.A.T. respectively). If we combine the two younger groups and compare their results with the oldest group, we find that the differences are significant at beyond the .05 level (t-ratio is 2.43 and 2.14 for the Rorschach and the T.A.T. respectively).

The overall range of scores for both indices is 1.95 to 5.00, with a midpoint of 3.48. On the Rorschach index only one 11-year-old and one 14-year-old exceeded the midpoint, while fully eight 17-year-olds exceeded it. Similarly, on the T.A.T. index two members of the 11-year-old group and two of the 14-year-old group exceed the midpoint, while seven members of the 17-year-old group exceed it. It is clear, then, that the 17-year-old group achieved the

least global scores on both the Rorschach and the T.A.T., and the 11-year-old and 14-year-old groups did not differ on them.

It is also clear from an inspection of Table 2 that none of the groups shows a substantial or significant difference between their Rorschach and T.A.T. scores. In fact, their scores on both indices are remarkably similar. This might suggest that the two scores can be combined into a single index of globality. However, correlations between the two indices, while substantially significant, are not very substantial. The two indices intercorrelated +.40 for the members of the 14-year-old group, +.58 for the 11-year-old group, and +.69 for the 17-year-old group. Each of these correlations (Pearson Product Moment) is significantly different from zero at beyond the .05 level (the 17-year-old group's is significant at beyond the .001 level), but none of them shows a shared variance that exceeds 50 percent. The two indices share a mere 16 percent of the variance for the members of the 14-year-old group. These results indicate that a significant relationship exists between the two indices, but they do not provide a basis for combining them into a single index.

Two-by-two contingency tables showing the degree of correspondence across the median scores of the two indices were also examined, and they are shown in Table 3. The Chi-Square results show that the 14-year-old group falls short

TABLE 3

TWO BY TWO CONTINGENCY TABLES SHOWING THE DEGREE OF CORRESPONDENCE ACROSS THE MEDIAN SCORES OF THE RORSCHACH AND THE T.A.T. INDICES

	Group		
	11-year-olds	14-year-olds	17-year-olds
	T.A.T.	T.A.T.	T.A.T.
	High / Low	High / Low	High / Low
Rorschach High	9 / 2	8 / 3	10 / 1
Rorschach Low	3 / 7	4 / 8	1 / 11
	12 / 9	12 / 11	11 / 12
Chi Square =	3.82	2.17	12.55
	$p < .05$	NS	$p < .001$

Note: Yate's Correction for Continuity used for the computation of the Chi Square.

of significance, while the 11-year-old group is significant at the .05 level and the 17-year-old group at the .001 level. Among the members of the 14-year-old group sixteen Ss fall in the same half of the distribution on both indices, but seven do not; while in the 17-year-old group only two Ss fail to fall in the same half. It seems, therefore, that for the oldest and youngest Ss both projective tests yielded a similar index of globality, while for the middle group they did not to the same extent.

These findings led to the decision to examine separately the relationship between each of the projective test scores and the recall scores, i.e., not to combine the two indices into one. While this has the disadvantage of a more cumbersome analysis, it may avoid the danger of confounding the index of globality and generating spurious results.

The Theme List and the Twin Story

The recall of the Theme List provided three independent scores: a measure of accuracy and completeness of recall, the number of intrusions (errors of commission in the learning reproduction), and the number of importations (errors of commission in the recalling reproduction). The Twin Story recall provided two measures: a measure of

accuracy and completeness, and the number of intrusions. Table 4 presents the results on these scores for the three age groups.

The accuracy scores of both the Theme List and the Twin Story show that the 11-year-old group, the youngest group, achieved the lowest scores, while the oldest group, the 17-year-olds, achieved the highest scores. On the Theme List, however, the 14-year-old group achieved almost as high an accuracy score as did the 17-year-old group. Because the variance for all of the groups is quite high, none of the inter-group mean differences achieves statistical significance. The difference between the 14-year-old group and the 17-year-old group achieves a t-ratio of less than one; and the difference between them and the 11-year-old group achieves significance at only the .10 level (t-ratio = 1.55 and 1.58).

On the longer Twin Story, on the other hand, the differences between the 11-year-old group and the other two groups does achieve statistical significance. The difference between the 11-year-old and the 14-year-old groups achieves a t-ratio of 4.14; between the 11-year-old and the 17-year-old groups a t-ratio of 5.43; and both are significant at beyond the .001 level. The difference between the 14-year-old and the 17-year-old groups, however, falls short of

TABLE 4

MEANS AND STANDARD DEVIATIONS (IN PARENTHESIS)
FOR THE THEME LIST AND TWIN STORY
FOR THE THREE AGE GROUPS

	Group		
	11-yr-olds	14-yr-olds	17-yr-olds
Theme List			
Accuracy Score	30.86 (8.31)	34.00 (7.49)	34.61 (7.35)
Intrusions	2.24 (1.54)	2.09 (1.17)	2.04 (1.49)
Importations	2.71 (1.69)	2.96 (1.78)	1.87 (1.26)
Total Errors of Commission	4.95 (2.52)	5.95 (2.26)	3.91 (1.93)
Twin Story			
Accuracy Score	52.00 (10.46)	65.79 (11.53)	71.52 (12.93)
Intrusions	3.71 (1.77)	3.26 (0.99)	3.52 (1.23)

significance (t-ratio = 1.57, p = .10). The conclusion may be drawn that the 11-year-old group had the lowest accuracy scores, and the 14-year-old and 17-year-old groups did not differ from each other.

Comparing the number of intrusions both on the Theme List and on the Twin Story, the youngest group, the 11-year-olds, has the greatest mean number. However, their differences from the other two groups are small and fail to achieve statistical significance. All the t-ratios are less than one. On Theme-List importations the differences between the groups are larger and do achieve statistical significance. The significant finding here is that the 17-year-old group, the oldest group, has the fewest number of importations. The 11-year-old and the 14-year-old groups do not differ significantly (t-ratio is less than 1), but the difference between the 17-year-old and the 11-year-old groups achieves a t-ratio of 1.87 (significant at the .05 level) and the difference between the 17-year-old and 14-year-old groups achieves a t-ratio of 2.35 (significant at the .01 level).

The only measure of errors of commission that differentiates among the three age groups is Theme-List importations. The significant finding is that the oldest group, the 17-year-olds, made the fewest number of such

errors. The expectation that the youngest group would make the greatest number of errors of commission is not confirmed. They did make the most intrusions on both the Theme List and the Twin Story, but the finding failed to achieve statistical significance. Perhaps the fact that they had the lowest accuracy scores may be a factor in this failure to achieve significance. Since they recalled less of the verbal material, they perhaps had less opportunity to make errors of commission. If we were to compute their percentage of errors against their accuracy score, then a significant difference would emerge.

The Relationship between Globality Indices and the Recall Scores

The relationship between the indices of globality and the recall scores will be examined in several different ways. A correlational analysis will be followed by a quartile analysis and then by an examination of some qualitative differences in errors of commission. The main hypothesis of this study is that globality of functioning as reflected in the projective tests will also be reflected in the prevalence of errors of commission in the recall of the verbal material. The main expectation, therefore, is that the globality indices will correlate with the intrusion

and importation scores both across the three age groups as well as within each of them.

Table 5 presents the results of a comprehensive correlational analysis of the two sets of data, showing the extent to which the Rorschach and the T.A.T. scores correlate with the recall scores of the Theme List and Twin Story for each of the three age groups. The first finding that is notable is the absence of significant correlation with the accuracy scores. Only one of the six correlations achieves significance: T.A.T. with Theme-List accuracy for the 11-year-old group. The six correlations between the Rorschach scores and the accuracy scores are all small and fall in no one direction. The T.A.T. scores' correlations, on the other hand, are all positive; one is significant at the .05 level, and two others are in the +.30's. This indicates that there is a small but consistent relationship between the T.A.T. index and the recall accuracy, and the relationship is that the greater the level of globality on the T.A.T., the lower the accuracy on the recall material.

When we examine the correlations between the globality indices and the errors of commission, we find that a strong and consistent relation exists for the members of the 11-year-old and 14-year-old groups, but not

TABLE 5

CORRELATIONS (PEARSON PRODUCT MOMENT) BETWEEN
THE GLOBALITY INDICES AND THE RECALL SCORES

		Group					
		11-year-olds		14-year-olds		17-year-olds	
		Rorschach	T.A.T.	Rorschach	T.A.T.	Rorschach	T.A.T.
Theme List							
	Accuracy	.25	.47*	.19	.23	-.08	.20
	Intrusions	-.31	-.13	-.53**	-.36	.21	.22
	Importations	-.53**	-.66**	-.57**	-.53**	.09	-.24
	Total Errors of Commission	-.54**	-.54**	-.72**	-.60**	.11	.03
Twin Story							
	Accuracy	.12	.32	-.06	.09	-.03	.37
	Intrusions	-.40*	-.62**	-.66**	-.35	.05	-.07

* =p.05
** =p.01

for the members of the oldest group, the 17-year-olds. For the 11-year-old and 14-year-old groups, all of the inter-correlations are negative without exception, and only four of the sixteen fail to reach statistical significance. Table 5 shows that the correlation with intrusions on the Theme List are consistently smaller than the correlations with importations. In fact, all four of the correlations with importations are significant at the .01 level, and they are quite substantial. Similarly, when intrusion and importations are combined (total errors of commission) the correlations are even stronger.

The findings indicate that for the two younger groups there is a consistent relationship between the globality indices and the prevalence of errors of commission on the recall material, such that the greater the level of globality, the greater the number of errors of commission. And this relationship is strongest for the importations on the Theme List. For the members of the oldest group, the 17-year-olds, there appears to be no relationship between globality and errors of commission.

A correlational analysis alone may not do full justice to the data since the relationship between the variables may not be altogether linear. Therefore, in addition to the correlational analysis the data were

examined by segregating the Ss of each group into high, medium, and low categories on the globality indices, and then comparing their recall scores.

Instead of dividing each group into quartiles of equal number, it appeared preferable to allow the natural groupings on the globality indices to form the subgroupings. The distribution of the Rorschach and T.A.T. scores were studied, and it was found that they naturally formed groupings. It was possible to identify a group of Ss who scored high on the indices and a group who scored low. In addition, it was possible to divide the remaining Ss into a Medium High and a Medium Low group. The aim of this procedure was to form four subgroups of Ss in each age group (a High, a Medium High, a Medium Low, and a Low group) which conformed to their distribution of scores on the Rorschach and T.A.T.. While an attempt was made to achieve relative equality of numbers for the four subgroupings, this was not always possible. Nevertheless, it was possible to achieve equality for the two High and two Low subgroups combined.

Once the three age groups had been divided into four subgroups that reflected their globality indices on the Rorschach and on the T.A.T., their mean number of errors of commission on recall tests were computed. Tables

6 and 7 present the findings of this procedure.

The first set of findings that will be considered are those which are based on the Rorschach indices. Table 6 presents the mean number of errors of commission for the three age groups for the subgroups of each. The table also shows the number of Ss in each subgroup. Inspection of the findings for the 11-year-old and 14-year-old groups reveals the pattern that is reflected in the significant correlations that are shown in Table 5: the mean number of intrusions and importations on the Theme List increases quite systematically across the four subgroups, and so does the mean number of intrusions on the Twin Story. At the same time, the 17-year-old group shows no systematic pattern on the Twin Story intrusions--which conforms to the absence of any correlation for that group (see Table 5).

The advantage of this analysis is apparent when we examine the findings for the 17-year-old group, where the correlational analysis failed to point up any relationship between the globality indices and the errors of commission. Table 6 reveals that, while there is no systematic pattern of mean scores across the four subgroups, the members of the High subgroup do, in fact, have the greatest mean number of errors of commission. If we compare their scores with those of the other three subgroups, we

TABLE 6

MEAN NUMBER OF ERRORS OF COMMISSION FOR THE THREE AGE GROUPS DIVIDED INTO HIGH, MEDIUM HIGH, MEDIUM LOW, AND LOW CATEGORIES BASED ON THE RORSCHACH INDEX OF GLOBALITY

	11-year-old group					14-year-old group					17-year-old group				
		Theme List			Twin		Theme List			Twin		Theme List			Twin
Globality	N	Int.	Imp.	Total	Int.	N	Int.	Imp.	Total	Int.	N	Int.	Imp.	Total	Int.
Low	5	1.80	2.00	3.80	3.20	7	1.29	1.43	2.72	2.43	3	2.00	1.67	3.67	3.33
Medium Low	5	1.80	1.60	3.40	2.60	4	1.50	3.25	4.75	3.00	8	2.25	1.88	4.13	3.63
Medium High	4	2.00	2.50	4.50	4.00	4	3.00	3.25	6.25	3.50	3	0.33	1.33	1.66	4.00
High	7	3.00	4.00	7.00	4.29	8	2.63	4.00	6.63	4.00	9	2.44	2.11	4.56	3.33
Low + Medium Low	10	1.80	1.80	3.60	2.90	11	1.36	2.09	3.45	2.64	11	2.18	1.82	4.00	3.55
High + Medium High	11	2.64	3.46	6.10	4.18	12	2.75	3.75	6.50	3.83	12	1.92	1.92	3.84	3.50
t-ratio		1.23	2.31	2.42	1.43		3.35	2.41	3.23	3.47		< 1	< 1	< 1	< 1
P		ns	.05	.05	ns		.01	.05	.01	.01		ns	ns	ns	ns

find they have a mean number of intrusions of 2.44 as compared to a mean of 1.78 for the rest, and a mean number of importations of 2.11 as compared to 1.70 for the rest. These differences achieve a t-ratio of 1.02 and 0.74 respectively. The conclusion is that no significant differences exist between the High globality subgroup and the combined Low globality, Medium Low globality, and Medium High globality subgroups.

Table 6 shows that, with the exception of the 17-year-old group's Twin Story intrusions and the 14-year-old group's Theme List intrusions, all of the subgroups that fall into the High global category on the Rorschach have the greatest mean number of errors of commission. When we total the number of intrusions and importations on the Theme List there is no exception to this finding. At the same time, it is not true that the Low subgroup always has the smallest number of errors of commission. In fact, this is true only for the members of the 14-year-old group.

The second set of findings are those which are based on the T.A.T. index. Table 7 presents the mean number of errors of commission for the three age groups for the subgroups of each. The number of Ss for each subgroup are also shown. The findings reveal that there is

TABLE 7

MEAN NUMBER OF ERRORS OF COMMISSION FOR THE THREE AGE GROUPS DIVIDED INTO HIGH, MEDIUM HIGH, MEDIUM LOW, AND LOW CATEGORIES BASED ON THE T.A.T. INDEX OF GLOBALITY

	11-year-old group					14-year-old group					17-year-old group				
		Theme List			Twin		Theme List			Twin		Theme List			Twin
Globality	N	Int.	Imp.	Total	Int.	N	Int.	Imp.	Total	Int.	N	Int.	Imp.	Total	Int.
Low	6	2.67	1.17	3.84	2.83	7	1.14	1.71	2.85	3.00	7	2.43	1.86	4.29	3.43
Medium Low	6	1.17	2.17	3.34	2.67	6	2.50	3.17	5.67	3.00	4	2.75	1.25	4.00	4.00
Medium High	2	1.00	3.50	4.50	3.50	5	2.80	2.80	5.60	3.20	3	0.67	0.67	1.34	3.67
High	7	2.86	4.29	7.15	5.43	5	2.20	4.60	6.80	4.00	9	1.89	2.56	4.45	3.33
Low + Medium Low	12	1.92	1.67	3.59	2.75	13	1.77	2.38	4.15	3.00	11	2.55	1.64	4.19	3.64
High + Medium High	9	2.44	4.11	6.55	5.00	10	2.50	3.70	6.20	3.60	12	1.58	2.08	3.67	3.42
t-ratio		<1	4.44	3.35	3.51		1.48	1.81	1.91	1.45		1.58	<1	<1	<1
P		ns	.001	.01	.01		ns	ns	ns	ns		ns	ns	ns	ns

no systematic progression in the mean number of intrusions or importations on the Theme List for the three age groups, with the exception of the 11-year-old group which does show this progression in the mean number of importations. There is no progression across the four subgroups for the mean number of intrusions on the Twin Story.

As was revealed in Table 6, an examination of Table 7 also underscores why the correlational analysis as shown in Table 5 failed to reveal any relationship between the T.A.T. globality indices and the errors of commission for the 17-year-old group. For this oldest group of Ss there is no systematic pattern of mean scores across the subgroups. For the 17-year-old group members of the High subgroup have the greatest mean number of importations but not intrusions. A comparison of the mean number of intrusions for the High subgroup with those of the other three subgroups show they have a mean of 1.89 as compared with a mean of 2.14 for the rest, whereas the mean number of importations for the High subgroup is 2.56 as compared to a mean of 1.43 for the other three subgroups. These differences achieve a t-ratio of 0.38 and 2.23 respectively ($P = .05$). The only significant difference can be found between the mean number of importations for the High globality subgroup and the combined Low globality, Medium Low globality, and Medium

High globality subgroups. No significant differences exist between the mean number of intrusions for the High globality subgroups and the other combined subgroups.

Again, paralleling the results of the Rorschach index, Table 7 shows that, with the exception of the Theme List and Twin Story intrusions for the 17-year-old group and the Theme List intrusions for the 14-year-old group, all the subgroups that fall into the High global category have the greatest mean number of errors of commission. Again, when the total number of intrusions and importations on the Theme List is examined, there is no exception to this finding. The Low subgroup, however, does not always have the smallest number of errors of commission. This is true only in the case of intrusions for the 14-year-old group and importations for the 11-year-old and 14-year-old groups.

A Qualitative Study of the Errors of Commission

In addition to simply tallying the number of errors of commission made by Ss, it may be valuable to look for qualitative differences in the kinds of intrusions that occur. In his study of such intrusions, Paul (1959) distinguished between those that were explicatory and those that were merely decorative. A preliminary examination of

the errors of commission that were made in the present study failed to find a significant number of them that could be considered purely decorative. The reason for this probably lies in the fact that Paul based his distinction on the reproduction of much lengthier stories than those used in the present study. Instead, however, the preliminary examination strongly suggested for the Twin Story reproductions a distinction between intrusions that are very close to the stimulus material--that are strongly implied (for example, adding "Eskimoes" to the Greenland "natives") --and those which are relatively distant from the material (for example, making the "mission" a "secret mission").

It is the rare intrusion that comes out of the blue; virtually all of them make good sense in the context of the story. Still, some constitute major additions to the story, and others seem quite trivial or minor. A distinction between major and minor intrusions can readily be defined, and the judgment requires no special subjectivity. The major intrusion is one that serves the global function, and it is reasonable to expect that the more global the subject the more will his intrusions be major ones.

A comparison of major and minor intrusions on the Twin Story was made for the Ss who fall in the highest and lowest parts of the continuum on the T.A.T. index of

globality. For each of the three age groups the six highest and six lowest were selected for comparison, and an attempt was made to equate the two groups of six with respect to their accuracy scores so that accuracy and completeness of recall would not be a confounding variable.

A) The 11-year-old group:

The seven highest and seven lowest scorers on the T.A.T. index were extracted from the entire 11-year-old group. In order to equalize their accuracy scores as much as possible, one S was removed from each group--a very high accuracy scorer from the Low global group and a very low scorer from the High global group. This left six Highs and six Lows, with the Lows having a mean accuracy score of 51.7 (with a range of 41-63) and the Highs having a mean accuracy score of 47.0 (with a range of 45-53).

Only one member of the Low global group commits a major intrusion, while five of the six members of the High global group commit a major intrusion. Put another way: only one High gives a reproduction that is wholly free of major intrusions, while five of the Lows do. Moreover, the single Low global S commits a single intrusion, while the five Highs commit a total of ten major intrusions between them.

The Twin Story was constructed so that there are two major gaps in it; these gaps were created by simply cutting out two sentences from the full text. In order to prevent these gaps from being too conspicuous as gaps, the sentences following each gap were slightly altered to imply the missing material. The first gap occurs between the first two paragraphs--how did our hero get to Greenland? And the second gap occurs between the second and third paragraphs--how did he get to the hospital? Paul and Alston (1960) have found that intrusions tend to cluster at the gaps.

We would expect to find that the High global Ss fill the gaps, while the Low Ss do not, and an examination of the reproductions from the two subgroups confirms this expectation. Only one member of the Low global group fills (or closes) the gaps, and only one member of the High global group fails to do so. One Low S fills both gaps and the remaining five Ss do not fill either. Among the High Ss three fill gap #1 and five fill gap #2.

An example of how gap #1 was filled by a High S is the following: "Horace went on a Greenland expedition of 23 men." An example of how gap #2 was filled is the following: "They put him on a dog sled and brought him to

a navy base. After that he went to a general hospital." For the most part, the second gap is closed by simply having the natives return the hero to the hospital instead of to the navy base.

What are these major intrusions? The Low global S has the hero of the Twin Story "crazy and hungry" when he is found (instead of "alive and delerious"). Three of the High global Ss also elaborate on the hero's condition: one has him "alive but sick," another writes "he had a fever," and the third gives him "a high fever." Two of the Highs introduce an age for the hero: "At the age of 17" and "at 21." On has him "stationed in Greenland," while another has him lost "off the coast of Greenland." And finally, one High S, obviously impressed with his serious condition, has the hero "rushed to the hospital."

An interesting finding is that, while none of the members of the Low group elaborates on the beginning of the story, fully three of the six Highs do. These High global Ss introduce the reproduction with a typical story beginning: "Once upon a time," "Once there were two...," and "There were these two twin...."

If we examine all 21 members of the 11-year-old group, we find that there are a total of eight who close both of the story's gaps. Of these eight Ss five are in

the High global subgroup, and the remaining three divide themselves among the three remaining subgroups. Nine members of the 11-year-old group fill neither of the two gaps; and of them five belong to the Low global subgroup, three fall into the Medium Low subgroup, and the last one in the the Medium High. In other words, there is a clear-cut relationship between gap-filling on the Twin Story and performance on the T.A.T. index of globality. The more global the 11-year-old is the greater is the extent to which he fills or closes the gaps. Not a single member of the High global subgroup gives a reproduction that is free of any gap-filling.

B) The 14-year-old group:

The six highest and six lowest members of the 14-year-old group have a mean accuracy score on the Twin Story of 62.5 and 68.7 respectively (with ranges of 42-86 and 57-79 respectively). All six of the High global group make major intrusions, and four of the six Lows do. The Highs have a total of eleven intrusions, and the Lows have a total of five.

Of the Lows' five intrusions three are simply a matter of making the hospital to which the natives take the hero the "nearest" or "nearby." One other has him

"stationed" in Greenland; and the fifth describes him as "a bit crazy" when he is found. Of the Highs' eleven intrusions two are "nearby" and the rest are more elaborate. One has the hero "on a ship" to Greenland; one speaks of a "tracking station;" one introduces an "island" where he is lost; one has him "drafted" into the Navy; and one describes the mission as "a routine test." One has the hero "stayed in the hospital and was said to be fine" for two intrusions; another says he "recovered;" while another writes "after he completely woke up." We see then that the High global Ss make a total of eleven major intrusions, while the Lows make less than half that number; and the difference appears even greater when we examine the intrusions themselves.

With respect to gap-filling, however, no difference between the Highs and Lows emerges. None of the Ss fills both gaps; and three of the Lows fill one gap, while two of the Highs fill one gap. The only finding that is noteworthy is how little gap-filling occurs among the 14-year-old Ss.

C) The 17-year-old group:

The six highest and six lowest members of the 17-year-old group have a mean accuracy score on the Twin Story

of 72.8 and 74.1 respectively (with ranges of 54-89 and 58-92 respectively). All six of the High global group make at least one major intrusion, and four of the six Low global Ss make one. The Highs have a total of ten intrusions, while the Lows have a total of five.

One High S and one Low S write "off the coast" of Greenland; one High and one Low recover him in the hospital ("fully recovered" and "when he recovered"); one High and one Low introduce a spurious time lapse ("some weeks later" and "even after three weeks"). On Low S adds "local" to natives; and another Low S describes the hero's condition as "he was tired." Two of the High Ss describe the mission as a "radar expedition;" another says he "became a technician in Alaska;" another writes he was "stationed" in Greenland, and another makes it "off the coast" of Greenland. One High S describes his condition as "lost and hurt;" another says "he was put in the hospital," and another adds "nearest" to the hospital. The main difference between the Highs and Lows appears to be in prevalence of major intrusions: the Highs make twice as many as the Lows.

There is a difference as well in gap-filling on the Twin Story, but the difference is not great. Two Ss fill both of the gaps, and one is a High while the other is a Low. Among the Lows only one other S fills a gap,

while among the Highs four others fill one. Only one High global gives a reproduction that is free of any gap-filling, while four of the six Low global Ss do.

DISCUSSION

The findings, on the whole, provide support for the main hypothesis of the study. In one major respect, however, the findings are non-confirmatory: namely, in the fact that the stepwise progression from the youngest to the oldest Ss almost never occurs for either the projective test measures of globality and the memory task scores. This is in keeping with Werner's contention that development does not proceed in a continuous mathematically conceived line.

While there are differences as expected between the 17-year-old group and the 14-year-old group as well as between the 17-year-old group and the 11-year-old group, the two younger groups do not differ from each other on either the Rorschach or the T.A.T. If only the youngest and the oldest groups are compared (the 11-year-olds and the 17-year-olds), then all of the differences conform to expectation. The youngest group has the higher scores on the two globality indices, and the youngest commits the

greater number of errors of commission on the memory tasks. However, in very few instances does the middle group (the 14-year-olds) fall significantly in between. The middle group is quite erratic; on some tests they performed no differently from the youngest group, and on others their scores are no different from the oldest group. On the projective test indices of globality the middle group scored no differently from the youngest group, while on the accuracy of recall scores and the number of intrusions they scored no differently from the oldest group. It is noteworthy, then, that on one aspect of the memory tasks do they also perform like the youngest group: namely, on the number of importations on the Theme List. It would appear that a difference of three years between the two younger groups was not enough to generate the degree of difference that can be measured by the tests used in this study. It is possible that if the youngest group had been nine years old instead of eleven, the results on the projective test indices of globality and the number of importations would have been more marked between the two younger groups. It is also noteworthy that the correlation is smaller for the 14-year-old group between the Rorschach Index and the T.A.T. Index than it is for the other two groups. There is also no significant correspondence as

measured by a chi-square test between the Rorschach Index and the T.A.T. Index for this group.

No clear agreement exists that fixes the termination of latency and/or the beginning of pre-adolescence chronologically. There is consensus, however, that these two stages can and often do overlap. The investigator believes the results generated by the 14-year-old group can be attributed to the particular age of this group. The turbulent stage of development in which the 14-year-old boys find themselves accounts for many of the reasons why this middle group does not follow any set pattern. Those familiar with the dynamics of adolescence will recognize that this is the period that spans the onset of puberty and the beginning of what is referred to as the adolescent crisis. Research in this field has shown that this time of life is associated with an intensification of instinctual impulses. One of the indirect effects of this intensification of impulses is the redoubling of the efforts of the person entering adolescence to master these instincts. Feelings of incompetence and the need for autonomy and individuation that accompany the onset of adolescence do not impinge on those in the youngest group, while those in the oldest group are better able to deal with these feelings

in a more developmentally integrated manner. The defenses needed to deal with re-awakened oedipal conflicts and the energy needed to maintain these defenses tend to subvert the energy that can be channelled for cognitive functions.

The behavior of the 14-year-old group during the study already reflected this fact. All the boys had been told that the data would be used for a dissertation. It was also stressed that their contribution was important and valuable. They had all volunteered to participate so that coercion was not a factor that could influence their degree of involvement. It was noted that the 14-year-old boys were the least co-operative of the Ss used in this study. They needed the most time to settle down to the various tests. Compared with the youngest and oldest groups, they behaved in a disruptive fashion on the group testing, were restless, and did not show the same degree of concentration or attention. They were more co-operative during the projective testing which was a one-to-one situation where there was no peer interaction. The general attitude of the oldest group was an interest in the tests given and a curiosity as to how the data would be used and what the end results would be. Several were interested in the central hypothesis. The youngest group also expressed interest and

showed excitement at being included in the study and at being allowed to do what the older boys were doing. It gave them status and their attitude was that they were making an important contribution. Both the youngest and the oldest groups were the easiest to test. The results generated by the middle group and their overt behavioral acting out reflect on this adolescent crisis. The fluctuations and shifts in their data on both the Rorschach and the T.A.T. indices as well as the errors of commission can be attributed to the difficulty this age group is experiencing in effectively trying to handle this period of sturm und drang.

It was also found that in none of the three groups is there a relationship between globality and accuracy. On the longer Twin Story there is a progression, and the youngest group has the lowest accuracy scores. However, what appears to be present in the Twin Story data is the fact that accuracy scores are a reflection of the difficulty of the material. The total number of information units to be recalled on the Theme List is twenty-five, as compared with fifty-five information units in the Twin Story. There are no significant differences in accuracy between the three age groups for the Theme List because all the groups were able to assimilate the twenty-five information units

almost equally. The significant differences between the 11-year-old group and the 14-year-old group, and the 11-year-old group and the 17-year-old group on the Twin Story would indicate that length and content of the material was more difficult for the youngest group to recall accurately than for the two older groups. This is important since the hypothesis states that errors of commission and not accuracy of recall are a reflection of globality. It cannot be said, therefore, that children who are less global remember better, or that those who are more global do not remember as well.

Errors of commission are regularly found in a person's recall of connected and unconnected verbal material. Paul makes a distinction between two kinds of errors of commission: intrusions and importations. Intrusions are seen as being caused by a variety of factors, insufficient learning, for one. Importations are defined as reflecting the ability to withstand the influence of separate but related experiences, and he discounts learning ability as having anything to do with the process. Intrusions and importations are correlated but relatively independent measures. Importations seem to be, as previous research has shown, a cognitive style that has some of the properties of personality trait and appear to be characteristic of

remembering as distinct from learning. Since importations are a measure of errors of commission in remembering as distinct from learning, it is significant that it is the only measure that differentiates the groups. Intrusions (both on the Theme List and on the Twin Story) show no significant differences across the three age groups. Intrusions, thus, reflect no developmental sequence across this age range. But importations do! The greatest relationship occurs for importation and not for intrusions, which would indicate that the relationship is in memory to a greater extent than it is in learning. For the two younger groups, who show a significant relationship between globality and errors of commission, the relationship is greater for importations than for intrusions. The oldest group has the fewest number of importations. However, the middle group has more importations than the youngest group. Again the focus turns to the middle group. When we examine separately the index of globality derived from the Rorschach and the T.A.T., the following findings are worth considering. On both indices, the High global Ss commit the greatest number of errors of commission--even in the case of the oldest group, though their findings fall short of statistical significance. However, it is not the case that the Low global Ss commit the fewest number of errors of commission.

The T.A.T. index of globality seems to show a particularly strong relationship to importations. For the youngest group there is a strong and linear relationship to importations; and for the other two groups the High global Ss have the most importations but not the most intrusions. Again confirming Werner's theory that development does not proceed in a continuous manner, none of the three age groups showed a consistent progression on the four sub-groupings from the Low global to the High global in the mean number of intrusions and importations made. Although the High global Ss give the most importations for all three groups, the differences between the High and Low global Ss are only significant for the 11-year-old group and the 14-year-old group. It is apparent, therefore, that we are dealing with something that exists among the High global subjects in the oldest group that differentiates these High globals from the High globals of the two younger groups: namely, the ability to withstand the stimuli of the intervening story. The differentiation which has taken place by the time they become 17 years old allows this oldest group to deal with the memory data in a more autonomous manner. The way in which they are able to handle the projective tests is independent of the way in which they deal with structured verbal material. The youngest groups do not

show the same ability to withstand the pressures of the intervening story. Under the assumption that the T.A.T. deals with conscious fantasy material and imagination and that the Rorschach deals primarily with unconscious processes, it is less difficult for the oldest group to handle the impact of these two tests because they have developed stronger ego controls and are more integrated, so that the capacity and ability to resist the merging of cognitive and affectual material has become strengthened.

Integrative functions of the ego have developed to a much greater extent in the oldest group, so that they can achieve a better relationship between internal drives and the external environment. This may also explain, in part, why the differences between the High global and the Low global Ss are significant on the Rorschach Index but not on the T.A.T. Index for the 14-year-old group. It could be hypothesized that it is more difficult for this middle group, whose egos are not as differentiated, to handle the upsurge of primary process material associated with the Rorschach than it is for them to deal with the more structured pictures of the T.A.T. which do not require as high a degree of ego integration.

It was also shown that the High global Ss is the sub-group that gave the most qualitatively different

intrusions in the Twin Story. While the minor intrusions made by the Low global Ss could be considered relevant to the story in terms of fleshing it out, such as taking the hero to the nearest or nearby hospital, the distinction between the Low global Ss is more evident when the major intrusions are examined for both groups. While most of the major intrusions can be said to be related in some way to the Twin Story, those major intrusions made by the High global Ss appear to be more farfetched than those made by the Low global Ss. It could be argued that they are more distant from the actual story material and appear as if from out of the blue, whereas those made by the Low global Ss embellish or add to the already existing story line. This is especially true of the two older groups, which would substantiate Northway's conclusions that what the subjects make out of the material might be called schematic differences which reflect the characteristics of the groups as they are incorporated by the individual.

SUMMARY

The study shows that globality is reflected in errors of commission and will decrease with age. It was also shown that errors of commission correlate with a test measure of globality for different age levels. The subjects were three groups of boys who attended a private school in New York City. They had been equated for academic status and socio-economic status. The youngest group had a mean age of 11 years; the middle group had a mean age of 14 years; and the oldest group had a mean age of 17 years.

The test measures of globality used were the Rorschach and the T.A.T.. The Theme List technique and the Twin Story were the Memory Tests used to measure errors of commission. The scoring for the Rorschach and the T.A.T. protocols followed Witkin's scoring, while scoring for errors of commission followed the procedures outlined in Paul's Manual. The memory data was scored for intrusions, importations, and accuracy. Rorschach and T.T.T. protocols were grouped into High, Medium High, Medium Low, and Low

categories, reflecting the degree of globality shown by the Ss. All the data was evaluated by a combination of correlational and group difference statistics. The two main categories of data generated results that were statistically significant on all the tests given, both for the projective tests and the memory tests. The results also show that there is a qualitative as well as quantitative differentiation between the three age groups, as evidenced by the kinds of intrusions and importations given by the subjects categorized as High global and Low global.

APPENDIX A

The Monkey

The sun was bright that beautiful spring morning, and the fat costumed general had on his brightly polished medals. Not in vain had he spent an hour, early that beautiful morning, vigorously polishing up his funny medals, for they sparkled proudly on his big round chest. The fat general stroked the tips of his waxed mustache, and when he bowed low to the ladies and nursemaids in the park all of his sparkling funny medals clanked and jangled.

He waved to the little children, whose merry nursery rhymes filled the fresh air with gaiety. How he loved their merry nursery rhymes! And how they loved his red and green uniform, his funny-shaped medals, and best of all his little shriveled monkey. The little children rushed up and made a big circle round him, hopping up and down with excitement, and loudly begged him to make the martial music from his magic music box. They begged so loudly for the martial music because they wanted to march round him in a big circle, and they wanted to see the little animal, with its shriveled face like an old man's, scurry around gathering up the rolling coins and dropping them into his little cup.

Suddenly, a big gold coin rolled among their dancing little feet. This was no mere penny, this was a large shiny thing with a rich gold color. The blind lady who had thrown it did not count on the mad frenzy that would follow. The blind old lady was surprised to hear such a mad scramble for a coin that she thought was a large copper penny. The fat organ grinder caught sight of the gold coin, and what a lot of money it seemed to him--what a nice new uniform it would buy. The children saw it too, and what a wonderful plaything it seemed to them--how nice it would be to hold and rub it.

So imagine the mad frenzy that took place on that beautiful spring morning! A large gold coin rolling helter-skelter among the little feet of the children; a fat red-faced general with all his funny medals jangling and clanking; and all in a mad scramble to catch the coin.

And meanwhile the little monkey stood chained to the organ, and followed the gold coin with his great staring eyes. Who knows what he thought of the big shiny thing? Who knows how he yearned for it?

As though it was guided by his big eyes, the gold coin rolled straight to the little beast, and he quickly scooped it up with his long hairy paw. He scooped it up so quickly that the children did not see him do it. But the fat organ grinder did. And, without a 'by your leave', he snatched the coin out of the long hairy paw, kissed it greedily, and stuffed it deep into his pocket.

The little children laughed and screamed. But a great sound of weeping and wailing was suddenly heard. Everyone looked around to see who was crying, but it had already stopped. And there on the cheeks of the little animal were seen two huge tears slowly falling from his large eyes. One huge tear fell from each eye of the poor little animal. Imagine, a monkey weeping!

The little children stopped their laughter and were sad. Even the fat organ grinder felt a pang of something. But only for a moment; and soon he waved goodbye, and continued through the park to find a new group of children to entertain.

APPENDIX B

TABLE 1

THEME LIST ERRORS OF COMMISSION FOR THE THREE AGE GROUPS DIVIDED INTO HIGH AND LOW CATEGORIES ON THE RORSCHACH INDEX

		N.	Int.	Int.^{2}	Imp.	Imp.^{2}	Int.+Imp.	Int.+I
11-year-olds	Low	5	9	27	10	38	19	79
	Medium Low	5	9	27	8	14	17	67
		10	18	54	18	52	36	146
	Total Low Mean		1.80		1.80		3.60	
	Medium High	4	8	18	10	26	18	86
	High	7	21	83	28	137	50	424
		11	29	101	38	163	68	510
	Total High Mean		2.64		3.46		6.10	
14-year-olds	Low	7	9	19	10	18	19	63
	Medium Low	4	6	10	13	47	19	97
		11	15	29	23	65	38	160
	Total Low Mean		1.36		2.09		3.45	
	Medium High	4	12	38	13	57	25	177
	High	8	21	65	32	152	53	409
		12	33	103	45	209	78	586
	Total High Mean		2.75		3.75		6.50	
17-year-olds	Low	3	6	18	5	13	11	49
	Medium Low	8	18	50	15	41	33	167
		11	24	68	20	54	44	216
	Total Low Mean		2.18		1.82		4.00	
	Medium High	3	1	1	4	10	5	17
	High	9	22	78	19	53	41	221
		12	23	79	23	63	46	238
	Total High Mean		1.92		1.92		3.84	

TABLE 2

THEME LIST ERRORS OF COMMISSION FOR THE THREE AGE GROUPS DIVIDED INTO HIGH AND LOW CATEGORIES ON THE T.A.T. INDEX

		N.	Int.	Int.^{2}	Imp.	Imp.^{2}	Int.+Imp.	Int.+Imp.^{2}
11-year-olds	Low	6	16	50	7	15	23	[illegible]
	Medium Low	6	7	15	13	20	20	[illegible]
		12	23	65	20	44	43	[illegible]
	Total Low Mean		1.92		1.67		3.58	
	Medium High	2	2	2	7	29	9	[illegible]
	High	7	22	88	30	142	52	[illegible]
		9	24	90	37	171	61	[illegible]
	Total High Mean		2.44		4.11		6.77	
14-year-olds	Low	7	8	14	12	26	20	70
	Medium Low	6	15	51	10	72	24	242
		13	23	65	31	98	[illegible]	[illegible]
	Total Low Mean		1.77		2.30		4.15	
	Medium High	9	14	42	14	64	28	114
	High	5	11	25	23	111	34	240
		14	25	67	37	175	62	[illegible]
	Total High Mean		2.50		3.70		6.20	
17-year-olds	Low	7	17	51	13	41	30	[illegible]
	Medium Low	4	11	33	5	9	16	[illegible]
		11	28	84	18	50	46	[illegible]
	Total Low Mean		2.55		1.64		4.19	
	Medium High	3	2	2	2	2	4	8
	High	9	17	61	23	65	40	210
		12	19	63	25	67	44	[illegible]
	Total High Mean		1.58		2.63		3.67	

TABLE 3

TWIN STORY ERRORS OF COMMISSION FOR THE THREE AGE GROUPS DIVIDED INTO HIGH AND LOW CATEGORIES ON THE RORSCHACH INDEX

		N.	Int.	Int.^{2}
11-year-olds	Low	5	16	60
	Medium Low	5	13	37
		10	29	97
	Total Low Mean		2.90	
	Medium High	4	16	64
	High	7	30	135
		11	46	199
	Total High Mean		4.18	
14-year-olds	Low	7	17	45
	Medium Low	4	12	36
		11	29	81
	Total Low Mean		2.64	
	Medium High	4	14	54
	High	8	32	132
		12	46	186
	Total High Mean		3.83	
17-year-olds	Low	3	10	34
	Medium Low	8	29	117
		11	39	151
	Total Low Mean		3.55	
	Medium High	3	12	56
	High	9	30	112
		12	42	168
	Total High Mean		3.50	

TABLE 4

TWIN STORY ERRORS OF COMMISSION FOR THE THREE AGE GROUPS DIVIDED INTO HIGH AND LOW CATEGORIES ON THE T.A.T. INDEX

		N.	Int.	Int.^{2}
11-year-olds	Low	6	17	55
	Medium Low	6	16	48
		12	33	103
	Total Low Mean		2.75	
	Medium High	2	7	25
	High	7	38	228
		9	45	253
	Total High Mean		5.00	
11-year-olds	Low	7	21	69
	Medium Low	6	18	60
		13	39	129
	Total Low Mean		3.00	
	Medium High	5	16	56
	High	5	20	82
		10	36	138
	Total High Mean		3.60	
17-year-olds	Low	7	24	88
	Medium Low	4	16	70
		11	40	158
	Total Low Mean		3.64	
	Medium High	3	11	49
	High	9	30	112
		12	41	161
	Total High Mean		3.42	

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