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The Imaginary Audience and Its Relationship to Cognitive Development, Grade Level, and Gender

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THE IMAGINARY AUDIENCE SCALE AND ITS RELATIONSHIP
TO COGNITIVE DEVELOPMENT, GRADE
LEVEL, AND GENDER

by
Rosario C. Pesce

A Dissertation Submitted to the Faculty of the Graduate School
of Loyola University of Chicago in Partial Fulfillment
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DEDICATION

To my parents, who raised me with love and understanding; to my sister for her example of perseverance; to my friends for their encouragement; and to my wife, Patricia, and my children, Cristina and Carmen, whose love and support make this effort worthwhile.

VITA

The author, Rosario C. Pesce, is the son of Carmen and Mary Pesce. He was born November 4, 1950 in Oak Park, Illinois.

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CHAPTER I

INTRODUCTION

One of the many existing problems connected with adolescent egocentrism has been the paucity of research aimed at testing the existence of adolescent egocentrism and its concomitant behavior. The concept of egocentrism has been most clearly described by Elkind, especially in regards to egocentrism as a by-product of the attainment of the stage of formal operations. Elkind first wrote about adolescent egocentrism some 15 years ago (Elkind, 1967). However, most of the research conducted up until the past five years was tenuously related to Elkind's theory. Research was not aimed at testing hypotheses derived from Elkind's theory. Instead, as to be reviewed, researchers examined egocentrism as it relates to social role-taking skills (Flavell, Botkin, Fry, Wright, and Jarvis, 1968; Chandler, 1973; Chandler, Greenspan, and Barenboim, 1974; Thelen, Fry, Dollinger, and Paul, 1976; and Marsh, Serafica, and Barenboim, 1980).

Another problem that exists in relation to the study of adolescent egocentrism is the lack of research aimed at testing the basic assumption underlying the construct. Elkind's basic assumption states that as the adolescent is able to think about his or her own thinking as he or she enters the stage of formal operations, and since he or she is so preoccupied with the many physical and psychological changes

that normally occur at adolescence, the adolescent fails to differentiate between the objects toward which the thoughts of others are directed and those which are the focus of his or her own concern. Therefore, as the adolescent is convinced that others are preoccupied with him or her, the adolescent is continually constructing and reacting to an audience. This is called the imaginary audience. Unfortunately, little research followed this theory, and few studies were ever conducted to study the construct of the imaginary audience.

The basic assumption underlying Elkind's explanation of some typical adolescent thinking and behavior is that the adolescent is just entering upon the stage of formal operations. This assumption has been questioned by some writers who have found that many adolescents and even adults never reach the stage of formal operations (Blasi and Hoeffel, 1974). Furthermore, little research has been conducted to test the relationship between the attainment of formal operations and adolescent egocentrism. The recent development of the Imaginary Audience Scale (Elkind and Bowen, 1979), designed to measure the willingness of an adolescent to reveal oneself to an audience, has allowed for a more accurate test of the relationship between cognitive development and adolescent egocentrism. From a cognitive point of view, one would predict that students at around the eighth grade would not only show heightened egocentrism (Elkind and Bowen, 1979) but also the recent attainment of formal operations.

Another related problem in the study of adolescent egocentrism is the existence of other possible explanations for the observation of egocentrism-linked behavior. Simmons, Rosenberg, and Rosenberg (1973) developed a scale to measure self-consciousness. The Imaginary Audience Scale was later derived from this same scale. They hypothesized that children experience a major disturbance in self-image as they enter upon adolescence. One component of such a disturbance is increased self-consciousness. They found that transition from elementary to junior high school represented a significant stress along various dimensions of one's self-image, including self-consciousness. Their results supported the notion that young adolescents become increasingly sensitive to others' reactions to themselves and their behaviors. This increased sensitivity is a function of the major change of social context, moving from a setting where the teacher is a parent-surrogate to a more impersonal environment where there are more demands on developing independence. From this social context point of view, one would predict that a major change in the environmental context, such as first entering high school, would result in the greatest amount of egocentrism independent of the level of cognitive functioning. Students could conceivably lie below the level of formal operations and yet score high on a measure of egocentrism.

The major purpose of this research project was to test whether the cognitive point of view or the social context point of view more adequately explains heightened egocentrism

in young adolescents. The major variables of grade, indicating social experience, and cognitive functioning were contrasted in relation to a measure of egocentrism. Those associated with a cognitive point of view would hold the attainment of formal operations as a prerequisite for heightened egocentrism, while those associated with a social context perspective would find no such prerequisite important. Both theoretical perspectives support the hypothesis that females may be less willing to reveal themselves to an audience as compared to males. This was expected from the findings of Simmons et al. (1973) and Elkind and Bowen (1979).

In all of these cases, adolescent egocentrism, defined as the degree of willingness to reveal oneself to an audience, was measured by the Imaginary Audience Scale. This instrument has been used in few studies (Elkind and Bowen, 1979; and Peterson, 1982). The investigator was also interested in observing whether egocentrism becomes heightened in early adolescence (eighth and ninth grades) as contrasted to younger students in sixth grade and older adolescents in twelfth grade. Egocentrism scores were contrasted with cognitive development as measured by a test of formal operations (Lawson, 1978).

CHAPTER II

REVIEW OF RELATED LITERATURE

As termed by Piaget, egocentrism is a by-product of cognitive development. Elkind (1970) provided clear theoretical notions as to the form egocentrism takes at each cognitive stage. Elkind (1967) included the description of adolescent egocentrism in his explanation of egocentrism at the stage of formal operations. As will be reviewed, there was little empirical support for the testing of Elkind's theory of adolescent egocentrism, especially as it is formulated through the constructs of the imaginary audience and the personal fable. Rather, research in social role-taking skills was a substitute for any direct testing of Elkind's constructs. Furthermore, the important underlying assumption of Elkind's position, that adolescents show egocentrism as a result of the attainment of formal operations, remained untested. Instead, authors such as Blasi and Hoeffel (1974) directed serious doubt as to whether many people, especially adolescents, even attain the stage of formal operations. Finally, a social context position (Simmons et al., 1973), which predicts a major disturbance of self-image in young adolescents, may adequately explain increased self-consciousness in the adolescent. This is similar to what Elkind describes as sensitivity to the existence of an audience.

Egocentrism: By-Product of Cognitive Development

For Elkind, egocentrism is considered a negative by-product of each cognitive stage's emerging mental system in that it corresponds to the fresh cognitive problems engendered by that system (Elkind, 1970). More recently, Elkind (1978) has taken a more positive position in relation to egocentrism by describing it as a developmental term rather than as a pejorative one. Cognitive development involves three major cognitive tasks: (1) the differentiation between transient and abiding facets of reality; (2) the differentiation between objective and subjective aspects of reality; and (3) the differentiation between universal and particular facets of reality. These types of differentiations, which vary in content and structure at each of Piaget's four stages of cognitive development, must be made at each stage. Egocentrism, then, can be defined as evidence of a child's failure to make one or all of these differentiations.

Egocentrism of the sensory-motor stage refers to a lack of differentiation between an object and the sense impressions occasioned by it. This occurs because the child responds to objects as though their existence depended upon being present in perception. For example, in considering an object seen, once out of sight, it is considered out of mind. However, at the end of this stage the child seeks the object even when hidden, thus indicating a differentiation between its existence and the child's perception of it. Thus, in terms of Piagetian theory the child demonstrates the major

achievement of the sensory-motor stage -- the construction of a world of permanent objects (Piaget, 1954).

During the pre-operational stage the rapid growth of linguistic skills results in a different type of egocentrism. The child fails to differentiate between words and their referents. The child at this stage believes that a name remains in a thing (person or object) and that an object cannot have more than one name. Elkind presents a common example of pre-operational egocentrism in regards to the correct understanding and use of the terms that can refer both to an individual and to a class. A preschool child has difficulty with one and many in his use of the terms "Daddy" and "Mommy." "Many mothers tell stories about walking with their preschool children, who proceed to call many strange men 'Daddy,'" (Elkind, 1978, p. 96). A child may use the term "Daddy" for a man which may resemble his or her father. As differentiation becomes more accurate and refined at the close of this stage, the child achieves a construction of a system of representations of the object world.

Operations (mental routines whose chief characteristic is that they are reversible) during the next stage of concrete operations are considered by the older child to be on par with perceptual phenomena. Within Elkind's framework the concrete operational child, now able to construct rules because of operational thought, may experience egocentrism in relation to distinguishing between transient and abiding rules, between subjective and objective rules, and between the one

rule and the many exceptions to that rule. The major achievement, then, of this stage is the construction of rules governing objects and representations.

Formal operational thought allows the adolescent to conceptualize not only his thought, but also to conceptualize the thought of other people. Egocentrism in adolescence occurs as the person fails to differentiate between the objects toward which the thoughts of others are directed and those which are the focus of his own concern.

Adolescent Egocentrism

Elkind (1978), himself, has shown increased differentiation in his theoretical treatment of egocentrism in general, and adolescent egocentrism in particular. Elkind introduced the differentiation between transient vs. abiding, objective vs. subjective, and universal vs. particular at each cognitive developmental level. In most of his work prior to that time, Elkind described adolescent egocentrism in a more global sense (Elkind, 1967; 1968; 1970). Thus, the present writer will discuss adolescent egocentrism within the most recent framework suggested by Elkind.

According to Piagetian theory (Piaget, 1962), the person in the stage of formal operations is able to operate upon and think hypothetically, counterfactually, and propositionally. Most important, though, is the fact that the adolescent is able to think about his own thinking. Elkind termed this the development of a reflective self as the adolescent comes to view himself as a thinker. Egocentrism does

not develop because of a lack of intellectual ability, but rather emerges from the adolescent's thought and thinking. Egocentrism in adolescence occurs because of this sophisticated thinking behavior.

Adolescent egocentrism is observed in the adolescent's difficulty in differentiating between transient and abiding thought. As an example of this phenomenon, Elkind wrote of the search of children of adoptive parents during adolescence to find their real parents. Elkind hypothesized that formal thinking allows the adolescent to appreciate the importance of biological inheritance. This makes the emotional commitment of adoptive parents appear transient, while making the emotional commitment of biological parents seem abiding. The adolescent thus fails to differentiate between biological and psychological parentage and abiding and transient emotional commitment on parents' part. Elkind (1978) has applied the distinction between transient and abiding in regards to different components of self. He incorporated this distinction in the development of the Imaginary Audience Scale (Elkind and Bowen, 1979). The abiding self consists of long-lived characteristics which the individual regards as permanent aspects of the self, such as mental ability and personality traits. The transient self consists of momentary appearances and behaviors which the individual does not regard as reflective of his or her true self, such as a bad haircut, accidentally soiled clothing, and inadvertent words or acts.

Elkind's earliest notions (Elkind, 1967) of adolescent

egocentrism related to the adolescent's inability to differentiate the objective and the subjective. Elkind wrote of the imaginary audience as one characteristic form of adolescent egocentrism. As the adolescent is convinced that others are preoccupied with him, the adolescent is continually constructing or reacting to an audience. "It is an audience because the adolescent believes that he will be the focus of attention; and it is imaginary because in actual social situations, this is usually not the case (unless he contrives it to be so)," (Elkind, 1967, p.1030).

The notion of the imaginary audience helps to explain the characteristic self-consciousness of early adolescence and conversely excessive self-admiration. When the adolescent feels self-critical, he expects the audience to be critical also. Being knowledgeable of the adolescent's each and every private cosmetic and behavioral sensitivity, the audience is expected to be a harsh judge. For instance, a small pimple on the adolescent's face may appear to the teenager as a major cosmetic flaw and therefore the focus of attention to all passers-by. The adolescent's wish for privacy may be a reaction to the feeling of being under the constant scrutiny of others. On the other hand, extreme self-admiration can be explained through the imaginary audience construct. According to Elkind, "A good deal of adolescent boorishness, loudness, and faddish dress is provoked partially in any case, by a failure to differentiate between what the young person believes to be attractive and what others admire," (Elkind, 1970, p.68).

This helps to explain why the adolescent fails to understand why adults disapprove of his dress and behavior. The egocentrism can be applied to expected reactions from members of the opposite sex. As the boy stands in front of the mirror for hours, he entertains the reactions he will produce in the girls, and as the girl prepares for a social engagement she imagines the glances that will come her way. Thus, in actual gatherings each person is more concerned with the aspect of being observed than with observing others. As indicated by Elkind, each young person is simultaneously an actor and an audience to others. Finally, one of the most common admiring notions in the adolescent is the reactions of others to one's death. What better place to imagine the positive reactions of others than in a group setting where all lament one's loss and praise his many virtues and positive attributes? Mark Twain may have succinctly captured this idea in Tom Sawyer as the two main characters arrive at the town's church to witness their own funeral and to observe the effect of their alleged death on the people of the town. The following is a quote from the book often cited by Elkind:

But this memory was too much for the old lady, and she broke entirely down. Tom was snuffling, now, himself - and more in pity of himself than anybody else. He could hear Mary crying and putting in a kindly word for him from time to time. He began to have a nobler opinion of himself than ever before. Still, he was sufficiently touched by his aunt's grief to long to rush out from under the bed and overwhelm her with joy - and the theatrical gorgeousness of the thing appealed strongly to his nature too - but he resisted and lay still. (Elkind, 1967, p. 1031; Elkind, 1970, p.68)

Thus, the imaginary audience becomes a motive for a variety

of behaviors with possible positive or negative outcomes.

A related form of adolescent egocentrism is the personal fable. The personal fable is closely related to the idea of the imaginary audience in that if the adolescent feels that because of the imaginary audience everybody is looking at him, then he must be special and unique. This form of adolescent egocentrism is the result of the adolescent's inability to differentiate between the one and the many, with the universal and the particular. "To the young adolescent, who is experiencing many feelings and ideas for the first time, it is as if he or she were the first person on earth to experience these feelings." (Elkind, 1978, p. 125).

The personal fable is defined as the belief in the uniqueness of one's feelings, thoughts, and experiences; it is a story that one tells oneself but that is not true. The fable is most obvious in the adolescent diary replete with experiences significant for all of posterity. The construct may explain the adolescent's belief in a personal confidant in God. As summarized by Elkind (1967), the deity becomes a personal confidant to whom one looks for guidance and support rather than for gifts.

The personal fable has some positive motivational consequences as the adolescent who feels special may strive for success in various constructive endeavors. A sense of value and worth is a positive outcome. However, there are negative consequences as well. The personal fable may explain the

recklessness observed in adolescence. The adolescent attempts dangerous stunts thinking he is immortal. Experimentation with dangerous drugs may be justified by the idea that "other people will get hooked, but not me." Finally, young adolescents deny the possibility of pregnancy because of some personal fable beliefs. Others may have relations which result in pregnancy, but the particular adolescent never believes that such would be the result of his or her own sexual activities. Many girls become pregnant partly because their personal fable states that only other girls, but not they, could become pregnant (Cvetkovich, 1976). Such a view may be the result of the adolescent's inability to look beyond the present. Thus, the adolescent would seem unlikely to grasp the future significance of giving birth during the teen years, either within or outside of marriage (Adelson, 1975).

Adolescent egocentrism is overcome on two separate planes, the cognitive and the affective. At the cognitive level, egocentrism diminishes as the stage of formal operations is firmly established. The imaginary audience which has been likened to an anticipatory group or as reflecting an hypothesis testing situation is gradually replaced by real-life audience experiences. As the adolescent tests hypotheses in regards to what is important to him and what is important to others, he comes to slowly realize the differences between his own concerns and preoccupations and the concerns and interests of others. Elkind states that the personal fable is never overcome in its entirety, however it is severely dimin-

ished due to affective factors. As the imaginary audience moves from imagined to real, the adolescent is able to establish true rather than self-interested interpersonal relations. This is similar to what Erikson labels as intimacy (Erikson, 1968). As the adolescent begins to share confidences and establish relations of mutuality, she starts to discover that others have feelings similar to hers. Fellow peers recount common emotional highs and lows. Thus, on the affective plane, egocentrism is overcome by a gradual integration of the feelings of others with one's own emotions.

Related Research

Until recently, most of the research in the area of children's egocentrism focused on the objectively measurable aspects of cognitive functioning, especially perception. The few studies that were conducted to study egocentrism in adolescence were actually intended to research the developmental trend of role-taking skills beginning in childhood and continuing on into adolescence. There is actually little direct relationship between the theory of Elkind and other writers such as Looft (1975) with the application of most of the research to be presented below. What appears to be shared by all interested writers is a wish to study "egocentrism" with no clear common definition of it. Yet, the studies are highlighted to illustrate the need for a more integrated and encompassing theory of adolescent egocentrism which may generate researchable hypotheses.

There are few studies that have employed the methods

to be described below in studying adolescent egocentrism. A limited number of experiments were done in the past decade that sought to study role-taking in adolescence (Flavell, Botkin, Fry, Wright, and Jarvis, 1968; Chandler, 1973; Chandler, Greenspan, and Barenboim, 1974; Thelen, Fry, Dollinger, and Paul, 1976; and Marsh, Serafica, and Barenboim, 1980). Implied in these studies is that when egocentrism is applied to interpersonal relations, it denotes the inability of the person to anticipate accurately the perspective of another person. Besides being labeled as role-taking ability, this skill has also been termed empathic ability, role-attribute discrimination, and communication effectiveness (Edleson, 1978).

Two methods of egocentrism measurement will be described. The first was extensively used with younger children and measured perceptual role-taking skills. The second is more closely associated with the ideas advanced by Elkind and is used to measure social role-taking skills. Both methods were used by Flavell et al. (1968). They conducted a major study aimed at delineating the developmental trends of role-taking and communication skills in children. Of particular interest for this paper is their work in measuring the development of role-taking skills. Flavell et al. (1968) began with the assumption that egocentrism as described by Piaget diminishes over time. Piaget had stated that the child is at first an egocentric organism. The child is limited to his own individual perspective and is largely ignorant of and unconcerned

with the differing perspectives of other people. By using certain experimental tasks, including the two to be described below, the writers were able to demonstrate diminishing egocentrism from childhood-early adolescence and subsequent increasing ability in both perceptual and social role-taking skills.

The authors contrived a task to measure perceptual role-taking skills. The specific measure in question was a person's ability to predict the appearance of a stimulus display from positions or perspectives other than his own. Subjects were shown four stimulus displays and were asked to reconstruct each one as it would appear to another subject (Es). The Es was to be seated at different vantage points in relation to the display. Thus, the subject's task was to reproduce the displays as they would appear to another person whose perspective would be different from that of the subject.

In examining trends for decreased perceptual egocentrism, the authors studied subjects from eight different grade levels (2,3,4,5,6,7,8, and 11). They found a significant main effect for grade when they compared this independent variable with two others, sex and IQ. A significant main effect for IQ was also observed as well as a significant interaction effect for IQ-grade. This interaction effect indicated that brighter subjects showed increased role-taking skill in the upper grades.

In the social role-taking measurement task each subject was given a series of seven pictures and instructed to tell

the experimenter the story which they illustrate. Three specific pictures were removed and then another subject (Es) entered. The subject was then requested to tell the story that Es would recount with the remaining four pictures. The seven pictures were so designed that the story they illustrated was quite different from the story shown by the remaining cards. The relevance of role-taking becomes evident in that the subject viewed the four pictures in the context of the other three (the total seven). Es, however, viewed the four cards in the absence of any other framework. The subject's task, then, was to suppress his own perspective and assume that of the Es. Role-taking was measured as the subject attempted to interpret the data as Es might have interpreted them.

A developmental trend over the eight grade levels was observed in the story-telling task. As summarized by the authors, successful role-taking in this task would assume the existence of a number of Piagetian notions. These would include operations, reversibility, decentration, and relativity. Flavell et al. (1968) concluded that role-taking involves more than just the ability to search and find the other's perspective. Role-taking also includes the ability to counteract the insistent intrusion of one's own perspective during the search.

Chandler (1973) attempted to test various hypotheses in relation to egocentrism and antisocial behavior in young adolescents (ages 11-13). He sought to show a relationship

between persistent social egocentrism and chronic delinquent behavior. Chandler (1973) first compared role-taking skills in delinquent and non-delinquent boys and found a significant difference in this ability between both groups. The non-delinquent boys had little difficulty in adopting the role or perspectives of others. To measure role-taking skills, Chandler used an instrument similar to the cartoon-story format used by Flavell et al. (1968). The author proceeded further to develop and evaluate a program of remedial training in deficient role-taking skills. The delinquent boys were divided into various treatment groups to remediate role-taking skills. One group was labeled a control non-treatment group. The remaining subjects were divided into a placebo group and an experimental group. The subjects in the experimental group attended a ten week, three hour a day film workshop where subjects were encouraged to develop, portray, and record brief skits dealing with events involving persons of their own age. Those in the placebo group attended a similarly lengthy workshop focused upon the students' producing animated cartoons and documentary-style films about their neighborhood. Results indicated that immediately following treatment, subjects of the experimental group improved significantly more in their role-taking ability than did subjects of the combined placebo and control groups. A similar pattern indicating a treatment effect for the intervention was observed in an eighteen month follow-up.

A similar type of study utilizing a different sample

group was conducted by Chandler et al. (1974). They wished to study role-taking and referential communication skills in institutionalized subjects to be substantially delayed in the acquisition of role-taking skills. Subjects were later assigned to various treatment groups. Role-taking training was similar to the method used in Chandler (1973) which utilized video films as vehicles for providing remedial training in deficient role-taking skills. The authors found that this treatment significantly increased role-taking skills immediately following the study.

Thelen et al. (1976) sought to examine whether videotaped models could improve the interpersonal adjustment of delinquents. The authors used a very small sample of subjects (eight) ranging in age from twelve to sixteen. Among the behaviors modeled included expressing empathic feelings. The models were portrayed in both home and school settings. All of the students lived in a group home. The researchers found statistically significant home adjustment ratings. No such improvement in school behavior was observed. Also, follow-up measures revealed failure to maintain improvement in the home setting.

In one study the effect of perspective-taking training on interpersonal problem solving was studied (Marsh et al., 1980). Subjects were young adolescents aged twelve years, eleven months through fourteen years, eight months. Unlike most other experiments summarized above, the researchers trained students in formal sessions aimed at increasing role-

playing skills. There were six such sessions for the experimental group. The authors found partial support for the hypothesis which stated that increased perspective-taking ability increases interpersonal problem solving ability. Support for this notion was observed in that students in the experimental group who showed increased role-taking skill through training also showed increased problem solving ability. However, the increased interpersonal problem solving was limited to only one measure (interpersonal problem analysis) and not to the other measure (means-end thinking). The authors concluded that there was little increase in means-end thinking with students of this age group because this skill is already highly developed by early adolescence.

As indicated in the research summarized up to this point, for some time there was a very tenuous relationship between the theoretical ideas advanced by Elkind on adolescent egocentrism and actual empirical findings. No clear tie between research and theory emerges. Instead, what becomes evident is a very confusing treatment of a construct termed "egocentrism." It appears that this term carries different meanings for various authors. As by Piaget, the concept seems cognitively based, closely aligned to perceptual and, although to a somewhat limited extent, to social tasks. Elkind may have attempted to expand its boundaries much too broadly to encompass some of his personal observations of adolescents and their "typical" behavior. This cloudiness is best illustrated by a curious irony. In most experiments

studying social role-taking, egocentrism is characterized as diminishing as social role-taking increases. Social role-taking increases as children approach adolescence. Yet, the essence of Elkind's theory of adolescent egocentrism is that the adolescent has difficulty taking the view of another person, assuming others to view the world as only he does.

Thus, adolescent egocentrism and its related constructs as developed by Elkind remained empirically unverified entities for over a decade. A first attempt at systematically constructing and validating an instrument to measure a characteristic form of adolescent egocentrism has recently been developed by Elkind and Bowen (1979). The instrument called the Imaginary Audience Scale (IAS), consisting of two subscales -- the Transient Self (TS) scale and the Abiding Self (AS) scale -- was developed and used to assess the existence of the imaginary audience across four grade levels. As predicted, eighth graders revealed the most unwillingness to reveal different facets of themselves to an audience. This was a prediction formulated on the premise that these students were just entering the stage of formal operations and thus, would show the existence of the by-product of early formal operation stage development, adolescent egocentrism. Also, girls were found to be less willing to reveal themselves to an audience at all age levels. Thornburg (1979) used the Imaginary Audience Scale to assess self-consciousness among middle school and junior high students. As found previously, girls scored higher on the Imaginary Audience Scale than boys at all grade levels.

However, in contrast to the Elkind and Bowen (1979) study, no age differences across 12, 13, 14, and 15-year-old students were found. Piagetian theory as espoused by Elkind would have predicted a heightened amount of egocentrism in the younger students. Peterson (1982) used the Imaginary Audience Scale to determine whether the existence of the imaginary audience is confined to adolescence, and whether it is associated with the advent of formal operational thought. She found that the existence of the imaginary audience was not confined to adolescence, and that it was not associated with the advent of formal operational thought. However, the scoring of the Imaginary Audience Scale was not consistent with Elkind and Bowen's (1979) method. Therefore, it is difficult to draw clear conclusions from her findings.

Recapitulation

The construct of adolescent egocentrism, especially as contrasted to egocentrism in younger populations, appears poorly formulated in empirical terms. The absence until recently of an instrument to measure the behavioral and perceptual sequelae of adolescent egocentrism has made the construct difficult to study until now. Therefore, there is a strong need to further validate the notion of egocentrism as epitomized in one of its characteristic forms, the existence of the imaginary audience.

An even more compelling reason to further study adolescent egocentrism within a correlational context rests in testing one of Elkind's basic assumptions. A critical under-

lying assumption for Elkind in explaining the existence of egocentrism in adolescence is that egocentrism is a by-product of the recent attainment of formal operations in the adolescent. Some writers, though, have seriously questioned whether most adolescents and whether most adults ever reach the stage of formal operations. In a most important article, Blasi and Hoeffel (1974) critically reviewed whether the attainment of formal operations was a prerequisite to observed changes in the adolescent personality. They presented a meta-analysis of all studies conducted to test the transition from concrete to formal operations as measured by a variety of Piagetian tasks. They concluded that a large percentage of individuals of normal intelligence and of average social background, not only at the age of adolescence but also in adulthood, did not seem to function at the formal operational stage. Typical changes from childhood to adolescent personality in regards to generalizations in thinking, adolescent attitudes, and adolescent affect traits were viewed as not necessitating a shift from the concrete operational stage to the formal operational stage. Instead, the writers concluded that personality development could take place independently of formal operations.

Simmons et al. (1973) studied self-image changes in the adolescent across four dimensions. One of these dimensions was self-consciousness. The questionnaire used to measure self-consciousness appeared to be a rudimentary precursor to the Imaginary Audience Scale later developed by Elkind and Bowen (1979). They found twelve year olds to show the sharpest

increased level of self-consciousness as compared to students at age levels eight through eighteen. Without considering cognitive factors in determining such an increase, the authors concluded that movement into junior high school significantly contributed to a general disturbance of self-image, including heightened self-consciousness. Aging from eleven to twelve to thirteen years of age itself was not found to be stressful, since within the same school class, age made little difference. However, within the same age group, school class made a great difference.

The research of Simmons et al. (1973) presents evidence of a rival explanation of heightened self-consciousness similar to Elkind's idea of heightened sensitivity to the existence of an imaginary audience. These authors hypothesized that early adolescents experience a disturbance in self-image due to a significant change in their social context. In their work, these researchers found that students' moving from an elementary school setting into a junior high school environment resulted in significant stress along several dimensions of a student's self-image. Also, they found that the self-consciousness declines somewhat in later adolescence.

Self-image disturbance encompasses changes in a variety of areas. A change in the directions of heightened self-consciousness has already been described. Simmons et al. (1973) noted that young adolescents also demonstrated greater instability of self-image, slightly lower global self-esteem, lower specific self-esteem, and a more negative perceived

self. Negative perceived self was described as their thinking that parents, teachers, and peers of the same sex viewed them less favorably than earlier.

Although Simmons et al. were able to empirically demonstrate the existence of a self-image disturbance in adolescents due to a change in social context, Erikson (1968) theorized that the development of an identity is critical for the adolescent. The adolescent is confronted with the changes of puberty as well as changes in psychosocial demands. Psychosocial demands indicate that the adolescent learn to become more independent and direct the individual away from his or her own family. The major difference between Simmons et al.'s and Erikson's conceptualization of self-image disturbance is the point at which such a disturbance occurs. Erikson places the ego identity crisis in late adolescence. On the other hand, Simmons et al. view the crisis as first occurring in early adolescence as movement into junior high school at puberty is characterized as a significant event for the child.

In summary, the changed social context, coupled with pubertal changes results in a less stable sense of self for the adolescent with an accompanied heightened sense of self-consciousness. The shift in social context from an elementary school to a junior high school setting presents the student with significant external changes. The student moves from a protected elementary school, where he or she usually has one teacher and one set of classmates, to a much more changing

and larger system. A student has an increased number of teachers with constantly shifting classmates. The context, then, is more impersonal and the student is expected to behave more independently. An even greater shift in social context could occur as a student moves from an elementary school setting into a senior high school system (grade nine through twelve) where the context becomes even larger than a junior high school setting with the additional demands of choosing both general course of study such as academic, commercial, or vocational and specific course offerings.

As mentioned above, the area of adolescent egocentrism and its concomitant self-consciousness warrants further research since it has just recently moved from a theoretical plane to an empirical one. The existence, though, of some serious doubt regarding the fundamental issue of the necessity of attaining formal operations for typical adolescent egocentrism to occur would also point to the need for continued research. There is an obvious need, then, to test these two dissonant theories, the social context vs. the cognitive point of view as they relate to an adolescent's willingness to reveal herself to an audience.

The main purpose of this dissertation was to formulate and test hypotheses generated from these two divergent explanations as to why adolescents demonstrate the type of egocentrism described by Elkind. According to the cognitive point of view, as advanced by Elkind, students should show increased Imaginary Audience Scale scores as they first enter the stage

of formal operations -- typically around eighth grade. This is what was found by Elkind and Bowen (1979). Thus, eighth grade students were included in this study. A cognitive theory's prediction regarding eighth grade students would then include heightened egocentrism along with the attainment of formal operations. On the other hand, a social context perspective would predict that ninth grade students, who are making a significant transition into high school, would show heightened egocentrism. Since the only published study utilizing the Imaginary Audience Scale found eighth grade students (ninth grade students were not included) also to show heightened egocentrism, a social context perspective would predict little difference between egocentrism in the eighth and ninth grade students. The critical issue in contrasting this social context position with that of Elkind is that egocentrism is obvious in eighth and ninth grade students regardless of whether or not the stage of formal operations has been attained. In terms of contrasting expected results, the cognitive perspective would predict heightened Imaginary Audience Scale scores for eighth grade students accompanied by recent emergence into the stage of formal operations. The social context perspective would predict heightened Imaginary Audience Scale scores for eighth and ninth grade students irrespective of cognitive ability. Thus, eighth and ninth grade students could conceivably score below the stage of formal operations on a cognitive task. Finally, a considerable number of studies reviewed previously which focused upon social role-taking

skills included special populations, such as delinquents and institutionalized youth. The researcher intended to bring some practical relevance to this study by including a special population sample. Truants were included since these students may have egocentrism-linked reasons for not attending school. There is no research on adolescent egocentrism with these students. Also, the study would allow an analysis of whether the cognitive development variable has an effect on school attendance.

CHAPTER III

METHOD

Hypotheses

The following null hypotheses were tested:

1. There is no relationship between cognitive level and adolescents' willingness to reveal their transient selves to an audience.
2. There is no relationship between cognitive level and adolescents' willingness to reveal their abiding selves to an audience.
3. There is no relationship between grade level and adolescents' willingness to reveal their transient selves to an audience.
4. There is no relationship between grade level and adolescents' willingness to reveal their abiding selves to an audience.
5. There is no relationship between gender and adolescents' willingness to reveal their transient selves to an audience.
6. There is no relationship between gender and adolescents' willingness to reveal their abiding selves to an audience.
7. There is no relationship between adolescents' willingness to attend school and their willingness to reveal their transient selves to an audience.
8. There is no relationship between adolescents' willingness to attend school and their willingness to reveal their abiding

selves to an audience.

Hypotheses #1 and #2 test the relationship between the attainment of formal operations and the amount of imaginary audience sensitivity. This is the position held by Elkind and the cognitive camp. Hypotheses #3 and #4 test the relationship between changes in the adolescent's environment and the amount of imaginary audience sensitivity. This may be termed the social context position. Hypotheses #5 and #6 test the relationship between gender and the amount of imaginary audience sensitivity as predicted by both cognitive and social context points of view. Finally, hypotheses #7 and #8 test the relationship between a special population and the amount of imaginary audience sensitivity. Elkind and Bowen (1979) recommended that the Imaginary Audience Scale be researched with special populations wherein the imaginary audience could play a special role.

Subjects

Subjects in the study were sixth, eighth, ninth, and twelfth grade students residing in a Chicago suburb. The community may perhaps best be described as working class. As per the 1980 census, median income is \$16,730. The district has a high percentage (approximately twelve percent) of foreign-born adults. The primary countries or origin are Czechoslovakia, Poland, Germany, Italy, Mexico, and Ireland. (Demographic data were obtained from the most recent North Central Association accreditation report of 1980). The largest portion of the high school district is of average intelligence (Otis-

Lennon mean IQ of 103 as calculated from students' entrance test scores).

There were 675 subjects in the study representing 74 male and 76 female sixth graders, 96 male and 96 female eighth graders, 89 male and 84 female ninth graders, and 76 male and 84 female twelfth graders. The sixth and eighth grade students came from three of the seven elementary schools of the suburban district. The suburb utilizes a K-8 system. The ninth and twelfth grade students were drawn from the high school into which feed all of the suburb's schools.

Materials

Student protocol packets consisted of two instruments. A classroom test of formal operations developed by Lawson (1978) and the Imaginary Audience Scale (IAS) developed by Elkind and Bowen (1979) were used. (See Appendix A for the packet filled out by each student.)

The cognitive test of formal operations, originally developed with fifteen items and given in a single session, was reduced by one item and divided in half. This was done by the writer because the deleted item, originally #15, was considered too time consuming. There was concern that its appearance would interfere with the tasks being completed in two 45 to 50 minute periods. The researcher sought to maintain normalcy in the students' schedule since periods are normally 50 minutes in length. Furthermore, the item measured combinatorial reasoning, a concept which was adequately measured elsewhere in the test. Finally, since the item was the

ceiling item, its absence did not interfere with past scoring practices. The test was split in half so as to be administered during two 45 to 50 minute periods. Type on the test was spaced to enhance readability and only two items were placed on each page to avoid bothersome turning of pages. The items in each seven-item half were grouped according to specific area of measurement. In the first half, item 1-1 measured the conservation of weight, items 1-2 and 1-3 proportional reasoning, items 1-4 and 1-5 controlling variables, item 1-6 combinatorial reasoning, and item 1-7 probability. In the second half, item 2-1 measured displaced volume, items 2-2 and 2-3 proportional reasoning, items 2-4 and 2-5 controlling variables, and items 2-6 and 2-7 probability. Each correct response with appropriate explanation was credited one point. Scores from both halves were summed. Scores from 0-5 placed students in the concrete level, 6-11 in the transitional level, and 12-14 in the formal level.

The Imaginary Audience Scale was administered as first developed. The scale is subdivided into two scales, the Transient Self scale consisting of items 1, 3, 5, 7, 9, and 10, and the Abiding Self scale consisting of items 2, 4, 6, 8, 11, and 12. For both these scales, subjects chose from three possible reactions. Item #1 is illustrated below:

You have looked forward to the most exciting dress up party of the year. You arrive after an hour's drive from home. Just as the party is beginning, you notice a grease spot on your trousers or skirt. (There is no way to borrow clothes from anyone.) Would you stay or go home?

- Go home.
- Stay, even though I'd feel uncomfortable.
- Stay, because the grease spot wouldn't bother me.

An unwillingness to participate was given a score of 2, an indifference to participate was given a score of 1, and a willingness to participate was given a score of 0. Thus, in relation to the example above, the first choice was scored as 2, the second as 1, and the third as 0. Thus, for both scales, the higher the score, the less willing a subject was to expose the transient and/or abiding self to an audience.

(See Appendix B for scoring criteria for both instruments.)

Procedure

The cognitive test and the Imaginary Audience Scale were administered to the subjects in groups in classroom settings. There were 35 different classrooms tested with a range of 11 to 26 students in each, and an average of 20 students per classroom. The tasks were administered by eight different examiners. Seven were trained volunteers (all psychology students). The writer also served as an examiner. The seven volunteers were trained by the investigator in one of three separate two-hour training sessions. The researcher demonstrated each item of the cognitive test, answered questions and concerns regarding the instrument and general administration procedures, and then observed the volunteers practicing items during training. The volunteers were also instructed to obtain the test kit some time before testing so as to allow more time for practice. The trained examiners



were randomly observed by the writer each time they visited the high school for the running of subjects. The sixth and eighth grade subjects were tested with their homeroom classmates. The ninth and twelfth grade students were administered the tasks during their English classes. Most classes were tested in the morning so as to ensure uniformity of testing. The only exception to this schedule were the students in the high school's special program for nonattenders. Since these students' schedule began in the mid-afternoon, they were administered the tasks during their first period. An examiner visited a given class for two consecutive days. No classes were visited on Monday mornings since attendance and enthusiasm on these mornings were thought to be less than on other days of the week. Each researcher used a standard method of procedure and instructions (see Appendix C).

Minor deviations in procedure necessitated the exclusion of a number of previously scheduled subjects. With nine classes, circumstances interfered with the researchers' returning to adequately complete testing during the second day. This occurred as one of the researchers had an emergency which interfered with her returning a second day. Another researcher was forced to give the cognitive test items out of order as a beaker had been accidentally broken by a student on the first day of testing. Finally, due to a sudden schedule change at the high school, morning periods were shortened so as to prevent ample time to complete the second day of testing. All of these unpredictable events resulted in the disallowance

of 179 protocols.

In 104 cases students were not at school for both days, 32 students either skipped or answered more than one response on the Imaginary Audience Scale, six students failed to mark their gender on the packets, six students gave unscorable answers on the cognitive task, and two students failed to give any explanations to items on the cognitive task. These disallowed protocols were qualitatively different than those discussed above, since the cause of the students' malperformance may have been related to their cognitive level and/or their adolescent egocentrism, i.e. the main variable of interest. The issues related to these students' protocols could and should be researched and more closely studied in the future. This was not possible in the present study since student follow-up was not planned nor given permission for by parents, since the emphasis of the research was on group findings.

Analytic Paradigm

The investigator sought to test the hypotheses of the study in the context of the analytic paradigm illustrated in Figure 1. The dependent variables of Abiding Self and Transient Self were examined in relation to the independent variables of cognitive development, grade level, gender, and attendance. A multiple regression was planned for use in assessing the influence of the independent variables on the dependent variables. In this case, the cognitive scores were reported as continuous. An analysis of variance (4x2x2x3)

		Grade															
		6				8				9				12			
		Gender								Attendance							
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
		+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
Cognitive Level	Formal																
	Transitional																
	Concrete																

Figure 1. Analytic paradigm of the study. The dependent variable consisted of a continuous measure of either an Abiding Self score or a Transient Self score. The cognitive score may be represented as a categorical variable, as above, or as a continuous variable. (Note: nonattenders were all in ninth grade)

was also planned to assess the effect of independent variables upon the dependent variables. The procedure is similar to the one used by Elkind and Bowen (1979).

CHAPTER IV

RESULTS

Null Hypothesis One

Null hypothesis one stated that there is no relationship between cognitive level and adolescents' willingness to reveal their transient selves to an audience. A multiple regression analysis was performed to determine the influence of cognitive level, grade, gender, and attendance on the transient self (see Table 1 for details). The combination of three of these variables (cognitive level, grade, and gender) was found to contribute significantly ($p < .0001$) to the transient self scores and to contribute to approximately five percent of the variance of these scores. Furthermore, a significant relationship between cognitive functioning and the transient self was found ($p < .0001$). Therefore, the null hypothesis was rejected.

In addition, an analysis of variance was performed on cognitive level as influenced by grade, gender, and attendance (see Table 2 for details). As mentioned earlier, a score from 0-5 placed students at the concrete level, a score from 6-11 placed students at the transitional level, and a score from 12-14 placed students at the formal operational level. As shown in Table 2, a main effect for grade was found to be significant at $p < .0001$. No other main

Table 1

Regression for Transient Self Scale as Related to
Cognitive Level, Grade Level, Gender, and Attendance

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>PR < F</u>	<u>R-SQUARE</u>
Model	4	229.80	57.45	8.27	.0001*	.047049
Error	670	4654.55	6.95			
Total	674	4884.35				
<u>Source</u>	<u>df</u>	<u>SS</u>	<u>F</u>	<u>PR < F</u>		
Cognitive	1	136.40	19.63	.0001*		
Grade	1	51.64	7.43	.0066*		
Gender	1	29.96	4.31	.0382*		
Attendance	1	11.80	1.70	.1929		

* $p < .05$

Table 2
 Analysis of Variance for Cognitive Test and
 Grade Level, Gender, and Attendance

<u>Source of Variance</u>	<u>df</u>	<u>SS</u>	<u>F</u>	<u>PR < F</u>
Grade	3	991.00	49.30	.0001*
Gender	1	.24	.04	.8509
Attendance	1	6.44	.96	.3273
Grade x Gender	3	11.90	.59	.63
Grade x Attendance	0	0	--	--
Gender x Attendance	1	5.47	.82	.37
Grade x Gender x Attendance	0	0	--	--

* $p < .05$

effects nor interactions were found to be significant ($p < .05$). A Duncan's test with the alpha level set at $p < .05$ showed that the mean cognitive score for the twelfth graders ($\bar{x} = 4.94$, $n = 160$) was significantly higher than the mean for the eighth graders ($\bar{x} = 2.69$, $n = 192$) and for the ninth graders ($\bar{x} = 2.63$, $n = 173$). Furthermore, the means for these three grades were significantly higher than that of the sixth grade students ($\bar{x} = 1.48$, $n = 150$). See Table 3 for details.

In order to obtain related information regarding the relationship between cognitive level and transient self scores, an analysis of variance was performed using the transient self as the dependent variable and cognitive level, grade level, gender, and attendance as independent variables. See Table 4 for details. Main effects for cognitive level ($p < .0001$) and gender ($p < .04$) were found. No other main effects or interaction effects were significant ($p < .05$). A Duncan's test with the alpha level set at $p < .05$ indicated that the mean of the transient self scores for students scoring at the concrete level ($\bar{x} = 6.13$, $n = 551$) was significantly higher than the mean of the transient self scores for students scoring at the formal operational level ($\bar{x} = 3.63$, $n = 8$). The transient self scores for students at the transitional level ($\bar{x} = 4.95$, $n = 116$) were not significantly different than those at either the concrete level or the formal operational level (see Table 5 for details).

Table 3
Duncan's Test for Variables of Cognitive
Test Analysis of Variance

<u>Grouping*</u>	<u>Mean</u>	<u>N</u>	<u>Grade</u>
A	4.94	160	12
B	2.69	192	8
B	2.63	173	9
C	1.48	150	6
<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Gender</u>
A	2.98	340	Females
A	2.90	335	Males
<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Attendance</u>
A	2.95	667	Attenders
A	1.75	8	Nonattenders

* Means with the same letters are not significantly different at $p < .05$.

Table 4

Analysis of Variance for Transient Self Scale and
Cognitive Level, Grade Level, Gender, and Attendance

<u>Source of Variance</u>	<u>df</u>	<u>SS</u>	<u>F</u>	<u>PR < F</u>
Cognitive	2	176.72	12.65	.0001*
Grade	3	41.58	1.98	.1132
Gender	1	30.30	4.34	.0377*
Attendance	1	4.47	.64	.4241
Grade x Cognitive	3	15.98	.76	.5183
Gender x Cognitive	2	5.26	.38	.6863
Attendance x Cognitive	0	0.0	--	---
Grade x Gender	3	13.18	.63	.6003
Grade x Attendance	0	0.0	--	---
Gender x Attendance	1	6.97	1.00	.3178
Grade x Gender x Cognitive	3	15.76	.75	.5243
All other Interactions	0	0.0	--	---

* $p < .05$

Table 5
 Duncan's Test for Variables of Transient
 Self Scale Analysis of Variance

<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Cognitive</u>
AA	6.13	551	Concrete
BA	4.95	116	Transitional
BB	3.63	8	Formal
<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Grade</u>
AA	6.20	192	8
AA	6.18	173	9
BA	5.93	150	6
BB	5.22	160	12
<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Gender</u>
A	6.11	340	Female
A	5.69	335	Male
<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Attendance</u>
A	7.00	8	Nonattenders
A	5.89	667	Attenders

* Means with the same letters are not significantly different at $p < .05$.

Null Hypothesis Two

Null hypothesis two stated that there is no relationship between cognitive level and adolescents' willingness to reveal their abiding selves to an audience. A multiple regression analysis was performed to determine the influence of cognitive level, grade level, gender, and attendance on the abiding self (see Table 6 for details). The combination of two of these variables (cognitive level and gender) was found to contribute to approximately four percent of the variance of these scores. A significant relationship ($p < .003$) between cognitive functioning and the abiding self was found. Thus, the null hypothesis was rejected.

Furthermore, an analysis of variance was performed to further delineate the relationship between the abiding self and the variables of cognitive level, grade level, gender, and attendance. See Table 7 for details. A main effect for cognitive level was found ($p < .006$). Main effects were also found for grade ($p < .007$) and gender ($p < .0001$). However, no main effects for attendance or for any interactions were found. A Duncan's test with the alpha level set at $p < .05$ showed that the mean of the abiding self scores for students at the concrete level ($\bar{x} = 6.18$, $n = 551$) was significantly higher than the mean of the abiding self score for students at the formal operational level ($\bar{x} = 4.25$, $n = 8$). The abiding self scores for students at the transitional level ($\bar{x} = 5.64$, $n = 116$) were not sig-

Table 6

Regression for Abiding Self Scale Related to Cognitive
Level, Grade Level, Gender, and Attendance

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>PR < F</u>	<u>R-SQUARE</u>
Model	4	162.39	40.60	7.56	.0001*	.043167
Error	670	3599.61	5.37			
Total	674	3762.00				

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>F</u>	<u>PR < F</u>
Cognitive	1	48.63	9.05	.0027*
Grade	1	3.14	.58	.4451
Gender	1	109.64	20.14	.0001*
Attendance	1	1.00	.18	.6676

* $p < .05$

Table 7

Analysis of Variance for Abiding Self Scale and
Cognitive Level, Grade Level, Gender, and Attendance

<u>Source of Variance</u>	<u>df</u>	<u>SS</u>	<u>F</u>	<u>PR < F</u>
Cognitive	2	55.22	5.23	.0056*
Grade	3	65.26	4.12	.0067*
Gender	1	110.03	20.85	.0001*
Attendance	1	4.16	.79	.3751
Grade x Cognitive	3	18.95	1.20	.3097
Gender x Cognitive	2	2.81	.27	.7662
Attendance x Cognitive	0	0.0	--	--
Grade x Gender	3	24.79	1.57	.1947
Grade x Attendance	0	0.0	--	--
Gender x Attendance	1	.29	.05	.8152
Grade x Gender x Cognitive	3	24.67	1.56	.1966
All other interactions	0	0.0	--	--

* $p < .05$

nificantly different than those of students at either the concrete level or the formal operational level (see Table 8 for details).

Null Hypothesis Three

Null hypothesis three stated that there is no relationship between grade level and adolescents' willingness to reveal their transient selves to an audience. The multiple regression analysis for transient self scores (Table 1) indicated that grade level was significantly related ($p < .007$) to transient self scores. Thus, the null hypothesis was rejected.

Additionally, the analysis of variance for transient self scores, as illustrated in Table 4, indicated a trend in the direction of a main effect for grade ($p < .11$). A Duncan's test with the alpha level set at $p < .05$ found no difference in transient self scores between the four grade levels. See Table 5 for details.

Null Hypothesis Four

Null hypothesis four stated that there is no relationship between grade level and adolescents' willingness to reveal their abiding selves to an audience. Although the multiple regression analysis for abiding self scores indicated that grade level was not significantly related ($p < .05$) to abiding self scores, the analysis of variance for abiding self scores yielded a main effect for grade level ($p < .007$). See Table 7 for details. A Duncan's test with the alpha level set at $p < .05$ indicated that the means

for the ninth graders ($\bar{x} = 6.33$, $n = 173$) and the eighth graders ($\bar{x} = 6.32$, $n = 192$) were significantly higher than the mean for the sixth graders ($\bar{x} = 5.60$, $n = 150$). The mean for the twelfth graders ($\bar{x} = 5.92$, $n = 160$) was found to be not significantly different than the means of the other three grade levels (see Table 8 for details). Although this null hypothesis was also rejected, the relationship of grade level to abiding self scores cannot be as clearly interpreted from these data as the relationship of grade level to the transient self scores.

Null Hypotheses Five

Null hypothesis five stated that there is no relationship between gender and adolescents' willingness to reveal their transient selves to an audience. The multiple regression analysis for transient self scores indicated that gender was significantly related ($p < .04$) to the transient self (see Table 1). Thus, this null hypothesis was rejected.

Also, the analysis of variance for transient self scores yielded a main effect for gender ($p < .04$), as illustrated in Table 4. A Duncan's test with the alpha level set at $p < .05$ indicated that females ($\bar{x} = 6.11$, $n = 340$) scored significantly higher than males ($\bar{x} = 5.69$, $n = 355$) on the Transient Self Scale. See Table 5 for details.

Null Hypothesis Six

Null hypothesis six stated that there is no relationship between gender and adolescents' willingness to reveal

Table 8
 Duncan's Test for Variables of Abiding
 Self Scale Analysis of Variance

<u>Grouping*</u>	<u>Mean</u>	<u>N</u>	<u>Cognitive</u>
AA	6.18	551	Concrete
BA	5.64	116	Transitional
BB	4.25	8	Formal
<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Grade</u>
AA	6.33	173	9
AA	6.32	192	8
BA	5.92	160	12
BB	5.60	150	6
<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Gender</u>
A	6.47	340	Female
B	5.66	335	Male
<u>Grouping</u>	<u>Mean</u>	<u>N</u>	<u>Attendance</u>
A	6.07	667	Attendees
A	5.63	8	Nonattendees

* Means with the same letters are not significantly different at $p < .05$.

their abiding selves to an audience. The multiple regression analysis for abiding self scores (Table 6) indicated that gender was significantly related to abiding self scores at the $p < .0001$ level. Thus, the null hypothesis was rejected.

In addition, the analysis of variance for abiding self scores yielded a main effect for gender ($p < .0001$). See Table 6 for details. A Duncan's test with the alpha level set at $p < .05$, as illustrated in Table 8, indicated that the mean abiding self score for females ($\bar{x} = 6.47$, $n = 340$) was significantly higher than the abiding self score for males ($\bar{x} = 5.66$, $n = 335$).

Null Hypothesis Seven

Null hypothesis seven stated that there is no relationship between willingness to attend school and adolescents' willingness to reveal their transient selves to an audience. The multiple regression analysis for transient self scores indicated that attendance was not significantly ($p < .05$) related to transient self scores. See Table 1 for details. Thus, this null hypothesis was not rejected. However, the great difference in the number of subjects in each group should be noted (n for attenders = 667, n for nonattenders = 8).

Null Hypothesis Eight

Null hypothesis eight stated that there is no relationship between willingness to attend school and adolescents' willingness to reveal their abiding selves to an

audience. The multiple regression analysis for abiding self score, as illustrated by Table 6, indicated that attendance was not significantly ($p < .05$) related to abiding self scores. Thus, this null hypothesis was also not rejected. However, the great difference in the number of subjects in each group, as noted above, should be considered (n for attenders = 667, n for nonattenders = 8).

Results Related to Inter-examiner Reliability

A series of one-way analyses of variance were performed using cognitive scores, transient self scores, and abiding self scores as separate dependent variables and examiners as independent variables. These were performed to assess consistent testing procedures. These could be done with only the scores from the sixth and eighth grade students, since these students were placed in rather heterogeneous classrooms. On the other hand, the ninth and twelfth graders had been placed in various English courses at four different levels as measured by reading and IQ scores. There were three different examiners of sixth graders and three different examiners of eighth graders.

In five of the six analyses of variance, there was no significant difference between examiners' students' scores on the cognitive and transient and abiding self measures at the sixth grade level, and the cognitive scores and the transient self scores at the eighth grade level. However, possible examiner effect was noted for abiding self scores at the eighth grade level ($p < .001$). (See Appendix D for Duncan's test of these analyses of variance.)

Caution must be exercised in assuming that these analyses reflect only examiner differences in that each examiner worked at only one of three elementary schools. Thus, differences in scores could be confounded by possible differences in school populations.

CHAPTER V

DISCUSSION

The results of this investigation will be discussed in relation to the null hypotheses which were tested. The four areas which were examined included the relationship between cognitive development and the imaginary audience, the relationship between grade level and the imaginary audience, the relationship between gender and the imaginary audience, and the relationship between school attendance and the imaginary audience. Also to be discussed will be conclusions from these findings, especially in relation to the cognitive versus the social context points of view, and recommendations for future research.

Cognitive Level and the Imaginary Audience Scale

Null hypotheses one and two were formulated to address the issue of whether one form of adolescent egocentrism, as measured by scores on the Transient and Abiding Self scales, is related to the recent attainment of the stage of formal operations. No relationship between Transient and Abiding Self scale scores and the attainment of formal operations was observed. On the other hand, a relationship between cognitive functioning and heightened transient self and abiding self scores was noted with the cognitive level posited at the concrete level. Students at the concrete

level of cognitive functioning scored significantly higher than students at either the formal or transitional level on both the Transient Self and Abiding Self scales. Therefore, Elkind's important underlying assumption which states that the young adolescent shows increased sensitivity to the existence of an audience because of the recent attainment of formal operational thinking is seriously questioned.

These results, on the other hand, support what authors such as Blasi and Hoeffel (1974) have written in regards to typical adolescent behavior and its relationship to functioning at the concrete level. These writers hypothesized that adolescent personality traits, including egocentrism, can be explained by concrete operational thought on the adolescent's part. Furthermore, the fact that many students in as high as the twelfth grade did not score at the formal operational stage supports these same two authors' contention that many people may not ever reach the stage of formal operations.

However, a caveat in interpreting these findings must be included. The instrument used to measure cognitive level (Lawson, 1978) required the differentiation of operational performance on non-social tasks into concrete, transitional, and formal operational levels. Piaget (1962) states that individuals may be at different performance levels in domains demanding separate skills even when competence is based on the same underlying structure. Performance variables implicit in social vs. non-social tasks may have resulted in

adolescents' performing at a level of formal operations on a social task (e.g. the Imaginary Audience Scale) and at a concrete level on non-social tasks as those required by the Lawson (1978) instrument used in the present investigation. Therefore, although these findings contradict Elkind's theoretical position, further investigation of the cognitive demands of varied performance tasks, particularly social and non-social tasks, is required.

From this researcher's perspective and in relation to applications to a special population setting, it would be interesting to conduct a similar study examining the relationship between cognitive development and adolescent egocentrism with mildly mentally retarded students mainstreamed in a high school setting. An examination of these students in regards to cognitive development and imaginary audience factors would be a critical test of the importance of cognitive level as it relates to adolescent egocentrism. These students may have been placed in special education programs due to delayed intellectual ability, academic achievement, and adaptive behavior. However, other variables such as a change in social context, for example, initial entrance into a large high school, would be interesting to study in the context of their influence on a change in egocentrism. It may be important for counselors, social workers, psychologists and other related service personnel who work with these students to realize that although these students show delay in some academic and non-academic areas, they may still be

prone to heightened self-consciousness or greater sensitivity to the existence of an imaginary audience that affects other students regardless of cognitive level.

Grade Level and the Imaginary Audience Scale

Null hypotheses three and four addressed the relationship between grade level and transient and abiding self scores. As discussed above, both null hypotheses were rejected, indicating that there is a relationship between grade level and transient and abiding self functioning and the Imaginary Audience Scale. In the case of both the transient and abiding selves, heightened sensitivity to the existence of an audience occurs for students at the eighth and ninth grades. Elkind and Bowen (1979) found heightened Transient and Abiding scale scores for eighth grade students as compared to fourth, sixth, and twelfth grade students. Their findings are illustrated by Figure 2. The present researcher's findings closely approximate the trend in Elkind and Bowen's work (see Figure 3), although Elkind and Bowen attributed the trend to the transition into formal operations at eighth grade and the later equilibrium achieved during twelfth grade.

The similarity between the present study's findings and that of Elkind and Bowen (1979) is especially significant as one considers the fact that eighth and ninth grade students showed the highest amount of egocentrism in spite of the fact that these same students were not at the level of formal operations. These findings lend support to the

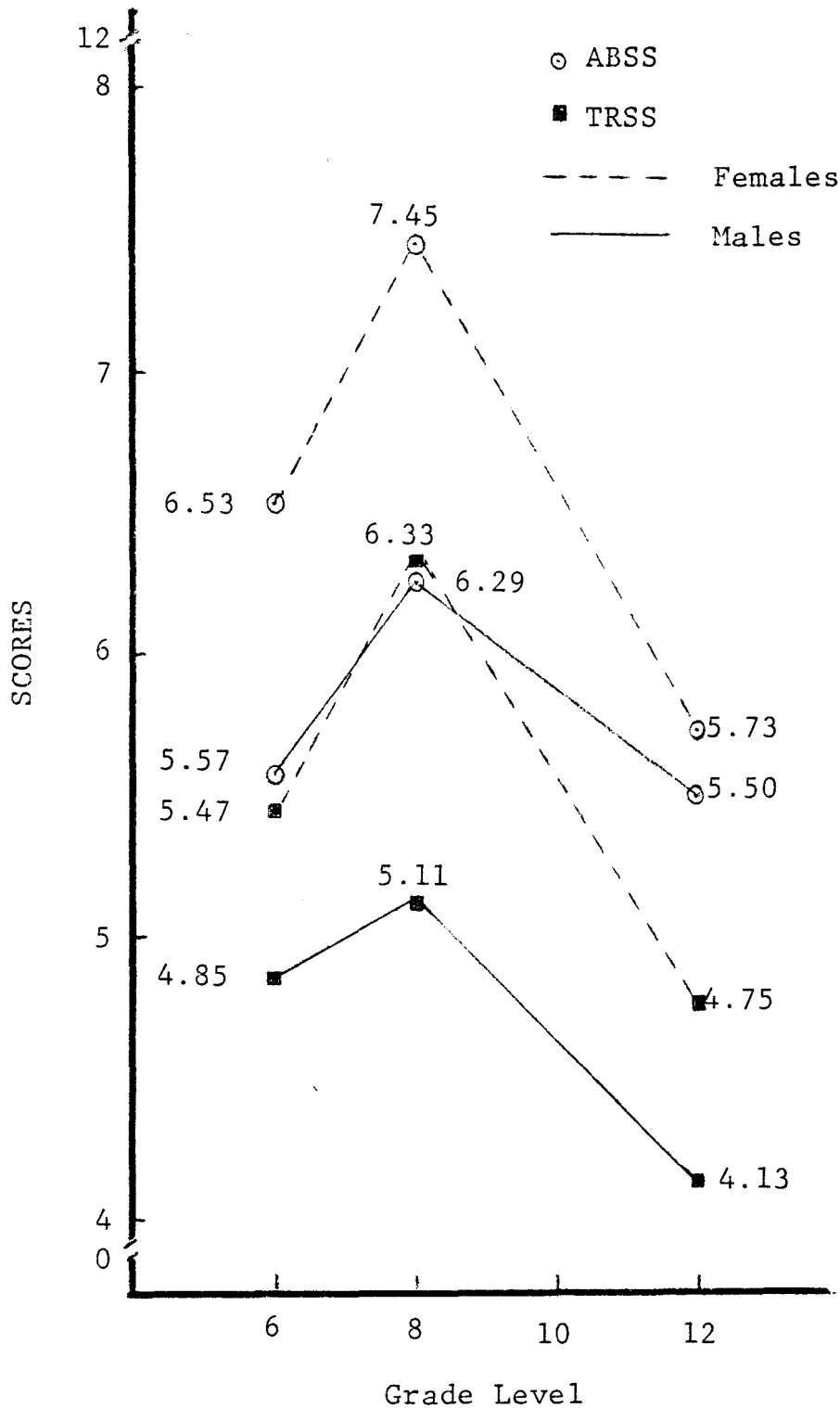


Figure 2. Transient Self scale (TRSS) and Abiding Self scale (ABSS) means for males and females (Elkind and Bowen, 1979, p.43).

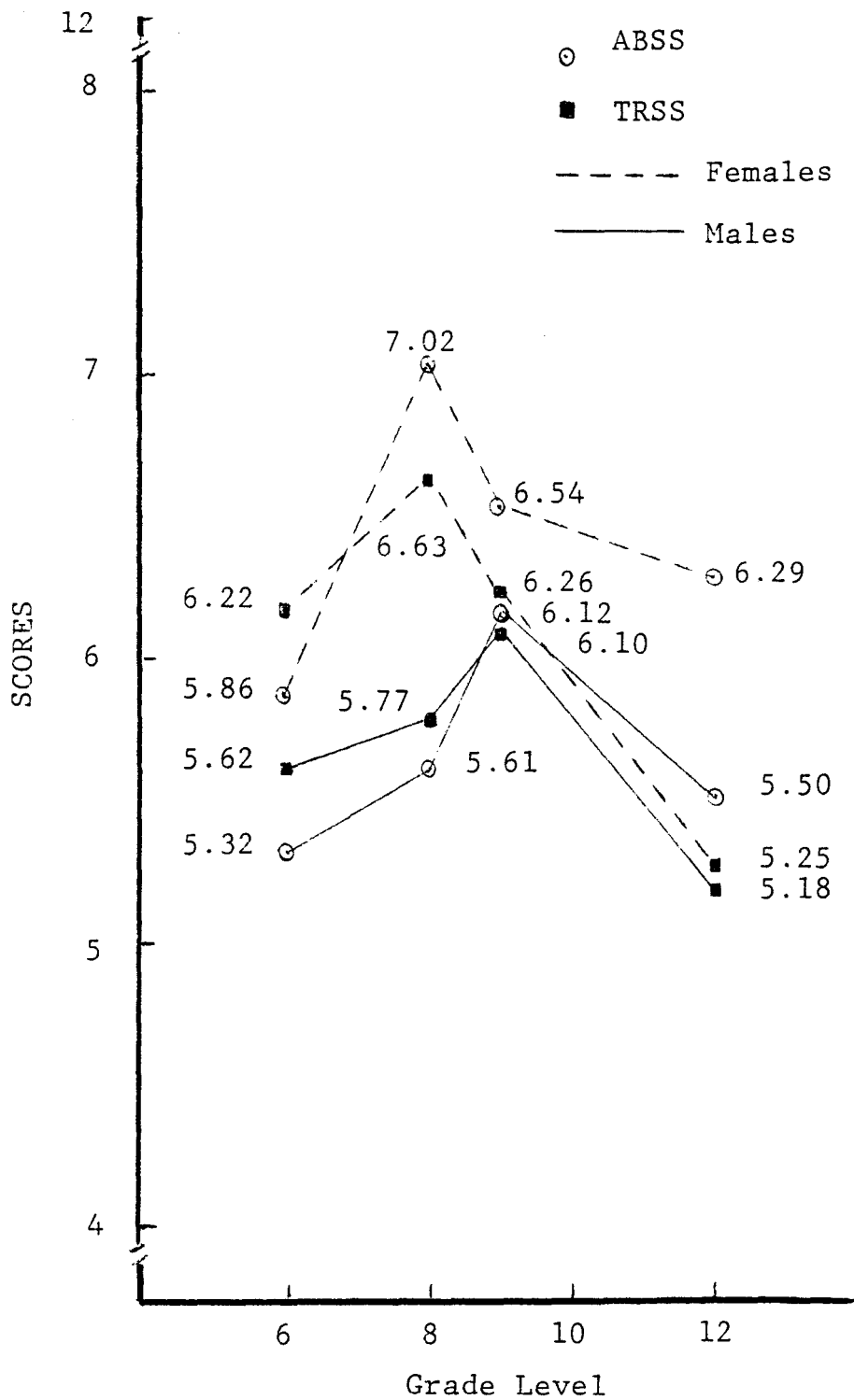


Figure 3. Transient Self scale (TRSS) and Abiding Self scale (ABSS) means for males and females.

social context position which states that the internal and external changes present at early adolescence account for a major disturbance of self-image, including heightened self-consciousness (Simmons et al., 1973). However, the effect of the other relevant variables investigated by Simmons et al. (1973), for example self-image stability, self-esteem, and perceived self on cognitive development, require further investigation.

Another implication of the consistent findings between the present study and that of Elkind and Bowen (1979) is that increased adolescent egocentrism for young adolescents, as measured by the Imaginary Audience Scale, is not a phenomenon limited to a particular socio-economic group. Elkind and Bowen described their subjects as middle class, while the students in the present study could be characterized as coming from working class backgrounds. In spite of this difference, a common heightened amount of egocentrism was noted to occur at around the eighth grade and to then drop off at later grades. Additional research with varied social and cultural groups is indicated to further validate the universality of this phenomenon.

When the findings of this investigation related to both cognitive development and grade level and their relationship to the imaginary audience are viewed together, even less support for the cognitive point of view as espoused by Elkind (1967) in favor of a social context perspective becomes evident. As students progressed from sixth through twelfth

grades, fewer students showed concrete cognitive functioning as compared to transitional cognitive functioning. According to the cognitive position, transition into formal operational thought allows for heightened egocentrism. In spite of the fact that more students were at the transitional level by twelfth grade ($n = 61$) as compared to sixth graders ($n = 6$), eighth graders ($n = 26$) and ninth graders ($n = 23$), students at the eighth and ninth grades showed the greatest amount of egocentrism.

Even if one argues that entrance into formal operations, at least on non-social tasks, is not the critical cognitive development point for heightened egocentrism, but rather the transitional stage is such a critical point, the findings still support the notion that grade level is very important for observed sensitivity to the existence of an imaginary audience. As illustrated by Figure 4, students at both the concrete and transitional level started to peak at the eighth grade, with the transitional students' scores on both the Transient and Abiding Self scales decreasing at later grades. No such drop off was observed for concrete students' abiding self scores. There were no students at the formal operational stage at the sixth, eighth, or ninth grades, making an observed trend impossible. Future research could be aimed at obtaining a more heterogeneous group in regards to cognitive level so as to include students at the formal operational stage at early grade levels. This arrangement would allow for a more complete analysis of the relative

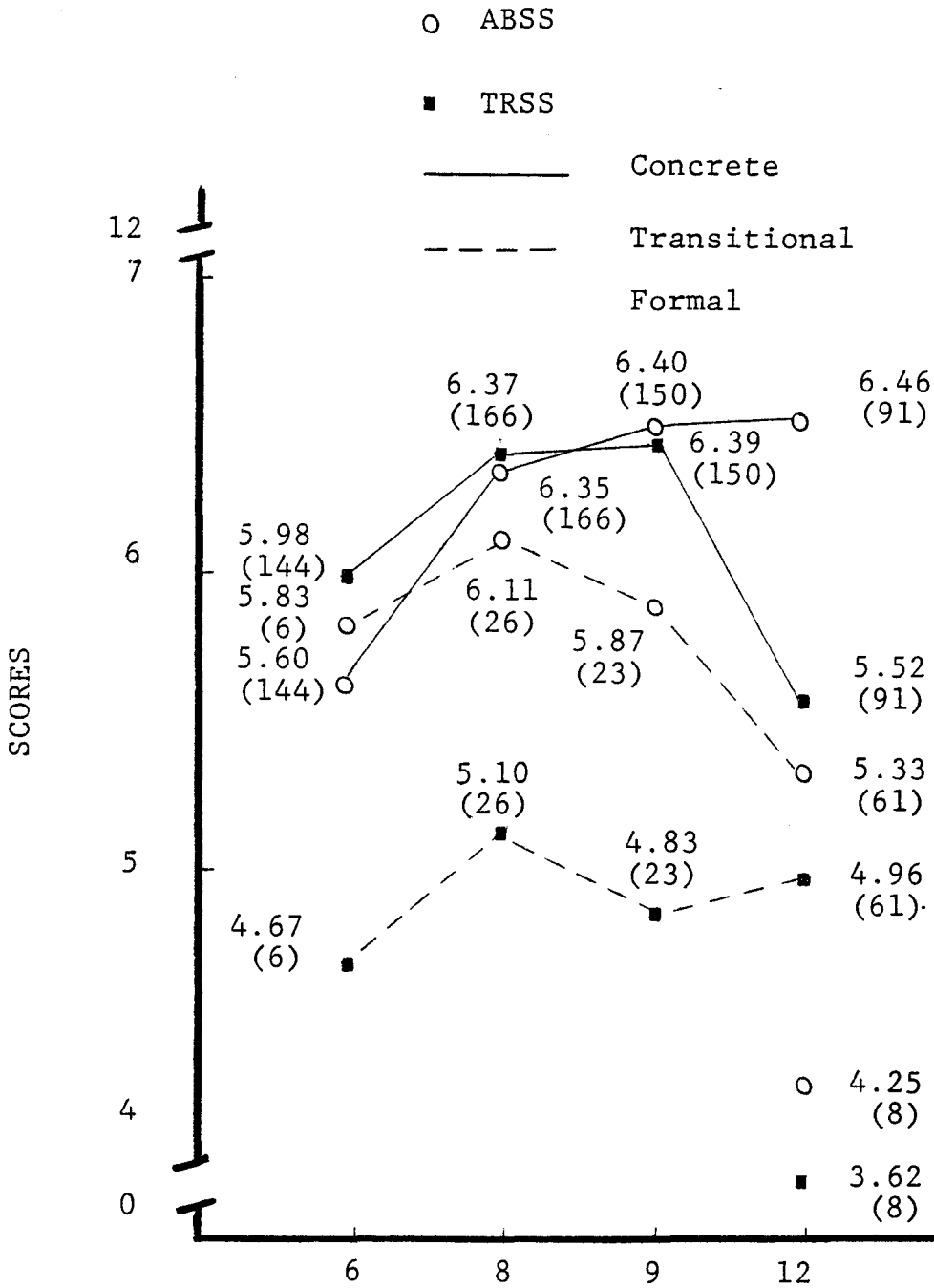


Figure 4. Transient Self scale (TRSS) and Abiding Self scale (ABSS) and cell sizes for concrete, transitional, and formal operational students at four grade levels.

effects of cognitive level and grade level on egocentrism.

Before disregarding the influence of cognitive level upon adolescent egocentrism in favor of social context variables, some consideration must be given to the instrument used in the present investigation to measure cognitive development. The instrument developed by Lawson (1978) could be considered as more of a continuous measuring device than as a categorical one. Between the lines of demarcation of concrete and formal functioning is the transitional area, which, when examined closely, represents ability beyond concrete functioning, yet not containing elements of formal thought. In other words, students scoring at the transitional level could be thought of as partially formal thinkers, beyond the concrete stage. Perhaps this is the cognitive stage described by Elkind as critical for the existence of adolescent egocentrism. This idea fits in well with what Looft (1975) described as accounting for the diminishing of adolescent egocentrism, "formal operational thought itself, in conjunction with the individual's interaction in a social world, leads to the dissolution of the adolescents' egocentrism" (p. 560). Thus, as the adolescent is more firmly established in the formal operational stage, egocentrism actually diminishes.

The present discussion, then, offers viability for the consideration of both cognitive and social context factors in the development of adolescent egocentrism, as at least manifested by heightened sensitivity to the existence of an audience. Future experimental work could be done to address

the relative importance of these variables. Perhaps a paradigm similar to the one used by Case (1978) could be utilized to see if students below even the transitional level of cognitive development could be trained to overcome egocentric thought. This framework would involve the three major areas of structural analysis, individual assessment, and instructional planning as related to how students typically deal with incidents where egocentrism is observed. If students were able to be trained in changing the degree of egocentric thought, considerable weight would be given to the importance of social context.

Gender and the Imaginary Audience Scale

Null hypotheses five and six were tested in order to establish whether or not a relationship existed between transient and abiding self scores and gender. A relationship between gender and both the transient and the abiding self was found. Females were found to score significantly higher than males on both the Transient and Abiding Self scales. These findings are consistent with those of Simmons et al. (1973) and Elkind and Bowen (1979). None of these authors interpreted this relationship. Simmons et al. (1973) briefly alluded to the notion that perhaps some people are more social-oriented than task-oriented. A task-oriented person would be more involved in a particular situation and less worried with how he or she is doing or what others are thinking of him or her. They took the position that females are culturally conditioned to be less task-oriented than males. An

alternative explanation may be based on the earlier physical maturity of females and that relationship to heightened scores on the Imaginary Audience Scale as compared to males. However, this finding, in regards to gender and scores on the Abiding Self scale and the Transient Self scale, is clearly not interpretable from the data available in this study.

The findings of the present investigation support continued differentiation between the abiding self and the transient self. As described earlier, the abiding self consists of long-lived characteristics which the individual regards as permanent aspects of the self while the transient self consists of momentary appearances which the individual does not regard as reflective of his or her true self. As found by Elkind and Bowen (1979), the present investigator also found the abiding self for each gender to be the most affected as contrasted to the transient self during young adolescence. This observation is consistent with the prediction of the social context viewpoint that there is a major disturbance of self-image in young adolescence. Furthermore, there was a distinction in which variables accounted for the greatest variance for the transient self scores versus the abiding self scores. As illustrated in Table 1, cognitive level contributed more to the variance of the transient self scores as compared to either the variable of grade level or gender. This conclusion is based upon inspection of the sum of squares scores for each of these variables, with the cognitive score being the highest. On the other hand, gender was found to

be a more significant variable as contrasted to either grade level or cognitive level in accounting for the variance of the abiding self scores. See Table 6 for details. Thus, the global self-image disturbance as reflected by changes in the abiding self scale scores is more significant for females as compared to males.

School Attendance and the Imaginary Audience Scale

A special group of students was included in the study for two reasons: (1) special groups had been studied in the past in relation to social role-taking skills and (2) Elkind and Bowen (1979) called for future research to be done utilizing the Imaginary Audience Scale with special populations wherein the imaginary audience might play a special role. This particular group, chronic truants, was chosen in order to discern if perhaps heightened self-consciousness and/or a different level of cognitive ability as compared to peers could influence these students' willingness to come to school. No relationship between regular school attendance and sensitivity to the existence of an audience for both the transient and abiding self dimensions was found. Also, there was no difference in cognitive level for attenders vs. nonattenders. However, these findings must be qualified in that the group of truants ($n = 8$) was so much smaller than that of regular attenders. On the other hand, it is suggested that these same phenomena be examined in the future with larger groups to help ascertain whether variables such as increased adolescent egocentrism, cognitive level, and perhaps other vari-

ables influence a student to not attend school, or whether nonattendance affects the development of adolescent egocentrism.

These findings are particularly relevant in helping to identify potential chronic nonattenders. As indicated by the present investigation, nonattenders may not necessarily be, for the most part, students who are particularly self-conscious. As far as the sample utilized in this study, the students in the nonattenders' program were no more self-conscious or self-admiring as compared to regular attenders. Furthermore, these students' decision to come to school regularly was not based on significantly different cognitive development as compared to regular attenders. Other factors such as a lack of support from home for regular attendance, past truancy in elementary school, inability to follow rules, etc., may have been operating to affect these students' desire to avoid school. Certainly more research, perhaps more qualitative in style by utilizing a case study approach, needs to be conducted to test the effect of these other variables.

Concluding Commentary

The present investigator found evidence for the existence of some heightened sensitivity to an imaginary audience for young adolescents. This finding supports that of Elkind and Bowen (1979) who noted that, "young adolescents were significantly less willing than children or older adolescents to reveal either their transient or the abiding self to an audience" (p. 44). However, the fact that younger adolescents

revealed heightened egocentrism in spite of the fact that the greatest majority of these students showed cognitive functioning at the concrete level is not consistent with Elkind's approach, the cognitive point of view.

In contrasting the cognitive point of view with the social context point of view in relation to this research project's findings, the results weigh more heavily in favor of the social context explanation for heightened self-consciousness for young adolescents. Although these findings indicate that a cognitive perspective, at least as posited by Elkind, should be ruled out in relation to an explanation for heightened egocentrism in young adolescents, caution may need to be exercised in assuming that a social context account completely explains the phenomenon.

The findings of this present investigation at least lead to suggestions for more research aimed at testing predictions from the social context position. For example, an interesting follow-up study could be one which basically replicates the present study with the addition of eighth and ninth graders who have come from a junior high school setting. Since these students have already made a change in educational social context before, moving from the sixth grade into a junior high school setting, one could predict less self-image disturbance at the eighth and ninth grades as contrasted to students coming from a K-8 grade setting. Thus, movement into high school could be viewed as just another larger scale, but similar, experience for students who once were in a junior

high school.

The multiple regression analyses showed that the variables of cognitive level (concrete), grade level, and gender significantly contributed to both transient and abiding self scores. Although the findings were statistically significant, the practical significance of this remains questionable in that minimal variance was accounted for by these variables. More research in the area is definitely warranted.

One interesting general area of study might be a consideration of physical changes in young adolescents. Both the cognitive perspective and social context perspective hold that the sudden physical changes that are observed by adolescents contribute to typical adolescent reactions. From the cognitive perspective, the adolescent who is in the constant notice of rapid physical changes is convinced that others are equally obsessed with him or her. From the social context perspective, new physical capabilities may coincide with new social pressures to become independent and result in self-definition ambiguities. A consideration of the importance of physical characteristics fits with one consistent finding in this and other studies, the heightened sensitivity of females to the existence of an audience in relation to both the transient and the abiding selves. The adolescent growth spurt for females begins at about age 11 and subsides at about age 13, while that for males begins at about age 13 and subsides at around 15 and one-half years of age (Tanner, 1971). The trends of both transient and

abiding self scores for females and males, as illustrated by Figures 2 and 3, duplicate these findings. Females peak at both transient and abiding self scores at an earlier age than males. Males follow the trend, but peak at ninth grade. Females show greater heightened scores at their peak as compared to males at their peak. These differences may be socially influenced or more a function of differences in physical maturation between males and females. A measure of physical changes could be included in later research if a method of relative physical change measurement could be developed. An objective measure as well as a perceived physical change scale could be used. It may be found that distinct differences in physical maturation with their concomitant psychological and social results are related to the observed differences in imaginary audience scores between males and females. If so, growth trends may prove to be important variables to consider in future research.

SUMMARY

The overall purpose of this investigation was to systematically examine the interrelationship between cognitive level, grade level, gender, and school attendance and adolescents' willingness to reveal their transient and abiding selves to an audience. The framework for the transient and abiding self emerged from the work of Elkind (1978) in reference to his writings on adolescent egocentrism. According to his theory, young adolescents typically demonstrate increased sensitivity to the existence of an imaginary audience (a characteristic form of adolescent egocentrism) due to the recent attainment of the stage of formal operations. According to a social context perspective, young adolescents show heightened self-consciousness due to the many internal and external changes related to a shift from puberty to adolescence.

Subjects in the present investigation were 675 students divided by grade level (sixth, eighth, ninth, and twelfth), gender, and willingness to attend school regularly. The students were administered the Imaginary Audience Scale and a test of formal operations. These were given to the students in groups within their classroom settings.

A number of null hypotheses were formulated to test which perspective, either the cognitive or the social con-

text, more adequately explained typical young adolescent egocentrism as measured by the Imaginary Audience Scale. A distinct trend was found in relation to heightened egocentrism as measured on the Transient Self scale and the Abiding Self scale for eighth and ninth grade students as compared to sixth and twelfth grade students. These findings replicated the previous findings of Elkind and Bowen (1979). However, more significantly, these same eighth and ninth grade students were found to lie below the level of formal operations as measured by the cognitive test. The cognitive level of these eighth and ninth grade students was found to lie at the concrete level. Thus, the explanation of adolescent egocentrism as occurring as a by-product of the stage of formal operations was (at least as measured on non-social tasks) ruled out. Instead, the rival explanation of the social context perspective was favored since movement from an elementary school system to a large high school system, coupled with the physical changes of early adolescence, could result in a major disturbance of self-image, including a heightened sense of self-consciousness.

Other predictions were made regarding gender and its relationship to the Imaginary Audience Scale. The results reported here support those found by other researchers: females showed heightened sensitivity to the existence of an audience on both the Transient Self scale and the Abiding Self scale.

Finally, a special group of students, all chronic

truants, were included to determine if they might be particularly sensitive to the existence of an imaginary audience. No such relationship was noted, although small sample size may have contributed to this finding.

All things considered, from the findings of the present investigation it must be concluded that since the cognitive explanation for adolescent egocentrism-linked behavior espoused by Elkind in previous research (Elkind, 1967; 1968; 1970; 1978) was not confirmed by this study, future research needs to be done to theoretically replicate these findings. For example, the inclusion of a group of mildly mentally impaired students would provide future researchers with a group of cognitively delayed students who still may show heightened sensitivity to the existence of an audience. In addition, in order to further support the social context position, other variables that have been linked to a major disturbance of self-image need to be included in future work. These variables include self-image stability, self-esteem, and perceived self. When contrasting the statistical significance of the results with the practical significance, a need is indicated for the inclusion of other important variables that may be responsible for observed behavior in young adolescents. One such general fund of variables could be those related to the sudden physical changes in young adolescents.

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APPENDIX A

APPENDIX A

Directions

For each of the items below a situation will be demonstrated. Each demonstration will lead to a question or questions for which there are a number of possible answers. For each item you are to check the box of the best answer and explain your choice in the space provided.

Example Item: "The Balancing Beam"

- Mark 3
- Mark 7
- Mark 8
- Mark 10

Please explain your choice.

Item 1-1: "Pieces of Clay"

- The pancake weighs more.
- The pieces weigh the same.
- The ball weighs more.

Please explain your choice.

Item 1-2: "Plastic Cylinders 1"

The water will rise to Mark:

- 7
- 8
- 9
- 10
- other
- There is no way of predicting.

Please explain your choice.

Item 1-3: "Plastic Cylinders 2"

The water will rise to Mark:

- | | |
|--|---|
| <input type="checkbox"/> 5 $\frac{1}{3}$ | <input type="checkbox"/> 8 $\frac{1}{3}$ |
| <input type="checkbox"/> 5 $\frac{2}{3}$ | <input type="checkbox"/> 8 $\frac{1}{2}$ |
| <input type="checkbox"/> 7 $\frac{1}{3}$ | <input type="checkbox"/> 9 |
| <input type="checkbox"/> 7 $\frac{1}{2}$ | <input type="checkbox"/> other |
| <input type="checkbox"/> 8 | <input type="checkbox"/> There is no way of predicting. |

Please explain your choice.

Item 1-4: "The Pendulum's Length"

Which pendulum or pendulums would you use for the experiment?

- 1 and 2
- 1 and 3
- 2 and 3
- 1, 2, and 3
- 2 only

Please explain your choice.

Item 1-5: "The Pendulum's Weight"

Which pendulum or pendulums would you use for the experiment?

- 1 and 2
- 1 and 3
- 2 and 3
- 1, 2, and 3
- 3 only

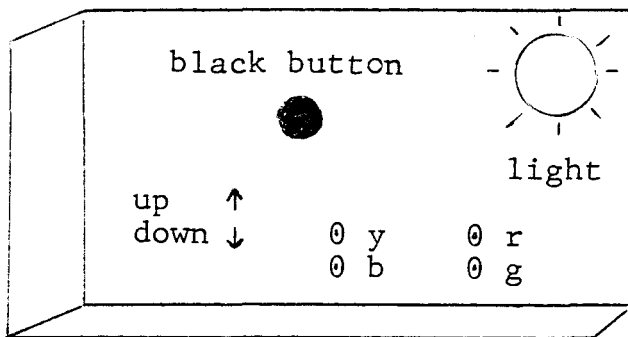
Please explain your choice.

Item 1-6: "The Metal Box"

The objective of this puzzle is to discover which switch or switches must be flipped to make the light turn on.

Example:

1. ~~y~~ _____ ON OFF ↙



y - yellow switch
 b - blue switch
 r - red switch
 g - green switch

Your record:

- | | | |
|-----------|-----------|-----------|
| 1. _____ | 11. _____ | 21. _____ |
| 2. _____ | 12. _____ | 22. _____ |
| 3. _____ | 13. _____ | 23. _____ |
| 4. _____ | 14. _____ | 24. _____ |
| 5. _____ | 15. _____ | 25. _____ |
| 6. _____ | 16. _____ | 26. _____ |
| 7. _____ | 17. _____ | 27. _____ |
| 8. _____ | 18. _____ | 28. _____ |
| 9. _____ | 19. _____ | 29. _____ |
| 10. _____ | 20. _____ | 30. _____ |

Item 1-7: "The Squares"

Three yellow squares and three red squares are put into a sack. What are the chances of pulling out a red square on the first try?

- | | |
|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> 1 out of 1 | <input type="checkbox"/> 2 out of 6 |
| <input type="checkbox"/> 1 out of 2 | <input type="checkbox"/> 4 out of 6 |
| <input type="checkbox"/> 1 out of 3 | <input type="checkbox"/> 3 out of 3 |
| <input type="checkbox"/> 1 out of 6 | <input type="checkbox"/> other |

Please explain your choice.

Directions

For each of the items below a situation will be demonstrated. Each demonstration will lead to a question or questions for which there are a number of possible answers. For each item you are to check the box of the best answer and explain your choice in the space provided.

Item 2-1: "Metal Weights"

- The water will rise to a higher level.
- The water will rise to a lower level.
- The water will rise to the same level.

Please explain your choice.

Item 2-2: "The Balancing Beam 1"

Where would you hang the 5-unit weight to make the beam balance?

- between Mark 3 and 4
- Mark 7
- Mark 12
- Mark 14
- at the end

Please explain your choice.

Item 2-3: "The Balancing Beam 2"

Where would you hang the 10-unit weight to make the beam balance?

- | | |
|---|----------------------------------|
| <input type="checkbox"/> Mark 5 | <input type="checkbox"/> Mark 8 |
| <input type="checkbox"/> Mark 6 | <input type="checkbox"/> Mark 9 |
| <input type="checkbox"/> between Mark 6 and 7 | <input type="checkbox"/> Mark 10 |
| <input type="checkbox"/> Mark 7 | <input type="checkbox"/> Mark 17 |

Please explain your choice.

Item 2-4: "The Spheres 1"

Which sphere would you release from the high position to find out if the place a sphere is released from makes a difference in how far the target goes?

- the heavy sphere
- the light sphere

Please explain your choice.

Item 2-5: "The Spheres 2"

Does this experiment prove that Metal B can hit a target farther than Metal A can?

- yes
- no
- need more information

Please explain your choice.

Item 2-6: "Squares and Diamonds 1"

Three red squares, four yellow squares, and five blue squares are put into a sack. Four red diamonds, two yellow diamonds, and three blue diamonds are put into the same sack. What are the chances of pulling out a red piece on the first try?

- | | |
|-------------------------------------|--------------------------------------|
| <input type="checkbox"/> 1 out of 1 | <input type="checkbox"/> 1 out of 21 |
| <input type="checkbox"/> 1 out of 2 | <input type="checkbox"/> 1 out of 7 |
| <input type="checkbox"/> 1 out of 3 | <input type="checkbox"/> other |
| <input type="checkbox"/> 1 out of 4 | |

Please explain your choice.

Item 2-7: "Squares and Diamonds 2"

Three red squares, four yellow squares, and five blue squares are put into a sack. Four red diamonds, two yellow diamonds, and three blue diamonds are put into the same sack. What are the chances of pulling out a red diamond or a blue diamond on the first try?

- | | | | |
|--------------------------|------------|--------------------------|-------------|
| <input type="checkbox"/> | 1 out of 1 | <input type="checkbox"/> | 8 out of 21 |
| <input type="checkbox"/> | 1 out of 2 | <input type="checkbox"/> | 9 out of 21 |
| <input type="checkbox"/> | 1 out of 3 | <input type="checkbox"/> | other |
| <input type="checkbox"/> | 1 out of 4 | | |

Please explain your choice.

Instructions: Please read the following stories carefully and assume that the events actually happened to you. Place a check next to the answer that best describes what you would do or feel in the real situation.

1. You have looked forward to the most exciting dress up party of the year. You arrive after an hour's drive from home. Just as the party is beginning, you notice a grease spot on your trousers or skirt. (There is no way to borrow clothes from anyone.) Would you stay or go home?
 - Go home.
 - Stay, even though I'd feel uncomfortable.
 - Stay, because the grease spot wouldn't bother me.

2. Let's say some adult visitors came to your school and you were asked to tell them a little bit about yourself.
 - I would like that.
 - I would not like that.
 - I wouldn't care.

3. It is Friday afternoon and you have just had your hair cut in preparation for the wedding of a relative that weekend. The barber or hairdresser did a terrible job and your hair looks awful. To make it worse, that night is the most important basketball game of the season and you really want to see it, but there is no way you can keep your head covered without people asking you questions. Would you stay home or go to the game anyway?
 - Go to the game and not worry about my hair.
 - Go to the game and sit where people won't notice me very much.
 - Stay home.

4. If you went to a party where you did not know most of the kids, would you wonder what they were thinking about you?
 - I wouldn't think about it.
 - I would wonder about that a lot.
 - I would wonder about that a little.

5. You are sitting in class and have discovered that your jeans have a small but noticeable split along the side seam. Your teacher has offered extra credit toward his/her course grade to anyone who can write the correct answer to a question on the blackboard. Would you get up in front of the class and go to the blackboard or would you remain seated?
 - Go to the blackboard as though nothing happened.
 - Go to the blackboard and try to hide the split.
 - Remain seated.

6. When someone watches me work . . .
- I get very nervous.
 - I don't mind at all.
 - I get a little nervous.
7. Your class is supposed to have their pictures taken, but you fell the day before and scraped your face. You would like to be in the picture but your cheek is red and swollen. Would you have your picture taken anyway or stay out of the picture?
- Get your picture taken even though you'd be embarrassed.
 - Stay out of the picture.
 - Get your picture taken and not worry about it.
8. One young person said, "When I'm with people I get nervous because I worry about how much they like me."
- I feel like this often.
 - I never feel like this.
 - I feel like this sometimes.
9. You have been looking forward to your friend's party for weeks, but just before you leave for the party your mother tells you that she accidentally washed all your good clothes with a red shirt. Now all your jeans are pink in spots. The only thing left to wear are your jeans that are too big and too baggy. Would you go the party or would you stay home?
- Go to the party, but buy a new pair of jeans to wear.
 - Stay home.
 - Go to the party in either the pink or baggy jeans.
10. Suppose you went to a party you thought was a costume party but when you got there you were the only person wearing a costume. You'd like to stay and have fun with your friends but your costume is very noticeable. Would you stay or go home?
- Go home.
 - Stay and have fun joking about your costume.
 - Stay, but try to borrow some clothes to wear.
11. Let's say you wrote a story for an assignment your teacher gave you, and she asked you to read it aloud to the rest of the class.
- I would not like that at all.
 - I would like that but I would be nervous.
 - I would like that.

12. If you were asked to get up in front of the class and talk a little bit about your hobby . . .

- I wouldn't be nervous at all.
- I would be a little nervous.
- I would be very nervous.

CODE # _____ SEX _____

GRADE _____ BIRTHDATE _____ AGE _____

SCHOOL _____ TEACHER _____

DATES _____ / _____

TS _____

AS _____

Tot _____

CT _____

Level _____

Exam. _____

APPENDIX B

APPENDIX B

Directions

For each of the items below a situation will be demonstrated. Each demonstration will lead to a question or questions for which there are a number of possible answers. For each item you are to check the box of the best answer and explain your choice in the space provided.

Example Item: "The Balancing Beam"

Mark 3

Mark 7

Mark 8

Mark 10

Please explain your choice.

Equal weights should be placed equal distances from the center.

Item 1-1: "Pieces of Clay"

The pancake weighs more.

The pieces weigh the same.

The ball weighs more.

Please explain your choice.

You did not add or take away any clay.

Item 1-2: "Plastic Cylinders 1"

The water will rise to Mark:

- 7
 8
 9
 10
 other
 There is no way of predicting.

Please explain your choice.

$$\frac{4}{6} = \frac{6}{x}$$

$$4x = 36$$

$$x = 9$$

Note: Students do not have to use this method to be considered correct. Any indication of proportional, rather than additive reasoning is OK.

Item 1-3: "Plastic Cylinders 2"

The water will rise to Mark:

- 5 1/3 8 1/3
 5 2/3 8 1/2
 7 1/3 9
 7 1/2 other
 8 There is no way of predicting.

Please explain your choice.

$$\frac{4}{6} = \frac{2}{3} = \frac{x}{11}$$

$$6x = 44$$

$$x = \frac{44}{6}$$

$$x = 7 \frac{1}{3}$$

Item 1-4: "The Pendulum's Length"

Which pendulum or pendulums would you use for the experiment?

- 1 and 2
- 1 and 3
- 2 and 3
- 1, 2, and 3
- 2 only

Please explain your choice.

Everything is the same except the length so you can tell if length makes a difference.

Item 1-5: "The Pendulum's Weight"

Which pendulum or pendulums would you use for the experiment?

- 1 and 2
- 1 and 3
- 2 and 3
- 1, 2, and 3
- 3 only

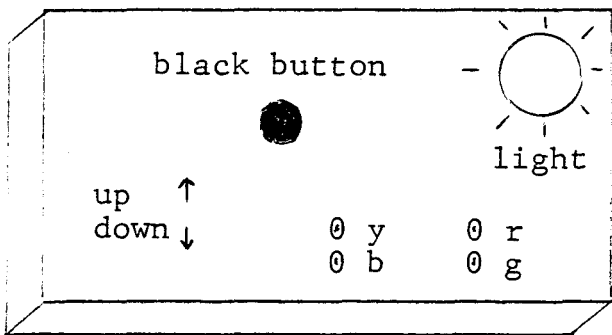
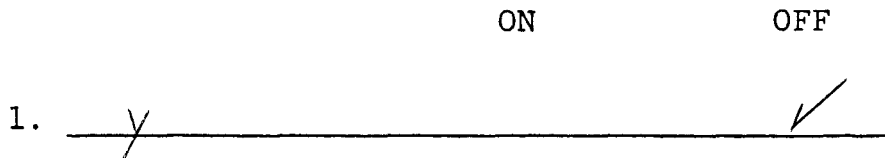
Please explain your choice.

Everything is the same except weight so you can tell if weight makes a difference.

Item 1-6: "The Metal Box"

The objective of this puzzle is to discover which switch or switches must be flipped to make the light turn on.

Example:



y - yellow switch
 b - blue switch
 r - red switch
 g - green switch

Your record:

- | | | |
|---------------------|---------------------------|-----------------------|
| 1. <u> y </u> | 11. <u> y, r, b </u> | 21. <u> </u> |
| 2. <u> r </u> | 12. <u> y, r, g </u> | 22. <u> </u> |
| 3. <u> b </u> | 13. <u> y, b, g </u> | 23. <u> </u> |
| 4. <u> g </u> | 14. <u> r, b, g </u> | 24. <u> </u> |
| 5. <u> y, r </u> | 15. <u> y, r, b, g </u> | 25. <u> </u> |
| 6. <u> y, b </u> | 16. <u> </u> | 26. <u> </u> |
| 7. <u> y, g </u> | 17. <u> </u> | 27. <u> </u> |
| 8. <u> r, b </u> | 18. <u> </u> | 28. <u> </u> |
| 9. <u> r, g </u> | 19. <u> </u> | 29. <u> </u> |
| 10. <u> b, g </u> | 20. <u> </u> | 30. <u> </u> |

Note: The combinations need not be in this order to be correct.
 There must be all 15 and no repetitions.

Item 1-7: "The Squares"

Three yellow squares and three red squares are put into a sack. What are the chances of pulling out a red square on the first try?

 1 out of 1 2 out of 6 1 out of 2 4 out of 6 1 out of 3 3 out of 3 1 out of 6 other

Please explain your choice.

3 of the 6 squares were red

$$3/6 = 1/2$$

Directions

For each of the items below a situation will be demonstrated. Each demonstration will lead to a question or questions for which there are a number of possible answers. For each item you are to check the box of the best answer and explain your choice in the space provided.

Item 2-1: "Metal Weights"

- The water will rise to a higher level.
- The water will rise to a lower level.
- The water will rise to the same level.

Please explain your choice.

The metal weights are the same size so they will displace the equal amounts of water.

Item 2-2: "The Balancing Beam 1"

Where would you hang the 5-unit weight to make the beam balance?

- between Mark 3 and 4
- Mark 7
- Mark 12
- Mark 14
- at the end

Please explain your choice.

It's half the weight so it should be twice the distance.

Item 2-3: "The Balancing Beam 2"

Where would you hang the 10-unit weight to make the beam balance?

- | | |
|---|----------------------------------|
| <input type="checkbox"/> Mark 5 | <input type="checkbox"/> Mark 8 |
| <input checked="" type="checkbox"/> Mark 6 | <input type="checkbox"/> Mark 9 |
| <input type="checkbox"/> between Mark 6 and 7 | <input type="checkbox"/> Mark 10 |
| <input type="checkbox"/> Mark 7 | <input type="checkbox"/> Mark 17 |

Please explain your choice.

The 10-unit weight is $\frac{2}{3}$ of the 15-unit weight, so it must be placed $\frac{3}{2}$ as far out. $\frac{3}{2} \times 4 = 6$.

Note: If a student uses the formula: $w_1 x d_1 = w_2 x d_2$ to solve the problem, this does not indicate the use of formal reasoning. The item should be dropped from consideration.

Item 2-4: "The Spheres 1"

Which sphere would you release from the high position to find out if the place a sphere is released from makes a difference in how far the target goes?

- the heavy sphere
- the light sphere

Please explain your choice.

Since the light sphere was released from the low position, it would also have to be released from the high position or else you could not tell. It would be an unfair test.

Item 2-5: "The Spheres 2"

Does this experiment prove that Metal B can hit a target farther than Metal A can?

yes

no

need more information

Please explain your choice.

The spheres hit targets of different weights so you can't tell anything about the two methods.

Item 2-6: "Squares and Diamonds 1"

Three red squares, four yellow squares, and five blue squares are put into a sack. Four red diamonds, two yellow diamonds, and three blue diamonds are put into the same sack. What are the chances of pulling out a red piece on the first try?

1 out of 1

1 out of 21

1 out of 2

1 out of 7

1 out of 3

other

1 out of 4

Please explain your choice.

7 of the 21 pieces are red.

$7/21 = 1/3$

Item 2-7: "Squares and Diamonds 2"

Three red squares, four yellow squares, and five blue squares are put into a sack. Four red diamonds, two yellow diamonds, and three blue diamonds are put into the same sack. What are the chances of pulling out a red diamond or a blue diamond on the first try?

 1 out of 1 8 out of 21 1 out of 2 9 out of 21 1 out of 3 other 1 out of 4

Please explain your choice.

4 red + 3 blue diamonds = 7 red or blue diamonds

7 out of 21 or 1 of 3 would be the chances.

Instructions: Please read the following stories carefully and assume that the events actually happened to you. Place a check next to the answer that best describes what you would do or feel in the real situation

1. You have looked forward to the most exciting dress up party of the year. You arrive after an hour's drive from home. Just as the party is beginning, you notice a grease spot on your trousers or skirt. (There is no way to borrow clothes from anyone.) Would you stay or go home?
 - 2 Go home.
 - 1 Stay, even though I'd feel uncomfortable.
 - 0 Stay, because the grease spot wouldn't bother me.

2. Let's say some adult visitors came to your school and you were asked to tell them a little bit about yourself.
 - 0 I would like that.
 - 2 I would not like that.
 - 1 I wouldn't care.

3. It is Friday afternoon and you have just had your hair cut in preparation for the wedding of a relative that weekend. The barber or hairdresser did a terrible job and your hair looks awful. To make it worse, that night is the most important basketball game of the season and you really want to see it, but there is no way you can keep your head covered without people asking you questions. Would you stay home or go to the game anyway?
 - 0 Go to the game and not worry about my hair.
 - 1 Go to the game and sit where people wouldn't notice me very much.
 - 2 Stay home.

4. If you went to a party where you did not know most of the kids, would you wonder what they were thinking about you?
 - 0 I wouldn't think about it.
 - 2 I would wonder about that a lot.
 - 1 I would wonder about that a little.

5. You are sitting in class and have discovered that your jeans have a small but noticeable split along the side seam. Your teacher has offered extra credit toward his/her course grade to anyone who can write the correct answer to a question on the blackboard. Would you get up in front of the class and go to the blackboard or would you remain seated?
 - 0 Go to the blackboard as though nothing happened.
 - 1 Go to the blackboard and try to hide the split.
 - 2 Remain seated.

6. When someone watches me work . . .
- I get very nervous.
 - I don't mind at all.
 - I get a little nervous.
7. Your class is supposed to have their pictures taken, but you fell the day before and scraped your face. You would like to be in the picture but your cheek is red and swollen. Would you have your picture taken anyway or stay out of the picture?
- Get your picture taken even though you'd be embarrassed.
 - Stay out of the picture.
 - Get your picture taken and not worry about it.
8. One young person said, "When I'm with people I get nervous because I worry about how much they like me."
- I feel like this often.
 - I never feel like this.
 - I feel like this sometimes.
9. You have been looking forward to your friend's party for weeks, but just before you leave for the party your mother tells you that she accidentally washed all your good clothes with a red shirt. Now all your jeans are pink in spots. The only thing left to wear are your jeans that are too big and too baggy. Would you go the party or would you stay home?
- Go to the party, but buy a new pair of jeans to wear.
 - Stay home.
 - Go to the party in either the pink or baggy jeans.
10. Suppose you went to a party you thought was a costume party but when you got there you were the only person wearing a costume. You'd like to stay and have fun with your friends but your costume is very noticeable. Would you stay or go home?
- Go home.
 - Stay and have fun joking about your costume.
 - Stay, but try to borrow some clothes to wear.
11. Let's say you wrote a story for an assignment your teacher gave you, and she asked you to read it aloud to the rest of the class.
- I would not like that at all.
 - I would like that but I would be nervous.
 - I would like that.

12. If you were asked to get up in front of the class and talk a little bit about your hobby . . .

0 I wouldn't be nervous at all.

1 I would be a little nervous.

2 I would be very nervous.

APPENDIX C

APPENDIX C

GENERAL TESTING PROCEDURES

1. Students should be seated with empty seats between them if possible.
2. Pass out one test blank to each student.
3. Provide the students with a general introduction to the test by explaining that the test consists of a number of demonstration items that lead to problems. Solution of the problems involves reasoning or problem-solving strategies that are useful in solving problems in a variety of areas. The test will provide information about how familiar you are with these strategies. Explain that some of the items are very easy and some quite difficult. Few students would be expected to get them all correct. Indeed, there may be a number of correct solutions to some of the items.
4. Have the students fill in the information on the back page of the test blank.
5. Explain that they will be progressing through the items as a class. This means that some students may finish some items before others and will have to be patient until all (or nearly all) of the other students have finished before going on to the next items.
6. Do the Example Item, "The Balancing Beam" with the class (see directions below). Have one student volunteer his answer and his explanation. Explain to the class that their explanations need not be lengthy but they should be complete. In this case, a complete explanation would be: "The weights are the same so the lengths should be the same." Give the students time to write down their explanations and proceed to Item 1.
7. After demonstrating Item 1, give students time to select an answer and justify their selection. Proceed to Item 2 when all but a few students have completed Item 1. You will have to use your own judgment about pacing as you progress through the rest of the items. You must go quickly enough so that the fast students do not become too impatient but you must go slowly enough so that the slower students have ample opportunity to respond. The entire

test takes 75 to 90 minutes of class time in one long session or two shorter sessions.

8. It is important that the students understand the situations and the questions as best as they can. For this reason, you may need to repeat or rephrase certain questions and items of information for certain students. This is proper but care must be taken not to provide hints as to the correct solution.

SPECIFIC TESTING PROCEDURES FOR EACH ITEM

Example: "The Balancing Beam"

Materials: 1 balance beam
2 10-unit hanging weights

Directions: Show the students the balance beam and the two 10-unit hanging weights. Point out the equally spaced marks along the length of the beam and how the beam balances like a teeter totter when no weights are hung on it. Hang a 10-unit weight on one side of the beam at the 7th mark.

Ask: Where should the other 10-unit weight be hung to make the beam balance?

Item 1-1: "Pieces of Clay"

Materials: 2 balls of clay of equal size, shape, and weight
1 balance beam
2 balance pans

Directions: Show the students the two balls of clay. Point out that they are the same size and shape. Demonstrate that they weigh the same by placing them in the balance pans hung equal distances from the fulcrum of the balance beam. Remove the balls of clay from the pans and flatten one of them into a "pancake shape."

Ask: Does the pancake shape piece weigh more now? Do the two pieces weigh the same? Or does the ball weigh more?

Item 1-2: "Plastic Cylinders 1"

Materials: 1 wide plastic cylinder
1 narrow plastic cylinder
1 jar of colored water

Directions: Show the students the two plastic cylinders. Point out the different diameters and the equally spaced marks along the front of each. Pour water from the jar into the wide cylinder up to the 4th mark. Pour that water into the narrow cylinder

and note that the water rises to the 6th mark. Tell the students to make a record of this information. Pour the water from the narrow cylinder into the jar. Pour water from the jar into the wide cylinder up to the 6th mark.

Ask: How high would this water rise if it were poured into the narrow cylinder?

Item 1-3: "Plastic Cylinders 2"

Materials: Same as for Item 1-2

Directions: Start with empty cylinders. Pour water from the jar up to the 11th mark in the narrow cylinder.

Ask: How high would this water rise if it were poured into the wide cylinder?

Item 1-4: "The Pendulum's Length"

Materials: 3 strings number 1, 2, 3 suspended from a single support. Strings #1 and #3 are of equal length, string #2 is longer.
2 5-unit weights hung at the end of strings #2 and #3
1 10-unit weight hung at the end of string #1

Directions: Show the students the three strings and the weights. Attach the weights to the proper strings and explain that this makes three pendulums (just three strings with weights attached to their ends). Point out that pendulum #1 and #3 are the same length while pendulum #2 is longer. Point out that Pendulum #2 and #3 have the same weight, but that pendulum #1 has a heavier weight. Swing one of the pendulums and count out loud each time the weight swings back to the release point. Point out that the pendulum seems to take about one second per swing.

Ask: Suppose you wanted to do an experiment to find out if changing the length of a pendulum changed the amount of time it takes to swing back and forth. Which pendulum or pendulums would you use for the experiment?

Item 1-5: "The Pendulum's Weight"

Materials: Same as for Item 1-4

Ask: Suppose you wanted to do an experiment to find out if changing the weight on the end of the string changed the amount of time the pendulum takes to swing back and forth. Which pendulums would you use for the experiment?

Item 1-6: "The Metal Box"

Materials: 1 metal box with four switches, a black button, and a light bulb on it.

Directions: Point out the box, the switches, the light bulb, and the black button. Point out that the switches are identified by four colors so that there is a "yellow switch," a "blue switch," a "red switch," and a "green switch." The switches can be flipped into either an "up position" or a "down position." If the correct switch or switches are flipped into the up position, and the black button is pushed, the bulb will light.

Cover the switches and flip the blue and green switches into the up position. Push the button to show the students that the bulb will, in fact, light if the correct switch or switches are flipped. You may need to flip other switches up and down again to assure that the students are not clued as to the correct combination. Flip all switches back to the down position and uncover them.

Explain that the objective of this puzzle is to discover which switch or switches must be flipped to make the light turn on. To do this they would actually need to use the box, but since there is only one box, they can only indicate how they would go about flipping switches to find out.

Show them how to use the symbols y, b, r, g, and the spaces labeled "Your Record" on their blank by doing the example. Flip switch y (the yellow switch), push the black button, and note that the light remains off.

Explain that on each try the order in which the switches are flipped does not matter. For instance, y, r, and r, y are the same trial so they should not write down both.

Item 1-7: "The Squares"

Materials: 3 yellow squares
3 red squares
1 sack

Directions: Put squares in sack.

Ask: What are the chances of pulling out a red square on the first try?

Item 2-1: "Metal Weights"

Materials: 2 metal weights of equal volume but different weight (18 and 55 grams).
2 25-ml graduated cylinders partially filled with colored water
1 balance beam
2 balance pans

Directions: Show the students the metal weights. Point out that they are equal in height and in thickness. Place them on the pans of the balance beam to demonstrate their unequal weights. Point out that the cylinders filled with equal amounts of colored water. Slowly lower the lighter weight into one of the cylinders. Note the rise in the water level.

Ask: If the heavier weight were lowered into the other cylinder, would the water level rise higher, the same, or lower than it did in the cylinder with the light weight?

Item 2-2: "The Balancing Beam 1"

Materials: 1 balance beam
1 10-unit hanging weight
1 5-unit hanging weight

Directions: Show the students the balance beam and the two hanging weights. Hang the 10-unit weight 7 marks out from the fulcrum on one side of the beam. Point out that the 10-unit weight is hanging at 7 marks from the center.

Ask: Where would you hang the 5-unit weight to make the beam balance?

Item 2-3: "The Balancing Beam 2"

Materials: 1 balance beam
1 15-unit hanging weight
1 10-unit hanging weight

Directions: Show the students the balance beam and the two hanging weights. Hang the 15-unit weight 4 marks out from the fulcrum on one side of the beam. Point out that the 15-unit weight is hanging at 4 marks from the center.

Ask: Where would you hang the 10-unit weight to make the beam balance?

Item 2-4: "The Spheres 1"

Materials: 1 ramp
1 target sphere
1 heavy sphere
1 light sphere

Directions: Show the ramp to the students. Point out that there are three spheres. One sphere is called the target sphere because it sits at the bottom of the ramp and gets hit by the other spheres that are rolled down the ramp. The other spheres (a heavy and a light one) are rolled from one of two positions -- a low position halfway up the ramp or a high position at the top of the ramp.

Point out the low and high positions on the ramp and demonstrate how the spheres roll down the ramp, hit the target sphere, and cause it to move a certain measurable distance up the other side of the ramp.

Tell the students that you will describe one-half of an experiment with the spheres and the ramp and they will have to tell you how to complete the experiment. Have the students imagine an experiment in which the light sphere was released from the low position, rolled down the ramp, hit and propelled the target sphere up the other side of the ramp.

Ask: Which sphere would you now release from the high position to find out if the place a sphere is released from makes a difference in how far the target goes?

Item 2-5: "The Spheres 2"

Materials: 1 ramp
 1 light target sphere
 1 heavy target sphere
 1 sphere called Metal A
 1 sphere called Metal B

Directions: Point out the light and heavy target spheres and Metal A and Metal B. Tell the students that you will demonstrate an experiment and then ask them a question about the experiment.

Place the heavy target sphere at the bottom of the ramp. Hold Metal A at the high position on the ramp. Tell the students to imagine that Metal A rolls down the ramp and hits the heavy target and that the target moves a certain distance up the other side of the ramp (do not actually release Metal A). Now place the light target sphere at the bottom of the ramp. Hold Metal B at the high position on the ramp. Point out that this is the same position that Metal A was released from. Tell the students to imagine that Metal B rolls down the ramp and hits the light target and that the target moves a certain distance up the other side of the ramp (do not actually release Metal B).

Tell the students that when this experiment was actually done, Metal B hit its target farther than Metal A hit its target.

Ask: Does this experiment prove that Metal B can hit a target farther than Metal A can?

Note: Do not tell the students anything about the relative weights of Metal A and B.

Item 2-6: "Squares and Diamonds 2"

Materials: 3 red squares
 4 yellow squares
 5 blue squares
 4 red diamonds
 2 yellow diamonds
 3 blue diamonds

Directions: Put squares and diamonds in sack.

Ask: What are the chances of pulling out a red piece on the first try?

Item 2-7: "Squares and Diamonds 2"

Materials: Same as for Item 2-6

Directions: Put squares and diamonds in sack.

Ask: What are the chances of pulling out a red diamond or a blue diamond on the first try?

APPENDIX D

APPENDIX D

Duncan's Tests for Transient Self Scores, Abiding
Self Scores, and Cognitive Test Scores
and Examiners of the Investigation

<u>Dependent Variable</u>	Grade 6			
	<u>Grouping*</u>	<u>Mean</u>	<u>N</u>	<u>Examiner</u>
Transient self	A	6.11	59	3
Transient self	A	5.84	51	8
Transient self	A	5.78	40	5
Abiding self	A	6.00	40	5
Abiding self	A	5.67	51	8
Abiding self	A	5.27	59	3
Cognitive test	A	1.98	40	5
Cognitive test	A	1.41	51	8
Cognitive test	A	1.20	59	3
	Grade 8			
Transient self	A	6.52	94	3
Transient self	A	5.94	80	1
Transient self	A	5.67	18	5
Abiding self	AA	6.85	94	3
Abiding self	BA	5.98	80	1
Abiding self	BB	5.06	18	5
Cognitive test	A	3.00	80	1
Cognitive test	A	2.48	94	3
Cognitive test	A	2.39	18	5

* Means with the same letters are not significantly different at $p < .01$.

APPROVAL SHEET

The dissertation submitted by Rosario C. Pesce has been read and approved by the following committee:

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

4/15/83
Date

Carol Harding
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