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COMPREHENSION OF HUMOR.**

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COGNITIVE DEVELOPMENT AND CHILDREN'S

COMPREHENSION OF HUMOR

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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* * * * *

The Ohio State University

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TABLE OF CONTENTS

	Page
Acknowledgments.	ii
Vita	iii
Table of Contents.	iv
List of Tables	v
Introduction	1
Review of Related Literature	4
Theoretical Background	11
Experimental Design.	27
Experimental Method.	37
Subjects.	37
Apparatus	37
Procedure	42
Development of the Scoring Systems.	50
Scoring of the Cognitive Tasks.	57
Results.	60
Discussion	81
Summary.	93
Appendix A	96
Appendix B	129
Appendix C	130
References	147

LIST OF TABLES

Table	Page
1 Correlations of Cognitive Development Scores with Humor Comprehension Scores.	60
2 Frequency Tables of the Ability of High and Low Cognitive Score <u>Ss</u> to Eliminate the Basis for Humor in Cartoons and Jokes	63
3 Frequency Tables of Descriptive and Interpretive Humor Explanations for High and Low Cognitive Score <u>Ss</u>	65
4 Mean Number of Correct Cartoon-sequences or Match-choices Obtained by High and Low Cognitive Score Groups for Sequential and Matching Cartoons.	67
5 Matrix of Correlations between Humor Comprehension Scores of Different Classes of Humor.	70
6 Matrix of Correlations between Humor Ratings of Different Classes of Humor.	71
7 Correlations between Humor Comprehension and Perceived Funniness for each Combination of Age Level and Class of Humor.	73
8 Mean Humor Comprehension Scores for each Class of Humor and each Age Group.	74
9 Mean Humor Ratings for each Class of Humor and Age Group.	75
10 Frequency Tables for Chi Square Tests of Age Differences in Descriptive-interpretive Humor Responses	77
11 Frequency Tables for Chi Square Tests of Age Differences in <u>Ss</u> ' Ability to Remove the Humor Content.	78
12 Mean Number of Correct Matches or Orderings by 5, 7 and 9 Year Olds on Matching and Sequential Cartoons	79

INTRODUCTION

While a great deal of empirical and theoretical attention has been given to the study of humor over the past 50 years, research on the significance of cognitive factors in the humor process has been very limited. Especially in the area of children's humor, very little is known about the significance of newly acquired cognitive capacities for the comprehension and appreciation of various types of humor. The aim of the present study is to determine the significance of developmental changes in conceptual thinking, as conceptualized in the theoretical framework advanced by Piaget (1950), for the comprehension of humor whose primary affect-arousing capacity lies in the identification of incongruous relationships among elements within a given stimulus situation.

The importance of classifying humor according to its emphasis on cognitive, affective or conative factors was recognized nearly three decades ago by Eysenck (1942) and more recently by Flugel (1954). Freud (1916), of course, drew a similar distinction in differentiating between wit, humor and the comic, emphasizing the conative, affective and cognitive aspects respectively. Flugel notes that while any given occasion for humor (in fact, any mental state or process) usually involves each of these aspects of mental functioning, their relative predominance may vary greatly from one humor situation to another. According to Flugel, situations providing for a primarily

conative basis for humor are generally assumed to operate on the basis of some psychic mechanism by which relief from some "tension" state is obtained. However, the kinds of mental stresses and emotions postulated as being relieved are quite varied, depending on the theoretical orientation adopted. While some writers (e.g., Burt, 1945) have emphasized that any emotional state may be relieved through laughter, the sources most frequently stressed include the satisfaction of such tendencies as aggression, feelings of superiority, sexual drives, fear and distress in general. Theories stressing the affective aspect of humor have generally devoted attention to the emotional manifestation of humor; investigations falling in this category have been concerned with identifying the kinds of situations that give rise to occasions for smiling or laughter. Cognitive humor, according to Flugel, is generally considered to entail symbolic condensations or incongruities. While the cognitive element is probably quite important for all occasions for humor, there would appear to be a continuum of humor arousal conditions anchored on one end by the satisfaction of various needs and emotional tendencies and on the other by such purely cognitive phenomena as novelty and incongruity.

The conceptualization used in the present study is in agreement with Eysenck's (1942) assertion that A) the essential characteristic of "cognitive" humor is that it contains a contradiction or incongruity between two or more ideas, attitudes or sentiments, and B) the humor is perceived only upon the integration or fusion of the incongruous elements. While cognitive processes are certainly involved in appreciation of all types of humor, the term "cognitive humor" will be used here to refer to the above

type of incongruity-based humor. In the present study, a distinction is drawn between two general types of cognitive humor, incongruity and novelty humor, differing in the degree to which logical operations (as defined within Piaget's system) are hypothesized to be required for comprehension of the humor depicted. Thus, this study tests the general significance of operational thinking for comprehension of classes of cognitive humor differing in the level of cognitive functioning hypothesized to be necessary for comprehension. Children's appreciation of humor (as measured by a funniness rating scale) and their ability to generate hypotheses about the necessary prerequisites for humor are also related to level of cognitive functioning. While this study uses children at three different age levels (5, 7 and 9) its aim is to demonstrate the significance of level of cognitive functioning within each age level; age itself is not the prime predictor here. Since the transition from preoperational to operational thinking generally occurs at about age 7, the 7 year old age group is considered to provide the most meaningful test for the main hypothesis mentioned above.

REVIEW OF RELATED LITERATURE

Although a great number of studies have explored various aspects of the "sense of humor" over the past 40 years, the study of cognitive factors in humor has been surprisingly limited. Prior studies relating cognitive factors to humor appreciation have typically conceptualized cognitive functioning in terms of intelligence test scores. The obtained data, however, are conflicting. In a very early study, Bird (1925) used a series of cartoons of varying difficulty and found a correlation of .89 between IQ scores and humor comprehension. Somewhat later, Kenderdine (1931) used pre-school children and found that in a situation with 100 possibilities for laughter, a group (N = 10) with a mean IQ of 141 averaged 13 instances of laughter as opposed to 4.7 for a group (N = 16) with a mean IQ of 118. Justin (1932) found correlations between IQ and number of laughter responses to an incongruity type of situation to range from .40 at age 3 to .12 at age 6. Overlade (1954) found a significant positive relation between comprehension of jokes and American Council of Education test performance, the ability to think abstractly, and the ability to discern embedded figures. Behar and Bevan (1956) found a significant positive relation between the ability to recognize incongruities and 1) chronological and mental age, and 2) gross amount of laughter. Other studies have shown positive relations between gross amount of laughter and 1) the ability to recognize incongruities (Brumbaugh, 1939), and 2) level of mental development (Brackett, 1934). Finally, Levine and Redlich (1960) found a significant correlation between comprehension of cartoons and intelligence test

scores, for both psychiatric patients and naval enlistees. These data suggest, then, that the greater ability of more intelligent individuals to recognize incongruities and to think abstractly provides for greater comprehension and appreciation of jokes and cartoons, as well as more frequent perception of humor in the events of their normal social environments.

In contrast to these positive findings, Hester (1924) and others failed to find a significant relationship between IQ scores and humor (Kambouropoulou, 1926; Omwake, 1939; Stump, 1939; Cattell and Luborski, 1947; and Cunningham, 1962). Such findings as these have caused a number of researchers to conclude that intellectual development is not a critical factor in determining appreciation of humor (e.g., Gregg, 1928; Ding and Jersild, 1932; Landis and Ross, 1933; and Omwake, 1939). As Flugel (1954) noted, however, others have concluded that cognitive development is an essential factor in the expression and understanding of humor, but its operation is difficult to observe because of such interfering factors as emotional state, temperament or attitude (Wynn-Jones, 1927; Mones, 1939; Piret, 1940).

Many of these discrepant findings are undoubtedly due to the lack of control exercised over the nature of the stimulus material. While a wide range of ages of Ss has been employed, in many cases no effort has been made to control for complexity or difficulty of the humor items for the particular subjects sampled. Thus, if a given set of cartoons or jokes is very difficult or very simple for the age group in question, we would not expect their humor performance to be differentiated along a continuum of intelligence. Apart from these methodological issues, the present writer would argue that an approach utilizing available standardized intelligence test scores sheds little light on the cognitive processes involved in the developing

child's understanding and appreciation of humor. While this approach may provide a comparison with same-age peers along certain standardized dimensions, it does not clarify the significance of newly acquired cognitive capacities or structures for children's humor. A more fruitful approach to research in this area would be to study the cognitive capacities and abilities present at various ages or levels of development and relate them to the characteristics and level of humor which the child is capable of understanding or initiating. While some of the above studies did employ Ss of different ages, no systematic efforts were made to determine how the child's level of humor functioning related to the acquisition of specific cognitive capacities.

There have, however, been a limited number of studies bearing on the ontogenetic development of humor. While some of these did not directly investigate cognitive functioning, their findings are suggestive of the effects of certain changes in level of cognitive functioning. Behar and Bevan (1956) studied the ability of children to recognize perceptual incongruities and found little recognition of incongruity before age 4. The most rapid increase in recognition occurred between $5\frac{1}{2}$ and $6\frac{1}{2}$; however, there was still very little spontaneous recognition by age 7. Based on their extensive observations of children, Gesell and Ilg (1946) state that gross motor behavior plays the most important role in the two year old's humor. By the third year, gross motor humor is becoming more refined and begins to give way to humorous word play and imaginative play. Silly rhyming, word play, exaggerations and name calling still predominate at ages 4 and 5. They noted very little interest in or appreciation of humor at 6 and 7, but by 8 and 9, the child is again interested in situational humor in stories,

surprise endings or occurrences, and fooling other people. Justin's (1932) data substantiate Gesell and Ilg's observation of a lack of responsiveness to humor around age 6. In support of Behar and Bevan, he also found an increase with age (between 3 and 6) in the effectiveness of incongruity in producing laughter responses. For these ages, Justin found situational humor to be most prominent, with pictorial presentation more effective than verbal presentation of the humor stimuli. Using children from 7 to 18 years of age (in Scotland,) Laing (1939) concluded that the development of the sense of humor paralleled the development of the intellect. When asked to tell their funniest jokes, most amusing experience, etc., the humor of the 7-10 and 11-13 year old groups was predominantly visual (i.e., involving deviation from some concrete "usual" situation, and incidents witnessed involving someone's discomfiture), while the 14-18 year old group showed much greater appreciation of verbal wit and more abstract situations.

Only three prior studies are known by the author to have aims similar to those of the present study. Schaffer (1930) asked Ss in grades 4-12 to explain the meaning of ten caricature-type cartoons dealing with important social, economic or political problems. Using a nationwide sample, he placed Ss' interpretations in three categories: descriptive, concrete interpretations and abstract interpretations. In grades 4-5, there was a high percentage of descriptive responses, but concrete interpretations were typically as frequent as, and generally slightly more frequent than, descriptive responses. Abstract interpretations tended to predominate by grade 7 and were always the most frequent response by grade 8. On the average, a transition from concrete to abstract interpretation occurred at 12.8 years

with individual cartoons ranging from 11.8 to 13.9 years. Considerable variability was found among Ss in the age at which they tended to give each class of response. In a study more similar in purpose to the present study, Zigler, Levine and Gould (1966) constructed a children's humor test (using cartoons), making an effort to utilize difficulty levels and content "appropriate" for children at varying age levels. Using Ss in grades 2, 3, 4, and 5, and assuming level of complexity of cognitive functioning to increase progressively with age, they found a significant positive relation between cognitive level and comprehension of the cartoons. Furthermore, within each grade, those Ss with a higher level of comprehension of the cartoons showed a greater mean mirth or humor response score. It was found, however, that while mirth response increased between grades 2 and 4, it decreased significantly between grades 4 and 5. The authors advanced a "cognitive-congruency" principle to explain this decrease, arguing that ". . . cartoons which make few cognitive demands elicit a lower mirth response than those that are in keeping with the complexity of the child's cognitive apparatus". (p. 507)

In a follow-up to this study, Zigler, Levine and Gould (1967) assessed the relation between humor appreciation and the level of cognitive demands made on S by a given humor stimulus. Groups of cartoons were matched in terms of difficulty for each of three grade levels (grades 3, 5 and 7). That is, on the basis of performance on a larger sample of cartoons, E selected four groups (representing four difficulty levels) of cartoons for each grade level such that a given group of cartoons for one grade was equally difficult for Ss in that grade as the corresponding group (composed of different cartoons) for Ss in another grade. Difficulty levels

were defined in terms of comprehension scores, such that a cartoon receiving a high comprehension score by a given age group was classified at a low difficulty level, and vice versa, within that age group. Their findings showed a peak in mirth response scores and cartoon preference scores at the moderately difficult level of humor stimuli. The authors concluded that these findings support the cognitive-congruency principle, since "The magnitude of the mirth response was found to depend upon the degree of cognitive congruence existing between the cognitive demand features of the humor stimulus and the cognitive resources of the individual." (p. 335) However, it should be noted that these investigators made no effort to identify either A) how the cognitive demand features vary among their different difficulty levels or B) along what relevant dimensions Ss in their three age groups differ in their cognitive resources. Rather, cartoons receiving high comprehension scores are said to tax existing cognitive structures very little while cartoons receiving low comprehension scores are considered to make demands beyond the capacities of the child's cognitive structures. While Zigler et al.'s data do fit this type of interpretation very nicely, this writer would argue that unless humor comprehension itself may be taken as an acceptable measure of Ss' level of cognitive development, their conclusions are not fully warranted. The cognitive-congruency hypothesis would appear to be a very important and meaningful one, and is deserving of additional research in which some effort is made to identify meaningful dimensions along which both the humor stimuli and children's cognitive structures are measured.

While these studies are suggestive, the present writer would argue that as with IQ, an approach which relies on age as a means of evaluating

the child's level of cognitive development does not provide a sufficient measure of the changes in level of cognitive functioning taking place in the developing child. While a great deal of research on problems with developmental implications continues to rely on age as the primary predictive independent variable, this writer would argue that data accounted for on the basis of age differences alone have not yet received the most adequate type of explanation. Age in itself cannot serve an explanatory function; age merely constitutes a dimension of time along which other factors might differentially manifest their influence. Our goal, then, must be to identify those factors which might give rise to increments in comprehension of humor with increasing age. Since, in the writer's opinion, Piaget's (1950) developmental theory provides the most elaborated and best-verified theory of cognitive development available at this time, Piaget's theoretical system was used as the basis for prediction in the present study.

THEORETICAL BACKGROUND

In his theoretical formulations, Piaget has been concerned not only with differentiating levels of cognitive functioning, but also with the identification of the underlying structures and their progressive transformation into higher levels of complexity. Piaget (1950) holds that cognitive structures or schemas have their origin in the sensorimotor coordinations of infants. Through the basic equilibration mechanisms of assimilation and accommodation (operating in conjunction with continuing maturation of the nervous system and experience in the physical and social world), sensorimotor schemas are progressively elaborated out of a purely perceptual framework into conceptual thought, which in turn becomes operational in concrete situations and finally acquires the formal logical properties characterizing adult reasoning. The principal concept in Piaget's system which accounts for this developmental process, then, is equilibration. Equilibration is an ongoing process within the organism by which cognitive structures are both enriched and modified; it is this process which provides the impetus for cognitive development. Equilibration occurs on the basis of two complementary processes: assimilation and accommodation. When a child is faced with a given situation he must incorporate or assimilate its various component elements into existing cognitive structures. That is, he construes the current situation in terms of already acquired knowledge. However, since the environment is generally a highly variable one, new objects or events may not be easily assimilated into current structures. Consequently, according to Piaget, the organism must accommodate his existing

structures to the new situation. That is, old structures are continually being modified to permit assimilation of new environmental events. These two complementary processes tend to operate toward the establishment of an equilibrium; that is, a balance between assimilation of new input into current structures and accommodation of those structures to readily permit such assimilation. It is this ongoing process which constitutes the central factor in development for Piaget.

While the sensorimotor schemas do organize sensory input and lead to adaptive behavior, the infant is unable to represent either his environment or his behavior in it conceptually. During this period, there is no distinction between the schema and what it represents. The first symbolic (not yet conceptual) schema consists of an internal image (which is distinguished from what it represents) of a sensorimotor schema. This probably develops out of the pretend-type of play occurring in late infancy, and is evidenced by the fact that a child can imitate a model's action when the model is no longer present. The initial cognitive structures, then, consist of mental representations of a specific event. According to Piaget, only by about age 4 does the child begin to demonstrate true conceptual thought; i.e., an understanding of the idea of a class of objects in which individual members of the class are alike in terms of their membership in the class, and yet different (i.e., not the same object) from other class members. While the child does possess conceptual thought at this point, he still has great difficulty in going beyond his perceptual input and performing transformations on it at a conceptual level. That is, he is only capable of centering or focusing on different aspects of the stimulus and cannot integrate or in any other way transform the various

sets of information taken in. He is unable to conceptualize even simple relationships among classes. During this preoperational period (ranging approximately from age 2-7), then, the child's concepts are not connected or related to one another. This lack of organization among concepts inevitably leads to inconsistencies and contradictions in the child's thought. Since a lack of organization among structures does not permit the child to think in a logical fashion, he remains a perceptually "centered" organism who cannot go beyond intuitive thinking.

Generally by the age of 7, however, the child acquires the ability to organize actions or objects into what Piaget has termed elementary "groupings" and progresses from a level of preoperational to operational thinking. While the younger child's concepts exist independently of one another and do not combine to form parts of a larger whole, the integration of class concepts into groupings transforms intuitive thought into operational thought and a series of belief systems. By a grouping, Piaget means an organization of elements in which there is some transformations which relates certain elements in the organization to certain others. (There is no single transformation in a grouping which can relate every element to every other one.) Furthermore, these transformations must be reversible. That is, for any operation performed on a given set of classes, there must be some counter operation which leads back to the original state.

Between the ages of about 7 and 11, the child's logical thinking can be applied only in concrete situations. He cannot operate on purely verbal propositions which have no direct counter-part in his experience. Since the concrete operational child has only a limited variety of operations available to him, only certain classes may be combined. It is this

limitation which restricts his logical reasoning to concrete situations.

The primary development which catapults the child from the intuitive thought characterizing the preoperational period to operational thought is that of reversibility of cognitive processes. Cognitive operations are reversible in that the cognitive process may take place in two opposing directions (e.g., combining vs. subtracting classes). In concrete operational thought, logical groupings may be concerned with either classes or relations (such as those of greater than or less than). The type of reversibility found with class operations is negation (an inverse operation which cancels out the operation already performed), while reciprocity (compensating for a difference via some additional operation) constitutes the type of reversibility found with operations on relations.

One of the central criteria used by Piaget to determine the presence of reversible operations is conservation, which is based on the process of negation. In testing for conservation of mass, for example, S is typically given two balls of clay of equal size. After having agreed to their equality, S observes some transformation of the shape (e.g., into a hot dog) of one ball and then judges whether the two balls still have the same amount of clay. A preoperational child, whose thinking is still dominated by current perceptual input, is likely to state that the hot dog has either more or less than the ball, depending on whether S cues in on the length or width of the hot dog. A younger child can only focus on one of these dimensions at a time; he is unable to keep both dimensions in mind and conclude that the increase in length is compensated for by a corresponding decrease in width. He is unable to cognitively transform (i.e., reverse) the current state of the clay into its former state, and

hence does not possess conservation of mass. The logical structures acquired by the operational child permit him to negate the aforementioned transformation and conclude that they are, indeed, still the same. Having acquired operational thinking in concrete situations, he is able to "decenter" his perceptions and draw his conclusion on the basis of logical reasoning.

The concrete operational child is restricted in that he has no operations available by which he can relate every element in a grouping to every other element. Furthermore, he is unable to realize the logical implications or significance of the various event combinations he does observe. This latter development is only realized by the age of 11 or 12, when the child acquires the ability to perform operations on verbal propositions. While the two types of reversibility always operate independently at the concrete level, they are completely integrated at the level of formal operations. That is, "formal structures bring together both inversions and reciprocities into a single system of transformations. . ." (Inhelder and Piaget, 1958, p. 273) They provide a "structured whole" by which all elements may be related to one another. It is this latter development which provides for combinatorial thinking and advances the adolescent to the level of formal logical thinking found in adults. One of the major accomplishments of this period is that the child may now talk about concepts for which there are no concrete operations. He can handle hypothetical or potential relationships rather than being confined to logical operations on actual observables. The combinatorial structure present at this time permits utilization of propositional operations, such as implication, conjunction, incompatibility, etc.

Before considering the implications of Piagetian theory for the comprehension of cognitive humor (i.e., stimulus situations depicting some incongruity, and in which there are no affective or conative bases for humor), the present writer would like to advance some considerations for a general developmental theory to account for the origins of cognitive humor in infancy, and its progressive development through middle childhood. It should be borne in mind, however, that the views suggested below are strictly applicable to humor based on incongruity. They do not apply to humor based on various drive states (e.g., sex and aggression) or humor in which the stimulus content contains some other basis for an affective investment in the stimulus elements.

The central assertion of the view to be put forth here is that the humor response to incongruity has its origin in the smiling response shown in early infancy. It is postulated that while initially primarily dependent upon maturational factors, learning and memory play increasingly greater roles in evoking smiling and other humor responses as the child develops. However, the smiling response has been subjected to varying interpretations by different investigators. Wolff (1963) has suggested that during the first three weeks of infancy, the occurrence of the smiling response is strictly contingent upon certain internal "state" variables (e.g., awake vs. drowsy). Only by the fourth week, according to Wolff, does the smile become independent of state.

A number of studies have attempted to determine the essential factors involved in eliciting the smiling response in infancy. Spitz (1946) and Spitz and Wolf (1946) concluded that a configuration of two eyes in full face, plus motion constituted the essential elements for smiling in the

2-6 month old infant. The latter study failed to find a smiling response to presentation of other objects of varying textures, sizes, colors and shapes. Similarly, Wolff (1963) concluded that motion and mobility of the human face are necessary. Salzen (1963), on the other hand, found the infant's first smiling response to be elicited by spatial or temporal contrast. Rheingold (1961) also concluded that the infant's smile is part of a more general response of delight to spatial and temporal changes in stimulation. Piaget (1950) held that the infant's earliest smile was due to pleasure from recognition of a familiar object. Finally, Bowlby (1958) asserted that smiling is a species-specific response, directly released by certain environmental stimuli.

Other investigators have emphasized the view that the smile is a strictly learned phenomenon, obeying all of the laws of conditioning. Gewirtz (1961) held that certain stimuli directly release the smiling response which, in turn, comes under the control of certain discriminative stimuli as soon as the infant is able to differentiate between caretakers and other objects or people. Brackbill (1958) found the smiling response to be subject to the effects of reward (smiling may be reinforced by picking S up) and to extinction.

Since most of the studies on smiling discussed above suffer from a lack of control over prior experience with the smile-arousing stimuli, it is difficult to draw any firm conclusions from them about the factors which give rise to the first externally elicited smile. Recently, however, studies of the influence of novelty, familiarity, complexity and other factors upon attentional behavior (Berlyne, 1960; Sokolov, 1963) have provided, in this writer's view, a promising new approach to conceiving of the smiling response.

Both Berlyne and Sokolov have shown that a novel or surprising stimulus is accompanied by an increase in physiological arousal, as measured by a GSR or EEG. The question we must consider, then, becomes whether this general rise in arousal might under certain conditions be manifest in a smiling response, or more generally speaking, in the peculiar class of affect we label as humor.

In a study by Lewis and Goldberg (1968), instead of making assumptions about the infant's experience with a given set of stimuli, novelty and familiarity were experimentally controlled by manipulating S's experience with the relevant stimuli. A given stimulus was presented repeatedly to $3\frac{1}{2}$ year old S for 6 trials; on trial 7, a new stimulus (defined as a novel event) was presented to the experimental group while the original stimulus was again presented to a control group. Thus, "expectations" were built up for both groups of Ss, but for one group these expectations were disconfirmed while for the other they were confirmed. For the experimental group, the difference in fixation time between trials 6 and 7 was significantly greater than the difference between trials 5 and 6. No differences were found here for the control group. But more importantly, Ss showed a consistent decrease in amount of smiling over the first 6 trials (over all 7 for the control group) and a significant increase in smiling upon presentation of the new stimulus. Thus, an unexpected stimulus led to increased smiling while an expected stimulus was associated with decreased smiling. As pointed out by Lewis and Goldberg, this finding suggests that the attention response to violation of expectancy may have affective components as well.

The results of this study suggest that a close tie may exist between mild levels of arousal and purely cognitive factors. That is, the building

up and violation of perceptual expectancies in an infant or very young child should be a purely cognitive phenomenon. But one consequence of the violation of cognitive expectancies appears to be an increase in smiling as well as increased attention. Of course, the kind of emotional state resulting from such disconfirmations of expectancies may depend on such factors as the magnitude of the violation and the context in which it occurs. Along this line of thinking, Hebb (1949), and more recently Pribram (1967), suggested that cognitive factors play a central role in emotion. Hebb defined emotion as "a disruption of the timing of neuronal activity in the cerebrum." Thus, for Hebb the phase sequences whose growth play a central role in cognitive development and functioning are also central in accounting for emotional behavior. A major cause of emotion for Hebb was a fear of the strange, or "an unfamiliar combination of familiar things." Thus, emotion occurred when new events did not fit into previously acquired "phase sequences." Pribram (1967) defines a physiological state of arousal as "uncertainty" in the central nervous system. This uncertainty occurs when cognitive expectations have been violated or disconfirmed. Pribram is suggesting, then, that it is the violation of cognitive expectancies which gives rise to the physiological arousal aspect of emotion. If a smiling response may be considered a manifestation of mild arousal, the Lewis and Goldberg (1968) findings would appear to support this view.

This concept of the affective significance of deviation from expectancy or "adaptation level" is not a new one. McClelland, Atkinson, Clark and Lowell (1953) adopted Helson's (1948) concept of adaptation level, theorizing that "positive affect is the result of smaller discrepancies of a sensory or perceptual event from the adaptation level of the organism;

negative affect is the result of larger discrepancies." These investigators would suggest that the new stimulus on trial 7 in the Lewis and Goldberg (1968) study constituted a small variation in the experimentally controlled adaptation level; the consequent positive affect is evidenced by the infant's smile. In conjunction with this line of theorizing, we might distinguish between two complementary bases for building up an expectancy or adaptation level. As in the Lewis and Goldberg study, expectancy might be defined in terms of a particular stimulus value which the organism has been experiencing on some relatively short-term basis. More in line with Helson's (1948) notion, however, we might define expectancy as an expected stimulus value based on a relatively long-term set of experiences with a range of values of the stimulus. That is, in a natural environment, an organism may experience the stimulus in many different forms or circumstances. Since a particular stimulus value is not consistently experienced, expectations relative to the nature of that stimulus should be built up much more slowly. As an expectancy is gradually acquired in this sense, it should consist of the most frequently occurring (i.e., the modal) value experienced. The effects of disconfirmation of this type of expectancy may differ from those of violation of expectancies built up on a short-term basis relative to only one value of the stimulus, in that the experiencing of a stimulus other than the expected one may not be a unique event. That is, other values have been experienced--although less frequently--so that a disconfirmation of expectancy in this situation should be less of a surprise event than in the relatively short-term experimental situation.

The position being advanced here, then, is that through experience in their everyday environment, young children acquire cognitive expectations

about the contextual composition of a continually expanding number of stimulus settings and events. While the nature of the expectancy built up depends on the diversity of experience with the stimulus setting or event in question, there is probably enough commonality among children's experience within a given culture to establish very similar expectations for a wide range of stimulus settings and events. Once an expectancy has been established, moderate deviation from the expected value or level, provided that it does not occur in the presence of some high drive state such as fear, anger, etc., should give rise to some manifestation of positive affect, such as a smile or laugh. Other external factors such as social restraint may restrict or modify the nature or extent of manifestation of the positive affect, but barring interference from such factors, the display of positive affect is postulated as a basic response to moderate violation of cognitive expectancies. While the elicitation of this response is initially mainly dependent on maturational factors (i.e., a smile is automatically elicited in the infant by such violations once a given maturational level is reached. Maturation of the visual system, necessary for the acquisition of visual discrimination, is probably the most significant factor here), with added experience in the environment, countless numbers of expectancies are being continually added and modified. But even the earliest of these are learned and always subject to modification through new experience.

A central notion in the view being set forth here is that we must distinguish between two types or levels of cognitive expectancy: perceptual and conceptual. In an infant, we may assume that expectations are built up exclusively on a perceptual basis. That is, while information is being

encoded, it is probably not actively processed or transformed. If, as Piaget (1950) suggests, conceptual thinking does not generally develop in children until the third or fourth year, we are left with an organism capable of taking in and storing information but incapable of actively manipulating it on a purely mental or conceptual basis. For an infant with these limited capacities, we may consider the infant's response as one to violation of perceptual expectations; i.e., expectations acquired strictly on the basis of perceptual experience. Expectancies assumed to be acquired either strictly or primarily on this basis will be referred to hereafter as perceptual expectancies. The writer would argue that in an infant or young child such violations of expectancy are experienced as novel events by the child. That is, they are simply discrepant to some unknown extent from his experience with the objects or events in question. The infant or young child smiles at this change only because the new objects or events are different. Being different, however, is not enough. It is postulated that only if an object or event constitutes a moderately novel experience will the consequent manifestation of positive affect occur. If the change is great, it may either be aversive to the child or the situation may not even be construed relative to the class of situations on which the original expectancy was based. If the change is very slight, the child is likely to consider the experience as a confirmation of his expectation.

In terms of a Piagetian framework, this view would assert that during the sensorimotor period objects or events which are barely assimilated into existing cognitive (at this time perceptually based) structures are gratifying to the young child and may be accompanied by such overt manifestations

of this mild pleasure as a smile. It may be, however, that the pleasure experienced is actually due to the motoric response to novelty, that is, to the successful accommodation of current cognitive (sensorimotor) structures to the novel event. The satisfaction accompanying such accommodation to moderately discrepant sensory input may be similar to the effects of satisfaction of what White (1959) has referred to as the effectance motive.

When a child begins to acquire a capacity for conceptual thinking (as noted earlier, Piaget has theorized that this occurs by the third or fourth year), expectancies cease to be acquired on a strictly perceptual basis. That is, as the child increases his conceptual abilities, expectancies are increasingly acquired for classes of objects and events rather than being confined to a particular situation or situations which are physically similar to it. Luria (1961) and Piaget (1950) have theorized (and gathered some supportive data for the view) that the use of newly acquired conceptual capacities only slowly comes to play an active role in the child's cognitive functioning, and in guiding his behavior. Granted this gradual growth of the utilization of conceptual processes, it follows that the acquisition of conceptual expectancies would proceed slowly as well. Thus, it is hypothesized that the expression of positive affect to moderate violation of conceptual expectancies should not appear until some time after the child first begins to acquire conceptual thinking.

Once conceptual functioning has become a relatively well developed cognitive tool for the child, and a wide range of expectancies at a conceptual level has been established, it is theorized that a new level of violation of expectancy becomes available to the child. With conceptual

thinking firmly entrenched in the child's cognitive repertoire, the child may now experience disconfirmation of expectancy in the form of an incongruous relation among stimulus elements. As was argued earlier for violations at the perceptual level, it is expected that very slight and very extreme incongruities will not result in positive affect to as great an extent as moderately incongruous situations.

At this point, the writer would like to propose that we refer to the expression of positive affect in response to perceived incongruity as a humor response. The basic prototype to humor based on incongruity lies in violation of perceptual expectancies in the pre-conceptual child. As noted earlier, there is some data to support the notion that violation of cognitive expectancies at this perceptual level are accompanied by an increased frequency of smiling behavior. The question which automatically arises at this point is, what is the nature of the conceptual child's response to violation of perceptual expectancies? It is argued by the writer that even though the older child may spend the majority of his time processing information at a primarily conceptual level, much information continues to be processed at the perceptual level as well. That is, cognitive expectations continue to be formed and violated at the perceptual level. Once conceptual capacities have developed, however, perceptual expectancies should be very closely tied to conceptual expectancies. Since the child's experience feeds into a conceptual system, expectations about physical characteristics perceived must also entail conceptual expectations about the class of events of which the specific event being perceived is a member. In response to the

above question, then, the writer would hold that for a child in whom conceptual thinking has become fairly well stabilized, violations of expectancy at the perceptual level--that is, novel experiences-- give rise to attention, curiosity or interest, but are not experienced as humorous. This view is consistent with the "cognitive congruency hypothesis" advanced by Zigler, Levine and Gould (1966). This principle asserts that stimuli "... which made few cognitive demands elicit a lower mirth response than those that are in keeping with the complexity of the child's cognitive apparatus". Thus, what is humorous for the very young child may only be mildly interesting for the older child. However, since the conceptual capacities themselves develop only gradually in the child, cognitive humor based on discrepancies from conceptual expectancies should develop very slowly. In fact, until conceptual operations become relatively stable and operative, humor based on violation of perceptual expectancies should predominate over humor based on violation of conceptual expectancies (in the form of incongruity). Once conceptual processes become more highly developed, the child should not only find conceptual incongruities humorous, but, in light of Zigler et al.'s (1966) cognitive congruency principle, find them more humorous than violation of perceptual expectancies.

It should be noted that the writer has failed to mention the occurrence of novelty at the conceptual level. That is, we may have a disconfirmation of conceptual expectancies in the form of a novel relationship as opposed to an incongruous one. While the writer has no firm basis for prediction in this area, it may be that novel experiences

at either the perceptual or conceptual level promote only curiosity or interest responses.

As was noted earlier in this theoretical section, Piaget (1950) has, over the past several decades, developed a theory of cognitive development which attempts to account for various changes in the level of conceptual thinking achieved by children at different ages. The present study will explore the implications of certain of these changes for the comprehension of cognitive humor (i.e., humor based on violation of perceptual and conceptual expectancies). This study will focus on the transition from preoperational to concrete operational thinking in Piaget's system. It was suggested earlier that humor based on conceptual incongruities develops very slowly after the onset of conceptual thinking. This study will explore the hypothesis that a child cannot appreciate incongruity at a conceptual level (it should be kept in mind that incongruity only occurs at this level; the objectively defined incongruous relationship is probably perceived as a novel one by the pre-conceptual child) until cognitive structures become operational in concrete situations. Thus, two basic classes of humor will be utilized; while one of these will include stimuli assumed to provide violation of primarily perceptual expectancies, the other will provide cartoons and jokes assumed to provide for violation of strictly conceptual expectancies.

EXPERIMENTAL DESIGN

The present study is concerned only with the first of the two major transition points discussed by Piaget. Hence, it is testing the general hypothesis that operational thinking plays an important role in the comprehension of incongruity-based humor. As noted earlier, both types of reversibility (i.e., negation and reciprocity) mark the attainment of the cognitive structures necessary for operational thought. Consequently, each type of reversibility was represented in the measures of cognitive development used. Four tasks (originally developed by Piaget) were chosen for evaluation of the child's level of cognitive functioning. These included conservation of mass and weight, lateral discrimination and class inclusion. Of these four, measures of A) conservation of mass, B) conservation of weight, and C) class inclusion are based on the process of negation, while reciprocity is utilized in the lateral discrimination task. For the two conservation tasks and the lateral discrimination, the standardized procedures set forth by Elkind (1961a, 1961b) were adopted. Following Elkind's procedure with the conservation tasks, prediction, judgment and explanation responses were obtained for each S. That is, S's judgment about the sameness or difference in the mass or weight of the two balls of Play-doh was first obtained before the transformation of one of them (prediction) and then again after the transformation (judgment). Finally, S was asked to tell why he answered as he did (explanation). The procedure for the class inclusion task followed that used by Piaget (1928).

Many prior investigations of children's humor have failed to exert strong control over the type of humor sampled. Typically, the only requirement has been that the cartoons or jokes be "appropriate" for children. For

example, sexually oriented cartoons or very difficult cartoons might be avoided. Within these loose limits, the basis for humor in cartoons and jokes has been generally unrestricted. The humor may have played upon affectively salient issues or it may have focused more on primarily cognitive determinants. Eysenck (1943) used college students and administered five different tests of humor appreciation which differentially stressed the cognitive or affective aspects of humor. He found very little agreement among these tests in terms of appreciation of humor. Thus, it seems likely that the inconsistencies in findings relating humor to various other measures might, at least partially, be due to the lack of control exercised over the stimulus materials themselves. An effort has been made to establish such control in the present study.

Since the present investigation is primarily concerned with the significance of cognitive capacities in children's humor rather than its affective or dynamic aspects, an effort was made to select stimuli in which the source of humor is primarily cognitive, with conative sources minimized to as great an extent as possible. Of course this goal cannot be reached in an absolute sense, due to the inability to control for the unique affective history of Ss prior to the time of testing. That is, an individual may have a great deal of affect invested in certain elements which just happen to be acting as a vehicle for the purely cognitive basis for humor. It is assumed, however, that such unique investments of affect will be randomly distributed among S's and across humor stimuli. Presumably, no humor stimulus has been used which has a more widespread "cultural" basis for an investment of affect.

In jokes or cartoons in which some incongruous or nonfitting relation exists among certain elements of the total stimulus complex, S's task is almost exclusively a cognitive one. That is, to understand the humor involved, S must identify conceptually discrepant elements in the stimulus. It is assumed that S's appreciation of the humor is based strictly on his reaction to the incongruity itself. Similarly, when expectancies which are primarily perceptual in nature are violated, S's reaction is assumed to be based on the expectancy violation itself. In all of the jokes and cartoons used in this study, then, violation of cognitive expectancies supplies the sole basis for humor.

For any cartoon or joke in which some incongruous relationship among two or more elements in the stimulus situation constitutes the sole basis for humor, two mutually exclusive aspects of the stimulus content might be distinguished: its core or focal content and its peripheral content. The core or focal content includes only those elements which are central to or directly involved in the incongruity; i.e., those without which the incongruous relationship would not exist. The elements comprising the core content compose the relationships perceived when we "get the point" of a cartoon or joke. In terms of our expectancy terminology, the core content at either the perceptual or conceptual level includes those elements for which our expectancies have been violated. The peripheral content, on the other hand, plays a supporting role for humor. It provides a background or setting in which the incongruous or discrepant core elements might be manifest. The peripheral content includes all aspects of the stimulus complex which are not represented in the core content. In order to understand a joke or cartoon based on violation of cognitive expectancy,

then, S must be able to differentiate the focal from the peripheral content.

An additional factor which must be controlled in any study of comprehension of humor is that of complexity of the stimulus materials. It goes without saying that one would expect a child's comprehension of a simple cartoon to be greater than his comprehension of a complex cartoon. One dimension along which different levels of complexity in humor might be differentiated is that of the type of cognitive demands made on S by the cartoon in order to understand it. This dimension was alluded to earlier when a distinction was drawn between the acquisition of perceptual as opposed to conceptual expectancies. It was postulated that a preconceptual child might find violations of purely perceptual expectancies to be humorous. However, once a child acquires conceptual thought capacities he probably ceases to acquire expectancies on a purely perceptual basis. That is, perceptual experience now feeds into a conceptual framework such that a violation of perceptual expectancy constitutes a violation of conceptual expectancy as well. In a child capable of conceptual thinking, perceptual and conceptual expectancies are undoubtedly so inextricably interwoven that it is not meaningful to talk about violation of expectancies at a purely perceptual level. When the term perceptual expectancy is used in this manuscript, it will always have reference to expectancies based on both perceptual and conceptual processes. The term will be used at times to contrast this type of expectancy violation with that in which perceptual expectancies are not violated. Furthermore, this study involves the use of cartoons and jokes, both of which relay information to S on a representational basis. Any time such a

representational basis is used for anchoring expectancy violations, we must assume that both conceptual and perceptual processes are at work. It would be incorrect, then, to assume that a cartoon or joke may be devised in which only perceptual expectancies are violated. However, a clear distinction can be drawn between two types of expectancy violation; one of these gives rise to novelty while the other leads to incongruity.

Expectancy violation in the form of novelty may occur at either a perceptual or conceptual level. That is, S might encounter at either level an event which is simply different from his prior experience with the elements composing that event. It is argued here, however, that expectancy violation in the form of incongruity may only be experienced at the conceptual level. This position is based on the view that the use of logic plays a central role in the experience of incongruity. This is, an incongruous relationship consists of a situation in which logical relationships among classes of objects or events have been violated. To say that events A and B are incompatible is to say that we do not expect them to occur together. In terms of a logic of classes, events A and B are considered to be mutually exclusive. Hence, if an example of class A is present, it is logically inconsistent for a member of class B to be present as well.

The present study, then, will utilize humor based on each of these two types of expectancy violation. These two types will be referred to as novelty humor and incongruity humor. In the very young child, novelty humor would be based on violation of perceptual expectancies only. After conceptual capacities developed, conceptual and perceptual expectancies would both be violated by the novel event; however, the use of logic would

not yet be a factor in producing the child's response. Once a child has developed logical thought capacities, he may come to see the same situation as one of incongruity. Thus, whether or not a given situation is experienced as novelty or incongruity depends not on the situation itself, but rather on the way in which it is construed by the child. One of the central hypotheses of the present study is that the way such situations are construed depends of the child's level of cognitive functioning.

Those stimuli used in the present study representing novelty humor differ from those representing incongruity humor along only one dimension; the degree to which expectancies are violated on a purely conceptual or primarily perceptual (it should be remembered that for Ss used in this study, perceptual violations constitute conceptual violations as well) basis. In novelty humor, situations are verbally or visually presented containing elements which are physically discrepant from S's prior perceptual experience with them. Stimuli exemplifying incongruity humor, however, do not contain elements which are discrepant from S's prior visual experience. Expectancies for incongruity stimuli are violated only at an ideational or conceptual level. The physical objects and events depicted merely act as vehicles which carry the incongruity at a purely conceptual level. Thus, these two classes of humor are differentiated according to the level of expectancy violation objectively represented. In incongruity stimuli the expectancies are violated at an abstract ideational level; in novelty stimuli they are violated at a perceptual and conceptual level. While an older child may interpret stimuli we are classifying as novelty humor as containing incongruous relationships, a younger child cannot locate perceptual violations in stimuli classified as incongruity humor.

The present study will test the significance of operational thinking for comprehension of novelty and incongruity humor. It is hypothesized that the acquisition of a logic of classes and relations (i.e., concrete operational thinking) is required for comprehension of incongruity humor, while a level of preoperational thinking is sufficient for comprehension of novelty humor. If incongruity does consist of a violation of logical expectancies, preoperational S's should show lower comprehension of this type of humor. Since all Ss used possess the capacities necessary for the identification of perceptual discrepancies, level of cognitive functioning should not be a relevant factor for comprehension of this type of humor.

In addition to determining comprehension on the basis of S's verbal explanation of why a humor stimulus is funny (as was the procedure above), level of comprehension might also be measured in terms of S's ability to eliminate the humor in a cartoon or joke. That is, a child would have to have at least a moderate understanding of a cartoon if he showed an ability to transform the core content (leaving the peripheral content unchanged) so as to eliminate the novel or incongruous relation among those elements and substitute an expected or harmonious one. In order to accomplish this task, S must mentally reverse the core content from its current representation and provide one more in agreement with the peripheral content. Since this task would appear to entail what Piaget referred to as reversible cognitive operations, it is predicted that the ability to remove the humor from the core content of a humor stimulus requires concrete operational thinking. While this prediction is made for humor involving violation of logical expectancies, no predictions are made for humor based on violation

of perceptual expectancies. Since the discrepancy itself may be identified without the use of logic, S may not need reversible thought capacities to substitute a new core context. Or, it may be that the processes involved in making a change at either level are similar, such that operational thinking is required.

In the first set of humor stimuli used in this study, then, S 1) gave a verbal explanation of why the stimulus situation was funny and 2) suggested a way of changing the core content so the cartoon would not be funny. Each S also indicated along a 5 point rating scale how funny he thought each cartoon or joke was.

Another more general approach to evaluating children's comprehension of humor might be to have Ss attempt to make a general statement about the nature of humor. That is, a child who understands how humor situations differ from nonhumor situations should be able to verbalize these differences. However, in light of Piaget's theorizing that a formal operations level of functioning is required to realize the implications of experienced events and generate a hypothesis to account for those events, it is predicted that no significant relationships will be found at the ages tested here between level of cognitive development and the ability to generate a hypothesis (based on the first set of humor stimuli) about the necessary prerequisites for humor.

While the first set of humor stimuli constituted the main focus of interest in this study, the investigation was also used as an opportunity to explore other approaches to the study of children's comprehension of humor. Thus, a second set of humor stimuli consisted of six sequential cartoons, in which S was to "put the parts in the right order so that they

make a cartoon." Highly similar tasks have been used in standardized tests of intelligence (e.g., the Wechsler tests). Each of the cartoons in this set involves 3 or 4 parts, such that S must integrate the information supplied by each part in order to fully comprehend the intended humor. Each of these cartoons primarily involved violation of logical expectancies. Since this integration involves logical processes, it is hypothesized that the acquisition of elementary groupings permitting operational thinking will be positively related to understanding of these cartoons. A child who is unable to go beyond a successive centering upon selected aspects of the cartoon should show poor comprehension of the humor in these cartoons.

Finally, two sets of cartoons involving a matching task were employed. Of these, one set consisted primarily of the type of cartoons earlier designated as novelty humor. With these stimuli, half of the cartoon was missing, and S's task was to choose which among three possible alternatives completed the cartoon and made it the funniest. Among the alternatives, only one provided a violation of perceptual expectancies; the remaining two provided a congruous or normal setting. In order to identify the "correct" choice, then, S merely had to recognize the part of the cartoon which was discrepant with his experience with that stimulus situation. Hence, it was hypothesized that preoperational thinking would suffice for identification of the humor in these cartoons.

The second matching task utilized cartoons in which S had to choose which of three captions made the cartoon the funniest. As in the first matching task, only one caption created an incongruous situation. In these cartoons, the core content was strictly ideational; there were no violations

of perceptual expectancies. Utilizing the same argument given earlier for incongruity humor, then, it was hypothesized that operational thought would be positively related to choice of the correct caption and comprehension of the humor depicted.

In summary, then, the present study employed four different approaches to determining the relationship between children's level of cognitive functioning and comprehension of novelty and incongruity humor. These four means of evaluating comprehension included determination of S's ability to: 1) give a verbal explanation for why a cartoon or joke is funny; 2) eliminate the humor elements in a cartoon or joke; 3) order cartoons in the correct sequence or choose the funniest caption or pictorial match; and 4) generate a hypothesis about the necessary prerequisites for humor. This study tests the general hypothesis that operational thinking plays a major role in the comprehension of incongruity humor, while it is not necessary for comprehension of novelty humor.

EXPERIMENTAL METHOD

Subjects.

The subjects were 90 boys from Jefferson local schools in Gahana, Ohio, a small, predominantly middle class central Ohio town. Since there was no basis for differential prediction according to sex, boys only were used so as to increase the sample size for different age levels. The sample included 30 boys at each of three age levels: five, seven and nine. A boy within one of these age groups was used as a subject if

- 1) his IQ was average to moderately high (ranging from 100 to 120) and
- 2) his birthday occurred six months or less prior to the time of testing.

With respect to the former criterion, then, the major concern was to eliminate extreme IQ scores in either direction. This criterion was used only for 7 and 9 year olds since IQ scores were not available for the 5 year old sample. Also, because of an age limit of 5 years for entrance to kindergarten in the school system used, nearly all of the 5 year olds were between 5 years, 6 months and 5 years, 8 months at the time of testing.

Apparatus

The apparatus consisted of a battery of four different sets of humor stimuli and four tasks devised by Piaget to evaluate children's level of cognitive development.

Humor Materials. The battery of humor stimuli was composed of four separate sets of cartoons and/or verbal jokes. In all four sets, novelty or incongruity constituted the basis for humor. Only cartoons which did not contain

such content areas as sex, aggression, etc., as a basis for humor were chosen for use in this study. An effort was made to use only stimuli which have no broad social basis for an investment of affect in the objects or events composing the stimulus content -- that is, to provide a basis for humor along purely cognitive rather than conative dimensions. All four sets of humor stimuli may be found in appendix A.

Set I contained 20 humor stimuli and was further divided into five different classes, with 4 examples of each composing the entire set. Two of these classes included cartoons without captions, two were verbal jokes with no pictorial counterpart, and one class consisted of cartoons with captions. In this latter group, the caption is essential to elucidation of the humor content.

In addition to the above basis for differentiating the five classes of humor in set I, stimuli within each class were also selected according to the type of cognitive demands assumed to be made upon S by the stimuli if the humor content is to be understood. Along this dimension, a distinction has already been made between novelty and incongruity humor stimuli. Considering the classes of cartoons first, a novelty cartoon is defined as a cartoon in which perceptual and conceptual expectancies are violated, as was discussed earlier. While higher level conceptual processes may contribute new dimensions to the humor, they are not required (it is hypothesized) for identification of the humor at this lower level. This position would suggest that in determining why such a cartoon is funny, it is not necessary for a child to be able to determine how the discrepant situation came about, or that it could not actually occur, in order for him to appreciate the humor present. A child might consider these cartoons funny simply because he is

perceiving a situation which is discrepant with the expectations he has come to hold for this situation from prior experience.

Cartoons based on incongruity, on the other hand, contain no expectancy-violating elements which might be pointed to physically. On a purely perceptual basis, the components of these cartoons are not inconsistent with S's prior experience. It is only after making certain inferences suggested by cues in the cartoon that the incongruity becomes apparent. The violated expectancy is not manifest in terms of the objects themselves, but rather in terms of some deviation from a logical sequence or combination of events which becomes apparent only at an ideational level.

In addition to cartoons, jokes were also conceptualized along this dimension. In novelty jokes, concrete situations or events are described which deviate from S's prior experience. In incongruity jokes, a situation or series of events is described in which the inherent incongruity only becomes apparent when S goes beyond visualizing or imagining the physical situation itself to consider logical inconsistencies in the behavior or circumstances composing the content of the joke. In both incongruity cartoons and jokes, S must interrelate two separate characteristics suggested by the stimulus content and infer their logical inconsistency. Subjects can pin-point or focus upon the core content of these stimuli only after this cognitive sequence has occurred. In novelty cartoons or jokes, on the other hand, S need not be aware of any logical inconsistencies involved (although if a child with conceptual capacities can locate instances of these, they may very well contribute to a greater appreciation of the humor) in order to cue in upon the core content.

The five classes of humor in set I will be referred to as A, B, C, D

and E. Class A consists of novelty cartoons without captions. On the basis of extensive examination of cartoons with and without captions, it was concluded by the writer that any captioned cartoon in which the caption is essential to identification of the core content may not be classified as novelty humor. If the caption content is essential, then there is nothing in the pictorial content alone which is inconsistent with S's prior experience; S must integrate conceptually the circumstances presented pictorially with the information supplied by the caption before the discrepancy may be identified.

Class B was designated novelty jokes, whose defining characteristics have already been discussed. Class C includes incongruity cartoons with captions, and Class D includes incongruity jokes. Finally, Class E is comprised of incongruity cartoons without captions. In this group of cartoons, pictorial cues assume the role normally played by the verbal information supplied by a caption. On a purely visual or pictorial basis, there are no apparent violations of expectancy. The latter appear only when S utilizes information supplied by cues in the cartoon itself and brings this information together to produce an interpretation of the cartoon. So expectancy disconfirmations in these cartoons should occur only at an ideational level.*

In order to determine the reliability of E's categorization of human stimuli as novelty or incongruity stimuli, two independent judges were asked

*It should be noted that while the 5 classes in set I were originally designed to be based on 4 examples per class, one Class B joke was later (but before the data were analyzed) placed in the Class D category since it appeared to fit the defining criteria of that class more closely than those of Class B. Thus, Class B includes 3 jokes and Class D includes 5.

to sort all stimuli in set I into one of these conceptual classifications. Their reliabilities with E were .850 and .900.

Set II consists of six sequential cartoons; i.e., cartoons containing three or four separate parts which are viewed in succession. Of these six, only one contains a caption on the last stimulus unit. In order to identify the basis for humor in these cartoons, a subject must integrate the separate units of information provided by each part of the cartoon and determine the core content on a purely conceptual basis. While there may be "lower level" perceptual characteristics (these occur only in the form of novel representations such as "funny faces", "long noses", etc.) in these stimuli which add to the humor, an integration of information contributed by successive parts is necessary to identify the total humor content.

Set III consists of a matching task in which each cartoon is divided into two parts. One half of the cartoon serves as a stem while the other half is mixed in with two other potential remaining halves. The S's task, then, is to choose the half which, when placed next to the stem, would make the cartoon the funniest. For all five of the stimuli composing this set, only one of the three possible choices poses some type of violation of perceptual expectancy; the remaining two are congruent with the stem. There are no captions accompanying any of these cartoons.

Like set III, set IV involves a matching task. Each of 7 cartoons is accompanied by 3 captions, only one of which creates an incongruous situation when related to the pictorial content. The pictorial content itself does not contain any expectancy violations, so the choice of the

"correct" caption is essential to identifying the incongruity providing the basis for humor.

Cognitive Tasks. Four tasks devised by Piaget were used to evaluate the level of S's cognitive development. For determining conservation of mass and weight, two different sets of differently colored Play-doh were used. For the class inclusion task, wooden beads (about one inch in diameter) originally designed for stringing were used. Of a total of 12 beads, 10 were orange and 2 were blue. The only apparatus for the reciprocity task consisted of a pencil, a penny and a key.

Procedure

Subjects were interviewed individually by a male E (the author) who administered both the humor material and cognitive tasks in a single experimental session. A separate experimental room was set up so that no interruptions would occur during the testing procedure. In all cases, E accompanied S from his classroom to the testing room and spent as much time as was necessary (up to 5 minutes) to establish a satisfactory level of positive rapport between S and E. More time was generally taken with 5 year olds if a child seemed unusually nervous.

Since two of the four tasks were conservation tasks it was considered desirable to separate their administration by as long an interval as possible, so as to eliminate any confounding or interference with the conservation of weight task by the child's prior performance of the conservation of mass task. Thus, the conservation of mass task was administered first, followed by the four sets of humor stimuli, and finally the remaining three cognitive tasks.

Conservation of Mass. For the conservation of mass task, S was presented with two balls of Play-doh of the same color, size, shape and weight and was allowed to examine them until he agreed that they contained the same amount of Play-doh. The E asked S: Do the two balls have the same amount of Play-doh? Is there as much in this ball as in that one? If S responded negatively to this question, he was asked to add or subtract Play-doh from either ball until they had the same amount. Once S had agreed to their equality, E said: Suppose I make one of the balls into a pancake. Will there be as much Play-doh in the pancake as there is in the ball? Will they both have the same amount of Play-doh? For 5 year olds, E also said: If we could eat them, would there be as much to eat in the pancake as in the ball? After S responded to this question, E flattened out one of the balls into a pancake while S watched. The E then asked: Is there as much Play-doh in the pancake as there is in the ball? Do they have the same amount of Play-doh? For 5 year olds, E added: Let's pretend we could eat these, OK? Is there as much to eat in the ball as in the pancake? After responding to these two questions, S was asked to explain why they would be the same or why one would have more (depending on the response given). Finally, in order to differentiate true conservation from what Piaget (1967) has termed "pseudoconservation", a check was administered in addition to the above procedure. Piaget found that certain children who gave adequate verbal explanations for conservation were unable to translate their thought processes into the corresponding behavior. That is, if they were asked to pour the same quantity of liquid into

two differently shaped containers, they were unable to compensate for height and width variations. Thus, they were said to be pseudoconservers. Following Piaget's test for pseudoconservation with respect to liquid, in order to test for pseudoconservation of mass Ss were given a small portion of Play-doh which had been made into a small pancake by E. The E also gave S a larger mass of Play-doh and said: Now here is some more Play-doh which I have made into a pancake. I would like you to take as much as you need from this bigger piece and make a ball so that the ball you make has just as much in it as this pancake. For 5 year olds, E also added: You make the ball so that if these were things to eat, you would have just to much to eat in the ball as I have to eat in the pancake. These instructions were repeated if S did not appear to understand.

Humor Materials. Upon completion of the conservation of mass task, E proceeded to administer the entire battery of humor materials. The order of administration for all Ss was set I, II, III, and IV. Within set I, the five classes of humor were alternated so that S never saw consecutive cartoons in the same class. Four runs were completed through the following order of presentation: A) Novelty cartoons; B) novelty jokes; C) incongruity cartoons with captions; D) incongruity jokes; and E) incongruity cartoons without captions.

Upon presentation of each humor stimulus, E said: What is there about this cartoon (joke) that makes it a cartoon (joke) instead of a regular picture (story)? Why do you think it is funny? After the first two or three stimuli within each set, E only asked S the second question

for each new stimulus. All Ss gave their responses verbally, and E wrote down their comments verbatim. The E then asked S: How could we change what is happening in the cartoon (joke) so that it wouldn't be a cartoon (joke) any more; so it wouldn't be funny? On the first two or three stimuli presented, S was reminded that You don't have to change the whole cartoon (joke); just change the part that makes it funny, so that its not funny any more. The S was then shown a five point rating scale (see Appendix B) with the following anchor points: 1) not funny at all; 2) just a little bit funny; 3) moderately funny (this word was explained as meaning 'in the middle'; 4) funny; 5) very funny. The use of the rating scale was discussed with S until it was clearly understood. For the first two or three stimuli, E reminded S: Now remember, if you think its not funny at all, give it a "1"; if you think its just a little bit funny, give it a "2", etc. For five year olds, a scale with a stick figure next to each number was utilized, and in addition to the above instructions E added: This boy didn't think it was funny at all, so he gave it a "1"; this boy thought it was just a little bit funny, so he gave it a "2", etc. In order to eliminate any interference with comprehension due to reading difficulties among the younger children, E read each joke and cartoon containing a caption to all 5 and 7 year olds. All 9 year olds read the verbal materials themselves unless signs of reading difficulties became apparent.

Upon completion of set I, S was asked to make a general statement about the basic requirements for a cartoon or joke, based on the cartoons and jokes seen in set I: Now that you've seen quite a few different

jokes and cartoons here, could you tell me what they all have in common?
What is there about a cartoon or joke that makes it a cartoon or makes
it a joke? What do we have to have in general to make a cartoon or joke
funny? This was usually repeated unless S clearly understood and began
 to respond immediately. Again, all of S's comments here were written
 down by E.

For the sequential cartoons composing set II, E presented the 3 or
 4 parts of a cartoon to S in a mixed up order, and asked S to put the
 parts of the cartoon in the right order: Now these next cartoons will
have 3 or 4 parts to them like the ones you see in the funnies. But I
am going to give them to you all mixed up, so they will all be in the
wrong order. What I would like you to do is unmix them and put them in
the right order so that they make a cartoon that is funny. OK? Do you
see what you have to do? If S seemed unclear about the instructions,
E went through the motions of changing the order of an imaginary cartoon
 in front of S. The order in which S put the parts was then recorded by
E, and E obtained a humor rating for each cartoon in the manner described
 above. As in set I, S was asked to describe the basis for humor in
 each cartoon.

Set III consists of a matching task in which S must choose the
 missing half of a purely pictorial cartoon (i.e., no captions involved)
 from three possible completions of the "stem" for the cartoon. These
 cartoons consist primarily of what was referred to earlier as perceptual
 cartoons, in that logical incongruities do not constitute the basis for
 humor. An S might identify the core content on the basis of its deviation

from previously acquired expectations for that situation. The E presented S with the stem and the 3 possible adjoining halves with the following instructions: Now I am going to show you some cartoons in which half of the cartoon is missing, and I would like you to tell me what the other half should be. (E then proceeded directly to the first cartoon since it was easier to make the instructions clear when exemplified in a concrete form.) So on this one, here is the main half of the cartoon, but which of these three is the other half? Which one of these could we put next to this one (stem) so that it would be the funniest and make a cartoon? A humor rating was then obtained for the cartoon in the standard fashion outlined above.

Set IV consists of a more complex matching task in which S must choose one of three possible captions which make the cartoon the funniest. These cartoons involve logical incongruities in which the caption is essential for identification of the incongruity. Upon presenting the first cartoon to S, E said: Now these cartoons will be like the ones with captions that we looked at earlier, but this time there are three captions or three sets of words with each cartoon, and there should be only one. So I would like you to tell me which one should go with the cartoon. Which one makes the cartoon the funniest? These instructions were repeated whenever necessary.

As with the earlier materials, E read the caption choices to 5 and 7 year olds, but 9 year olds read them themselves. With the two younger age groups, E first read through the three choices, with a pause after each, in order to allow S to familiarize himself with the possibilities.

Then E reread them and asked S to: Stop me when we get to the one you think makes the cartoon the funniest. This repetition was employed so that S would not be obliged to remember the various alternatives, and thus be at a disadvantage relative to the 9 year olds who could refer back to other choices at will. If S could not decide upon a choice, the three alternatives were again read and S stopped E at the "correct" caption. Again, ratings were obtained for each cartoon according to the standard procedure described above.

Conservation of Weight. Following the completion of all of the above procedures, E returned to the administration of the remaining three cognitive tasks. To test for conservation of weight, the standardized procedure outlined by Elkind (1961) was again followed. The E presented S with two balls of Play-doh of the same color (although the color differed from that used for conservation of mass), size, shape and weight and S was again allowed to examine and change the two balls until he agreed that they did weigh the same. The E said: Do the two balls weigh the same? Do they have the same amount of weight? Are they just as heavy? After S agreed, E added: Suppose I make one of the balls into a pancake; will they still have the same weight? Will they weigh just as heavy? After recording S's response, E proceeded to flatten out one of the balls into a pancake in front of S and asked: Do they weigh the same now? Are they just as heavy? Subjects were allowed to lift the two masses for comparison if they so desired. Subjects were then asked to explain why they thought the two did or did not weigh the same. Finally, a check was again made to distinguish between pseudoconservation

and true conservation. Each S was given a small piece of Play-doh, which E had earlier formed into a pancake, along with a larger mass of unformed Play-doh and E said: Now here is some more Play-doh which I have made into a little pancake. I would like you to take as much as you need from this bigger piece and make a ball so that the ball you make is just as heavy as the pancake. Make it so they both weigh the same. In scoring for true conservation of mass and weight, the criterion was whether or not S compensated for the length and width (or diameter) dimensions of the pancake in the process of forming the ball. That is, if the diameter of the ball made by S was greater than the thickness and less than the width of the pancake, he was considered to be a true conserver. If the diameter of the ball made by S equaled either dimension of the pancake, he was classified as a pseudoconserver (assuming appropriate responses to the prior questions).

Class Inclusion. To test for class inclusion, S was presented with 12 wooden beads (10 orange and 2 blue) and E said: Now I have twelve beads here (S was allowed to count them to be certain that there were 12). Ten of them are orange and two of them are blue, but they are all made out of wood, aren't they? (S was again allowed to count each color and verify that all were wooden.) Then E repeated: So ten of them are orange and two of them are blue, but they are all wooden, aren't they? Then E asked: OK. Now, are there more orange beads or are there more wooden beads?... Are there more orange or wooden beads?

Reciprocity. To test S's understanding of reciprocal relationships, E sat on the opposite side of a table from S so that E and S were directly facing

each other. The E then gave S the following instructions: Show me your right hand . . . Show me your left hand . . . Show me your right leg . . . Show me your left leg . . . OK, now which is my right hand? . . . Which is my left hand? . . . Which is my right leg? . . . And which is my left leg? The E then placed a pencil and a penny on the table in front of S (with the penny to S's left and the pencil to his right) and asked: Is the pencil to the right or left of the penny? . . . Is the penny to the right or to the left of the pencil? The E then asked S to come over and sit beside him on E's side of the table and proceeded to repeat the same two questions with S now viewing the pencil and penny (which were not moved) from E's perspective. With S still sitting beside E, E then said: Now I am going to take this key and put it here. (E placed the key between the penny and the pencil.) OK? Now, is the pencil to the right or to the left of the key? . . . Is the key to the right or to the left of the penny? . . . Is the penny to the right or to the left of the pencil? . . . Is the pencil to the right or to the left of the penny?? . . . Is the key to the right or to the left of the pencil? . . . Is the penny to the right or to the left of the key? The S was then asked to return to his original seat across from E (with the 3 objects remaining in the same order) and E repeated the above 6 questions in the same order. Throughout the reciprocity task, E paused after each question for as long as S needed to think about the answer.

Development of the Scoring Systems

In order to qualify better Ss' verbal responses along a dimension of comprehension, a humor comprehension rating scale was devised. It should

be made clear that the present study has utilized only one technique among many to generate a basis for humor. A cartoon or joke was employed in this study only if the basis for humor was primarily or wholly within the cognitive realm. Salient need or drive areas such as sex and aggression were carefully avoided. A given cartoon was excluded from use if any aspect of its content was considered affectively salient on a relatively broad social basis. Thus, the scoring system to be described below should be considered applicable only to cartoons or jokes in which violation of cognitive expectancies constitutes the sole basis for humor.

The comprehension scoring system is based primarily around the distinction made earlier between the core and peripheral content of an incongruity-based humor stimulus. In conjunction with this dichotomy, several different levels of comprehension might be differentiated. First, an individual may be able to distinguish the focal from the peripheral content, but be unable to advance beyond this to an acknowledgement of why the focal elements are humorous in the present peripheral context. Since the latter provides a more complete account of the basis for the humor arousing capacity of the humor stimulus, Ss giving such a response should be credited with greater understanding than those who are unable to go beyond a mere identification of the core humor elements.

Secondly, a response which does verbalize or cue in on the focal content should be scored higher than a response which identifies the focal content only in the process of a general non-selective description of the cartoon or joke. That is, an S may not have any insight into the basis for humor in the cartoon or joke (as witnessed by the fact

that he has been unable to distinguish between the focal and peripheral content), but may accidentally and unknowingly hit upon the focal content in the process of giving a global description of the total stimulus situation. The S might also locate other varying degrees of disconfirmed expectancies in the stimulus situation which, although they do not represent the core content of the cartoon or joke, do nevertheless constitute a real or imposed violation of expectancy. While such a response deserves some credit for coming up with a technically sound basis for humor (that is, a positing of specific incongruous relationships), the failure to identify the core or focal content suggests that it should receive a lower score than a response which cues in solely on the focal content.

Finally, S might either give no response at all or give a response which specifies only congruous or normal peripheral aspects of the stimulus situation, as opposed to either the focal content itself or other less central expectancy violations located in the peripheral content. Since this type of response does not verbalize any basis for humor in any objective sense, it was felt that such responses should be given the lowest score in the scoring system developed.

On the basis of the above consideration, the following 4 point scale was devised for rating S's comprehension of the basis for humor in humor stimuli:

1. A. No response or a non-verbal pointing response.
B. A response (generally confined to the peripheral content)
which specifies only congruous or normal aspects of the

stimulus content.

(Note: a "1" score can be given only if S fails to verbalize any expectancy violation at all.)

2. A. Any response which mentions the core content of the stimulus in the process of describing other normal or congruous aspects of the stimulus content.

(Note: this will always be a response which demonstrates that S has been unable to determine which elements are central or essential in providing the basis for humor.)

- B. A response which does acknowledge some real or imposed (by S) expectancy violation, but one other than that constituting the core content of the cartoon or joke.

- C. A partial acknowledgement of the core content; that is, a response in which S cues in upon the core content, but does not describe it in such a way that it is clear to an objective observer that S does indeed understand the discrepancy comprising the core content.

3. A response which focuses strictly and directly upon the core content, with no additional descriptions or comments about usual or consistent aspects of the humor stimulus.

(Note: in a "3" response, S merely verbalizes the core content but does not elaborate upon this with an explanation of why the core content is funny.)

4. A. A response which identifies the core content (i.e., a "3" response) and also verbalized the nature of the discrepancy, or contrasts the normal state of affairs with

that depicted in the cartoon or joke, or in some other way explains why the core content arouses humor.

- B. A response which specifies the impossibility or improbability of the composition of elements forming the core content.

Using this general rating manual as a guide, the investigator proceeded to build a larger manual for specific humor stimuli. That is, for each stimulus the above general framework for rating comprehension was anchored in terms of specific examples illustrating a 1, 2, 3 and 4 response for that particular cartoon or joke. (This manual for individual stimuli may be found in Appendix C.) A small number of defining examples (usually 2 to 4) was established by E for each stimulus. These examples were then evaluated by four additional upper level graduate students, and any discrepancies of opinion were discussed until complete agreement was reached upon the manifestation of the general scoring system in specific examples.

To determine the reliability of E's scoring of S's responses for comprehension, the protocols of 3 Ss were randomly chosen from each age group and scored for comprehension by two independent raters. These raters used only the general rating manual; the manual which exemplified each of the 4 ratings for each humor stimulus was not consulted. Thus, since these raters utilized less information than E in scoring S's verbal responses, a relatively conservative measure of reliability was obtained. For the 342 cartoons and jokes rated, reliabilities with E were .719 and .670.

A measure was also obtained of the internal consistency (with respect to Ss' comprehension) of the items or examples composing the various categories of humor used. The degree of reliability in comprehension of the humor stimuli was determined by Kuder-Richardson's formula #8 (Richardson and Kuder, 1939). These reliabilities were as follows: set IA, .677; set IB, .765; set IC, .779; set ID, .809; set IE, .778; set II, .813; set III, .792; set IV, .802.

In addition to scoring for comprehension, S's verbal description of the basis for humor was also classified according to whether it was essentially a description of either the core or peripheral content, or an interpretation of the same. A response was classified as descriptive if S A) simply described or enumerated events occurring in the pictorial or verbal content, or B) gave a verbatim repetition of a caption or joke. A response placed in this category generally constituted a type of "verbal pointing" which did not go beyond a very superficial level of explanation. A response was classified as interpretive if S A) pulled together and contrasted certain of the discrepant elements comprising the core content; B) contrasted the current situation with its normal or usual state; C) gave a motivational interpretation of the behavior of some character in the cartoon or joke; or D) gave some other type of general account of the events occurring in the stimulus situation which goes beyond merely describing ongoing events in the stimulus. The E showed 74% and 78% agreement with two independent raters in rating this dimension.

As noted earlier, for the 20 cartoons and jokes in set I, each S was

asked to change the cartoon (joke) so that it would no longer be funny. The S's response here was classified according to whether S was successful or unsuccessful in eliminating the basis for humor. As noted earlier, S was told that he did not have to change the whole cartoon (joke), but rather should just change the part that makes it funny. Thus, S's change was classified as unsuccessful if it either changed the whole stimulus content rather than altering the focal content alone, or provided for a change which did not eliminate the inconsistent core content. If S's posited change was confined to the focal content and did substitute a consistent (i.e., consistent with expectancy) situation for the former discrepant one, S was given credit for successfully eliminating the basis for humor. The E showed 79% and 86% agreement with two independent scorers on this variable.

Finally, S's effort to make a general statement about the prerequisites for humor in light of the present group of cartoons and jokes was rated along a 4 point scale according to the degree to which his statement constituted an abstract generalization incorporating the common basis for humor characterizing these humor stimuli. The defining points of this rating scale were as follows:

1. No response at all, or S says he doesn't know.
2. Specification of one or more particular objects, events or situations which S considers humorous; or a repetition of the word funny either alone or relative to a particular object, event, etc.

(Examples: someone doing tricks; a rocket going up; a

picture from the comics; a funny face; funny words, people, pictures, etc.)

3. A. A pseudo-generalization; that is, a generalization which does not give satisfactory or full explanation, such that E must still ask what types of events fulfill the conditions specified by S.

(Examples: something sort of dumb; something silly; something that makes you laugh; something ridiculous; imaginary things; something different.)

- B. A partial generalization; that is, a general statement about a particular object or event.

(Examples: people that aren't real; a dog doing something that can't really happen; etc.)

4. A generalization specifying the idea that incongruous, inconsistent or improbable events and situations are necessary to give rise to humor.

(Examples: things that are impossible, improbable, unreal, unusual, don't really happen, turn out wrong, are backwards or opposite, aren't true, couldn't happen, or are never seen.)

Using this scoring system, E's reliability with two independent judges was .778 and .889.

Scoring of the cognitive tasks

Each S's performance on the conservation of mass and weight tasks was scored on a 4 point scale as follows: 1) failure on both prediction

and judgment questions; 2) success on the judgment question, but an inadequate verbal explanation for conservation (the prediction question may or may not be correct; a "2" was always given if S responded correctly to the judgment question); 3) pseudo conservation (i.e., a satisfactory explanation and judgment response but a non-conserving response on the check); 4) true conservation (i.e., a "3" performance plus a conserving response on the check).

For the lateral discrimination task, five levels of performance were differentiated according to the following criteria: 1) confusion of S's own right and left; 2) equating others' right and left with S's own (which he does identify correctly); 3) correct identification of right and left of self and others, but not with respect to the relationship between two objects; 4) correct identification of right-left relationship among two objects, but not among more than two; 5) correct identification of right-left relationship between 3 or more objects. Finally, on the class inclusion tasks, S was given a "0" for an incorrect response (i.e., "more orange beads" or "they have the same amount") and a "1" for a correct response (i.e., "more wooden beads"). Using these bases for scoring the cognitive tasks, E's reliability was 1.000 with each of two independent judges.

Each of these four tasks evaluate different dimensions of the child's progression from preoperational to operational thinking. There is no sharp transition from preoperational to operational thought; rather the child's logical thinking spreads gradually from one sphere to another. For example, conservation of mass generally precedes conservation of weight, which in turn precedes conservation of volume.

When combined, then, the four tasks employed in this study would provide a broader and more inclusive evaluation of the child's level of cognitive development. Since this general picture was considered to provide a more meaningful measure of the child's level of cognitive attainment (i.e., in terms of the concerns of the present study, there is no basis for differential prediction from the different cognitive tasks), a combined cognitive task score was obtained for each S by summing his scores on each of the 4 tasks. Thus, an S's score might range from 0 to 14. All analyses described below involving this variable are based on this combined cognitive score.

RESULTS

Cognitive Development and Humor Comprehension

To determine the relationship between the child's level of cognitive development and comprehension of humor, Pearson correlation coefficients (Hays, 1963) were computed between Ss' total cognitive score and the mean comprehension score for the stimuli composing a given class of humor. Thus, within Set I the mean for novelty cartoons was based on 4 scores, the mean for novelty jokes on 3 scores, and so on. These correlations are shown in Table 1. In all of the discussion to follow, the 4 sets of humor will be referred to as follows: IA) novelty cartoons; IB) novelty jokes; IC) incongruity cartoons with captions; ID) incongruity jokes; IE) incongruity cartoons without captions; II) sequential cartoons; III) pictorial matching cartoon set; and IV) caption matching cartoon set.

Table 1
Correlations of cognitive development scores
with humor comprehension scores

		IA	IB	IC	ID	IE	II	III	IV
5	(N=30)	-.095	-.077	-.093	.212	.142	.229	.009	-.019
7	(N=30)	.023	.350	.301	.548 ^b	.377 ^a	.550 ^b	.359 ^a	.282
9	(N=30)	-.195	-.338	.012	.142	-.047	.022	-.170	.489 ^b
All <u>Ss</u>	(N=90)	.345 ^b	.371 ^b	.593 ^b	.638 ^b	.502 ^b	.665 ^b	.421 ^b	.611 ^b

^a $p < .05$

^b $p < .01$

While the correlations for all Ss combined have been included, the

most meaningful relationships in terms of the concern of the present study are those within each age group; other factors associated with chronological age confound the relationship with Ss combined. Furthermore, if level of cognitive functioning is a critical factor for the performance variables considered here, then differential prediction for different cognitive levels should occur within as well as across age groups. If prediction does occur within age groups, it may safely be assumed that cognitive level plays a role in differential performance across age levels.

An inspection of Table 1 reveals that the relationship between cognitive scores and humor comprehension depends on both the type of humor and the child's age. For the 5 year olds, none of the relationships approach significance. At age 7, however, significant correlations were found for sets ID, IE, II and III, with marginal significance obtained for IB and IC. Except for the relationship with set III (which barely reached significance), then, all of the significant relationships at age 7 occurred with incongruity classes of humor. At age 9, only the correlation for the caption matching task was significant.

Cognitive Development and the Removal of Humor

Fisher exact probability tests (Siegel, 1956) were used to determine the relationship between cognitive score and ability to remove the humor in a cartoon or joke. Cognitive scores were initially divided into groups of lower, middle and upper third (0-4, 5-9, 10-14) for these analyses. However, the extreme variability in cognitive scores across the age groups left certain cells empty for the 5 and 9 year olds.

That is, for the age 5 group there were no scores in the 10-14 category, while for the age 9 group there were no scores in the 0-4 category. Consequently, two levels were used to define high and low cognitive score groups within each age. For age 5 high refers to scores between 5 and 9 while low refers to scores between 0 and 4. For ages 7 and 9 high refers to scores between 10 and 14 while low includes scores between 5 and 9. (Two 7 year olds who had scores between 0 and 4 were included in the low group). In this way a meaningful evaluation of the significance of cognitive level for elimination of humor was obtained within each age.

Table 2 includes the 2 x 2 frequency distributions for all 15 Fisher tests computed. Since each class of humor contained more than one example, Ss were placed in a given category only if the majority of their responses for that class fell in that category. Thus, for example, since there are 4 humor items in class IA, an S would be placed in the successful or unsuccessful category only if he successfully eliminated the humor in 3 (or 4) or 1 (or 2) of the cartoons respectively. If S's responses were evenly distributed along this dimension, he was not included in the analysis. (Hence the variation in total N in Table 2).

As shown in Table 2, cognitive scores are significantly related to S's ability to eliminate the basis for humor only in 7 year olds and only with humor involving incongruity. In these 3 cases, high cognitive scores are associated with successful humor changes while low scores are associated with unsuccessful changes. In general, Table 2 indicates that for humor in which S's perceptual experience alone is sufficient to permit identification of the discrepancy (IA and IB), even 5 year

Table 2
Frequency tables of the ability of high and low cognitive
score Ss to eliminate the basis for humor
in cartoons or jokes.

Humor Class	Age	5			7			9		
		Low	High	Total	Low	High	Total	Low	High	Total
I A	Successful	8	13	21	18	11	29	6	22	28
	Unsuccessful	4	3	7	1	0	1	0	1	1
	Total	12	16	28	19	11	30	6	23	29
IB	Successful	9	11	20	15	11	26	6	23	29
	Unsuccessful	5	5	10	1	0	1	0	1	1
	Total	14	16	30	16	11	27	6	24	30
IC	Successful	2	1	3	1	5	6 ^a	4	19	23
	Unsuccessful	12	13	25	13	5	18	2	4	6
	Total	14	14	28	14	10	24	6	23	29
ID	Successful	3	3	6	7	10	17 ^a	4	21	25
	Unsuccessful	10	12	22	9	1	10	2	3	5
	Total	13	15	28	16	11	27	6	24	30
IE	Successful	4	10	14	5	11	16 ^b	4	20	24
	Unsuccessful	6	4	10	6	1	7	1	2	3
	Total	10	14	24	11	12	23	5	22	27

a $p < .05$ b $p < .025$

olds are generally able to remove the humor content. Older Ss are rarely unable to do so. With the more complex humor, in which the incongruous relationships supplied may only be identified by the utilization of logical processes, 5 year olds are very unsuccessful (with the exception of class IE) while 9 year olds again are generally very successful at eliminating the humor-evoking capacity of the core content. Cognitive level does not appear to be a significant factor in differential performance here at either age 5 or 9.

Cognitive Development and Descriptive vs. Interpretive Humor Responses

Cognitive scores were classified as high or low as described in the preceding section, and Fisher exact probability tests (Siegel, 1956) were computed to determine the relationship between level of cognitive development and the ability to give interpretive explanations for humor. These were computed for each age-humor class combination and are shown in tabular form in Table 3. This table shows that significant relationships were again found only at the 7 year age level. Furthermore, as with the preceding analysis significance was found only for humor in which violations of expectancy existed at a logical ideational level (IC, ID, IE, II, IV). In every one of these significant relationships, a high cognitive score was associated with interpretive humor responses while a low score ~~was~~ associated with descriptive ones.

For all classes of humor, 5 year old Ss consistently gave a much greater percentage of descriptive than interpretive responses. Nine year olds generally gave many more interpretive than descriptive responses; but even these older Ss gave slightly more descriptive than

Table 3

Frequency tables of descriptive and interpretive humor
explanations for high and low cognitive score Ss.

Humor Class	Age	5			7			9		
		Low	High	Total	Low	High	Total	Low	High	Total
IA	Descriptive	10	13	23	17	6	23	2	10	12
	Interpretive	2	1	3	0	1	1	3	6	9
	Total	12	14	26	17	7	24	5	16	21
IB	Descriptive	11	13	24	15	5	20	3	13	16
	Interpretive	3	3	6	3	6	9	3	11	14
	Total	14	16	30	18	11	29	6	24	30
IC	Descriptive	7	12	19	10	1	11 ^b	0	0	0
	Interpretive	2	2	4	3	7	10	5	21	26
	Total	9	14	23	13	8	21	5	21	26
ID	Descriptive	12	12	24	14	2	16 ^a	4	5	9
	Interpretive	2	4	6	5	9	14	2	19	21
	Total	14	16	30	19	11	30	6	24	30
IE	Descriptive	6	8	14	7	1	8 ^a	0	5	5
	Interpretive	6	5	11	5	8	13	4	17	21
	Total	12	13	25	12	9	21	4	22	26

Table 3 (Cont.)

Descriptive II	10	12	22	15	3	18 ^a	2	10	12
Interpretive	2	2	4	2	5	7	2	8	10
Total	12	14	26	17	8	25	4	18	22
Descriptive III	10	10	20	9	2	11	2	3	5
Interpretive	4	4	8	7	9	16	3	18	21
Total	14	14	28	16	11	27	5	21	26
Descriptive IV	3	7	10	8	1	9 ^a	1	3	4
Interpretive	5	4	9	7	8	15	5	20	25
Total	8	11	19	15	9	24	6	23	29

a $p < .05$ b $p < .01$

interpretive responses to the novelty bases for humor in set I (IA and IB).

Cognitive Development and Correctness of Choice

For sets II, III and IV, an additional way to determine a child's comprehension of these cartoons might be to count the number of "correct" choices. That is, both the sequential and matching cartoons were chosen so that only one sequence or one match created a humorous situation. A cartoon was included in the study only if three independent judges

(graduate students) unanimously agreed that one choice was clearly more funny than the other two. Treating these predetermined choices as "correct" then, Ss at each age level were divided into high and low cognitive score groups as defined previously. The mean number of correct matches (set III and IV) or cartoons placed in the correct sequence (set II) was determined and *t* tests (Hays, 1963) were computed to determine the significance of the difference in number correct for high and low cognitive score groups. Table 4 shows the means for each age-humor combination. For every age-humor combination, high cognitive score

Table 4
Mean number of correct cartoon-sequences or match-choices
obtained by high and low cognitive score groups
for sequential and matching cartoons

	5		7		9	
	Low	High	Low	High	Low	High
Set II	1.43	2.13	2.89	3.73 ^b	3.57	4.61 ^b
Set III	3.36	3.81	4.05	4.36 ^a	4.00	4.83 ^b
Set IV	1.43	2.00	4.26	4.91	4.00	4.96

a $p < .005$ (two tailed *t* test, Hays, 1963)

b $p < .01$

Ss made more correct choices and were more successful in putting cartoons in the correct sequence. The significance of these differences varies because of the differing degrees of variance in scores for different age groups and humor classes. However, for both the sequential and

pictorial matching tasks, high cognitive score Ss in the 7 and 9 year old groups made a significantly greater number of correct choices.

Cognitive Development and the Generation of Hypotheses about Humor

At the end of set I, each S was asked to make a general statement--based on the cartoons and jokes seen--about what has to be in a cartoon or joke in order to make it funny. The S's verbal response was then scored along a 4 point scale as described earlier. Pearson r 's were computed between cognitive scores and ratings along this 4 point scale for each age group. These correlations were $-.237$ (age 5), $.241$ (age 7) and $-.198$ (age 9). None of these correlations was significant. Thus, level of cognitive development-- to the extent measured in this study-- does not appear to be a relevant factor in the determination of the ability to abstract a general hypothesis, based on experience, about the necessary conditions for humor. This suggests that the capacity to perform this type of operation depends on cognitive structures acquired at some later date.

Cognitive Development and Humor Appreciation

Pearson correlations were computed between Ss' cognitive scores and mean humor ratings (based on the 1-5 funniness scale) for each class of humor for all 24 combinations of age and humor class (3 ages, 8 classes of humor). The only significant relationship obtained was that with the caption matching task (set IV) for 5 year olds ($.371$). Otherwise, all relationships here were insignificant, ranging from $.297$ to $-.268$. Thus, appreciation of the humor in these cartoons and jokes does not appear to be contingent upon cognitive level of development.

Reliability of Humor Comprehension among Humor Classes

Pearson correlations were computed for each age level between the mean comprehension scores of the various classes of humor. These correlations are shown separately for each age in Table 5. As these correlations show, there is a relatively high degree of consistency in comprehension of different classes of humor. There are very few negative correlations, and none of those that were found reach significance. Among 5 year olds, novelty jokes and sequential cartoons showed the most consistent prediction to comprehension of other classes of humor. For 7 year olds, comprehension of novelty jokes and sequential cartoons was again quite reliable with the majority of other classes. However, prediction was most consistent with incongruity jokes and incongruity cartoons with captions. For 9 year olds the greatest reliability with comprehension of other humor classes occurred with sequential cartoons (which involve conceptual incongruities) and incongruity cartoons without captions.

Reliability of Humor Appreciation among Humor Classes

As with the comprehension scores, Pearson r 's were computed at each age level between the mean humor ratings of all 8 classes of humor. Table 6 shows these correlations separately for each age level. Of the 84 correlations shown in this table, only the IC-ID correlation for 7 year olds is negative. At age 5, 64% of the correlations reach significance, with an average correlation of .417. All but one of these nonsignificant correlations (IA-IB, which reaches marginal significance) consist of relationships between novelty and incongruity classes of humor.

Table 5
Matrix of correlations between humor comprehension
scores of different classes of humor

Age		I B	I C	I D	I E	II	III	IV
5	I A	.436 ^a	.152	-.214	.315	.375 ^a	.264	.114
	I B		.423 ^a	.296	.454 ^a	.640 ^b	.458 ^b	.339
	I C			.290	.253	.538 ^b	-.120	.301
	I D				.195	.265	-.136	.386 ^a
	I E					.401 ^a	-.206	.356 ^a
	II						.348	.282
	III							-.213
7	I A	.132	.382 ^a	.136	.017	.335	-.116	.281
	I B		.377 ^a	.491 ^b	.349	.372 ^a	.386 ^a	.037
	I C			.528 ^b	.358 ^a	.540 ^b	.027	.358 ^a
	I D				.298	.658 ^b	.506 ^b	.446 ^b
	I E					.343	.270	.373 ^a
	II						.289	.450 ^a
	III							.024
9	I A	.165	.205	.275	.284	.133	.351	.251
	I B		.371 ^a	.325	.354 ^a	-.019	.125	.143
	I C			.323	.549 ^b	.505 ^b	-.054	.374 ^a
	I D				.313	.254	.199	.426 ^a
	I E					.439 ^a	.489 ^b	.196
	II						.436 ^a	.372 ^a
	III							.066

a $p < .05$ b $p < .01$

Table 6
 Matrix of correlations between humor ratings
 of different classes of humor

Age		I B	I C	I D	I E	II	III	IV
5	I A	.338	.298	.038	.236	.382 ^a	.578 ^b	.153
	I B		.184	.003	.359 ^a	.218	.406 ^a	.228
	I C			.552 ^b	.451 ^a	.369 ^a	.502 ^b	.646 ^b
	I D				.408 ^a	.446 ^a	.611 ^b	.593 ^b
	I E					.491 ^b	.469 ^b	.597 ^b
	II						.603 ^b	.830 ^b
	III							.673 ^b
7	I A	.329	.184	.193	.299	.091	.390 ^a	.204
	I B		.142	.293	.226	.027	.151	.029
	I C			-.039	.458 ^b	.131	.228	.173
	I D				.075	.343	.297	.505 ^b
	I E					.126	.368 ^a	.150
	II						.591 ^b	.628 ^b
	III							.619 ^b
9	I A	.089	.348	.317	.486 ^b	.454 ^a	.321	.421 ^a
	I B		.490 ^b	.603 ^b	.401 ^a	.512 ^b	.215	.554 ^b
	I C			.599 ^b	.664 ^b	.667 ^b	.529 ^b	.760 ^b
	I D				.467 ^b	.628 ^b	.495 ^b	.722 ^b
	I E					.649 ^b	.497 ^b	.670 ^b
	II						.471 ^b	.696 ^b
	III							.739 ^b

^a $p < .05$

^b $p < .01$

Thus, 5 year olds who found one type of novelty humor to be funny were also likely to perceive other novelty jokes or cartoons as humorous. Similarly, 5 year olds who found one type of incongruity humor to be funny also found other incongruities humorous. However, there tended to be no relationship among 5 year olds between perceived humor in novelty and incongruity classes of humor.

Unlike the 5 year old group, the 7 year old boys showed very little generality in their humor appreciation. A child in this group who found one class of humor funny did not necessarily see other classes as funny. Only 25% of the correlations for this group reached significance with an average correlation of .258. There were no apparent trends among those relationships which did reach significance.

By age 9, however, 82% of the correlations reached significance, with an average correlation of .517. Again, as with the 5 year olds, the only insignificant relationships (except for IA-IB) were those relating novelty to incongruity classes of humor. Thus at both 5 and 9 humor appreciation is very highly reliable within each basic mode of representation of the expectancy violations involved. The reliability is markedly lower, however, across these modes.

Humor Comprehension and Humor Appreciation

In order to determine the relationship between comprehension of humor and humor appreciation, it was considered necessary to obtain this relationship separately within each subject and for each set of humor stimuli. That is, an approach utilizing mean scores for this analysis would, in the process of summing across several scores, lose information

on the relation between comprehension and funniness for any particular cartoon. In order to avoid this confounding, Pearson correlations were computed between comprehension and humor ratings within each set of humor stimuli and for each subject. These correlations were then converted to z scores and a mean z score was computed for each class of humor within each age group. Finally, these mean z scores were again converted back to correlations. These correlations for each age level and class of humor are shown in Table 7. None of the relationships

Table 7
Correlations between humor comprehension and perceived
funniness for each combination of age level
and class of humor

Age	Humor Class							
	IA	IB	IC	ID	IE	II	III	IV
5	-.061	.128	.213	.059	.077	.012	.045	.101
7	.325	-.013	.169	.182	.183	.202	-.123	.068
9	.053	-.291	.257	-.035	.305	.089	.069	.334

shown in Table 7 reaches significance, indicating that for humor based on the violation of cognitive expectancies, children within this age range do not show an increased humor response to cartoons and jokes as their comprehension of them increases. Since one would expect cognitive humor to be perceived as funnier the better it was understood, this lack of prediction is deserving of some explanation. In

the discussion following below, three alternative explanations have been provided for these findings.

Changes with Chronological Age

While this study was primarily aimed at exploring the significance of children's level of cognitive functioning for comprehension and appreciation of "cognitive" humor, it is interesting to note the consistent significance of age differences in the various dependent variables used. While the writer does not intend in any way to suggest the use of age as an explanatory factor here, these data are presented on the assumption that examination of these age trends might suggest further research on possible underlying factors in the changes described.

Humor comprehension. Table 8 presents the mean comprehension score for each age and each class of humor. One-way analyses of variance (across age) were computed for each class of humor (Hays, 1963). All eight of

Table 8

Mean humor comprehension scores for each class of
humor and each age group

Age	Humor Class							
	IA	IB	IC	ID	IE	II	III	IV
5	2.51	2.47	1.50	1.66	1.81	1.67	2.51	1.13
7	2.80	2.90	1.85	2.30	2.08	2.07	2.84	2.25
9	3.03	3.09	2.57	2.73	2.66	2.57	3.22	2.73

the resulting F's were significant at the $p < .001$ level. For every class of humor, older Ss always showed significantly greater comprehension than younger Ss. It is also interesting to note that for all 3 age groups, humor based on perceptual discrepancies (IA, IB and III) was better understood than humor based on conceptual or ideational incongruity (IC, ID, IE, III, IV).

Humor appreciation. As in the previous analysis, one-way analyses of variance were computed on humor ratings for each class of humor. The mean humor ratings for each age group and class of humor are shown in Table 9. Of these, only the analyses for IC and IV were significant.

Table 9

Mean humor ratings for each class of humor and age group

Age	IA	IB	IC	ID	IE	II	III	IV
5	3.62	3.25	3.04	3.27	3.44	3.71	3.97	2.54
7	3.88	3.37	2.74	3.15	3.52	3.86	4.07	3.63
9	3.62	3.47	3.24	3.13	3.40	3.75	4.08	3.80

While conceptual or ideational incongruities constitute the basis for humor in both of these classes of humor the lowest humor ratings were given by 7 year olds in the former case and 5 year olds in the latter. The highest humor ratings were given by 9 year olds for both IC and IV. In general, then, there appears to be no completely consistent relationship between age and humor appreciation for humor based on violation of either perceptual or logical expectancies.

Descriptive vs. interpretive humor explanations. Chi square analyses (Siegel, 1956) were performed to determine the relationship between age and the tendency to give a descriptive or interpretive account of the basis for humor in cartoon and jokes. The frequency tables for these 8 analyses are shown in Table 10. These analyses were significant for sets IC, ID, IE, III and IV. In all five of these classes of humor, 5 year olds gave primarily descriptive responses while 9 year olds consistently gave a much greater proportion of interpretive responses. Seven year olds were more evenly spread and did not consistently give a greater number of either type of response. In light of the earlier analysis with cognitive scores at age 7, this spread would appear to be due to variability in the degree to which Ss have acquired operational thinking. Cartoons or jokes comprising those classes which did not reach significance appeared to have a "pull" for descriptive explanations. Even with these classes of humor, however, a greater proportion of interpretive responses was associated with increasing age. For all cartoons and jokes employed in this study, then, older Ss tended to give interpretive accounts of humor while younger Ss gave primarily descriptive accounts.

Table 10

Frequency tables for chi square tests of age differences in

descriptive-interpretive humor responses												
IA				IB				IC ^b				
	5	7	9	Tot	5	7	9	Tot	5	7	9	Tot
Descriptive	23	23	12	58	24	20	16	60	19	11	0	30
Interpretive	3	1	9	13	6	9	14	29	4	10	26	40
	26	24	21	71	30	29	30	89	23	21	26	70
ID ^b				IE ^a				II				
Descriptive	24	16	9	49	14	8	5	27	22	18	12	52
Interpretive	6	14	21	41	11	13	21	45	4	7	10	21
	30	30	30	90	25	21	26	72	26	25	22	73
III ^b				IV ^a								
Descriptive	20	11	5	36	10	8	4	22				
Interpretive	8	16	21	45	9	16	25	50				
	28	27	26	81	19	24	29	72				

a $p < .025$ b $p < .001$

Removal of humor content. Chi square analyses were also computed to determine the relationship between age and the ability to successfully remove the core content of cartoons and jokes. The frequency tables for these analyses are shown in Table 11. The only significant age differences found were with respect to humor based on violation of logical

Table 11

Frequency tables for chi square tests of age differences
in Ss' ability to remove the humor content

	IA				IB				IC ^b			
	5	7	9	Tot	5	7	9	Tot	5	7	9	Tot
SUCC	21	29	28	78	20	26	29	75	3	6	23	32
UNSUC	7	1	2	10	10	1	1	12	25	18	6	49
	28	30	30	88	30	27	30	87	28	24	29	81
	ID ^b				IE ^a							
	5	7	9	Tot	5	7	9	Tot				
SUCC	6	17	25	48	14	16	24	54				
UNSUC	22	10	5	37	10	7	3	20				
	28	27	30	85	24	23	27	74				

a $p < .05$

b $p < .001$

expectancies. With all three incongruity classes of humor, 5 year olds tended to be unsuccessful in eliminating the humor in the core content while 9 year olds were generally successful. The performance of 7 year

olds was again inconsistent. In the two classes of humor based upon perceptual discrepancies, even 5 year olds were relatively successful at removing the humor in the core content of cartoons and jokes.

Matching and sequential humor. Three one-way analyses of variance were computed to test for the presence of age differences in the ability to determine the correct match or order of parts in the matching tasks and sequential cartoons. The means on which these analyses were based are listed in Table 12. All 3 of these analyses were highly significant.

Table 12

Mean number of correct matches or orderings by 5, 7 and 9
year olds on matching and sequential cartoons

Age	Sequential	Pictorial Matching	Caption Matching
5	1.63 ^a	3.60 ^a	1.77 ^a
7	3.20	4.20	4.47
9	4.30	4.73	4.80

a $p < .01$

with an increase in correctness of ordering or matching associated with increases in age in each case. Thus, if the ability to choose the funniest picture completion or caption (in the case of the matching sets) and to order multi-sequence cartoons in the correct sequence may be taken as an index of comprehension of the humor depicted, older Ss showed greater understanding of all three of these sets of cartoons.

Subjects' general statements. A one-way analysis of variance was computed on E's ratings (based on a 4 point scale) of S's attempt to make a general statement, based on looking at the cartoons and jokes in set I, about the necessary prerequisites of humor. The mean ratings for 5, 7 and 9 year olds were 1.60, 2.37, and 3.13 respectively. The F test for this analysis was significant at the $p < .001$ level. Thus, older Ss were better able to formulate a hypothesis, based on experience, about the structural characteristics of humor stimuli.

DISCUSSION

The present investigation was primarily aimed at exploring new approaches to the study of children's humor. While the bulk of research on humor has been concerned with psychodynamic aspects of the humor process, the fact that cognitive factors are involved in all humor suggests that it might be profitable to investigate A) the comprehension and appreciation of humor in which the potential satisfaction or relief of "emotional tendencies" by humor stimuli is minimized to as great an extent as possible, and B) the significance of level of cognitive capacity for understanding and appreciating such humor. The latter consideration would appear to be especially important in studying children, in whom level of cognitive functioning is in a relatively high state of flux.

The results of the present study would appear to confirm the hypothesis that a child's level of cognitive functioning is a highly significant variable in determining his comprehension of humor based on incongruity. However, it appears to be a less salient dimension for appreciation of such humor. Three of the four approaches used to evaluate humor comprehension in this study indicated that comprehension of cognitive humor based on violation of logical expectancies (in the form of incongruity) is positively related to the degree of S's acquisition of concrete operational thinking. As would be expected if the transition from preoperational to operational thinking constitutes an important factor in the comprehension of this type of humor, the significant relationships between cognitive level and humor comprehension

were generally restricted to the 7 year age group. This was expected because most 5 year olds are still functioning at a preoperational level while most 9 year olds have already acquired operational structures in at least some spheres. While one might expect some 5 year olds to be accelerated and some 9 year olds to be somewhat retarded in their acquisition of reversible cognitive structures, there should be much less variability among these Ss in terms of their status along this dimension. In the 7 year old group, on the other hand, most Ss should be somewhere in transition between preoperational and operational modes of thinking. The data on Ss' cognitive scores on the Piaget cognitive tasks confirm these expectations. That is, the range of scores for the 5, 7 and 9 year old groups were 3-9, 3-14 and 8-14 respectively. Thus, it was the 7 year old group of Ss that posed the most critical test for this study. If performance on any of the dependent variables considered is contingent upon the capacity for operational thinking, it should be most clearly manifest with 7 year old subjects.

An inspection of the three tables relating to comprehension (Tables 1, 2 and 4) reveals that not only were significant relationships confined mainly to the 7 year old group, but they also occurred primarily for humor based on violation of logical expectancies. Thus, operational thinking does not appear to be necessary for comprehension of humor based on violation of combined perceptual-conceptual expectancies, although it is necessary when conceptual expectancies alone are violated in the form of logical incongruity. These findings

support the initial assumption that the ability to perceive incongruous relationships does depend on the use of logic, and confirms the hypothesis that it is only upon the acquisition of a logic of classes and relations among events that a child may see humor in incongruous relationships. If one can assume that the preoperational child is incapable of experiencing incongruity, it would seem to follow that expectancy disconfirmation for him can only be experienced as novelty. Thus, for a young child, a humor response to violation of cognitive expectancy must be a response to novelty. Since the environment is full of endless novel experiences for a child with only limited experience, one can expect to find in the young child's everyday life endless exhibitions of laughter and humor. But it seems likely that children find some novel experiences to be humorous, while others are considered frightening, or only interesting. One possible differentiating factor here might be the degree to which acquired expectancies are violated. Perhaps only moderate expectancy violations are conducive to a humor response, while very slight violations only arouse our attention and interest and very large violations arouse fear. Future research is needed here to determine the basis for differential responsiveness to expectancy violation.

It is especially interesting to note the data in Table 2 on eliminating the basis for humor. Significant relationships were found here only for 7 year olds' comprehension of incongruity humor. In effect, the child is being asked here to mentally operate on his current cognitive input; he must decenter his current perceptions and

mentally reverse certain elements in the stimulus situation so as to provide a total harmonious or consistent relation among all of the elements. The fact that level of cognitive functioning is not an important factor for removing the humor in sets IA and IB (even most 5 year olds were able to remove the core content in novelty humor) suggests that operational cognitive structures are necessary for this task only when the basis for humor involves the violation of logical expectancies. When novelty constitutes the basis for humor, pre-operational structures are sufficient to allow S to eliminate the humor content. When asked to change these cartoons and jokes, it may be that Ss are merely relying on memory to inform them of the way they have seen a given situation in the past. In order to make the change, then, S must simply describe his expectancy; that is, his prior experience with the stimulus situation in question.

No significant relationships were found at any age between level of cognitive functioning and the ability to generate a hypothesis about the necessary prerequisites for humor. This finding was expected since Piaget's theory holds that the ability to formulate abstract hypotheses does not appear until the onset of formal operational thinking, which generally appears some time around 11 or 12. Furthermore, the present study did not utilize any cognitive tasks designed to measure formal operations functioning.

As with removing the humor content, significant relationships were found between level of cognitive functioning and the tendency to give either descriptive or interpretive explanations for humor only for humor involving violation of logical expectancies, and only for

the 7 year old group. Again, the fact that the type of explanation given depended on cognitive level only within the 7 year old group reflects the fact that this constitutes a transition point in terms of modes of intellectual functioning. Since Ss are pretty evenly split in terms of having begun to acquire operational structures, there is better opportunity to observe the differential influence of different cognitive levels. Since most 5 year olds obtained relatively low cognitive scores and most 9 year olds obtained relatively high scores, there was less opportunity for the influence of operational structures to be manifest. The lack of differential prediction for high and low cognitive score Ss to type of explanation for novelty humor might be accounted for by a kind of "pull" for descriptive responses exhibited by these cartoons and jokes. That is, in stimuli in which perceptual expectancies are violated, the discrepant stimulus elements are physically represented in the stimulus; so a response that focuses strictly upon the core content is likely to be a descriptive one. Of course interpretive responses may always be given to perceptual humor, since S can always attempt to account for how the discrepancy came about or why it is discrepant. Table 3 shows that the pull for descriptive humor explanations in novelty humor is so strong that even 9 year olds (most of whom can be assumed to have acquired operational cognitive structures to some degree) give more descriptive responses to them than interpretive responses. However, a few Ss at each age level are able to overcome this pull and give interpretive rather than descriptive explanations for humor. For stimuli in which only logical conceptual expectancies are violated,

it is impossible to give a descriptive response which identifies the incongruity present since the expectations violated are those for relationships among events rather than the events themselves. Thus, more interpretive explanations would be expected for these stimuli by Ss capable of identifying logical incongruities. Of course a descriptive response may be given to any stimulus; so a number of descriptive explanations are found for incongruity humor as well.

With the exception of the caption matching task for 9 year olds, the data from the present study yielded no significant relationship at any age level between level of cognitive functioning and humor appreciation. For the types of cognitive humor used in this study, then, the level of development of the child's cognitive structures is essential for comprehension of humor based on incongruity, but it does not play a major role in determining the funniness of either novelty or incongruity humor. The cognitive congruency principle advanced by Zigler et al. (1966) would predict that Ss who have acquired operational structures would find humor involving violation of logical expectancies more humorous than humor based primarily on violation of perceptual expectancies. Subjects capable of operational thinking should find humor based on perceptual discrepancies too easily comprehended, and therefore not very funny. Since the perception of incongruities taxes their newly acquired logical reasoning capacities to a greater extent, they should find incongruity humor to be funnier than the novelty humor arising from violation of perceptual-conceptual expectancies. However, all relationships with humor ratings (except

one) were non-significant and bordering zero. Thus, this study does not support the Zigler et al. (1966, 1967) findings with respect to the cognitive congruency principle.

Three alternative explanations might be offered for the failure of this study to support the Zigler et al. data. First of all, Zigler et al.'s approach to conceptualizing level of cognitive functioning may be questioned. That is, the complexity of the child's cognitive apparatus was merely assumed to increase with age; level of cognitive functioning was not in any way measured. While it is true that a wide range of developmental changes are highly reliable with age, it is also true that individual Ss may show great variability in the onset of these changes. If differential performance is to be attributed to some cognitive dimension, then each child's status along that dimension must be measured. Since Zigler et al. worked across rather than within age groups, their data may also have been at least partially due to other factors associated with age, such as a general experience factor.

Secondly, the nature of humor stimuli employed in the present study and in the Zigler et al. studies were very dissimilar. While the cartoons in the latter studies "...sampled a wide range of psychological content areas, for example, general hostility, dependency, and child-adult relations", the present study made every effort to eliminate such bases for humor. If the cognitive congruency hypothesis is a true phenomenon, it would be expected to be manifest most clearly in humor based on violation of cognitive expectancies. That is, if it is indeed the "stretching" of S's cognitive abilities which is the

crucial factor here, prediction in line with this principle should be strongest for humor which is primarily based on their functioning. The fact that this does not appear to be the case (for the present data) suggests that it may have been the tapping of emotion-laden content in the Zigler et al. studies which accounted for their findings. That is, "getting the point" of a joke or cartoon at the edge of one's cognitive abilities may give rise to a greater mirth response than one easily comprehended when the humor content is emotionally salient to the subject. Since careful efforts were made to neutralize any emotionally-relevant content areas in the present study, this may account for the discrepant findings. Perhaps cognitive humor like that employed in the present study does satisfy a type of effectance motive (White, 1959) but the barren emotional content of the joke or cartoon simply reduces the level of accompanying emotional expression. Hence, one may experience cognitive humor as being funny in the sense of being clever; that is, one may have a more purely cognitive appreciation of cognitive humor. A complicating factor in drawing any conclusion here lies in the way the two studies obtained "funniness" data. The main findings of the Zigler et al. studies were based on ratings by E of overt expressions of affect by S (such as smiling and laughing), while the present study utilized humor ratings given by S for each humor stimulus. Thus, approaches using overt affective expression and intellectual statements given by S may be measuring two different aspects of the humor response.

Thirdly, while humor stimuli in the present study were objectively defined in terms of complexity level before the beginning of

the experiment, an S's humor response might actually be based on identification of violated expectancies at either of the two complexity-defining levels. That is, S may not perceive the logical inconsistency in an incongruity-based cartoon or joke, (and hence get a low comprehension score) but may find it very funny strictly in terms of certain perceptual characteristics (in the case of cartoons). Thus, S may find funny aspects of the stimulus other than those comprising the core content, and base his humor response on those. The fact that Ss knew that these were cartoons and jokes, and that cartoons and jokes always have something funny in them, may have contributed to this type of responding.

Reliability of humor comprehension scores across different humor classes was generally quite low. While sporadic significant relationships were found at each age level, these were inconsistent and no real trends were apparent. If the primary element of commonality or difference among the various classes of humor was the kind of cognitive expectancies violated, one would expect high reliabilities within modes of expectancy violation and low reliabilities across modes. That is, if the most salient feature of cartoons or jokes based on violation of logical expectancies is that such expectancies are violated, Ss who comprehend incongruity cartoons with captions would be expected to also understand incongruity jokes and incongruity cartoons without captions. Similarly, all types of novelty humor should be equally well understood. However, a child who understood humor in which the use of logic was not a factor would

not necessarily be expected to understand humor based on violation of logic. The fact that these expected findings did not occur suggests that other dimensions along which the humor stimuli varied were also important. That is, there may be very significant differences in the type of vehicle used to express the discrepancy within each of these basic modes of establishing expectancy violations. The cognitive requirements for identifying expectancy violations in a joke may differ from those using the same class of expectancy violations in a cartoon. This idea receives support when the correlations between specific stimuli within a given humor class are considered. When these correlations were computed separately for each age and class of humor, the lowest correlation obtained was .55, with most of the correlations falling between .60 and .80. Thus, comprehension scores within each class of humor were highly reliable while comprehension scores between different classes were relatively unreliable. Future research is needed here to isolate additional salient features of humor stimuli based on violation of cognitive expectancies.

The data on reliability of humor ratings (i.e., funniness ratings given by S) across different classes of humor are also puzzling. At both the 5 and 9 year age levels humor ratings are highly reliable across humor classes. At each of these age levels, with the exception of the relation between novelty cartoons and novelty jokes, the insignificant relations are almost exclusively those involving two different bases for expectancy violation. Thus, Ss who found humor based on violation of perceptual-conceptual expectancies to be funny

did not find humor based on violation of logical expectancies to be very funny, and vice versa. This finding would be reasonable in light of the cognitive congruency principle if it turned out that 5 year olds were giving high ratings to novelty humor and low ratings to incongruity humor, while 9 year olds were doing the opposite. However, the relative sizes of the mean humor ratings for 5 and 9 year olds shown in Table 9 suggests that this is probably not the case. Thus, it is difficult to account for this similarity in humor responsiveness on the basis of cognitive factors. It is equally difficult to account for the lack of reliability among 7 year olds' humor ratings for different humor classes. There is no consistent trend among the few correlations which did reach significance for 7 year olds. The only possible explanation the writer can offer for these findings is that the 7 year olds are in a transition period for the acquisition of logical reasoning, so they may have been inconsistent in their understanding of incongruity humor. Since these correlations were based on means of responses for 3 or more stimuli representing a given class of humor, it may be that some incongruity stimuli were considered funny while others were not. This may have contributed to the washing out of any relation between humor ratings.

Since an important aim of this study was to show that the approach used here provides information which an IQ score approach cannot provide, some mention should be made of the prediction of IQ scores to the various bases for defining comprehension used. For the critical age 7 group, analyses of incongruity humor showed: 1) there were no

significant relationships between IQ and comprehension based on S's verbal explanation of humor; 2) no relationships were significant between IQ and ability to eliminate the humor in a cartoon or joke; 3) only for set IV did high IQ Ss show a significantly greater frequency of choice of the correct caption (match) - the relationships for sets II and III were not significant; 4) only for set IC did high IQ Ss show a significantly greater frequency of interpretive explanations of humor than low IQ Ss. All other such relationships for incongruity humor were not significant.

Finally, it should be noted that except for the data on humor ratings, nearly all of the response measures obtained in this study were found to vary significantly (generally an increase) with increasing age. While these data were briefly reported, the writer has not dwelled on them at any length since a major concern of the present study was to go beyond the mere description of age differences and attempt to identify relevant underlying factors which give rise to age differences in performance. Thus, the writer's concern has been to discuss the significance of one such factor, namely level of cognitive functioning, for differential humor comprehension and appreciation within different age levels.

SUMMARY

The present investigation was designed to test children's level of cognitive functioning and their ability to understand the basis for humor in cartoons and jokes. This study has abandoned an approach relying on either age alone or IQ scores for evaluating level of cognitive functioning, since neither of these approaches yields information on the acquisition of specific cognitive capacities and their significance for comprehension of various types of humor. Rather, the theoretical framework advanced by Piaget was utilized as a basis for predicting the relationship between the acquisition of particular cognitive structures (namely, concrete operational structures) and comprehension of humor based on violation of cognitive expectancies.

An effort was made to eliminate usage of any humor stimulus in which satisfaction of some emotional "tendency" (e.g., aggression, sex, superiority, etc.) provided the main basis for humor. Rather, a more purely cognitive type of humor was used. In all cartoons and jokes used in this study, the violation of cognitive expectancies constituted the primary (if not the sole) basis for humor. Two types of cognitive expectancies were differentiated, corresponding to the two classes of humor used in this study. First, in a preconceptual child expectancies can be assumed to be acquired and violated on a purely perceptual basis. With the onset of conceptual thinking, violations of cognitive expectancies probably entail simultaneous perceptual and conceptual discrepancies. Humor based on violation of such expectancies was classified as novelty humor; the discrepant

situation is seen as funny simply because it is different from what was expected. A second class of humor, incongruity humor, was considered to involve violation of logical (these occur only at a conceptual level) expectancies. The use of logic was postulated as being essential to comprehension of incongruous relationships. This study tested the general hypothesis that the possession of operational thinking (as defined within Piaget's system) is essential for comprehension of incongruity humor but is not necessary for comprehension of novelty humor.

Four different approaches were used to determine the relationship for 5, 7 and 9 year old boys between level of cognitive functioning and comprehension of novelty and incongruity humor: 1) giving a verbal explanation for why a cartoon or joke is funny; 2) eliminating the humor elements in a cartoon or joke; 3) ordering cartoons in the correct sequence or choosing the funniest caption or pictorial match; and 4) generating a hypothesis about the necessary prerequisites for humor. As expected, significant prediction was found only for 7 year olds in nearly all analyses. The results for the 7 year old group were as follows; 1) scoring Ss' verbal explanations for comprehension, the degree of acquisition of operational thinking showed a significant positive relation with comprehension with 3 classes of incongruity humor and the pictorial matching task; 2) operational thinking was necessary for elimination of the basis for humor only with incongruity cartoons and jokes; 3) operational thinking was always associated with more correct ~~orderings~~ or matches, although significance was

found for only 2 of these 3 tasks; 4) no relationship was found between level of cognitive development and the ability to generate a hypothesis about the necessary prerequisites for humor.

Further analysis of the data showed operational thinking to be an important factor in the ability to give an interpretative, as opposed to a descriptive, account of the basis for humor in incongruity humor. No relationship was found, however, for novelty humor. Level of cognitive development was not significantly related to humor appreciation for either novelty or incongruity humor. Furthermore, in contrast to earlier studies, no relation was found between humor comprehension and humor appreciation at any age level for the type of cognitive humor stimuli used here.

While the present study makes an effort to deemphasize an approach which simply delineates changes in behavior with age, analyses of age differences were computed with the hope of providing some impetus to future research into the factors underlying such age differences. With the exception of humor appreciation, significant positive relationships with age were found for nearly all analyses involving incongruity humor. Age differences for novelty humor were relatively infrequent.

APPENDIX A

SET I

Novelty Cartoons

Novelty Jokes

1. Molly the elephant is very kind-hearted. In yesterday's parade she stepped on a mother bird, and then went up to the bird's nest and sat on the baby bird to keep it warm.
2. Our cat swallowed a ball of yarn, and when she had kittens they were all born with sweaters on them.
3. I went into a pet shop yesterday to buy a bird, and a parrot looked up at me and said "hello". When I didn't say anything, the bird looked up at me and said "What's the matter, can't you talk"?

Incongruity Cartoons

With Captions

"THE PHONE IS RINGING..... LET ME GO..... I HAVE TO ANSWER THE PHONE!"

"GOOD HEAVENS, DEAR, WE'VE JUST HAD A BABY!"

"NOW, IF I REMEMBER CORRECTLY...."

"HURRY UP SIR! I'LL TELL YOU HOW THE MOVIE ENDS!"

Incongruity Jokes

1. 'Well, I see you have a new dog. I thought you didn't like dogs.'

'Well, I don't. But my mother bought a lot of dog soap on sale, so we had to get a dog to use it up.'

2. 'What are you laughing at?'

'Nothing sir. I'm just practicing so I can be ready when you say something funny.'

3. Mr. Smith: 'Why are you so sad?'

Mr. Jones: 'My best friend just got run over by a train.'

Mr. Smith: 'Gee, that's too bad.'

Mr. Jones: 'That's for sure! He was wearing my best suit.'

4. Mother: 'Wake up! Wake up!'

Father: 'What's the matter? What happened?'

Mother: 'I forgot to give you your sleeping pills.'

5. John: 'How far is it to your house, Susan?'

Susan: 'Oh, about four miles. You can walk it easily in an hour if you run.'

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Incongruity Cartoons

Without Captions

SET II

Sequential Cartoons

"I HAVE TO GO TO
THE BATHROOM."

SET III

Pictorial Matching

SET IV

Caption Matching

1. "ISN'T IT A BEAUTIFUL VIEW FROM HERE?"
2. "I'LL RACE YOU DOWN THE HILL."
3. "I NEVER DREAMED THAT SKIING WAS SO EASY."

1. "NOW JOHNNY, ITS TIME TO GO HOME."
2. DON'T BE AFRAID JOHNNY . . . JUST THINK OF IT AS A SKI LIFT."
3. "DON'T BE AFRAID JOHNNY . . . IT WON'T HURT YOU."

1. "BEFORE YOU SAY A WORD, LET ME TELL YOU ABOUT THE BAD DAY I HAD."
2. "HOW DID THIS HAPPEN?"
3. "HOW WILL WE EVER FIND THE MONEY TO PAY FOR THIS FIRE?"

1. "ITS A LIST OF COMPLAINTS AGAINST THE SENATOR."
2. "IT SAYS HE'S OUT TO LUNCH."
3. "IT A LIST OF INSTRUCTIONS FOR OUR JOB THIS WEEK."

1. "GOOD SHOT SIR !"
2. "YOU WIN SIR . . . CAN WE GO TO THE LIFE BOATS NOW, BEFORE THE SHIP SINKS?"
3. "ITS STILL YOUR TURN, SIR . . . YOU KEEP SHOOTING UNTIL YOU MISS."

1. "THAT'S A LOT MORE ALLOWANCE THAN I GIVE MY KIDS."
2. "WELL, ITS NOT TOO SERIOUS . . . JUST SEE THAT HE GETS A LOT OF REST."
3. "I'LL GIVE YOU SOME MEDICINE TO MAKE IT LESS PAINFUL."

APPENDIX B

APPENDIX C

Comprehension Rating Manual For Specific Humor Stimuli

Set I

1. Fish Bowl - TV

- 1) Because her face looks funny - because the TV man is there.
- 2) Either "because a man is in the fish bowl" or "because fish are in the TV", but not both responses. The S may or may not mention other usual or irrelevant details, but still gets a "2" if only one of these points is made. Or, give a "2" if S makes both points but includes extraneous material also; e.g., "because a man is in the fish bowl and the fish are in the TV and the TV repairman is there."
- 3) A response which mentions both of the above points and includes no other peripheral details; e.g., "because the man is in the fish bowl and the fish are in the TV".
- 4) Because they're just the opposite - because they should be the other way around - because the man is in the fish bowl and the fish are in the TV, instead of the other way around.

(Note: This cartoon is a unique case in that two incongruous situations are central to the total humor stimulus.)

2. Molly The Elephant

- 1) Because the elephant stepped on the bird - because there was a parade - because the birds are in the nest.
- 2) Because the elephant stepped on the mother bird and then went up to sit on the baby birds - because the elephant is sitting on the nest and the birds are in the nest.
- 3) Because the elephant went up to the birds' nest (to keep the baby birds warm) - because the elephant is in the tree - because the elephant is sitting on the nest - because the elephant sat on the baby birds. (Two or more of these still get a score of "3".)
- 4) Because the limb would break - because an elephant can't climb into a tree - because an elephant is too heavy to sit on a

nest (limb) - because the elephant was acting as if it were the mother bird - because birds sit on nests and elephants can't.

3. Fire and Phone Ringing

- 1) Because the house is on fire - because firemen are putting out the fire - because she said the phone is ringing - because they won't let her go in - because they're putting out the fire and the phone is ringing.
- 2) Because she wants to answer the phone but can't because the house is on fire - because the house is on fire and they won't let her go answer the phone - because they're going to use her to knock the door down.
- 3) Because she wants to answer the phone - because the house is on fire and she wants to answer the phone.
- 4) Because she would get burned if she went in to answer the phone - because she's not concerned about her house - because you would have to be crazy to go into the house when its burning - because she thinks its serious to answer the phone when her house is burning.

4. Dog Soap

- 1) Because they washed the dog with dog soap - because the dog soap was on sale - because he didn't like dogs.
- 2) Because she didn't like dogs, but had to use up the dog soap - because the mother had to get a dog - because they got some dog soap and had to buy a dog - because he's not supposed to like dogs.
- 3) Because they bought a dog just to use up the dog soap - because she bought dog soap and didn't have a dog - because they bought a dog when they didn't even like dogs - because they didn't like dogs, but got one just because the mother got some dog soap.
- 4) Because you don't have to get a dog just because you have some dog soap - because there was no reason to buy the dog soap if they didn't have anything to do with it - because they could have just given the dog soap away, and didn't need to buy a dog - because she had to buy the dog soap just because it was on sale, even though she didn't have a dog to use it on.

5. Space Ship

- 1) Because both rockets are on the moon - because there are two space ships going to the moon - because the man is getting into the rocket - because that man (boy) has a funny face - because there's a big rocket and a little rocket.
- 2) Because those kids are on the moon - because the two little kids came in a smaller rocket than the men - because the kids are going to the moon in a rocket too - because the men have their rocket and the kids have their own rocket too - because he's just getting on (off) and the rocket is blasting off.
- 3) Because these kids built a rocket that went to the moon - because the kids got there before the astronauts - because the kids are already there and the men are just getting there.
- 4) Because those couldn't land a space ship on the moon - because the kids couldn't possibly get there before the men (astronauts) - because kids couldn't build a rocket that would get to the moon.

6. Dog Carrying Car

- 1) Because the dog is chasing a car (and the man and woman are watching) - because the dog is tearing up a play car - because they're watching their dog.
- 2) Because the dog is carrying a car and the man and woman are watching - because the dog is eating their car and they are talking - because the dog is carrying that car and a cat (man, dog) is inside the car.
- 3) Because the dog is carrying (biting, eating) that car - because the dog tipped that big car over - because the dog is so big it can carry that car.
- 4) Because a dog can't be big enough to do that (carry a car) - because a dog usually carrying a bone, but here he's carrying (bringing back) a car - because the dog is carrying the car rather than the car carrying the dog - because the dog is carrying the car but the car is bigger and heavier than the dog.

7. Kittens Born With Sweaters

- 1) Because the mother had kittens - because the yarn was in a ball.

- 2) Because the kittens had sweaters on (no specification that they had them on when born) - because cats don't like to eat yarn - because the cat swallowed a ball of yarn.
- 3) Because the kittens were born with sweaters on - because the cat swallowed a ball of yarn and the kittens were born with sweaters on.
- 4) Because the kittens couldn't have sweaters on when they are born - because she couldn't swallow yarn and then have it get on the kittens - because the mother couldn't make a sweater in her stomach - because how could they get knitted in there?

8. Operation

- 1) Because his feet are sticking out - because they're operating - because he has glasses on - because the men are doctors - because they're giving him a shot - because of the big light overhead.
- 2) Because he said "now if I remember correctly..." (and he didn't say anything else - because he didn't finish his sentence - because he can't remember what to do, and his feet are sticking up.
- 3) Because he can't remember what to do - because he doesn't know what to do - because he's trying to remember what to do - because he forgot how to operate.
- 4) Because he's a surgeon (doctor) and doctors don't forget what to do - because a doctor should know how to operate, but he doesn't - because the doctor says "now if I remember correctly..." and doctors are supposed to know everything.

9. Practice Laughing

- 1) Because he said something funny - because he's laughing - because the man says "what are you laughing at?" - because when the man says something funny, they should both laugh.
- 2) Because he said "I'm just practicing so I can be ready when you say something funny" - because he wants to be ready to start laughing - because he was laughing at something; he said he wasn't, but he was - because he's making a list of funny things and waiting for someone to say something funny, and he will laugh.

- 3) Because he's practicing laughing - because he's practicing for when he says something funny.
- 4) Because he was laughing at nothing - because there was no reason to laugh - because you don't have to practice laughing - because you just laugh when there is something funny; you don't need to practice.

10. Taxi Service

- 1) Because the man has a beard - because the car doesn't have a top - because the man is driving the car - because he's stopping - because he's sad.
- 2) Because its only a one-man car so two couldn't fit, and its an old time car - because the taxi is too small for other people, and the man is fat - because there's no back seat and he has a beard - because its too beat up a car to be a taxi - because there's a mail box on the car.
- 3) Because there's no room for anyone else - because only one man can get into the car - because there's no back seat - because he's taking up all the space.
- 4) Because it can only function as a taxi if it has room for other people - because its supposed to be a taxi but the car is only big enough for him - because the taxi driver takes up all the room, but he has a taxi sign on his car - because there's no back seat and its supposed to be a taxi.

11. Policemen on Big Bikes

- 1) Because they're rolling that - because the wheels are going that way - because they have big wheels with the little wheels - because they're riding on bicycles - because those bikes are hard to get on.
- 2) Because two policemen are riding on big bikes and they are looking at each other - because those wheels are too big - because the men are too little to ride on them - because they're in a modern city and are riding old bikes - because they're riding bikes with big wheels (no specification that they are policemen).
- 3) Because the policemen are riding old (big, high, etc.) bikes.
- 4) Because policemen should be on motor cycles or in cars (not on

bikes like that) - because you don't usually see policemen on bikes like that - because you wouldn't be able to catch robbers (in general, fulfill a policeman's role) on bikes like that.

12. Parrot Talking

- 1) Because the bird is in a pet shop - because he's going to buy a bird - because the man is in a pet shop - because birds aren't allowed in pet shops.
- 2) Because the bird talked and the man didn't, and the man was surprised (shocked, angry) - a complete repetition of the joke - because the man didn't (couldn't, wouldn't) talk - because the bird talked - because the man really could talk, but didn't want to - because the parrot thought the boy couldn't talk.
- 3) Because the bird said "what's the matter, can't you talk?" - because the bird talked and the man didn't.
- 4) Because (usually) a man can talk but a bird can't (here its the other way around) - because the boy should be talking to the bird rather than vice versa - because the bird talks as if he can think (like a person) - because parrots don't know how to say all the words people know.

13. Plane Sinking

- 1) Because the plane crashed in the water - because she can't remember how the movie ends - because all the men are trying to get in there and the lady is in the way - because they're on a boat and the door on the plane is open.
- 2) Because the plane is sinking (and one man is still in there) and she says "hurry up sir, I'll tell you how the movie ends" - because the man won't come out of the plane and she yells "hurry up ..." - because the plane should sink if it crashed - because they landed in the water just to go to a movie - because the plane should be in the sky - because the plane is sinking and she's trying to get in.
- 3) Because the plane crashed (is sinking) and the man is still watching a movie - because the plane is sinking and a man won't come out - because the man won't come out of the plane until he sees how the movie ends.
- 4) Because he'll drown if he stays in there - because he'll

sink with the plane if he keeps watching the movie - because he's so interested in the movie that he just sits there watching while the plane sinks - because he's more interested in watching the movie than in getting out of the plane.

14. Best Suit

- 1) Because he (his best friend) got run over by a train - because he shouldn't have run in front of the train - because his best suit was ruined - because all the men are talking.
- 2) Because Smith was sad because he (Jones) was wearing his best suit, and he shouldn't have run across the track - because he was wearing his best suit - because he shouldn't have been wearing his best suit - because his best friend got run over and had his best suit on - because he said "I'll say, he was wearing my best suit".
- 3) Because he was sad about his best suit being ruined - because Smith was sad that his best friend was wearing his best suit when he was run over.
- 4) Because he wasn't sad (didn't care) about his friend - because he was just sad about his suit and didn't care about his friend - because he was more concerned about his suit than about his friend.

15. Super Floor Cleaner

- 1) Because she has a long nose - because the super floor cleaner is in the box - because she's washing (mopping, cleaning) the floor (with super floor cleaner) - because it says super floor cleaner, and she's getting her floor so white - because the mop is too long.
- 2) Because she's sweeping up and the dirt came all the way over here; and it should be black and white, not just white - because its taking off the floor, and the people coming wouldn't like that - because she's painting her floor white.
- 3) Because she's cleaning the tiles (paint, checks) off the floor - because the super floor cleaner is cleaning off those spots (checks) - because she's washing her floor and all the checks are coming off.
- 4) Because she couldn't sweep up those checks like that - because you couldn't just wipe the tiles up like that - because the super floor cleaner took off the tile instead of just cleaning

the floor - because the super floor cleaner is so strong that it takes the tiles off too.

16. Car Upside Down

- 1) Because he has a long nose - because she looks mad - because the boy is tiny and she's big - because the husband is walking behind and she's complaining that he can't drive.
- 2) Because the car is upside down in the garage and she's walking away looking mad - because the car is upside down and he has a long nose - because they put the car in upside down and then went and stole some money - because the wife is much bigger than the husband - because she turned the car upside down so she wouldn't have to go to work.
- 3) Because the car is upside down in the garage - because the car shouldn't be upside down - because she drove in (parked) upside down.
- 4) Because there's no way she could drive in upside down (unless she was in a wreck) - because no car could run on its roof - because you can't get a car in a garage like that.

17. Sleeping Pills

- 1) Because she forgot to give him his sleeping pills - because the mother said "I forgot to give you your sleeping pills" - because he's taking sleeping pills.
- 2) Because she forgot to give him his sleeping pills and he was already asleep - because he slept without his sleeping pills - because he was already asleep, and if he forgot to take his sleeping pills he wouldn't be asleep - because its too late - because she woke him up too early.
- 3) Because she woke him up just to give him his sleeping pills - because he was already asleep - because she forgot to give him his sleeping pills and woke him up when he was already asleep.
- 4) Because he didn't need the sleeping pills - because she didn't have to wake him up (because he was already asleep) - because he was already asleep without them (and didn't need them) - because you wouldn't wake him up just to tell him to take sleeping pills.

18. Good Heavens Dear

- 1) Because they're going to have a baby - because she has a pointed nose - because she's (he's) reading a big book - because he's reading a paper.
- 2) Because the man is real fat and the woman is real skinny and they've had a baby and didn't know it - because they didn't go to a doctor to have the baby - because she just had a baby and she's not in the hospital - because he was reading the paper, and said "good heavens dear, we've just had a baby" - because he read in the paper that they just had a baby.
- 3) Because he didn't know that they had a baby until he saw it in the paper - because its in the paper and they didn't even know it yet - because he was surprised when he read that in the paper - because he thinks they've just had a baby.
- 4) Because they would have to already know - because it couldn't (shouldn't) be in the paper without them knowing it - because someone else with the same name had a baby and he thought it was them - because he probably wasn't listening when she told him he didn't know.

19. Walk if You Run

- 1) Because they're running - because he has to run - because she said she walked real far - because they were supposed to get her - because he's four miles from Susan's house.
- 2) Because its four miles to her house and she says you can walk it in an hour if you run - a total repetition of joke - because four miles is too far to walk (run) - because you couldn't run (walk, get there) there in an hour.
- 3) Because she said you can walk there in an hour if you run - because she said you can walk if you run (or walk and run) - because first she said to walk and then she said to run.
- 4) Because you can't walk and run at the same time - because its all mixed up; it says to walk but then says run - because it says to do opposite things (or two different things).

20. Fish in Tree

- 1) Because he has baseball socks on - because he has an axe - because he's chopping down a tree - because he's trying to

get his fishing pole out of the tree.

- 2) Because his fishing pole is caught in the tree and he's chopping down the tree to get it, and it looks like it will fall toward him - because a fish is hanging in the tree - because he's chopping the tree down to try to kill the fish - because he couldn't get his fishing pole tangled up that high - because his fish is stuck and he's trying to get it down.
- 3) Because he's chopping down the tree just to get his fish (pole, line) down - because he got his fish stuck in the tree, and he's chopping down that whole tree just to get it.
- 4) Because its unusual to chop down a whole tree just for a fish - because he's chopping it down rather than climbing it (or getting a ladder, cutting the line, catching another fish) - because no one would do that for a fish - or in general, any response specifying a simpler way or getting the fish down.

Set II - Sequential Cartoons

1. Bathroom

- 1) Because he says he has to go to the bathroom - because he wants to go to the bathroom and then wants to go back out - because she's taking off his clothes - because the mother takes his clothes off and he goes to the bathroom - because he has to go to the bathroom, and here he's taking his clothes off.
- 2) Because he has to take his clothes off again, and half of her is missing - because the woman's body isn't there - because his clothes are too big - because he takes his clothes off and then puts them back on - because he told his mother he had to go to the bathroom and she took off all of his clothes - because he's in his snowsuit and he has to go to the bathroom.
- 3) Because he gets all ready (or he gets all those clothes on) and then has to go to the bathroom - because she goes to all that trouble to get him dressed and then he says he has to go to the bathroom (and she has to take everything off again) - any response tying together getting him dressed and a) his having to go to the bathroom, or b) having to undress him again.
- 4) Because he didn't go to the bathroom before he got dressed - because he had to go to the bathroom when he was all dressed, but he didn't while (before) he was getting dressed - because he didn't say he had to go to the bathroom until she was all finished dressing him.

2. Dog Chasing Stick

- 1) Because he's hiding his eyes - because the man throws a stick, the dog runs for it, the tree falls down and the man won't look - because he's hiding from the dog, and then throws a stick and the dog goes after it - because he's training the dog to fetch a stick.
- 2) Because he brought back a tree and it doesn't look like a dog - because first the man throws a stick, and then the dog chases it and brings back a tree - because the man throws a stick and the dog brings back a tree and the man covers up his eyes - because that's not a dog - because the dog is climbing a tree - because the man threw the stick for the dog and the dog climbed up a tree to get it.
- 3) Because the dog brought back (is carrying) a tree - because the man threw a stick, but the dog came back with a tree - because the dog thought the tree was the stick, so he brought back the tree.
- 4) Because a dog couldn't carry (pull out, lift) a big tree - because a dog wouldn't confuse a tree for a stick.

3. Dragon's Birthday

- 1) Because he wants a piece of cake - because he's tipping the cake over - because he's blowing out the candles - because he can't blow them all out - a description of successive pictures, in which S describes blowing the candles out.
- 2) Because the dragon is blowing fire on the candles and wants a piece of cake - because he's tipping the cake over and then puts fire on the cake - because he's blowing out the candles with his fire - because dragons don't have birthdays - because the dragon baked a cake - because he brought him a cake and it wasn't even his birthday.
- 3) Because the dragon is blowing fire on the candles (cake) - because the mother brought a cake and the baby dragon blew out fire and lit the candles - because the dragon lit the candles with his fire.
- 4) Because the dragon lit (or dragons light) the candles instead of blowing them out - because the dragon lights the cake when he blows, but people blow the candles out - because the dragon lit the candles with his fire rather than a match - because dragons don't need matches to light the candles; they can just blow their own fire.

4. Cars Standing Up On End

- 1) Because the cars are going up a hill - because the cars were hotrodding and they crashed - because they want to cross the street.
- 2) Because he raises his hands and the cars go up and then he crosses the street - because the cars are going by very fast, and then they raise their fronts up - because they're walking along and he raises his hands and the cars go up (crash) - because they're trying to cross but the cars are going by too fast, as he gets them to stop and they cross - because he wanted the cars to stop so they could walk through; then the cars went up so they could cross.
- 3) Because he made the cars go up - because he just raised his hands and made all the cars go up on their back ends - because they couldn't cross, so he made the cars go up so they could walk through - because the cars are standing up one one end.
- 4) Because real cars can't go up like that - because no one could just put their hands up and make that happen (make the cars go up in the air).

5. Big Horn in Trunk

- 1) Because he passed a red light and bumped into him - because he crashed into another car and this car blew up - because that big horn made a lot of noise - because the man wasn't watching and bumped into the other car - because the man is blowing his horn, then this guy bumps him, and then he blows his horn too.
- 2) Because he had a gun (cannon) in his trunk - because he has a blower in the back to keep other cars away - because he has a horn in the back of his car - because he blew up the other car - because the big car beeped and then a horn came out of the little car and blew the other car up - because the big car blow his horn at the little car and the little car blew him up with his big horn.
- 3) Because that little horn blew the other car up - because that great big horn came out of that little car's trunk.
- 4) Because a horn that big couldn't come out of that car - because a horn couldn't blow up a car like that.

6. Elephant Chasing Stick

- 1) Because the elephant looks funny - because the elephant has a curled up nose - because the elephant is carrying (pulling up) a tree - because the elephant is standing up - because the man is covering his eyes.
- 2) Because the man was trying to train the elephant to fetch a stick, but the elephant brought back a tree - because the elephant is chewing on a tree - because the elephant brought back a tree rather than a stick.
- 3) Because the man is throwing a stick for an elephant to chase - because the elephant is chasing a stick - because the man is trying to train an elephant to fetch a stick - because the elephant brings back a tree like a dog would bring back a stick.
- 4) Because an elephant can't chase a stick (like a dog) (so he comes back with something his own size) - because a stick is the right size for a dog, but not for an elephant - because the man thinks an elephant can chase (pick up) a stick (small things).

Set III - Pictorial Matching

1. Elephant Dancing

- 1) Because it looks like part of a cartoon - because he's singing and he's playing - because he's laughing.
- 2) Because the elephant is dancing (with a dress on) and the man is laughing - because the elephant has a dress on - because it's an elephant - because an elephant would go right through the floor.
- 3) Because the elephant is dancing like a person (with a ballet dress on) (to the music) (and wearing clothes). -
- 4) Because an elephant can't (doesn't) dance like that - because whoever heard of an elephant dancing and wearing clothes? - because a man is playing the piano and an elephant is dancing, but an elephant can't dance like that - because usually a girl would be dancing inside to a piano, not an elephant.

2. Legs Upsidedown

- 1) Because he has bandages all over - because there's a nurse there.

- 2) Because his feet are upsidedown and all bandaged and in the air - because of his legs - because that woman turned the bed over.
- 3) Because his feet (legs) are upsidedown (backwards).
- 4) Because you usually can't turn your legs like that - because his feet couldn't be turned backwards - because your legs wouldn't be like that unless you were in an accident.

3. Little Dog House

- 1) Because he's hammering a nail - because the little boy is making a dog house - because he's building a dog house and the dog looks sad.
- 2) Because there's a nail and the dog house is too small for the dog - because he's going to break down the house - because the dog house isn't fixed yet - because he's making a little dog house.
- 3) Because its a big dog and a little dog house - because he's making a small dog house for that big dog.
- 4) Because he's doing all of that for nothing; he's building it so small that the dog can't get in - because he doesn't even know that his dog won't be able to get in.

4. Bird With Hair

- 1) Because they're talking - because its a girl bird - because that's the mother bird and that's the father - because that's a lot of eggs in the nest.
- 2) Because she's talking about something and she has long hair - because she has long hair but he doesn't.
- 3) Because the bird has (long) hair - because the bird has a hair-do.
- 4) Because birds have feathers. not hair - because birds don't have long hair like that - because you don't usually see a bird with hair - because the mother bird has long hair like a girl usually has.

5. Steam Room

- 1) Because he's going to close the door on him - because he's holding his pants up - because he's opening the door.

- 2) Because he shrunk and he has a towel around him - because one man is big and one man is little - because that man is smaller than most people - because he opens the door and a little man comes out.
- 3) Because he got smaller (shrunk) in the steam room - because he was real big before and he came out of the steam room real little - because he took a steam bath and came out real small.
- 4) Because you are supposed to lose weight in a steam room, but it doesn't make you smaller - because you can't shrink people like that - because a steam room can't make you little.

Set IV - Caption Matching

1. Ski Lift

- 1) Because she thought skiing was hard - because she likes to ski.
- 2) Because she thinks skiing is easy - because skiing is not easy - because skiing is really hard; it just looks easy - because she said "I never dreamed that skiing was so easy".
- 3) Because she's just riding on the ski lift and she says "I never dreamed..."
- 4) Because she doesn't know that this is just a ski lift - because she thinks she's skiing, but she's just on the ski lift (or, but she's not) - because she's new at skiing and thinks she's skiing, but she's not.

2. Don't Be Afraid Johnny

- 1) Because he doesn't think its a ski lift - because he's crying.
- 2) Because he's afraid of the escalator - because she says to think of it as a ski lift - because its not really a ski lift.
- 3) Because he doesn't want to go on the escalator and she says "don't be afraid, Johnny, just think of it as a ski lift".
- 4) Because a ski lift is more dangerous (frightening) than an escalator - because he should be more afraid of a ski lift than an escalator.

3. Bad Day

- 1) Because the woman wants to tell the man something - because

the house is all burned up - because they had a fire - because he just came home from a hard day at work.

- 2) Because he won't let her say anything - because she didn't get a chance to say what happened.
- 3) Because he doesn't notice what happened to his house - because his house is all burned down and he says "wait until you hear about the bad day I've had".
- 4) Because he thinks his day was bad, but hers was much worse than his - because he seems more concerned about his bad day than about his house burning down.

4. Out To Lunch

- 1) Because he went out to lunch - because he's done working - because he should have brought his lunch to his office.
- 2) Because that long list says he's out to lunch, and he's probably not supposed to be - because he isn't going out to lunch - because he's out to lunch and its time to be working - because its such a long list - because it says he's out to lunch.
- 3) Because that big long list just says he's out to lunch - because it says he's out to lunch and its such a long list.
- 4) Because you don't need all that writing (space, room) to say that you're out to lunch - because he left a big long note instead of just saying "out to lunch".

5. Plaster Caste

- 1) Because the nurse is there - because he has bandages on - because his leg is in a caste.
- 2) Because the nurse thinks its a mummy - because its not empty, but they say it is - because they must have forgotten to put him in when they made the caste - because he had to get all those bandages off to get out.
- 3) Because he's all bandaged up and the doctor says "Nurse, Mr. Smith's plaster caste is empty" - because he's all wrapped up in a caste and they say his caste is empty - because his plaster caste is empty.
- 4) Because there's no way he could get out of the caste - because

I never heard of someone's caste being empty - because if he was in it before he would have to still be in it.

6. Ship Sinking

- 1) Because he won - because they are going ashore on life boats - because the man owns the ship and doesn't want it to sink.
- 2) Because the captain wants to shoot pool when the ship is sinking, and the ball just goes up and then comes back down - because he probably didn't win - because the ship is sinking - because the captain really wants to win but the other man wants to get off the boat.
- 3) Because the ship is sinking and they're still playing pool - because they won't leave the ship until they finish the game - because the captain wants to play pool when the ship is sinking.
- 4) Because they will drown if they keep playing - because they should be more concerned about the ship than the game of pool - because pool shouldn't be important if the ship is sinking.

7. Swallowed Allowance

- 1) Because he's got a lot of money - because he gives his kids an allowance too -- because he is in a doctor's office. -
- 2) Because there are spots on his stomach - because he swallowed some money (his allowance) - because he has money in his stomach - because he ate more money than he even gives his kids - because he doesn't give his kids an allowance.
- 3) Because he swallowed some money and the doctor says "that's a lot more allowance than I give my kids" - because the doctor just talks about how much money he gives his kids.
- 4) Because he should just care about the boy, and not how much money she gives him - because he's a doctor and shouldn't be talking about how much allowance he gets - because he's just thinking about the amount of the boy's allowance, and not how he'll get it out (or about the boy getting sick).

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