

Utah State University

DigitalCommons@USU

---

All Graduate Theses and Dissertations

Graduate Studies

---

5-1990

## Enhancing Female Adolescent Identity Development Through Ideological Perspective-Taking Training: A Replication and Extension Study

Deborah Lynn Huston  
*Utah State University*

Follow this and additional works at: <https://digitalcommons.usu.edu/etd>

 Part of the [Family, Life Course, and Society Commons](#)

---

### Recommended Citation

Huston, Deborah Lynn, "Enhancing Female Adolescent Identity Development Through Ideological Perspective-Taking Training: A Replication and Extension Study" (1990). *All Graduate Theses and Dissertations*. 2722.

<https://digitalcommons.usu.edu/etd/2722>

This Thesis is brought to you for free and open access by the Graduate Studies at DigitalCommons@USU. It has been accepted for inclusion in All Graduate Theses and Dissertations by an authorized administrator of DigitalCommons@USU. For more information, please contact [digitalcommons@usu.edu](mailto:digitalcommons@usu.edu).



ENHANCING FEMALE ADOLESCENT IDENTITY DEVELOPMENT  
THROUGH IDEOLOGICAL PERSPECTIVE-TAKING  
TRAINING: A REPLICATION AND  
EXTENSION STUDY

by

Deborah Lynn Huston

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF SCIENCE

in

Family and Human Development

Approved:

UTAH STATE UNIVERSITY  
Logan, Utah

1990

## ACKNOWLEDGEMENTS

I would like to take this time to thank those who made this project possible:

To Todd, my husband and best friend, a thank you seems much too simple for all you have done for me. Without your encouragement, support, and love I would probably still be procrastinating. I am so lucky to have you in my life, and I am a better person because I am with you.

To Ryan, my baby, for your company during all of my long days and late nights. Your innocence and excitement about life is so refreshing. You helped me keep my perspective about what is truly important in my sometimes- hectic life.

To Mom, Dad, and Brenda for providing me with my secure base from which to explore. Your unconditional love and encouragement inspired me to be the best I could be.

To Gerald and Carol, my major professors, for their time, patience, and guidance throughout this research endeavor not to mention their friendship. I am lucky to have had the opportunity to have studied and worked with both of you. I have learned so many things.

To Frank Ascione and Kim Openshaw for their time, commitment, and interest throughout the duration of this project.

And last, but certainly not least, to Camille O'Dell and all of the women who volunteered their time and were committed to the success of this project. Your assistance was invaluable to me.

*Juliana A. Huston*

## TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS . . . . .	ii
LIST OF TABLES . . . . .	vii
ABSTRACT . . . . .	viii
INTRODUCTION . . . . .	1
Statement of the Problem . . . . .	2
Statement of the Purpose. . . . .	5
Predictions of the Study. . . . .	7
REVIEW OF THE LITERATURE . . . . .	8
Erik Erikson's Psychosocial Theory . . . . .	8
Identity Statuses . . . . .	9
Ideological and Interpersonal Identities. . . . .	13
Social Perspective-Taking. . . . .	14
Effects of Social Perspective Taking Training. . . . .	17
Ideological Perspective-Taking Training . . . . .	18
Critique of Prior Training Studies . . . . .	19
Summary . . . . .	21
METHODOLOGY . . . . .	23
Sample . . . . .	23
Instrumentation. . . . .	25
Extended Objective Measure of Ego Identity Status (EOM-EIS). . . . .	26
Ego Identity Scale (EIS). . . . .	29
Erikson Psychosocial Inventory Scale (EPIS) . . . . .	31
Experimental Design and Procedures . . . . .	31
Screening of subjects . . . . .	31
Design . . . . .	34
Ideological perspective-taking training . . . . .	36
Group session . . . . .	36
Control group with interaction. . . . .	39
Maturational control group . . . . .	40

RESULTS . . . . .	41
Reliability and Validity of Measurements . . . . .	41
Reliability . . . . .	41
Validity . . . . .	45
Summary . . . . .	48
Tests of Hypotheses . . . . .	48
Group equivalence . . . . .	50
Group differences . . . . .	52
Group by time interactions . . . . .	54
Pretest to posttest change between identity status . . . . .	54
DISCUSSION . . . . .	58
Findings of the Study . . . . .	58
Suggestions for Future Research . . . . .	65
Conclusions . . . . .	67
REFERENCES . . . . .	69
APPENDICES . . . . .	73
Appendix A - Sign Up Sheet . . . . .	74
Appendix B - Information Sheet . . . . .	76
Appendix C - Schedule Sheet . . . . .	79
Appendix D - Background Information . . . . .	81
Appendix E - Extended Objective Measure of Ego-Identity Status: Items and Answer Sheets . . . . .	84
Appendix F - Ego-Identity Scale: Items, Answer Sheet, and Key . . . . .	90
Appendix G - Erikson Psychosocial Stage Inventory: Items and Answer Sheets . . . . .	98
Appendix H - Informed Consent Statement . . . . .	107
Appendix I - Ideological Perspective Taking Training . . . . .	110
Appendix J - Annual Editions: Human Development Articles . . . . .	128
Appendix K - Human Development Exercises . . . . .	146
Appendix L - Control Group without Interaction Schedule Sheet . . . . .	156
Appendix M - ANOVA Tables . . . . .	158
Appendix N - ANCOVA Tables . . . . .	165
Appendix O - Cronbach Alpha for the EOM-EIS Pretest Scores Prior to Subsampling . . . . .	169

Appendix P - Intercorrelations Between the Ideological Identity Subscales of the EOM-EIS for Pretest Scores Prior to Subsampling . . . .	171
---	-----

## LIST OF TABLES

Table	Page
1. The Four Identity Statures as Proposed by Jim Marcia.....	11
2. Age Distribution of Subjects.....	24
3. Instrumentation and Scoring.....	27
4. Experimental Design.....	35
5. Internal Consistency of the Extended Objective Measure of Ego Identity Status for Pretest and Posttest Scores.....	42
6. Internal Consistency of the Ego Identity Scale (EIS) and the Erikson Psychosocial Inventory Scale (EPIS) for Pretest and Posttest Scores.....	43
7. Intercorrelations Between the Ideological Identity Subscales of the Extended Objective Measure of Ego Identity Status (EOM-EIS) for Pretest Scores.....	46
8. Intercorrelations Between the Subscales of the Erikson Psychosocial Inventory Scale (EPIS) for Pretest Scores.....	47
9. Correlations Between the Ego Identity Scale (EIS) and the Subscales of the Erikson Psychosocial Inventory Scale (EPIS) for Pretest Scores.....	49
10. Mean Comparisons Between Groups on the Identity Subscales of the Erikson Psychosocial Inventory Scale (EPIS) for Pretest Scores.....	51
11. Estimated Mean Differences on the Ideological Achievement Subscale of the Extended Objective Measure of Ego Identity Status (EOM-EIS) Using the Independent Variable as a Covariate on the Pretest Scores.....	53



12.	Pretest to Posttest Changes in Ideological Identity Status Utilizing the Extended Objective Measure of Ego Identity Status (EOM-EIS).....	55
13.	Status of Subjects Utilizing the Extended Objective Measure of Ego Identity Status at the Time of Pretesting and Posttesting.	56
14.	Religious Preference of Subjects.....	64

ABSTRACT

Enhancing Female Adolescent Identity Development  
Through Ideological Perspective-Taking  
Training: A Replication and  
Extension Study

by

Deborah Lynn Huston, Master of Science  
Utah State University, 1990

Major Professors: Dr. Gerald R. Adams  
Dr. Carol Markstrom-Adams  
Department: Family and Human Development

The purpose of this study was to determine the effect of ideological perspective-taking training on female identity development. The primary hypothesis of the study was that those subjects engaged in the training sessions would show advancement in identity development that exceeded that of normal adolescent development. Ninety-eight subjects were pretested for the study. Attrition due to elimination during prescreening and failure to complete the training phase of the study left 50 subjects. Participants were assigned to a treatment group, an engaged control group, or a maturational control group. Both the treatment and engaged control groups participated in two sessions a

week for a 4-week period. Posttesting was completed during the final week of the study. One-way analysis of variance and a repeated measures analysis of variance were computed on the pretest and posttest scores. There were no significant advances in ideological identity for those participating in the training program. Validity and reliability of the dependent measures are assessed and discussed. Implications for future research are presented.

(182 pages)

## INTRODUCTION

Identity formation is viewed as a developmental construct that is accomplished by the individual integrating past and present activities to provide a framework with which to interpret the present and anticipate future experiences. While identity formation is a central task of adolescence, the consolidation of identity appears to occur primarily during late adolescence or the college years (Adams, Ryan, Hoffman, Dobson, & Nielsen, 1985).

Although extensive literature has been published in the area of ego identity, the majority of research has focused on the refinement, development, or validation of instruments used to assess identity status (Bourne, 1978). However, recent interests have emerged regarding the identification of intervention techniques designed to promote identity development beyond that which would occur through normal development processes. For example, Enright and Deist (1979) developed a social perspective-taking training program designed to facilitate growth in identity. Markstrom-Adams (1988) has developed an ideological perspective-taking training program to enhance ideological components of identity. Initially the results from these studies have been promising, but further replication is needed to improve limitations in the research design and instrumentation of these training applications. The focus

of the following study was to improve and extend Markstrom-Adams's (1988) ideological perspective-taking training and then evaluate the program's effect on subjects' ideological identity development.

#### Statement of the Problem

Due to the importance of identity in adolescent personality formation, several studies have attempted to identify factors that promote healthy identity development. Initially, Erik Erikson (1968) stressed the importance of formal operational thought as a necessary precursor for successful identity resolution. Since Erikson, adolescent psychologists have focused on the study of identity formation, its measurement, trajectories in development, and its social/environmental correlates. However, little is known about the effects of training programs and modification techniques on identity development.

Enright and Deist (1979) suggested that social perspective-taking, an aspect of formal operational thought, might be an important precursor to identity development. Specifically, it was hypothesized that engaging in social perspective-taking provides the adolescent with social cognitive skills that exceed formal operations alone. Based on this hypothesis, Enright, Ganiere, Buss, Lapsley, and Olson (1983a) and Enright, Olson, Ganiere, Lapsley, and Buss (1984) developed and pilot tested a social perspective-

taking training program, based on Robert Selman's (1971) earlier model, to promote identity development. Utilizing a paper-and-pencil task, samples of high school and college students demonstrated improvements in overall identity as assessed by Rasmussen's (1964) Ego Identity Status measure.

There is evidence that there may be problems in conceptualizing identity as a broad and general concept and clearer results could be obtained by evaluating the effects of treatment on the individual components of identity. For instance, Grotevant and Adams (1984) and Grotevant, Thornbeck, and Meyer (1982) proposed that identity consists of both an interpersonal and an ideological domain. James Marcia (1966) further conceptualized identity as consisting of achievement, moratorium, foreclosure, and diffusion components. More recently Bennion and Adams (1986) merged these two perspectives to include the assessment of ideological and interpersonal identity within the four identity statuses. Consequently, given the multidimensionality of identity formation, when choosing to focus on the subject's overall identity development important discrepancies could be overlooked.

While Enright et al.'s (1983a; 1984) training procedures seem to emphasize the interpersonal domain of identity, in a recent study by Markstrom-Adams (1988) an ideological perspective-taking training was developed that explicitly emphasizes the domains of ideological identity.

Using a paper-and-pencil task similar to Enright et al.'s (1983a; 1984) and with the addition of a group discussion component, Markstrom-Adams (1988) reported some positive gains in subjects' ideological identity development. However, the control group comparison was based on an engaged control procedure, creating a pretest by posttest confound with neutral activity. Consequently, outcomes of this study are unclear regarding maturation versus testing-by-activity interactions based on control group comparisons. In future studies the inclusion of a control group that has been only pretested and posttested would help separate the effects of the treatment from various threats to internal validity, especially maturation.

In addition, assuming that the four identity statuses (achievement, moratorium, foreclosure, and diffusion) are independent of each other, it still is unclear how the treatment affects individuals within each status. It is possible that subjects' identity statuses at the time of pretesting could influence the effectiveness of the training procedures. For example, those individuals in a state of foreclosure may benefit from a training session that exposes them to new alternatives, while those who are in moratorium may be less affected or even temporarily overstimulated by the procedures.

To summarize, the development of a perspective-training

procedure to enhance or promote identity development is a new phenomenon. While results of studies addressing this issue appear promising, the effects of training on individuals in varying identity statuses have not been addressed. Further, there have been no reports of studies utilizing a control group that does not engage in interaction activities eliminating possible Hawthorne effects.

#### Statement of the Purpose

The primary purpose of this study was to examine the effects of ideological perspective-taking on identity development in female adolescents. Specifically, utilizing a revised version of Markstrom-Adams's (1988) ideological perspective-taking training, this study examined the effect of the training on ideological identity development using a sample of college women in the moratorium status of identity development. While Markstrom-Adams (1988) demonstrated some positive results using the training sessions, additional replication and revisions of the procedure were deemed necessary to clarify previous results and to further validate the training model. Thus, selecting a sample of women who were in the same status of identity development would help clarify the treatment effects on a specific population. The extension and replication of the ideological perspective-taking training program was the



primary focus of this research endeavor.

Ego-identity development has been of interest to numerous researchers in the field of human development; however, there exists a lack of treatment models for clinical use with identity-disordered adolescents. If the ideological perspective-taking training program is found to be effective in promoting identity growth beyond that which would occur through normal maturation, then there would be implications for its use within a clinical setting.

Ego identity was assessed using the same instrumentation utilized by Markstrom-Adams (1988) and Enright et al. (1983a;1983b;1984), in which an overall identity score was obtained. Rosenthal's Erikson Psychosocial Inventory Scale was also utilized in assessing the individuals' identity status. In addition, identity was assessed using the EOM-EIS, in which subjects are categorized into one of four identity statuses: achievement, moratorium, foreclosure, or diffusion. Subjects whose pretest scores placed them in the moratorium status were selected for participation in the study. By selecting only one of the four statuses for inclusion in the project, training effects could be studied on a specific status. Using Marcia's (1966) identity classifications, advances in identity were assessed by a subject's positive gains in moratorium or achievement.

Predictions of the Study

1. Those individuals participating in the experimental training will show significant advances in moratorium and achievement subscales. Similar advances will not be shown by control group subjects.
2. Subjects in the moratorium status are already thought to be engaging in exploration with regard to identity issues, and, consequently, it is proposed that the experimental training procedures will serve to facilitate their advancement into the identity-achieved status.
3. Subjects participating in the ideological perspective-taking training will have significantly less regression into the foreclosure and/or diffusion statuses than the control group participants.
4. The overall identity development of experimental group subjects will significantly exceed that of control group subjects.
5. No significant differences in training effects due to the effect of the group leaders are predicted.

## REVIEW OF THE LITERATURE

Erik Erikson's Psychosocial Theory

Erik Erikson has been recognized as the initial and most influential theorist in the widely studied area of adolescent identity. Erikson (1968) recognized three components of identity; the ego, self, and formal operations. Specifically, the ego was defined as the unconscious mechanism within the individual that screens and organizes incoming information from the environment and integrates it into one's identity. The ego acts as a guard for the contents of one's thoughts, or self (Erikson, 1968). The self may be conceptualized as how an individual views himself or herself in comparison to others by assessing differences and similarities between these two entities. This ability of the individual to see all possibilities, an aspect of formal operational thought, is a very important component to identity development according to Erikson (1968). Formal operations was also seen as the mechanism that allowed an individual to seek for new information in the environment, thus promoting growth in identity.

Identity is defined as an integration and synthesis of past and future experiences on an individual, societal, and a cultural level. In other words, identity formation includes a cognitive ability to understand and integrate

information about the self and others on a variety of levels (Erikson, 1968). While Erikson recognized identity formation as a normal developmental process within his epigenetic theory, he emphasized that there are instances where an individual is unable to successfully resolve this crisis.

### Identity Statures

James Marcia is credited with operationalizing the construct of identity. Based on the criteria of crisis (the period of choosing alternatives or the willingness to explore other directions), and commitment (the degree of personal investment), four identity statuses of achievement, moratorium, foreclosure, and diffusion were developed (Marcia, 1966). The status concept can be viewed as the different ways an individual copes with crisis and arrives at a psychological resolution.

Achieved individuals are those who have experienced a crisis and have made a commitment to a specific alternative. Moratorium individuals are said to be currently engaged in a crisis period or time of active exploration and the making of a commitment. Foreclosed individuals have not experienced a crisis but have made a commitment to an alternative, usually in accordance with parental values and ideologies. Diffused individuals may or may not have experienced a crisis period but they are distinct because of

their lack of interest in exploring alternatives (Marcia, 1966) (see Table 1). Achievement and diffusion statuses are considered to be the polar alternatives of the model. Marcia (1966) developed and utilized the Identity Status Interview and the Incomplete Sentence Blank instrumentation, to determine the identity status of the individual in areas of religion, occupation, politics, and, less commonly, sexual orientations or values.

Several studies have investigated the personality characteristics that seem to be most common among each identity status. Prager (1985) reported the majority of achieved college students seemed to be older students. Craig-Bray, Adams, and Dobson (1988) reported that subjects in identity achievement have higher levels of self esteem, greater ego and cognitive complexity, and a greater sense of inner-directed behavior. Marcia and Friedman (1970) reported that females in the achievement status had lower levels of self esteem, identifying a possible sex difference in identity.

Moratorium students have been described as anxious, socially ambivalent, and intense in their actions (Craig-Bray et al., 1988). In addition, females in the moratorium status were found to have low levels of authority (Marcia & Friedman, 1970). Further, Marcia (1976), has found that subjects in the higher statuses of achievement and moratorium were more at ease with controversy and more

Table 1

The Four Identity Statuses as Proposed by James Marcia

---

Commitment	Crisis	
	No	Yes
No	Diffusion	Moratorium
Yes	Foreclosure	Achievement

---

cooperative.

When studying cognitive structure and its relation to individual identity statuses, Slugoski, Marcia, and Koopman (1984) found those subjects in achievement and moratorium to manifest more integrative psychological complexity while tending to behave in a more personal manner. In other words, those subjects in the higher levels of identity development were able to integrate multiple perspectives and levels of meaning and were also more at ease in discussing controversial topics in a social situation.

Low levels of anxiety, self esteem, and self direction appear to be characteristic of foreclosed individuals (Craig-Bray et al., 1988). Individuals in this status may also be more rigid, rule bound, and impulsive (Slugoski et al., 1984). Foreclosures may be found more frequently in younger college samples (Prager, 1985), and may be the most likely to change into more advanced stages of identity especially in the domains of religion and politics. Marcia and Friedman (1970) observed females in the foreclosed status as having higher levels of self esteem and higher degrees of authoritarianism than other subjects. Marcia and Friedman (1970) suggested that foreclosure may be an adaptive status for females, although Adams et al. (1985) found foreclosed individuals to have high levels of external focus, less control, and to be less involved in competitive activities.

Diffused individuals have been noted to have the highest degrees of conformity and consequently are influenced to a greater degree by peer pressure (Toder & Marcia, 1973; Adams et al., 1985). Furthermore, diffused individuals may be more apt to use withdrawal in stressful situations (Craig-Bray et al., 1988), and tend to be impulsive, while their opinions may lack depth (Slugoski et al., 1984). Further, they may have low levels of interest and involvement in activities (Leadbeater & Doinne, 1981).

To summarize, studies have demonstrated significant differences in personality characteristics for individuals within each domain of identity. It is possible that these personality traits may have an effect on the subjects' receptiveness to perspective-taking training programs, some statuses being more receptive to the activities than others. For example, foreclosed females have been found to have higher levels of external control which may make them less receptive to the perspective-taking process. On the other hand, moratorium subjects are thought to behave in a more personable manner and have a higher level of cognitive complexity, traits which would be an asset to training programs.

#### Ideological and Interpersonal Identities

Due to reported sex differences in the measurement of identity, Grotevant, Thorbecke, and Meyer (1982) extended



Marcia's measure into the interpersonal domains of friendship, dating, and sex roles. Grotevant and Adams (1984) developed an objective instrument to measure both the interpersonal and ideological components of identity. The ideological component included Marcia's (1966) domains of occupation, religion, and politics, while the interpersonal component included the domains of friendship, dating, and sex roles. This instrument was an extension of the Objective Measure of Ego Identity initially developed by Adams, Shea, and Fitch (1979). Recently, Bennion and Adams (1986) extended the measure to include the ideological domain of philosophical life style and the interpersonal domain of recreation.

#### Social Perspective Taking

While much of the research on ego identity focuses upon validating instruments and assessing differences in individuals within the identity domains, thus far there is no widely used empirically based intervention program for promoting identity development. In an attempt to fill this void, Enright and Deist (1979) developed a social perspective-taking training based on Robert Selman's (1971; 1980) developmental stage model of social perspective-taking. The concept of social perspective-taking is similar to role taking which consists of predicting someone else's thoughts, feelings, or viewpoints (Enright & Lapsley, 1980).

Selman's (1971) perspective-taking model is based on a cognitive developmental framework with each stage dependent on specific cognitive abilities of the individual. In other words, the perspective-taking model incorporates the various aspects and stages of formal operational thought. Conversely, in reference to cognitive abilities, egocentrism is the inability to take the role of another. Looft (1971) defined egocentrism as the embeddedness in one's own point of view. Adolescence is marked by the acquisition of formal operational thought and increased social interaction therefore decreasing egocentrism. Selman's (1971) perspective-taking model allows the individual to differentiate between him or herself and others and provides an atmosphere for the integration of ideas and information.

In developing social perspective-taking training, Enright and Deist (1979) suggest that there is a more specific way in which an individual gathers social information in addition to formal operations as was initially suggested by Erikson (1968). Based on the idea that effective social interaction is a result of the ability of the individual to consider behavior from more than one perspective (Feffer & Suchotliff, 1966), and that identity is thought to consolidate by cognitive strategies similar to this (Enright & Deist, 1979), it was proposed that an individual's identity may become more integrated through perspective-taking training (Enright et al., 1983a).

Social perspective-taking consists of the ability to understand others on an individual, group, and societal basis (Enright & Deist, 1979; Enright et al., 1983a). Enright et al. (1983a) further state that if adolescents are to understand themselves, they need to examine commonalities and differences in relation to other individuals. If an individual can start with simple perspective, (level two of Selman's model) and move to complex perspectives (level four of Selman's model) then their identity may be clarified. Enright and Deist's (1979) social perspective-taking training focuses directly on the individual's ability to relate others to the self, therein utilizing Selman's (1971;1980) general framework.

While this theoretical model may be used to promote identity development there are ways in which the procedure can lead to confusion of the individual and impede identity development (Selman, 1971). In order for the model to be effective one must take into account the possible limitations or sources of confusion for the individual: 1) the subject may be bombarded with information on the individual, group, and societal levels resulting in confusion, 2) the individual may center only on commonalities between the self and others, and 3) the individual may center only on the uniqueness of the self from others. In order for training procedures to be effective these precautions must be taken into account and

minimized in order for the individual to obtain the intended effect of the procedures.

Effects of Social  
Perspective-Taking Training

Enright et al. (1983a) were the first to initiate a paper and pencil intervention based on Enright and Deist's (1979) levels of perspective-taking. The training sessions were developed to encourage the individual to focus on similarities and differences between the self and others on each level of the perspective-taking model. By engaging in the intervention, the individual is assisted in organizing his or her thoughts, and consequently may eliminate some confusion that could impede identity development.

Utilizing samples of high school seniors and college students, Enright et al. (1983a; 1984) used Rasmussen's (1964) Ego Identity Scale to assess the identity status of the subjects before and after the treatment. Subjects engaged in the training sessions one hour a day, two times per week, for two weeks. Both studies reported the training sessions to have positive effects on identity development, with those exposed to the treatment showing significant gains over those involved in the control group activities which consisted of solving two logical reasoning problems each day. It was hypothesized that this group should have similar gains in identity development if formal operations played a significant role in identity consolidation.

Ideological Perspective-  
Taking Training

Recently Markstrom-Adams (1988) developed an ideological perspective-taking training program to complement the social perspective-taking training procedure by Enright et al. (1983a; 1984). Based on the notion that ego identity consists of both ideological and interpersonal components (Grotevant & Adams, 1984), the underlying process that promotes growth in each component should be parallel in nature. Like social perspective-taking, Markstrom-Adams's (1988) ideological perspective-taking focuses on the similarities and differences between the self and others in regard to the different components of ideological identity. Specifically, in ideological perspective-taking the perspective of the entities are of a more intrapersonal rather than interpersonal nature. The training sessions are thought to increase individual exploration which would facilitate growth in ideological identity.

In accordance with Enright et al. (1983a; 1984), Markstrom-Adams's (1988) training sessions were directed at examining the differences and similarities between the individual and the group. In addition, this procedure also included a group discussion component designed to allow subjects' further exploration by providing an atmosphere for the exchange of ideas and information on the various topics of identity development with their peers.

Utilizing a college sample of men and women between the ages of 18 and 21, Markstrom-Adams (1988) engaged the subjects in the ideological perspective-taking training and in Enright's social perspective-taking training sessions two times a week for a period of four weeks. Like Enright et al. (1983a; 1984), a control group engaged in group and individual activities unrelated to the project for the same length of time.

Results indicated that both forms of training had positive effects on the ideological component of identity, yet, surprisingly, advances in interpersonal identity were not observed. Results were clouded as both the experimental and control groups showed similar increases in identity advancement and regression to less mature statuses in the interpersonal domain of identity. Hence, the observed changes could not be viewed as an outcome of the social perspective-taking treatment per se.

#### Critique of Prior Training Studies

While the Markstrom-Adams (1988) and Enright et al., (1983a; 1984) studies were important in addressing the effects of social perspective-taking training on identity development they have certain identifiable limitations. First, the intervention utilized by Enright et al. (1983a; 1984) was limited to a paper and pencil exercise for a two week period. Even though change did occur during this short

time it would be useful to see the effects of a longer intervention process. Enright et al. (1983a; 1984) agree that their training procedure should be longer and that a discussion or interaction component should be added to the paper and pencil approach.

Second, Enright et al. (1983a; 1984) did not differentiate between the ideological and interpersonal components of identity, thus generalizations could only be made in accordance with the treatment effects on the subjects' overall identity, a construct that has received some criticism as to its validity. Consequently they were unable to determine the effects of their training on each component of identity. It could be that their model would be more appropriate to facilitate interpersonal identity as opposed to ideological identity. This was not shown to be the case by Markstrom-Adams (1988) however.

While Markstrom-Adams's (1988) study improved on many of Enright et al.'s (1983a; 1984) limitations such as adding a group discussion component and extending the duration of treatment, some improvements and revisions are still needed. First, while the ideological and interpersonal components of identity were addressed separately in Markstrom-Adams's (1988) study, little is known about the effect of perspective taking on the specific identity statuses (moratorium, foreclosure, and diffusion). It is possible that some subjects may be more receptive to the perspective-

taking training procedures based upon their stage of ego development when entering the study. More specifically some individuals may have personality characteristics that enable them to benefit fully from the training sessions. By stratifying the sample by pretest identity statuses the homogeneity of the groups would be enhanced and the effects within the individual statuses could be evaluated.

In an attempt to distinguish between treatment and Hawthorne effects, both Enright et al. (1983a; 1984) and Markstrom-Adams (1988) utilized control groups that participated in number manipulation tasks and human development exercises respectively. Both were unrelated to issues of identity formation with a format of activity similar to that of the treatment groups. Surprisingly, Markstrom-Adams (1988) reported some degree of positive gain in interpersonal identity across all groups (including controls) participating in the study. Therefore, it was not possible to attribute the observed results of the treatment effects as opposed to other intervening factors. Future studies would benefit by adding a control group that participates only in pre- and posttest activities.

#### Summary

Identity development was first recognized by Erik Erikson (1968) as the primary developmental task of adolescence and the consolidation of identity is thought to



occur during the late adolescent years. Since Erikson, James Marcia (1966) has operationalized the identity construct into four identity statuses that can be measured based on the individuals level of commitment and crisis.

Initially, Erikson recognized three components of identity; the ego, self, and formal operations. Enright and Deist (1979) added the component of perspective-taking as an important precursor to identity development. Until recently there has been a void in the existing research on identity development regarding intervention programs to facilitate identity growth and achievement. Enright et al., (1983a; 1984) and Markstrom-Adams (1988) have developed perspective-taking training procedures to facilitate identity growth beyond that which occurs during normal maturational processes and consequently have provided a foundation on which to base future training studies.

While results of previous studies seem promising there is still a need for replication and validation of instrumentation and training procedures. The replication and extension of Markstrom-Adams (1988) training program served as the focus of this study.

## METHODOLOGY

Sample

Because researchers of ego identity development have recognized late adolescence as the most important developmental period in the formation of identity (Adams et al., 1985), the subjects consisted of female adolescents between the ages of 18 and 21 (see Table 2). This convenience sample was recruited from various undergraduate courses taught at Utah State University. It was decided to limit the sample to females in order to increase the homogeneity of the treatment and control groups from samples in previous studies.

Five to ten minutes of class time were used for the explanation of the study to prospective subjects. Students were told that the study was related to enhancing their self-understanding and/or issues related to human development. The time commitment and activities of the study were explained, and the issue of confidentiality was addressed. Pre-screening procedures were then explained to the classes, and students were told that some participants would be eliminated from further participation in the project at that time. As an incentive to participate in the study, students were told that upon completion of the project, they would be allowed to register for 1 Pass/Fail

Table 2

Age Distribution of Subjects (n=50)

---

Age (in Years)	Frequency	Percent
18	11	22
19	24	48
20	9	18
21	6	12

---

credit of independent study in either Psychology or Family and Human Development. It was decided to have the credit obtained upon completion of the project so that subjects eliminated during pre-screening procedures, or those deciding to withdraw from the study, would not be penalized by receiving a failing grade.

Following this brief introduction a sign-up sheet (see Appendix A) was circulated around the classroom. Interested students were told to take an information sheet that explained the dates and times of the pre-screening sessions (see Appendix B). Interested students were called and reminded about the pre-screening sessions to facilitate their participation. A total of 162 students signed up to participate in the study.

Of the 162 students who signed up to participate, 96 subjects completed all pretesting activities.

### Instrumentation

The same instruments were completed at the pretesting and posttesting sessions. The primary aim of the study was to show advances in ego identity, with emphasis on the ideological component, through subjects' participation in the ideological perspective training program developed by Markstrom-Adams (1988).

Instrumentation involved measures of ego identity. Each instrument and its scoring procedures and constructs are

summarized in Table 3. Since some of the instruments contain both negative and positive items, negative items were reverse weighted. This allowed for consistency across all instruments with higher scores reflecting a greater degree of the construct being measured. The instruments in which reverse weighting occurred were the Rasmussen Ego-Identity Scale and Rosenthal's Erikson Psychosocial Inventory Scale.

Extended Objective Measure of Ego Identity Status (EOM-EIS). The revised version of the EOM-EIS (Bennion & Adams, 1986) was selected for use in the study. The instrument measures the ideological domain of identity as addressed by Marcia (1966), and includes the interpersonal domain initiated by Grotevant et al. (1982). The ideological component includes the domains of occupation, religion, politics, and philosophical life style. The interpersonal component includes the domains of sex roles, friendship, dating and recreation (Adams, Bennion, & Huh, 1987). Scoring of the instrument is based on the assumption that exploration (crisis) and commitment are a conscious action and can be measured by self-reports.

The EOM-EIS consists of 64 items that represent the ideological and interpersonal components of ego identity.

Table 3

Instrumentation and Scoring

<u>Instrument</u>	<u>Number of</u> <u>Items</u>	<u>Scoring</u>	<u>Range</u>
<u>EOM-EIS</u>			
<u>Ideological Identity</u>			
1. Achievement subscale	8	1-6	8-48
2. Moratorium subscale	8	1-6	8-48
3. Foreclosure subscale	8	1-6	8-48
4. Diffused subscale	8	1-6	8-48
<u>Rasmussen Ego-Identity Scale</u>			
Degree of overall identity	72	Agree/Disagree	0-72
<u>Rosenthal Erikson Psychosocial Inventory Scale</u>			
1. Trust subscale	12	1-5	12-60
2. Autonomy subscale	12	1-5	12-60
3. Initiative subscale	12	1-5	12-60
4. Industry subscale	12	1-5	12-60
5. Identity	12	1-5	12-60
6. Intimacy	12	1-5	12-60

Each of the eight identity domains are measured by eight items, two items representing each identity status (achievement, moratorium, foreclosed, and diffused). The interpersonal components of identity were omitted from the instrument due to the primary focus of the study being changes within ideological identity. Thus only the 32 items measuring the ideological components of identity were scored. Each item of the instrument is responded to on a six point Likert scale ranging from strongly agree to strongly disagree. Responses reflect the degree of commitment and exploration of the individual.

In a sample of college students, Bennion and Adams (1986) established reliability of the revised version of the EOM-EIS. Cronbach alphas ranging from .62 - .75 for the ideological domains and .58 - .80 for the interpersonal domains provided support for the internal consistency of the instrument. Additional studies have indicated the split-half reliability and test-retest reliability of the measure to range from moderate to strong as summarized in Adams et al. (1987).

Clear evidence has been found for the face validity, concurrent validity, predictive validity, and construct validity of the instrument in three studies by Grotevant and Adams (1984). Bennion and Adams (1986), established the face validity of the revised EOM-EIS with a 95% agreement rating. Convergent validity was reported as ranging from

.38 to .66. Additional studies as summarized in Adams et al. (1987), have reported coefficients assessing predictive and concurrent validity ranging from .38 to .92.

Construct validity of the instrument, as assessed through factorial analysis, demonstrated that there are predictable differences among the four statuses on the instrument. While achievement and foreclosure emerged as pure factors, moratorium and diffusion shared the same factor. This occurrence may be attributed to the lack of true diffused subjects in the samples or the need for a greater distinction between the two domains. The EOM-EIS has been used in over 30 studies, and additional evidence of its reliability and validity is documented in Adams et al. (1987).

Ego Identity Scale (EIS). The Rasmussen (1964) Ego Identity Scale (EIS) was derived directly from Erik Erikson's stages of psychosocial development. It was included in this study to replicate, in part, the instrumentation used by Enright et al. (1983a; 1984) and Markstrom-Adams (1988) in previous studies and consequently its inclusion would allow for greater comparability between the studies.

The EIS is composed of 72 items, that attempt to operationalize the conflicts in the first six stages of Erikson's theory (trust to intimacy). Twelve items per subscale represent the successful and unsuccessful



resolutions of each stage (Rasmussen, 1964). Responses to the items elicit a forced choice of either agree or disagree. Overall identity scores and individual psychosocial stage scores may be obtained from this questionnaire.

The validity of the instrument was assessed by Rasmussen (1964) using two judges to clarify possible ambiguity in the wording of the items and to establish face validity of the instrument. Rasmussen (1964) confirmed the validity of the instrument by having the scale items originate explicitly from the theory on which they were based. Construct validity was established by comparing the EIS to the Adjective Check List (Gough, 1950), and to the peer nomination procedure developed by Wilkins, Rigby, and Ossono (1958).

Using two samples of Navy recruits, Rasmussen (1964) assessed the reliability of the measure. Utilizing the Spearman-Brown formula, the reliability of the measure was .849 and .851. An additional study by Enright et al. (1983b) reported the instrument to have a split-half reliability of .85.

Several additional studies have provided further support for the reliability and validity of the EIS including a study of leaving home strategies of adolescents (Anderson & Fleming, 1986a), and a study addressing the relationship of ego identity and individuation (Anderson &

Fleming, 1986b).

Erikson Psychosocial Inventory Scale (EPIS). The Erikson Psychosocial Inventory Scale (EPIS) was developed by Rosenthal, Gurney, and Moore (1981) to measure the psychosocial stages of Erik Erikson's theory. The instrument would also be suitable for administration to large sample populations. The scale consists of six subscales representing the first six psychosocial stages outlined by Erikson. The instrument consists of 72 items, twelve items representing each subscale. Responses to each item range from hardly ever true, to almost always true on a five point Likert type scale. Rosenthal et al., (1981) reported the instrument's reliability to be adequate across all subscales with alphas ranging from .57 to .81. Construct validity of the measure was established by comparing the EPIS subscales to those of Greenberger and Sorensen's Psychosocial Maturity Inventory, Form D (1974), and a self report attitude survey. High correlations were found between the various instruments by Rosenthal et al. (1981).

#### Experimental Design and Procedures

Screening of subjects. During a one week period, blocks of time were set aside for the pretesting and screening of eligible participants. Individual pretesting sessions lasted approximately 1 to 1 1/2 hours during which

all pretest questionnaires were completed. Each subject was given the following forms and questionnaires to complete:

- 1) schedule sheet (Appendix C)
- 2) background information sheet (Appendix D)
- 3) EOM-EIS (Appendix E)
- 4) EIS (Appendix F)
- 5) EPIS (Appendix G)

During the pretesting sessions, subjects were again informed of confidentiality issues concerning their participation.

After pretesting procedures were completed, the data were statistically analyzed to make the final determination of participants to be included in the study. Subjects were classified into their dominant identity status according to the criteria of the Extended Objective Measure of Ego Identity Status (EOM-EIS) given by Adams et al. (1987). Briefly, subjects' raw scores on each subscale (diffusion, foreclosure, moratorium, achievement) were compared to pre-established means and the standard deviations of each subscale. Using the following rules subjects were then classified into a single identity status:

- 1) Individuals who score more than one standard deviation above the mean on one subscale are classified as being in that status if all other scores are below the established cutoff score for those other subscales.

- 2) Individuals whose scores fall less than one standard deviation above the mean on all four subscales are scored as "low profile" moratoriums.
- 3) Individuals with more than one score above the standard deviation cutoffs are scored as being in transition and are given a transition status (ie. moratorium-achieved). Individuals who are in a transition status can be collapsed down into the less mature identity status.

Subjects whose scores place them in the domains of identity achieved, foreclosed, or diffused were eliminated from the study. These subjects were told that while their scores were within the normal range, they were not in the range needed for the study. This affected 45 of the 96 subjects who were pretested leaving a total of 51 eligible subjects all of whom chose to participate in the research study.

Subjects were then randomly assigned to one of two experimental groups, one of two engaged control groups, or a maturational control group. One subject dropped out during the training phase of the study. Thus a total of 50 subjects completed the pretesting, training, and posttesting sessions. Of that number 17 were in the ideological perspective-taking training group, 17 were in the engaged control group, and 16 were in the maturational control group.

Design. Pretesting of subjects occurred two weeks before the actual training began. Based on the subjects pretest EOM-EIS identity classification of moratorium, subjects were randomly assigned to one of two ideological perspective-taking groups, one of two engaged control groups participating in human development activities with a format similar to that of the treatment groups, or to a maturational control group that participated in pretest and post-test activities only. Two trained group leaders, both female, each led an experimental and a control group session. Thus, all eligible participants could be assigned to one of five groups (see Table 4). All participants of the study participated in their respective group with the same group leader throughout the duration of the project.

Subjects were engaged in the training sessions during four weeks of the Spring Quarter. They were involved in two sessions per week approximately 1 hour each in length. During this four week training phase the two treatment groups and the two engaged control groups engaged in similar activities. The first session took place Monday or Tuesday of each week and consisted of an individual written exercise. Participants were required to come in between the hours of 9 to 5 to the Family Life building to complete their individual written exercise. During the first session a consent form was signed by each subject (see Appendix H).

The second session was held Wednesday, Thursday or

Table 4

Experimental Design

---

Group	Group Leader			Total
	#1	#2	None	
Treatment	9	8	0	17
Engaged Control	8	9	0	17
Maturational Control	0	0	16	16

---

Friday of each week. Participants were randomly assigned to a discussion group on a specific day and time based on their schedules. However, some concessions were made due to students' scheduling and availability limitations.

Groups consisted of 8-9 participants and involved a discussion based on the written exercise completed earlier in the week. Subjects remained in the same group throughout the course of the project.

Ideological perspective-taking training. The training sessions utilized the paper and pencil tasks and group format developed by Markstrom-Adams (1988). Some of the original questions were modified to improve their clarity, and some repetitive questions were eliminated.

There were four different paper and pencil tasks that correspond to the four components of ideological identity; occupation, religion, philosophical life style, and politics (see Appendix I). One topic was addressed each week. The questions were designed to aid the subjects in thinking carefully about each component of the specific issue. The written exercises assessed what information is known by the participant and facilitate the subject's ideas about the similarities and differences between various ideas. Finally, each participant addressed how the various issues related to oneself.

Group session. During the initial meeting each group leader explained the format and confidentially issues

related to the group discussions. Subjects were told that their anonymity would be insured by the use of identification numbers instead of their names and that all results would be reported by group rather than individual change. In addition it was explained that while the sessions were being audio taped, only project directors and those associated with the research endeavor would be exposed to them.

The content of the discussions consisted of specific questions previously targeted from the individual written assignments. Accordingly, all groups had the same content for the basis of their discussions.

Each question selected for inclusion in the group component is marked by an asterisk (\*) in Appendix I. For the domain of occupation, all items marked were responded to on an individual basis. When addressing issues of politics, each member listed their issues from question 3 and then selected three of them to discuss for question 4. The remaining questions were responded to individually. For the domain of philosophical life style, group members responded separately to question 1, and on question 2 each participant was asked to share 2-3 of her responses. Questions 3, 4, 5, and 6, were addressed by the group, and questions 9, 10, and 11 were addressed individually. Finally for the domain of religion, questions 1 and 2 were responded to individually. Questions 3, 4, 5, and 6 were



addressed by the group. Questions 9, 10 and 11 were responded to on an individual basis.

Some modifications were made from the original study by Markstrom-Adams (1988), based on the auditory tapes of group discussions. When addressing the topic of religion, the discussion groups appeared to be more hesitant in confronting and exploring the various issues than when addressing other topics in the study. This may be due in part to religion being of a more personal topic than others in the study. In this study the topics of discussion were rearranged so that religion was discussed during the fourth week of the study. Thus the topics of group discussions progressed on a continuum of intensity (occupation, politics, philosophical life style, and religion). This reordering helped increase the level of group discussion by allowing more time for group members to familiarize themselves with each other and the group leader. Consequently members may have felt more comfortable when discussing personal ideas and beliefs on the more sensitive topics.

Specifically, the format of the group sessions was such that particular questions from the individual written exercises were targeted for discussion by the group leader. The group members then took turns responding to the questions with the group leader insuring each member a right to discuss their viewpoint on each issue. When hesitancy

was shown in giving responses, probing questions were administered by the leader to the individual respondents. Group discussion was encouraged and subjects were encouraged to compare their responses to the responses of other group members. Spontaneous discussions among group members were encouraged, yet group leaders remained in control of the discussion at all times by insuring each subject had an opportunity to express her thoughts and viewpoint about each issue. The group leader was also responsible for recording subjects' responses on a chalkboard to aid in facilitating discussion.

Control group with interaction. The two individual control groups with interaction had similar written and discussion activities to the treatment groups but the content of the material was different. These control groups were included in order to determine that change in the treatment groups was not due to the Hawthorne Effect.

Participants in these groups attended two sessions each week for a period of four weeks. Monday or Tuesday of each week, participants were given an article to read from Annual Editions: Human Development (Fitzgerald & Walraven, 1987). (see Appendix J) A corresponding work sheet was completed at this time (see Appendix K). Topics addressed issues related to the physical and biological aspects of human development, and were judged to be unrelated to identity or aspects of psychosocial development by Markstrom-Adams

(1988). In addition, the topics were not expected to promote self-reflection or self-analysis.

The second session took place Wednesday, Thursday, or Friday of the same week. During this time, subjects engaged in small group discussions based on each article and the work sheets completed earlier in the week. All of the written questions were addressed during each session, and the group leaders again were responsible for insuring that all participants had the opportunity to respond to each question.

Maturational control group. A maturational control group was included in the study that participated in only the pretesting and posttesting sessions (see Appendix L). Subjects in this group engaged in no interaction or written exercises of any kind. The primary purpose of this group was to help clarify the treatment effects and control for the Hawthorne effect and other external influences on development. The inclusion of a maturational control group also facilitated comparisons of normal identity development with identity development of those engaged in the training and engaged control group sessions. Results from Markstrom-Adams (1988) failed to show significant differences between the identity advances in the control groups and identity advances in the treatment groups. Consequently, observed advances in identity could not be attributed just to the effects of the perspective-taking training program.

## RESULTS

Several statistical procedures were used to test the hypotheses of this study, and their results will be the focus of this section. An assessment and analysis of the findings will follow in the discussion section.

### Reliability and Validity of Measurements

The initial step in data analysis began with an assessment of reliability and validity of measurement. Prior research has shown that internal consistency (alpha) ranges from the low .60s to the middle .80s on the instruments used in this investigation. Given the relatively small sample size of this study internal consistency in the .60 to .70 range would generally be acceptable given that internal consistency calculations are partially influenced by sample size.

Reliability. Reliability was assessed for both the pretest and posttest measures using Cronbach alpha. Reliability estimates for the ideological items of the Extended Objective Measure of Ego Identity Status, Ego Identity Scale, and the Erikson Psychosocial Inventory Scale are reported in Tables 5 and 6.

Table 5

Internal Consistency of the Extended Objective Measure of  
Ego Identity Status (EOM-EIS) for Pretest and Posttest  
Scores (n=50)

---

Identity Status	Time	
	Pretest	Posttest
Diffusion	.1646	.6766
Foreclosure	.5519	.8522
Moratorium	.6784	.6313
Achievement	.2524	.6350
<b>Mean</b>	<b>.4118</b>	<b>.6988</b>

---

Table 6

Internal Consistency of the Ego Identity Scale (EIS) and the Erikson Psychosocial Inventory Scale (EPIS) for Pretest and Posttest Scores (n=50)

---

Scale	Time	
	Pretest	Posttest
EIS	.7661	.8097
EPIS		
Trust	.8124	.8018
Autonomy	.7071	.7421
Initiative	.6161	.5823
Industry	.7492	.7451
Identity	.7585	.8681
Intimacy	.7244	.7620
Mean	.8546	.7502

---

Table 5 reveals that the internal consistency for the pretest scores on the EOM-EIS ranges from .16 to .67. This results in an average alpha of .42. These findings are less than anticipated and suggest major caution in the interpretation or use of analysis based on pretest measures with the ideological items of the EOM-EIS.<sup>1</sup> This caution is particularly true for the diffusion and achievement subscales given the pretest alphas of .16 and .25, respectively. In comparison, the internal consistency ranges from .63 to .85 for the same measure on the posttest scores. This results in an average alpha of .70. Hence, posttest scores on the EOM-EIS are considerably more internally reliable and can be used with greater faith in their reliability with this sample.

Table 6 summarizes the estimates of internal consistency for the EIS and EPIS. The pretest and posttest alphas are .76 and .81, respectively, for the EIS. The average pretest alpha for the six subscales of the EPIS was .85. The average alpha for the posttest is .75. These estimates of internal consistency were judged acceptable and require no substantial caution in the interpretation of

---

<sup>1</sup> Internal consistency for the pretest scores on the EOM-EIS ranged from .37 to .76 using the initial sample of subjects prior to subsampling (N=96). This resulted in an average alpha of .61. These findings suggest that the EOM-EIS is more reliable when using a diversified sample of subjects as opposed to subjects who have been subsampled from a particular status of identity development (ie. moratorium). (see Appendix N)

pretest and posttest comparisons.

Validity. Convergent and discriminant validity estimates were first estimated for those instruments with subscale scores by correlating the scales (from the pretest measurement only) within a measure against each other. The intercorrelations for the identity status subscales of the EOM-EIS are reported in Table 7. The correlations are generally consistent with previous psychometric findings. Diffusion is uncorrelated with foreclosure, positively but only significantly correlated with moratorium, and negatively correlated with achievement. Foreclosure is negatively correlated with moratorium and uncorrelated with achievement. Moratorium is not significantly correlated with achievement. Although the EOM-EIS estimates of reliability suggest caution, the convergent and discriminant validity estimates are in the typical and anticipated directions.<sup>2</sup>

Table 8 summarizes the intercorrelations between the subscales on the EPIS. In an Eriksonian framework, all subscales would be expected to positively correlate with each other. The correlations between the subscales ranges from .14 to .68. These correlations result in an average correlation of  $r=.467$  between scores. The strongest

---

<sup>2</sup> Convergent and discriminant validity estimates using the entire sample of subjects (N=96) are reported in Appendix O.



Table 7

Intercorrelations Between the Ideological Subscales  
of the Extended Objective Measure of Ego Identity Status  
(EOM-EIS) for Pretest Scores (n=50)

EOM-EIS Subscales	EOM-EIS Ideological Subscales			
	Diffusion	Foreclosure	Moratorium	Achievement
Diffusion	$\bar{r} =$ $\bar{p} =$			
Foreclosure	$\bar{r} =$ .161 $\bar{p} =$ .132			
Moratorium	$\bar{r} =$ .335 $\bar{p} =$ .009	-.217 .065		
Achievement	$\bar{r} =$ -.187 $\bar{p} =$ .098	.057 .348	.046 .375	

Table 8

Intercorrelations Between the Subscales of the Erikson  
Psychosocial Inventory Scale (EPIS) for Pretest Scores  
(n=50)

EPIS		EPIS Subscales			
Sub-					
Scales		Trust	Autonomy	Initiative	Industry
Trust	$r=$ $p=$				
Autonomy	$r=$ .543 $p=$ .001				
Initiative	$r=$ .654 $p=$ .001		.667 .001		
Industry	$r=$ .453 $p=$ .687		.623 .001	.445 .001	
Identity	$r=$ .687 $p=$ .001		.561 .001	.455 .001	.407 .002
Intimacy	$r=$ .437 $p=$ .001		.138 .167	.239 .047	.137 .171
		Identity	Intimacy		
Identity	$r=$ $p=$				
Intimacy	$r=$ .561 $p=$ .001				

associations between subscales include the correlations between trust, autonomy, initiative, industry, and identity. In general, the weakest correlations were between these five subscales and intimacy. Therefore, one can conclude that the first five subscales of the EPIS manifest clear and consistent convergent validity with this sample.

Finally, while the EIS is used as a single score measure, precluding intersubscale correlational analyses, it can be correlated with the EPIS, given both instruments are based on an Eriksonian psychosocial model. Therefore, one would also expect a significant correlation between the EIS and the subscales of the EPIS. Table 9 summarizes these correlations. All correlations are significant and in the positive anticipated direction.

Summary. Acceptable estimates of reliability and validity were found for the three measures with this sample. The findings caution use of the diffusion and achievement subscales of the EOM-EIS with pretest scores. Further, the intimacy subscale of the EPIS should be used with caution given its lower estimates of convergent validity with other subscales and measures.

#### Tests of Hypotheses

The basic hypothesis of this investigation was that individuals in the ideological training groups would manifest greater advancement in identity formation and

Table 9

Correlations Between the Ego Identity Scale (EIS) and the Subscales of the Erikson Psychosocial Inventory Scale (EPIS) for Pretest Scores (n=50)

---

Subscales of the EPIS	Ego Identity Scale (EIS)
Trust	$r = .803$ ( $p < .001$ )
Autonomy	$r = .524$ ( $p < .001$ )
Initiative	$r = .536$ ( $p < .001$ )
Industry	$r = .414$ ( $p < .001$ )
Identity	$r = .533$ ( $p < .001$ )
Intimacy	$r = .270$ ( $p < .029$ )

---

psychosocial maturity than subjects in either an engaged control group or a maturational control group (pretest and posttest measurement only). To test this hypothesis three general forms of analyses were undertaken. First, after group placement was completed, the three groups were compared for equivalence on pretest scores. Second, analyses were completed to compare five basic groups (two experimental, two engaged control, and one maturational control) for hypothesized groups differences on posttest measures. Third, group by time interactions were assessed to measure possible differences in change due to group context.

Group equivalence. A series of one way analyses of variance were computed comparing those subjects placed into the experimental, engaged control, and maturational control conditions. These analyses were completed on pretest measures and subscales to test for group equivalence. Only one significant difference was observed on the pretest scores. A significant analysis,  $F(2,49) = 3.53, p < .05$ , on the identity subscale of the EPIS revealed that the experimental subjects reported higher identity functioning than either of the two control groups (see table 10). Therefore, in the calculation of group differences for the posttest measure, a covariance would be needed to adjust for the initial group differences on the pretest scores for this measure. Indeed, it was judged appropriate to use an

Table 10

Mean Comparisons Between Groups on the Identity Subscales of the Erikson Psychosocial Inventory Scale (EPIS) for Pretest Scores (n=50).

Group	N	Mean	Std. Dev.
Experimental	17	50.71	4.44
Engaged Control	17	46.06	7.62
Maturational Control	16	45.13	7.04

analysis of covariance model for all group difference test although the three basic groups appeared equivalent on pretest measures with the exception of the identity scale in the EPIS.

Group differences. It was hypothesized that the experimental groups would show higher ego identity functioning at the time of posttesting than the control groups. Given two group leaders were used, initially five groups were identified in the analyses. This included two experimental, two engaged control, and one maturational control group. Analyses were completed using an analysis of covariance model where each dependent variable was treated as a covariant using the pretest score. No significant differences were observed, indicating that there was no individual trainer effect.

To increase statistical power through the use of a larger sample size per experimental group, the five groups were collapsed into the three basic groups of experimental, engaged control, and maturational control. The analyses of covariance were once again computed treating the dependent variable as a covariate on the pretest scores. A marginally significant group difference was observed,  $F(2,46) = 2.53$ ,  $p < .09$ , on the achievement subscale of the EOM-EIS. Mean differences are summarized in Table 11. Pair-wise comparisons using the least squared differences revealed that the experimental and maturational control groups

Table 11

Estimated Mean Differences on the Ideological Achievement Subscale of the Extended Objective Measure of Ego Identity Status (EOM-EIS) Using the Dependent Variable as a Covariate on the Pretest Scores.

---

Group	N	Mean	Std. Dev.
Experimental	17	36.58	1.21
Engaged Control	17	35.68	1.19
Maturation Control	16	32.83	1.23

---



differed significantly. Interpretation of this findings should be tempered however, given the pretest scores on the achievement subscale showed low internal consistency.

Group by time interactions. The analysis involved assessing a group by time interaction. The three experimental groups (training group, engaged control, maturational control) were compared on their pretest and posttest scores. Rummage (Scott, 1980) was used to compute a group between factor and a within time of measurement factor. No significant interaction effects were observed nor were any trends ( $p$ 's  $< .20$  or smaller) noted.

Pretest to posttest change between identity status. Finally, analyses were completed on changes in identity statuses from pretest to posttest. Subjects identity statuses were derived using the standardized rules from the EOM-EIS for both the pretest and posttest scores. The EOM-EIS was scored and analyzed according to the criteria given by Adams et al. (1987). Subjects' pre and post-test scores were used to determine the changes within each group and between the five groups. Subjects were then classified into their dominant identity status for analysis.

Subjects were categorized as either showing no change, regression (movement to foreclosure or diffusion), or progression (advancement to identity achievement). These findings are summarized in tables 12 and 13. Chi square analyses revealed no significant differences between groups

Table 12

Pretest to Posttest Changes in Ideological Identity Status  
Utilizing the Extended Objective Measure of Ego Identity  
Status (EOM-EIS)

Group	Pretest to Posttest Changes		
	Regressed	No Change	Advanced
Experimental	12%	53%	35%
	(n=2)	(n=9)	(n=6)
Engaged Control	18%	47%	35%
	(n=3)	(n=8)	(n=6)
Maturational Control	18%	68%	13%
	(n=3)	(n=11)	(n=2)

Table 13

Status of Subjects Utilizing the Extended Objective Measure  
of Ego Identity Status at the Time of Pretesting and  
Posttesting (n=50)

---

EOM-EIS Ideological Subscales				
Time	Diffusion	Foreclosure	Moratorium	Achievement
Pretest	n=0	n=0	n=50	n=0
Posttest	n=5	n=3	n=28	n=14

for regression, progression, or stability. While 35% of the experimental group manifested positive growth in identity only 13% of the maturational group showed similar change. However, the engaged control group showed an identical 35% positive growth. These findings suggest the manifested changes are due to attention only or some form of general cognitive or analytic activity associated with studying human development.

## DISCUSSION

Perspective taking training procedures utilized to enhance identity development are relatively new phenomena. The primary aim of this study was to revise and expand Markstrom-Adams's ideological perspective-taking training program.

The study was novel in several aspects. First, the sample was limited to females in the moratorium status as assessed by the EOM-EIS from subjects' pretest scores. By focusing the training program on only those in the moratorium phase of identity development, it was possible to observe the training program's effects on a specific status of ideological identity development. Second, gender differences and training program effects have not been addressed in previous studies. While this study was composed of an all female sample, future studies that include males will allow for possible gender comparisons in the effectiveness of the program.

### Findings of the Study

The primary prediction of the study was that subjects participating in the ideological perspective-taking training sessions would show significant advances in their ideological identity and psychosocial maturity exceeding that of the control group participants. Specifically,

subjects in the treatment group were predicted to advance into ideological achievement as measured by the ideological and moratorium subscales of the EOM-EIS. In accordance with this prediction, it was also expected that subjects in the treatment groups would regress into the statuses of foreclosure and diffusion significantly less than those engaged in control group activities. In addition, it was expected that these subjects would also show positive gains in their overall identity as measured by the Ego Identity Scale (EIS) and the subscales of the Erikson Psychosocial Inventory Scale (EPIS).

Three forms of analysis were used to test these predictions. First, group equivalence was assessed based on subjects' pretest scores. A significant difference was found on the identity subscale of the EPIS with the treatment group reporting more advanced scores than the control groups.

The second step in data analysis involved using an analysis of covariance with the dependent variable as the covariate on the pretest scores. There were no significant differences observed with regard to possible trainer effects, and consequently it was judged appropriate to collapse the groups into one treatment group, one engaged control, and the maturational control group. An analysis of covariance was again computed on the sample and a significant finding was observed on the achievement subscale

of the EOM-EIS between the treatment and maturational control groups. However, caution should be used in interpreting these results due to the lower than anticipated pretest levels of internal consistency on the EOM-EIS. In other words, while it appears that the training may have significantly advanced subjects into ideological achievement, the inconsistency of the EOM-EIS at the time of pretesting limits the credibility of the result.

Finally, group by time interactions were assessed using a repeated measures anova design. There were no significant findings.

It is interesting to note, however, that when assessing subjects' movement across the statuses from pretest to posttest, 35% of the treatment group showed advancement into the achievement category while only 13% of the maturational control group advanced. These results were discounted due to the engaged control group also showing a 35% advance into the achievement status. It may be that the group interaction component (in addition to the written training exercises) is responsible for the experimental and engaged control subjects' growth in identity development.

Surprisingly, there was a lack of significant findings observed in this study. This occurrence may be explained in several ways. First, the sample was composed of subjects currently in the moratorium status of identity development. It is possible that since moratorium adolescents are

currently engaged in exploration, they may not readily benefit from perspective-taking activities that facilitate the exploration of ideological identity. Subjects in the statuses of foreclosure and diffusion may benefit more from the training due to the possibility of lack of exploration and/or a commitment to an ideology prematurely (i.e., foreclosure). In other words it is possible that subjects' identity status at the time of pretesting could influence the effectiveness of the training procedures. Further, college students may be more likely to remain in the moratorium stage of identity development for extended periods than non-college adolescents due to the choices and opportunities the college atmosphere provides. The moratorium subjects in this sample may simply have not been ready to make a commitment at this particular stage in their lives.

Similarly, a study by Cote and Levine (1988) suggested that the differences between college students in the moratorium and achievement statuses may be minimal due to the availability of role experimentation in a college atmosphere. In other words, achieved subjects recruited from college environments may be less stable in their identity status due to the greater availability of experimentation and exploration exceeding that of subjects in other social contexts. Therefore a subject's identity status should be interpreted with regard to the social



context of the individual.

Another explanation could be the time duration of the training program. Each topic of ideological identity was discussed for a 50 minute period each week. With subjects currently in the moratorium status a more intense program with a longer time duration may have been more beneficial by allowing subjects ample time to discuss and explore the various perspectives. Group leaders often encountered time constraints and had to limit group discussion on various topics in order to maintain consistency across the experimental groups with regard to time. Participants perceptions of exploration could have been minimal due to the limited time each topic was given and consequently at the time of posttesting they perceived themselves as having manifested little change in their exploration in comparison to their everyday activities.

The treatment group was observed to be significantly more advanced than subjects in the control groups at the time of pretesting. This could have had an effect on the training procedures with the treatment groups having less room for improvement than subjects in the control groups.

The final significant difference observed was between the treatment and maturational control groups with regard to advances into the achievement statuses as measured by the EOM-EIS. Again, it is important to consider the weak internal consistency of the EOM-EIS especially with regard

to the subscales of achievement and diffusion during the pretest sessions. Yet even with the principle instrument having lower internal consistency than expected, the other measurements used in the study also failed to show any significant differences from pretest to posttest in subjects' overall identity.

Finally, it is important to look at the effect the sample had on the treatment outcomes. The sample was drawn from a college located in a relatively conservative Utah community. The sample was composed primarily of subjects affiliated with the Mormon religion, the primary religion of the region. (see table 14) In a previous study Campbell (1984) compared Mormon and non-Mormon subjects and found Mormon subjects to be more conforming. It is possible that the homogeneity of the sample with regard to religion may have contributed to the lack of change from pretest to posttest due to subjects resisting change and new perspectives on issues especially related to religion. In other words, subjects had already conformed to the standards and norms of the society in which they lived and consequently were more apt to resist change in their attitudes and opinions. Specifically, observations from group leaders found subjects to be very reluctant to question their religion and had a considerable void in their knowledge of major world religions. This observation was similar to that of Markstrom-Adams's (1988) study in which a

Table 14

Religious Preference of Subjects (n=50)

---

Religious Preference	Frequency	Percent
Baptist	2	4
Catholic	2	4
LDS	41	82
Lutheran	1	2
Presbyterian	1	2
No affiliation	3	6

---

similar population was used. Subjects' lack of knowledge and perceived lack of interest may have tempered any effect of the treatment on ideological identity in which religion is a component. Further it was observed that participants also had considerable difficulty when discussing various political issues. Discussion of the issues was minimal with many showing little interest in the topics. Again, this would have had an effect on the outcome of the treatment success.

#### Suggestions for Future Research.

The area of perspective-taking programs on identity development is of relatively new interest to researchers of psychosocial development. While this study failed to show significant results, the training program should not be discarded for there remain several areas to address in future studies.

First, the training program has been limited to a white college sample. Future studies would benefit by including a non-college working sample with some diversity in religion and ethnicity. It would also be interesting to apply the treatment to an all male sample so that gender comparisons could be made to a female sample as used in this study. It would also be of interest to include males and females in the same study. Furthermore the training program has yet to be used with other age ranges. Younger age groups may

benefit more by the training procedures during their initial stage of identity development. For example a high school sample, such as that used by Enright et. al. (1983a, 1984) may benefit from ideological perspective-taking training as they are currently engaged in career and other identity issues.

Next, future intervention studies should attempt to recruit larger sample sizes. Furthermore, experimental group sizes should be limited to 4-5 individuals so that members get ample time to express their opinions and questions on each component. An extension of this would be to apply the treatment on an individual basis instead of a group format. In this way the various components of identity could be investigated thoroughly and perhaps this would facilitate a commitment by the subject.

Likewise, future investigators should benefit by including additional measures of identity. Specifically, instruments used in categorizing subjects into one of the four identity statuses such as the Identity Status Interview may increase measures of consistency and validity and therefore add to the credibility of the findings. Further, the individual domains of ideological identity (eg., occupation, religion, politics) could be assessed for training effects.

It would be of interest to apply the training program for a longer duration. Group leaders made the observation

that the training program would have been more comprehensive if there would have been more time to address the various topics each week. For example participants' knowledge in the area of religion was limited and consequently more time was needed to adequately explain various religions and their similarities and differences. Furthermore group leaders should be educated and prepared to answer and explain questions in all areas of ideological identity (i.e., salary ranges and requirements of various occupations). All of this would contribute to a more intense training program and provide participants with a knowledge base from which to further base their commitments.

Finally, a study that included a follow-up assessment of identity status would be beneficial in determining any long term effects of the program. By again comparing the maturational and treatment groups any significant differences in their identity development could be determined.

### Conclusions

In conclusion, although Markstrom-Adams (1988) reported some significant findings with regard to advances in ideological identity, the present study failed to replicate those findings. However, many suggestions for future research were presented and there remains an abundance of options and opportunities for advances and refinements in

the area of perspective-taking training programs.

Until recently there has been a void in the area of perspective-taking training programs and their application in the area of identity development and psychosocial maturity. Hence, while the effects of the training program were not shown, it is important to note that the program is still in its initial stages and should not be discounted until further refinements are made in training and studies are performed with more diverse samples.

## REFERENCES

- Adams, G.R., Bennion, L., & Huh, K.H. (1987). Objective measure of ego identity status: A reference manual. Unpublished manuscript, Utah State University, Logan Utah.
- Adams, G.R., Ryan, J.H., Hoffman, J.J., Dobson, W.R., & Nielsen, E.C. (1985). Ego identity status, conformity behavior, and personality in late adolescence. Journal of Personality and Social Psychology, 47, 1091-1104.
- Adams, G.R., Shea, J., & Fitch, S.A. (1979). Toward the development of an objective assessment of ego-identity status. Journal of Youth and Adolescence, 8, 223-237.
- Anderson, S.A., & Fleming, W.M. (1986a). Late adolescents' home-leaving strategies: Predicting ego identity and college adjustment. Adolescence, 21, 453-459.
- Anderson, S.A., & Fleming, W.M. (1986b). Late adolescents' identity formation from the family of origin. Adolescence, 21, 785-796.
- Bennion, L.D., & Adams, G.R. (1986). A revision of the extended version of the objective measure of ego identity status: An identity instrument for use with late adolescents. Journal of Adolescence Research, 1, 183-198.
- Bourne, E. (1978). The state of research on ego identity: A review and appraisal. Part II. Journal of Youth and Adolescence, 7, 371-392.
- Campbell, E. (1984). Adolescent identity status and current familial relationships during separation. Unpublished manuscript, Utah State University, Logan, Utah.
- Cote, J.E., & Levine, C. (1988). The relationship between ego identity status and Erikson's notions of institutionalized moratoria, value orientation stage, and ego dominance. Journal of Youth and Adolescence, 17, 81-99.
- Craig-Bray, L., Adams, G.R., & Dobson, W.R. (1988). Identity formation and social relations during late adolescence. Journal of Youth and Adolescence, 17, 173-187.



- Enright, R.D., & Deist, S.H. (1979). Social perspective taking as a component of identity formation. Adolescence, 14, 517-522.
- Enright, R.D., Ganiere, D.M., Buss, R.R., Lapsley, D.K., & Olson, L.M. (1983a). Promoting identity development in adolescence. Journal of Early Adolescence, 3, 247-255.
- Enright, R.D., & Lapsley, D.K. (1980). Social role-taking: A review of the constructs, measures, and measurement properties. Review of Educational Research, 50, 647-674.
- Enright, R.D., Lapsley, D.K., Cullen, J., & Lallensack, M. (1983b). A psychometric examination of Rasmussen's ego identity scale. International Journal of Behavioral Development, 6, 89-103.
- Enright, R.D., Olson, L.M., Ganiere, D., Lapsley, D.K., & Buss, R.R. (1984). A clinical model for enhancing adolescent ego identity. Journal of Adolescence, 7, 119-130.
- Erikson, E.H. (1968). Identity: Youth and crisis. New York: W. W. Norton & Company.
- Feffer, M., & Suchotliff, L. (1966). Decentering implications of social interactions. Journal of Personality and Social Psychology, 4, 415-422.
- Fitzgerald, H.E., & Walraven, M.G. (Eds.). (1987). Annual editions: Human development 87/88. Guilford, Conn.: Dushkin Publishing Group, Inc.
- Gough, H. (1950). Predicting success in graduate training, a progress report. Berkeley: University of California, Institute of Personality Assessment and Research.
- Greenberger, E., & Sorensen, A.B. (1974). Toward a concept of psychosocial maturity. Journal of Youth and Adolescence, 3, 329-358.
- Grotevant, H.D., & Adams, G.R. (1984). Development of an objective measure to assess ego identity in adolescence: Validation and replication. Journal of Youth and Adolescence, 13, 419-437.

- Grotevant, H.D., Thorbecke, W., & Meyer, M.L. (1982). An extension of Marcia's identity status interview into the interpersonal domain. Journal of Youth and Adolescence, 11, 33-47.
- Leadbeater, B.J., & Doinne, J.P. (1981). The adolescent's use of formal operational thinking in solving problems related to identity resolution. Adolescence, 14, 111-121.
- Looft, W.R. (1971). Egocentrism and social interaction in adolescence. Adolescence, 6, 485-494.
- Marcia, J.E. (1966). Development and validation of ego-identity status. Journal of Personality and Social Psychology, 3, 551-558.
- Marcia, J.E. (1976). Identity six years after: A follow-up study. Journal of Youth and Adolescence, 5, 145-160.
- Marcia, J.E., & Friedman, M.L. (1970). Ego identity status in college women. Journal of Personality, 2, 247-263.
- Markstrom-Adams, C. (1988). The effects of social perspective-taking training and ideological perspective-taking training on ego-identity formation in late adolescence. Unpublished manuscript, Utah State University, Logan, Utah.
- Prager, K.J. (1985). Identity development, age, and college experience in women. The Journal of Genetic Psychology, 147, 31-36.
- Rasmussen, J.E. (1964). Relationship of ego identity to psychosocial effectiveness. Psychological Reports, 15, 815-825.
- Rosenthal, D.A., Gurney, R.M., & Moore, S.M. (1981). From trust to intimacy: A new inventory for examining Erikson's stages of psychosocial development. Journal of Youth and Adolescence, 10, 525-537.
- Scott, D.T. (1980). G. Rex Bryce (Ed.) Data analysis in rummage: A users guide. Department of Statistics, Brigham Young University, Provo, Utah.
- Selman, R.L. (1971). Taking another's perspective: Role-taking development in early childhood. Child Development, 42, 1721-1734.

- Selman, R.L. (1980). The growth of interpersonal understanding: Development and clinical analysis. New York: Academic Press.
- Slugoski, B.R., Marcia, J.E., & Koopman, R.F. (1984). Cognitive and social interactional characteristics of ego identity statuses in college males. Journal of Personality and Social Psychology, 47, 646-661.
- Toder, N.L., & Marcia, J.E. (1973). Ego identity status and response to conformity pressure in college women. Journal of Psychology and Social Psychology, 26, 287-294.
- Wilkens, W.L., Rigby, M.K., & Ossono, E.D. (1958). The application of sociometric technique to women recruits: II. Analysis of individual and group characteristics  
O.N.R. Contract, N7 onr - 40802 (NR 151-092) Tech. Rep. No. 9.

## APPENDICES

Appendix A  
Sign-Up Sheet

Sign-Up Sheet

If you are an 18-21 year old, female college student and would like to be involved in the study just described to you, please provide the following information. Be sure to take one of the attached information sheets.

Name and AddressPhoneMajorAge

Appendix B  
Student Information  
Sheet

Dear Student,

You have been asked to participate in a study on enhancing self-understanding that is being carried out Spring Quarter 1989. For your involvement in this study you will be allowed to take 1 P/F credit in Family and Human Development or Psychology after the study is completed. Your participation will be required for a total of six weeks during the quarter. During these six weeks you will be asked to participate in two weekly sessions lasting 1 to 1-1/2 hours each, making a total time commitment of three hours per week. There will be no homework assignments. The activities will include a combination of written exercises and group discussions related to topics of self-understanding and/or human development. Not only should you find the subject matter interesting, but you should also benefit personally from your involvement in the study.

Your attendance is required at a pre-screening session in order to make a final determination of who will be included in the study. The majority of those pre-screened will be included in the study.

Blocks of time have been arranged for pretesting. You will need to come to Family Life 128 (in the group of rooms at the east end of the Family Life building on the lower level) at some time during one of the days listed below. Plan about 1 to 1-1/2 hours for this session.

Pre-screening Sessions

Monday, March 27;	9-5
Tuesday, March 28;	9-5
Wednesday, March 29;	9-5
Thursday, March 30;	9-5
Friday, March 31;	9-5

It is essential that you attend one of the sessions during this week. Attend a time convenient for you during the hours given. If you are unable to attend one of the times listed, due to schedule conflicts, let me know as soon as possible so that other arrangements can be made for you to complete the pretesting material.

Thank you for your interest in this study. I hope you will find that this is a profitable experience for you. Please feel free to contact me at 750-3578 (work) or 753-5474 (home) if you have any questions or decide that you cannot participate in the study. If you know of other 18-21 year

old female college students who might be interested in



participating, please let me know or bring them with you to the prescreening session.

Sincerely,

Debbi L. Huston

Appendix C  
Student Schedule  
Sheet

ID# \_\_\_\_\_

Thank you for your participation in this study. At this time I would like your help in scheduling the various groups for Spring Quarter. We will be meeting two times a week for five weeks beginning the week of April 10. On Monday or Tuesday of each week, you will need to plan to come in between the hours of 9 - 5 on either of these days to complete an individual written exercise. This will take approximately 1 to 1-1/2 hours to complete.

The second session of the week will take place on Wednesday, Thursday, or Friday. A set time will need to be established for this session and you will be given several sessions from which to choose. Look over the following schedule and indicate all possible times that you would be available to attend a session. Although you will only need to attend one of these sessions, it will be helpful to have all available times when assigning groups. Each group will take approximately 50 minutes each week.

	<u>Wednesday</u>	<u>Thursday</u>	<u>Friday</u>
8:30-9:20	_____	_____	_____
10:30-11:20	_____	_____	_____
12:30-1:20	_____	_____	_____
1:30-2:20	_____	_____	_____
2:30-3:20	_____	_____	_____
3:30-4:20	_____	_____	_____
4:30-5:20	_____	_____	_____

You will be contacted in a few weeks and informed as to which session you will be assigned. Thank you for your assistance in this project.

Appendix D  
Background  
Information Sheet

ID# \_\_\_\_\_

Background Information

Name: \_\_\_\_\_

Current Address: \_\_\_\_\_  
\_\_\_\_\_

Current Phone #: \_\_\_\_\_

Permanent Address: \_\_\_\_\_  
\_\_\_\_\_

Permanent Phone Number: \_\_\_\_\_

Birth date: \_\_\_\_\_

Year in school: \_\_\_\_\_

Major: \_\_\_\_\_

Marital Status:  
\_\_\_\_\_ Single  
\_\_\_\_\_ Married  
\_\_\_\_\_ Divorced  
\_\_\_\_\_ Separated  
\_\_\_\_\_ WidowedRace:  
\_\_\_\_\_ Asian/Oriental  
\_\_\_\_\_ Black  
\_\_\_\_\_ Caucasian  
\_\_\_\_\_ Hispanic  
\_\_\_\_\_ Other (please specify)Religious preference:  
\_\_\_\_\_ Baptist  
\_\_\_\_\_ Catholic  
\_\_\_\_\_ Episcopalian  
\_\_\_\_\_ L.D.S.  
\_\_\_\_\_ Lutheran  
\_\_\_\_\_ Methodist  
\_\_\_\_\_ Presbyterian  
\_\_\_\_\_ Jewish  
\_\_\_\_\_ No affiliation  
\_\_\_\_\_ Other (please specify)

Father's Occupation: \_\_\_\_\_

Mother's Occupation: \_\_\_\_\_

ID# \_\_\_\_\_

Father's highest level of education: \_\_\_\_\_

Mother's highest level of education: \_\_\_\_\_

Parent's combined approximate annual gross income:

___ 9,999 or less	___ 25,000 to 29,999	___ 45,000 to 49,999
___ 10,000 to 14,999	___ 30,000 to 34,999	___ 50,000 to 54,999
___ 15,000 to 19,999	___ 35,000 to 39,999	___ 55,000 to 59,999
___ 20,000 to 24,999	___ 40,000 to 44,999	___ 60,000 and over

Number of older brothers you have: \_\_\_\_\_

Number of younger : \_\_\_\_\_

Number of older sisters you have: \_\_\_\_\_

Number of younger : \_\_\_\_\_

ALL INFORMATION WILL BE KEPT IN THE STRICTEST  
CONFIDENCE

Appendix E  
Extended Objective  
Measure of Ego-  
Identity Status:  
Items and Answer  
Sheets

Self-Perception Questionnaire #1

Read each item and indicate to what degree it reflects your own thoughts and feelings. If a statement has more than one part, please indicate your reaction to the statement as a whole. Indicate your answer on the answer sheet by choosing one of the following items. Do not write on the questionnaire itself.

A = strongly agree  
B = moderately agree  
C = agree  
D = disagree  
E = moderately disagree  
F = strongly disagree

1. I haven't chosen the occupation I really want to get into, and I'm just working at whatever is available until something better comes along.
2. When it comes to religion I just haven't found anything that appeals and I don't really feel the need to look.
3. There's no single "life style" which appeals to me more than another.
4. Politics is something that I can never be too sure about because things change so fast. But I do think it's important to know what I can politically stand for and believe in.
5. I'm still trying to decide how capable I am as a person and what jobs will be right for me.
6. I don't give religion much thought and it doesn't bother me one way or the other.
7. I'm looking for an acceptable perspective for my own "life style" view, but haven't really found it yet.
8. I haven't really considered politics. It just doesn't excite me much.
9. I might have thought about a lot of different jobs, but there's never really been any question since my parents said what they wanted.
10. A person's faith is unique to each individual. I've considered and reconsidered it myself and know what I can believe.



For all the questions on this page, choose from the following responses.

- A= strongly agree
- B= moderately agree
- C= agree
- D= disagree
- E= moderately disagree
- F= strongly disagree

11. After considerable thought I've developed my own individual viewpoint of what is for me an ideal "life style" and don't believe anyone will be likely to change my perspective.
12. I guess I'm pretty much like my folks when it comes to politics. I follow what they do in terms of voting and such.
13. I'm really not interested in finding the right job, any job will do. I just seem to flow with what is available.
14. I'm not sure what religion means to me. I'd like to make up my mind but I'm not done looking yet.
15. My own views on a desirable life style were taught to me by my parents and I don't see any need to question what they taught me.
16. There are so many different political parties and ideals. I can't decide which to follow until I figure it all out.
17. It took me a while to figure it out, but now I really know what I want for a career.
18. Religion is confusing to me right now. I keep changing my views on what is right and wrong for me.
19. In finding an acceptable viewpoint to life itself, I find myself engaging in a lot of discussions with others and some self exploration.
20. I've thought my political beliefs through and realize I can agree with some and not other aspects of what my parents believe.
21. My parents decided a long time ago what I should go into for employment and I'm following through their plans.

For all the questions on this page, choose from the following responses.

- A= strongly agree
- B= moderately agree
- C= agree
- D= disagree
- E= moderately disagree
- F= strongly disagree

22. I've gone through a period of serious questions about faith and can now say I understand what I believe in as an individual.
23. My parents' views on life are good enough for me, I don't need anything else.
24. I'm not sure about my political beliefs, but I'm trying to figure out what I can truly believe in.
25. It took me along time to decide but now I know for sure what direction to move in for a career.
26. I attend the same church as my family has always attended. I've never really questioned why.
27. I guess I just kind of enjoy life in general, and I don't see myself living by any particular viewpoint to life.
28. I really have never been involved in politics enough to have made a firm stand one way or the other.
29. I just can't decide what to do for an occupation. There are so many that have possibilities.
30. I've never really questioned my religion. If it's right for my parents it must be right for me.
31. After a lot of self-examination I have established a very definite view on what my own life style will be.
32. My folks have always had their own political and moral beliefs about issues like abortion and mercy killing and I've always gone along accepting what they have.

ID# \_\_\_\_\_

Self-Perception Questionnaire #1  
Answer Sheet

A = Strongly Agree  
B = Moderately Agree  
C = Agree  
D = Disagree  
E = Moderately Disagree  
F = Strongly Disagree

- |     | A   | B   | C   | D   | E   | F   |
|-----|-----|-----|-----|-----|-----|-----|
| 1.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 2.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 3.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 4.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 5.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 6.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 7.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 8.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 9.  | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 10. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 11. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 12. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 13. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 14. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 15. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 16. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 17. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 18. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 19. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| 20. | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |

ID# \_\_\_\_\_

A= strongly agree  
B= moderately agree  
C= agree  
D= disagree  
E= moderately disagree  
F= strongly disagree

21. ( ) ( ) ( ) ( ) ( ) ( )  
22. ( ) ( ) ( ) ( ) ( ) ( )  
23. ( ) ( ) ( ) ( ) ( ) ( )  
24. ( ) ( ) ( ) ( ) ( ) ( )  
25. ( ) ( ) ( ) ( ) ( ) ( )  
26. ( ) ( ) ( ) ( ) ( ) ( )  
27. ( ) ( ) ( ) ( ) ( ) ( )  
28. ( ) ( ) ( ) ( ) ( ) ( )  
29. ( ) ( ) ( ) ( ) ( ) ( )  
30. ( ) ( ) ( ) ( ) ( ) ( )  
31. ( ) ( ) ( ) ( ) ( ) ( )  
32. ( ) ( ) ( ) ( ) ( ) ( )

Appendix F  
Ego-Identity Scale:  
Items, Answer  
Sheet, and Key

Self-Perception Questionnaire #2

The following pages contain a number of statements which are related to opinions and feeling about yourself and life in general. There are no right and wrong answers to these statements. Thus, you should give YOUR OWN personal opinion in answering the statements.

Read each statement, decide how you really feel about it, and mark your answer on the ANSWER SHEET. If the statement is one with which you AGREE or GENERALLY AGREE as it applies to you or what you believe, mark it AGREE on the answer sheet. If you DISAGREE or GENERALLY DISAGREE with the statement, mark it DISAGREE on the answer sheet.

It is important that you work right through the statements and answer each one. DON'T spend too much time on any one statement, but try to be as accurate as possible in deciding whether you generally agree or disagree with the statements. Several of the statements may sound the same, but don't worry about this. Answer each one as you come to it.

1. I seem to have regrets when I have to give up my pleasures right now for goals or things I want in the future.
2. No one seems to understand me.
3. I have a fear of being asked questions in class because of what other people will think if I don't know the answer.
4. Working is nothing more than a necessary evil that a person must put up with to eat.
5. It doesn't pay to worry much about decisions you have already made.
6. People are usually honest in dealing with each other.
7. From what others have told me, I feel I am a person who is very easy to talk to.
8. When given a job, I try never to get so tied up in what I am doing at the moment so as to lose sight of what comes next.
9. I work best when I know my work is going to be compared with the work of others.
10. I have no difficulty in avoiding people who may get me in trouble.
11. When I have to work, I usually get pretty bored no matter what the job is.
12. It doesn't worry me if I make a mistake in front of my friends.
13. The decisions I have made in the past have usually been the right ones.
14. Although I sometimes feel very strongly about things, I never show other people how I feel.
15. After I do something I usually worry about whether it was the right thing.
16. I am confident that I will be successful in life when I finally decide on a career.
17. It's best not to let other people know too much about your family or background if you can keep from it.

18. I really don't have any definite goals or plans for the future, I'm content to let my parents decide what I should do.
19. I never enjoyed taking part in school clubs or student government activity.
20. If I am not careful people try to take advantage of me.
21. In general, people can be trusted.
22. It is very seldom that I find myself wishing I had a different face or body.
23. I would get along better in life if I were better looking.
24. At my age a person must make his or her own decisions, even though his or her parents might not agree with the things s/he does.
25. It's not hard to keep your mind on one thing if you really have to.
26. It seems as if I just can't decide what I really want to do in life.
27. I am always busy doing something, but I seem to accomplish less than other people even though they don't work as hard as I do.
28. When I'm in a group I find it hard to stand up for my ideas if I think other people won't agree with me.
29. I have at least one close friend with whom I can share almost all of my feelings and personal thoughts.
30. I do not feel that my looks and actions keep me from getting ahead in life.
31. Even when I do a good job in my work, other people don't seem to realize it or give me credit.
32. One of the hardest things a young person to overcome is his or her family background.
33. The best part of my life is still ahead of me.
34. In a group I can usually stand up for what I think is right without being embarrassed.



35. I seem to have the knack or ability to make other people relax and enjoy themselves at a party.
36. I can't seem to say no when the group does something which I don't think is right.
37. Being without close friends is worse than having enemies.
38. I am not sure what I want to do as a life-time occupation, but I have some pretty definite plans and goals for the next few years.
39. It is easier to make friends with people you like if they don't know much about your background.
40. I don't like sports or games where you always have to try and do better than the next person.
41. A person who can be trusted is hard to find.
42. I believe that I must make my own decisions in important matters, as no one can live my life for me.
43. In order to be comfortable or at ease, a person must get along with others but s/he doesn't really need close friends.
44. I am proud of my family background.
45. I cannot keep my mind on one thing.
46. It is a good idea to have some plan as to what has to be done next, no matter how much you have to do at the moment.
47. During the past few years I have taken little or no part in clubs, organized group activity, or sports.
48. I have found that people I work with frequently don't appreciate or seem to understand my abilities.
49. For some reason, it seems that I have never really gotten to know the people I have worked with, even though I like them.
50. I am pretty content to be the way I am.
51. I can't stand to wait for things I really want.
52. A person is a lot happier if s/he doesn't get too close to others.

53. Even though I try, it is usually pretty hard for me to keep my mind on a task or job.
54. One of the good parts of being a teenager is getting together with a group which makes its own rules and does things as a group.
55. When it comes to working, I never do anything I can get out of.
56. My way of doing things is apt to be misunderstood by others.
57. A person who hasn't been a member of a well organized group or club at some time in his or her teens has missed a lot.
58. When I think about my future, I feel I have missed my best chances for making good.
59. I like to tackle a tough job as it gives me a lot of satisfaction to finish it.
60. I am always busy but it seems that I am usually spinning my wheels and never seem to get anywhere.
61. It is very important that your parents approve of everything you do.
62. It doesn't bother me when my friends find out that I can't do certain things as well as other people.
63. As a rule, I don't regret the decisions I make.
64. I feel pretty sure that I know what I want to do in the future and I have some definite goals.
65. I don't have any trouble concentrating on what I am doing.
66. A person can't be happy in a job where s/he is always competing against others.
67. I feel I have missed my opportunity to really be a success in life.
68. If a person wants something worthwhile s/he should be willing to wait for it.

69. At home, I enjoyed work or spare time activities where I had to compete against others.
70. I never make any important decisions without getting help or advice from my family.
71. It is better to say nothing in public than to take a chance on other people hearing you make a mistake.
72. I lose interest in things if I have to wait too long to get them.

ID# \_\_\_\_\_

Self-Perception Questionnaire #2  
Answer Sheet and Key

	Agree	Dis- Agree		Agree	Dis- Agree		Agree	Dis- Agree
1.	( )	(X)	25.	(X)	( )	49.	( )	(X)
2.	( )	(X)	26.	( )	(X)	50.	(X)	( )
3.	( )	(X)	27.	( )	(X)	51.	( )	(X)
4.	( )	(X)	28.	( )	(X)	52.	( )	(X)
5.	(X)	( )	29.	(X)	( )	53.	( )	(X)
6.	(X)	( )	30.	(X)	( )	54.	(X)	( )
7.	(X)	( )	31.	( )	(X)	55.	( )	(X)
8.	(X)	( )	32.	( )	(X)	56.	( )	(X)
9.	(X)	( )	33.	(X)	( )	57.	(X)	( )
10.	(X)	( )	34.	(X)	( )	58.	( )	(X)
11.	( )	(X)	35.	(X)	( )	59.	(X)	( )
12.	(X)	( )	36.	( )	(X)	60.	( )	(X)
13.	(X)	( )	37.	(X)	( )	61.	( )	(X)
14.	( )	(X)	38.	(X)	( )	62.	(X)	( )
15.	( )	(X)	39.	( )	(X)	63.	(X)	( )
16.	(X)	( )	40.	( )	(X)	64.	(X)	( )
17.	( )	(X)	41.	( )	(X)	65.	(X)	( )
18.	( )	(X)	42.	(X)	( )	66.	( )	(X)
19.	( )	(X)	43.	( )	(X)	67.	( )	(X)
20.	( )	(X)	44.	(X)	( )	68.	(X)	( )
21.	(X)	( )	45.	( )	(X)	69.	(X )	( )
22.	(X)	( )	46.	(X)	( )	70.	( )	(X)
23.	( )	(X)	47.	( )	(X)	71.	( )	(X)
24.	(X)	( )	48.	( )	(X)	72.	( )	(X)

Appendix G  
Erikson Psychosocial  
Stage Inventory:  
Items and Answer  
Sheets

Self-Perception Questionnaire #3

1 = hardly ever true  
2 =  
3 =  
4 =  
5 = almost always true

1. I am able to take things as they come.
2. I can't make sense of my life.
3. I wish I had more self-control.
4. I get embarrassed when someone begins to tell me personal things.
5. I can't make up my own mind about things.
6. I change my opinion of myself a lot.
7. I am able to be first with new ideas.
8. I'm never going to get on in this world.
9. I'm ready to get involved with a special person.
10. I've got a clear idea of what I want to be.
11. I feel mixed up.
12. I find the world a very confusing place.
13. I know when to please myself and when to please others.
14. The important things in life are clear to me.
15. I don't seem to be able to achieve my ambitions.
16. I don't seem to have the ability that most others have got.
17. I've got it together.
18. I know what kind of person I am.
19. I worry about losing control of my feelings.
20. I have few doubts about myself.
21. I rely on other people to give me ideas.

22. I don't enjoy working.
23. I think I must be basically bad.
24. Other people understand me.
25. I'm a hard worker.
26. I feel guilty about many things.
27. I'm warm and friendly.
28. I really believe in myself.
29. I can't decide what I want to do with my life.
30. It's important to me to be completely open with my friends.
31. I find that good things never last long.
32. I feel I am a useful person to have around.
33. I keep what I really think and feel to myself.
34. I'm an energetic person who does lots of things.
35. I'm trying hard to achieve my goals.
36. Things and people usually turn out well for me.
37. I have a strong sense of what it means to be female/male.
38. I think the world and people in it are basically good.
39. I am ashamed of myself.
40. I'm good at my work.
41. I think it's crazy to get too involved with people.
42. People are out to get me.
43. I like myself and am proud of what I stand for.
44. I don't really know what I'm all about.
45. I can't stand lazy people.
46. I can stop myself doing things I shouldn't be doing.

47. I find myself expecting the worst to happen.
48. I care deeply for others.
49. I find I have to keep up a front when I'm with people.
50. I find myself denying things even though they are true.
51. I don't really feel involved.
52. I waste a lot of my time messing about.
53. I'm as good as other people.
54. I like to make my own choices.
55. I don't feel confident of my judgment.
56. I'm basically a loner.
57. I cope very well.
58. I'm not much good at things that need brains or skill.
59. I have a close physical and emotional relationship with another person.
60. I stick with things until they're finished.
61. I'm a follower rather than a leader.
62. I can stand on my own two feet.
63. I find it hard to make up my mind.
64. I trust people.
65. I like my freedom and don't want to be tied down.
66. I like new adventures.
67. I prefer not to show too much of myself to others.
68. I don't get things finished.
69. I like finding out about new things or places.
70. I don't get much done.
71. Being alone with other people makes me feel uncomfortable.



72. I find it easy to make close friends.

ID# \_\_\_\_\_

Self-Perception Questionnaire #3  
Answer Sheet

1 = hardly ever true  
2 =  
3 =  
4 =  
5 = almost always true

	1	2	3	4	5
1.	( )	( )	( )	( )	( )
2.	( )	( )	( )	( )	( )
3.	( )	( )	( )	( )	( )
4.	( )	( )	( )	( )	( )
5.	( )	( )	( )	( )	( )
6.	( )	( )	( )	( )	( )
7.	( )	( )	( )	( )	( )
8.	( )	( )	( )	( )	( )
9.	( )	( )	( )	( )	( )
10.	( )	( )	( )	( )	( )
11.	( )	( )	( )	( )	( )
12.	( )	( )	( )	( )	( )
13.	( )	( )	( )	( )	( )
14.	( )	( )	( )	( )	( )
15.	( )	( )	( )	( )	( )
16.	( )	( )	( )	( )	( )
17.	( )	( )	( )	( )	( )
18.	( )	( )	( )	( )	( )
19.	( )	( )	( )	( )	( )
20.	( )	( )	( )	( )	( )

ID# \_\_\_\_\_

1= hardly ever true

2=

3=

4=

5= almost always true

- |     | 1   | 2   | 3   | 4   | 5   |
|-----|-----|-----|-----|-----|-----|
| 21. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 22. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 23. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 24. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 25. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 26. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 27. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 28. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 29. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 30. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 31. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 32. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 33. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 34. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 35. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 36. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 37. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 38. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 39. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 40. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 41. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 42. | ( ) | ( ) | ( ) | ( ) | ( ) |

ID# \_\_\_\_\_

1= hardly ever true

2=

3=

4=

5= almost always true

- |     | 1   | 2   | 3   | 4   | 5   |
|-----|-----|-----|-----|-----|-----|
| 43. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 44. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 45. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 46. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 47. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 48. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 49. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 50. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 51. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 52. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 53. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 54. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 55. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 56. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 57. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 58. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 59. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 60. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 61. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 62. | ( ) | ( ) | ( ) | ( ) | ( ) |
| 63. | ( ) | ( ) | ( ) | ( ) | ( ) |

ID# \_\_\_\_\_

1= hardly ever true

2=

3=

4=

5= almost always true

	1	2	3	4	5
64.	( )	( )	( )	( )	( )
65.	( )	( )	( )	( )	( )
66.	( )	( )	( )	( )	( )
67.	( )	( )	( )	( )	( )
68.	( )	( )	( )	( )	( )
69.	( )	( )	( )	( )	( )
70.	( )	( )	( )	( )	( )
71.	( )	( )	( )	( )	( )
72.	( )	( )	( )	( )	( )

Appendix H  
Informed Consent  
Statement

Dear Participants:

Late adolescence/early adulthood is a time of life when many important choices regarding adult roles are being considered for adoption. In addition, it is a time to engage in greater exploration of what the self is all about, while at the same time trying to gain a better understanding of others. The purpose of this study is to determine if special written and group exercises may be utilized to enhance processes of understanding the self and others. This project is being carried out by Debbi L. Huston, a M.S. student in Family and Human Development, and is under the supervision of Dr. Gerald Adams and Dr. Carol Markstrom Adams who are in the departments of Family and Human Development and Psychology respectively.

There are nine possible groups that you may be assigned to in this project. To insure equivalence, the project leader will assign you at random to one of these groups. Depending on the group in which you are a participant, activities will be related to topics of self exploration and understanding and/or human development.

Although the content of the nine groups vary, the time commitment needed for each group is the same. The actual study itself will take six weeks. The completion of questionnaires, individual written exercises, and small group discussions will comprise the activities of these six weeks. Participation in these activities will require approximately one and one half hours of your time, two times a week, making the total time commitment approximately three hours a week. After the training is complete, there will be a session scheduled in which further details of the study will be shared.

Depending on the group you are assigned to, you should benefit from this study by acquiring a greater sense of self-awareness, interpersonal understanding, and/or by increasing your knowledge in the field of human development. If you complete the training, you have the option of taking one independent study credit, P/F, in either Family and Human Development or Psychology. There are no anticipated risks for you, as a participant, in this study.

You have the right to withdraw from this study, at any time, without suffering a penalty.

As a participant, your confidentiality is assured in this project. This will be accomplished by assigning participants an identification number. All materials that you complete as a part of the study will bear this assigned number. A list containing your name and identification

number will be kept apart from the materials that you have completed.

Data in this study will be analyzed for publication purposes for the whole group. Thus, individual scores on the measures will not be assessed.

If you have any questions, at any point during the study, do not hesitate to ask the project director, Debbi Huston, Gerald Adams or Carol Markstrom Adams. Thank you for your assistance in this project.

Sincerely,

Debbi L. Huston  
Graduate Student  
Family and Human Dev.  
(801) 750-3578  
Utah State University  
Logan, UT 84322-2905

Dr. Gerald Adams  
Professor  
Family & Human Dev.  
(801) 750-1545  
Utah State University  
Logan, UT 84322-2905

Dr. Carol Markstrom Adams  
Assistant Professor  
Department of Psychology  
(801) 750-1460  
Utah State University  
Logan, UT 84322-

-----  
Participant Informed Consent

I have read the above information and agree to participate in this study. I further understand that I may withdraw from the study at any time without any penalty or consequences.

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

I would like to receive a summary of the research findings.

Name \_\_\_\_\_  
Mailing Address \_\_\_\_\_  
\_\_\_\_\_



Appendix I  
Ideological Perspective-  
Taking Training

## Ideological Perspective-Taking Training

Dear Participant:

Living an adult life involves making choices in a variety of areas of life. Some of these are internal choices, that is, we select values, beliefs, and ideologies that we have determined have meaning to ourselves. These are individual choices that we make, nonetheless, they have an influence on the kinds of roles we adopt as adult members of our society.

In order to make these very important choices, however, we need to be informed as to what options are available to select from. What is especially important, is to have the opportunity to think about the options available in life and to make selections for yourself. The training you are a part of is designed to give you such an opportunity.

Over the next several sessions, you, along with other participants, will be given questions to answer which should help guide your thinking and selection of various choices in regards to important values, beliefs, and ideologies. You will have the opportunity, both in individual and group sessions, to clarify and articulate what is important to you as an individual. The group session will consist of seven to ten individuals, similar to yourself in age and college experience.

The areas of interest that you will be examining are occupation, politics, philosophical life-style, and religion. Over the next four weeks, one of these topics will be addressed each week.

If you need clarification of any item or assistance as you answer the questions, do not hesitate to ask the aide.

ID# \_\_\_\_\_

WEEK 1  
OCCUPATION

This first week's topic will be on occupation. Please give a written response, in the space provided, to the following questions related to your ideas about occupations. These items will be used as a basis for discussion in the group session later this week.

- 1.\* a. List five occupations that seem interesting to you and that you have considered as possible career choices for yourself.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

- b. List five occupations that you know that you are not interested in and would not adopt as career choices.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

ID# \_\_\_\_\_

- 2.\* For each occupation, list next to it characteristics that describe it. An example of characteristics to consider include: What is the income associated with the occupation? What kinds of skills are needed (e.g., business, mathematical, technical, computer, interpersonal, medical, etc.)? Is it a nine-to-five job or are the hours flexible? Is travel involved? Are there desirable fringe benefits? In addition, generate other characteristics that describe each occupation.
3. Of the occupations that are most interesting to you (as designated in Question #1), list the ways in which they are similar to one another (using the criteria generated in Question #2)? In what way are these occupations different from one another? List as many similarities and differences that you can think of.

SimilaritiesDifferences

1. \_\_\_\_\_

1. \_\_\_\_\_

2. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

5. \_\_\_\_\_

ID# \_\_\_\_\_

4. Of the occupations of least interest to you (as designated in Question #1), list the ways in which these occupations are similar to one another? In what ways are these occupations different from one another? List as many similarities and differences that you can think of.

Similarities

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Differences

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

- 5.\* From this exercise, has it become apparent to you that there are certain job characteristics that have more appeal to you than others? If so, what are the job characteristics that you value?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

- 6.\* Of the job characteristics that you value, describe how these characteristics are similar to what you know about yourself as an individual, e.g., your personality traits, interests, hobbies, etc?

ID# \_\_\_\_\_

- 7.\* From this exercise, can you narrow your list of five favored occupations, to one or two occupations that are of most interest to you? What are they?
1. \_\_\_\_\_
  2. \_\_\_\_\_
8. Summarize the kind of occupation you would like to go into and why.

ID# \_\_\_\_\_

WEEK 2  
POLITICS

This week's topic will be on politics. Please give a written response, in the space provided, to the following questions related to your ideas about politics. These items will be used as a basis for discussion in the group session later this week.

- 1.\* Provide a definition of what you think is politics.
  
  
  
  
  
  
  
  
  
  
- 2.\* When you think of politics, what terms and issues come to your mind as being components of politics?
  
  
  
  
  
  
  
  
  
  
- 3.\* List five political issues that you are aware of and have some knowledge. A political issue is any issue in which local, regional, national, and/or international politics plays a role. (An example of a political issue was the ABC tax initiatives that were proposed by the Utah State government)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

ID# \_\_\_\_\_

4.\* Select three of the five issues listed in Question #3. For each issue, take the perspective of and provide a pro and a con for each side of the issue. Be sure to do this separately for each of the three issues you select.

1. Issue:

Pro:

Con:

2. Issue:

Pro:

Con:

3. Issue:

Pro:

Con:



ID# \_\_\_\_\_

5. Of the various pro's and con's presented in Question #4, in what ways are the arguments are similar to one another? (ie. they represent a conservative viewpoint, they represent a liberal viewpoint etc.)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

6. Of the various pro's and con's presented in Question #4, in what ways are the arguments are different from one another?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

- 7.\* In looking over the different political viewpoints presented in Question #4, which viewpoints are most similar to your own personal political viewpoints?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

ID# \_\_\_\_\_

- 8.\* In looking over the different viewpoints presented in Question #4, which viewpoints are the most different from your own personal political viewpoints?
1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
  4. \_\_\_\_\_
  5. \_\_\_\_\_
9. Summarize, as completely as you are able, your own viewpoint about politics.



ID# \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

- 3.\* Taking all 10 components of a philosophy of life given in Question #2, in what ways are they similar to one another? Give as many similarities as you can think of.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

- 4.\* Group the ten components you listed in Question #2 into subgroups according to those most similar to one another. (There is no specific number of groups you should have.)

Group #1Group #2Group #3Group #4

ID# \_\_\_\_\_

- 5.\* Of the subgroups given in Question #4, what are the similarities within each group?

<u>Group #1</u> <u>Similarities</u>	<u>Group #2</u> <u>Similarities</u>	<u>Group #3</u> <u>Similarities</u>	<u>Group #4</u> <u>Similarities</u>
--	--	--	--

- |          |       |       |       |
|----------|-------|-------|-------|
| 1. _____ | _____ | _____ | _____ |
| 2. _____ | _____ | _____ | _____ |
| 3. _____ | _____ | _____ | _____ |
| 4. _____ | _____ | _____ | _____ |
| 5. _____ | _____ | _____ | _____ |

- 6.\* What are the major differences between each of the subgroups you have listed in Question #4? (ie. how does group #1 differ from groups 2, 3, and 4)

<u>Group #1</u> <u>Differences</u> <u>from groups</u>	<u>Group #2</u> <u>Differences</u> <u>from groups</u>	<u>Group #3</u> <u>Differences</u> <u>from groups</u>	<u>Group #4</u> <u>Differences</u> <u>from groups</u>
---	---	---	---

- |          |       |       |       |
|----------|-------|-------|-------|
| 1. _____ | _____ | _____ | _____ |
| 2. _____ | _____ | _____ | _____ |
| 3. _____ | _____ | _____ | _____ |
| 4. _____ | _____ | _____ | _____ |
| 5. _____ | _____ | _____ | _____ |

7. Is there any subgroup(s) of components of philosophical life-style, that you listed in Question #4, that has more appeal to you than the other subgroups? List the aspects of this subgroup(s) that are most appealing to you? Why are these appealing?

ID# \_\_\_\_\_

8. Are there any of the subgroups, listed in Question #4, that are less appealing to you? List the aspects of these groups that are not appealing. Why are they less appealing?

9.\* Which of the various aspects of philosophical life-style given in Question #2 do you consider closest to your own personal philosophy of life?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

10.\* Which of the various aspects of philosophical life-style given in Question #2 are not part of your personal philosophy of life?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

11.\* Summarize your own personal philosophical life-style.

ID# \_\_\_\_\_

WEEK 4  
RELIGION

This week's topic will be on religion. Please give a written response, in the space provided, to the following questions related to your ideas about religion. These items will be used as a basis for discussion in the group session later this week.

1.\* Provide a definition of what you think is religion.

2.\* List what you think are the five major religions of the world?

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

3.\* Taking all five religions into consideration, in what ways are they similar to one another? Give as many similarities as you can think of.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

ID# \_\_\_\_\_

- 4.\* Group the five religions listed in Question #2 into subgroups according to those religions most similar to one another. (There is no specified number of groups you should have.)

Group #1      Group #2      Group #3      Group #4

- 5.\* Of the subgroups you listed in Question #4, what are the similarities within each subgroup?

<u>Group #1</u>	<u>Group #2</u>	<u>Group #3</u>	<u>Group #4</u>
<u>Similarities</u>	<u>Similarities</u>	<u>Similarities</u>	<u>Similarities</u>
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____



ID# \_\_\_\_\_

- 6.\* What are the major differences between each of the subgroups you have listed in Question #4? (ie. how group #1 is different from groups 2, 3, and 4)

	<u>Group #1</u> <u>Differences</u> <u>from groups</u>	<u>Group #2</u> <u>Differences</u> <u>from groups</u>	<u>Group #3</u> <u>Differences</u> <u>from groups</u>	<u>Group #4</u> <u>Differences</u> <u>from groups</u>
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____

7. Is there any subgroup(s) of religions, listed in Question #4, that has more appeal to you than the other subgroups? What aspects of this subgroup(s) are most appealing to you? Why?
8. Are there any of the subgroups, listed in Question #4, that you definitely know that you are not interested in? What aspects of these subgroups are not appealing to you? Why?

ID# \_\_\_\_\_

9.\* Which religion(s) listed, if any, do you consider closest to your personal belief system? What aspects of that religion are congruent with your own beliefs?

10.\* In the religion(s) given in Question #9, are there any aspects of that religion that you question, or do not understand? What are these aspects?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

11.\* Summarize your own beliefs about religion.

Appendix J  
Annual Editions:  
Human Development Articles

---

*Article 1*

---

*The hormonal  
 constitution is as  
 hereditary as eye color,  
 body structure or any other  
 physical trait carried by*

---



---

*Genes:*  
 Our  
 individual  
 programing  
 system

---



---

Nature occasionally produces tragic experiments in which disease or heredity disturbs the body's hormone balance. Unfortunate as these occurrences are, they nonetheless teach scientists a great deal about how the endocrine system works in health and disease.

New knowledge about the endocrine system comes slowly and often by chance; for it is difficult and often unethical to perform genetic research on human beings. People cannot be bred like laboratory

animals. Affected individuals and their families are scattered around the world. The genetic conditions are rare. And few physicians are interested in research so that many instances simply go unrecorded.

Animal research on hormones is no substitute for human research. Animals' hormones, especially animal sex hormones and fertility cycles, are somewhat unlike those of human beings. Monkeys, it is true, most closely resemble human beings;

but research with monkeys is expensive and difficult. And monkeys are still not the same as people.

Medical investigators therefore, must simply wait for those unlikely experiments of nature and be ready to learn from them whenever and wherever they occur. Despite the many problems, this research is beginning to show the connections between genes and hormones, sex and fertility.

## Many factors influence the endocrine system

ONE FUNCTION OF GENES IS TO shuffle the biological deck repeatedly so that individuals of a species differ from each other. The genes responsible for controlling hormones are no exception to this rule. People differ as to how much of a particular hormone they produce, in the sensitivity and number of their receptors for a hormone on target tissues, and in the ability of target tissues to respond to their hormones' chemical signals.

Many genetic factors are involved in a programming system with so many variables. But the complexity of the endocrine system notwithstanding, each element must be the expression of programs written in the genes.

The genes are often overruled by forces that are not genetic. Genes simply give a program for how the body will function. Many cultural, social, environmental, nutritional and many other factors have cooperated to change the basic pattern. That women menstruate and go through menopause, for example, is determined by the genes that make a woman. Both menarche and menopause are the expression of hormones, in turn controlled by processes set up by the genes. Today 95 percent of young women in Europe and the United States have their first menstrual period (menarche) between the ages of 10 and 16.

Medical investigators must simply wait for unlikely experiments of nature in order to study genetic mistakes.

Although the genes have remained the same for the past several centuries, the average age of menarche has been coming down about three years a century for young women in industrialized countries.

Consequently, women are maturing faster than they did in the past. The average age of menarche is now stable in industrialized countries but is still coming down in the less developed countries, showing again the importance of social, environmental and nutritional factors on maturation. Menopause, in contrast, has been delayed by about three years a century and it is safe to assume that this, too, is because of environmental and nutritional factors.

Nonetheless, despite wide variations in human hormones, it is clear that genes must be at least partly responsible for the patterns of hormone actions, the types of hormones produced and the body's sensitivity to them. This is certain because:

- Certain hormonal problems run in families;
- Animals of different species have similar but not identical hormones;
- And, perhaps the most telling piece of evidence, males differ from females. The difference between males and females is genetically determined. Somewhere in the genes are the instructions that make males and females produce different hormones or the same hormones in different amounts.

## Genes determine hormones and hormones determine sex

GENES INHERITED FROM THE mother and the father establish a person's sex. By the time a human fertilized egg has divided three times, it is either male or female. Its sex is genetically determined at the moment of fertilization and the genetic pattern already makes a difference when the embryo is only eight cells large. There are no outward signs of sex yet, of course. These will not appear until the fetus has grown for another two months. But particularly from the moment of conception, the chemical potential is programmed into the embryo's cells for the person to be of one sex or the other.

Before the eight-cell stage of the embryo, the X chromosome runs the show. In the earliest cell divisions, cells of the growing embryo seem to pay no attention to whether the other chromosome is an X (that is, the embryo is female) or a Y (that is, the embryo is

male).

If the embryo is genetically male, the Y chromosome begins to dominate the scene after the eight-cell stage and eventually directs the chemical processes that stimulate the growth of testes and male germ cells. The baby is a boy.

If the embryo does not have a Y chromosome, testes do not develop, and the fetus grows ovaries. The baby is a girl.

### The genetics of sex

Every cell of a human being (except for the sperm and egg) has 23 pairs of chromosomes. Twenty-two pairs determine traits of the body. One pair determines the person's sex. Sex chromosomes, like all the other chromosomes a person has, come from the parents: one of a pair from the mother and one of a pair from the father. Sex chromosomes are either X or Y, so called because of their shape when examined under the microscope.

The first step that brings together the combination of genes for male or female determines most of the steps that follow. In the normal course of events, a female has two X chromosomes (XX) and a male has one X and one Y chromosome (XY). These combinations are dealt in the moment that a sperm (carrying either a single X or Y chromosome) fertilizes an egg (carrying one of the mother's X chromosomes). The genes carried on these chromosomes carry the family history. In the moment of fertilization, they project that history one more generation into the future.

### Sex chromosomes

		Mother's Sex Chromosomes		
		X	X	
Father's Sex Chromosomes	X	XX	XX = Female	
	Y	XY	XY = Male	

## Male Sex Hormones

THE EMBRYO'S TESTES PRODUCE male hormones, notably testosterone, and a variety of other powerful substances that may be said loosely to "defeminize" and "masculinize" the growing male fetus. This is a gross oversimplification. But animal research and some work with human beings does seem to show that if nothing changes the original pattern, you get a girl. To get a boy, the fetus needs to change some of

## 1. DEVELOPMENT DURING THE PRENATAL PERIOD

Research and work with human beings does seem to show that if nothing is done to change the original genetic pattern, you get a girl. To get a boy, the fetus needs to change.

the starting materials. And the agents of change are hormones.

French biologist Alfred Jost studied this process, mostly in rabbits, more than 30 years ago and found that the process of sexual differentiation is sequential, ordered and simple.

When Jost removed the testes from a genetically male (XY) rabbit fetus, he produced a female. She was sterile, of course, because she lacked ovaries; but she was in most other ways a female. When Jost implanted a testis in the neck of a genetically female (XX) rabbit fetus, he produced a male. He was sterile, too, because he lacked the male germ cells to produce sperm. But otherwise he was a male. Jost concluded that the difference between males and females is in the action of sex hormones in the fetus—hormones for which the genes carry the programs.

Once the genes have given their chemical instructions for the fetus to develop along the male model, the fetus takes over, helping to determine how it will look by producing more sex hormones.

In the early embryo, the developing testis secretes testosterone and a protein substance called Mullerian regression factor (MRF). MRF is responsible, in a sense, for "defeminizing" the male embryo. In the female embryo, a set of tubes called Mullerian ducts normally develops into the structures of the female reproductive system—Fallopian tubes, uterus and upper part of the vagina. In the male, almost nothing remains of the primitive Mullerian ducts because the protein messenger MRF instructs the embryo to absorb them.

A second hormone, human chorionic gonadotropin (hCG), starts the processes by which male sexual structures

develop. Produced by the placenta, hCG stimulates cells of the testis (Leydig cells) to synthesize testosterone, which gives the signal for another set of tubes called Wolffian ducts to develop in the male. Wolffian ducts eventually become seminiferous tubules and the vas deferens. Testosterone secreted by the Leydig cells also diffuses into areas of the embryo that will become the male external genitalia—penis, scrotum, prostate and urethra.

Once testosterone is produced, male development proceeds quickly because the little bit of testosterone produced stimulates the production of more. Blood vessels invade the tissues that will become the testes, the Mullerian ducts that have been characteristically female structures degenerate and male Wolffian ducts develop. All this happens within the first trimester. In contrast, ovaries do not develop until the second trimester.

This situation is not so simple, however. True, in the normal course of events, the presence of a Y chromosome in mammals is necessary to force development toward maleness. But it takes more than the presence of the Y chromosome and the enzymes it codes to make a male. There must also be a sufficient number of receptors on the appropriate tissues to receive the chemical signal from the Y chromosome. The tissue receptors must be sensitive enough to respond to the signal, and the small response of recognition on the part of the receptors must be capable of triggering a greater response by the cell.

There are cases of people with the normal XY genetic endowment who nevertheless appear female. Their Y chromosome produces the proper

Research has now found that one of the X chromosomes is actually inactivated in the female. Only one X chromosome is responsible for directing the course of female fetal development.

enzymes but their bodies lack the receptors to stimulate the growth and development of male tissues.

This is not the end of the story of X and Y. The female has two X chromosomes. For many years, research scientists wondered if both X chromosomes contributed to the development of the ovary and female characteristics.

Research has now come up with the surprising finding that one of the X chromosomes is actually inactivated in the female. Only one X chromosome is responsible for directing the course of female fetal development. Even more surprising, the X chromosome is inactivated in males, too. In fact, having an activated X chromosome in males interferes with the normal processes by which germ cells divide and mature to be sperm cells. Men with the genetic anomaly, XXY, develop testes but because they do not inactivate their X chromosome, they do not usually produce sperm. Sometime later in development, a female takes advantage of having both X chromosomes in producing eggs.

The significance of these complex patterns of turning on and off genes and their enzyme products and the secrets of the silent X chromosome remain mysteries of evolutionary history.

### The genetics of sterility

Hormones are not the entire story. In one kind of male infertility, testes are normal but they produce no sperm. The explanation is to be found in the chromosomes. Part of the Y chromosome near the center codes for enzymes that produce structures of the testis; another part of the Y chromosome, further out on one of the arms of the Y-shaped structure, codes for the messengers that produce the sperm. It is possible, therefore, to have a normal testis, producing all the right hormones, without having any sperm at all.

Gonads and the primitive cells that eventually mature to germ cells arise from two different sources in the embryo. The germ cells that will become sperm cells or eggs actually arise in the yolk sac, not strictly speaking part of the embryo itself. They then migrate to a part of the developing embryo known as the genital ridges. These migratory cells differentiate and mature to become eggs or sperms depending on which hormones act on them. The issue of the ovaries or testes, however, comes from a different part of the growing embryo. The result is that it is possible for gonads to develop normally in response to the hormones triggered by the presence of a Y chromosome and still have no sperm or eggs.

---

## Sometimes the message gets garbled

FOUR STEPS ARE REQUIRED FOR normal development of a male:

- Leydig cells must produce normal concentrations of testosterone;
- Synthesis of Mullerian regression factor (MRF) must be normal;
- Testosterone must be converted to the more biologically potent androgen, dihydrotestosterone; and
- Sex hormones must actually induce their effects within cells.

Sometimes, however, the message gets garbled. The appropriate androgens or Mullerian regression factor cannot exert their effects within the cells. If androgens are not effective, either because they are not being synthesized in high enough concentration or because something is wrong with the androgen receptors, an individual who is a genetic male—that is, whose genotype is XY—matures like a woman at puberty. The condition is known as testicular feminization.

If Mullerian regression factor (MRF) does not instruct the embryo to absorb

the Mullerian ducts, genetic males may grow to have some of the sexual structures of females. Men may look normal but may actually have incompletely developed Fallopian tubes and uterus.

---

## Do hormones shape behavior?

THE BODY PARTS THAT DISTINGUISH males from females are clearly shaped by genes and hormones. How much of human behavior—and especially behaviors directly and indirectly related to mating—is initiated and shaped by hormones? The answer is that no one knows if there is a connection between hormone levels and human behavior.

Males have more circulating testosterone than females do. Males may differ from females in activity level, preference for physical contact in sports and demonstrations of anger, assertiveness and aggressiveness. There are many problems with this research. Separating the effects of genetics from the effects of culture is almost impossible. Even if the differences in male and female behavior are real, whether the differences in behavior are related to differences in hormone

...much of human behavior—and especially behavior directly and indirectly related to mating—is initiated and shaped by hormones? The answer is that no one knows if there is a connection between hormone levels and human behavior.

levels simply cannot be determined.

For a long time it was an attractive hypothesis that men with the genetic endowment of XYY, that is, an extra Y chromosome capable of triggering the production of abnormally high levels of testosterone—might account for the abnormally high levels of violent and assaultive behavior in some men. XYY men may be impulsive, but endocrin-

---

## Hormones and Homosexuality: Is There a Connection?

Homosexuality has intrigued researchers for decades. The notion that homosexuality could be biologically determined is not new, for example. As early as 1920, Freud suggested that hormones could ultimately prove to be the key to the mystery. And recent technical advancements in measuring blood hormone levels have focused new attention on whether varying levels of hormones in males or females, even before birth, can lead to adult homosexuality.

Investigators remain divided on the issue. In one early study launched by a California endocrinologist, ketosteroids in the urine of active male homosexuals and heterosexuals were analyzed and revealed differences in the endocrines that matched the participants' sexual preferences 90 percent of the time. In 1971, the Masters and Johnson Sex Research Institute reported that young homosexual males studied had lower levels of the male hormone testosterone than participating heterosexual men. These findings have remained unsubstantiated, however. Two later studies conducted by other investigators revealed higher testosterone levels among homosex-

uals than those found in heterosexual participants, and eight other studies reported no difference in testosterone level among the male participants. The findings of studies measuring gonadotropins and other sex hormones in the blood of male subjects also varied widely.

Even less research has been devoted to the relationship between hormones and female homosexuality. In the only reported study conducted with female participants, researchers found a higher level of plasma testosterone in the homosexual women than in heterosexual females, but noted that hormone measurements for all of the participants fell within healthy ranges.

Other questions persist, say scientists. The findings of plasma tests are also weakened by the results of early attempts to "treat" homosexuals—a reflection on the long period when homosexuality was widely viewed as an "illness." Administering testosterone to male homosexuals in these treatments increased their sex drive but did not change sexual orientation.

Other scientists have speculated that pre-

natal deficiencies or excess levels of sex hormones may lead to homosexual behavior later in life. Dr. Günter Dörner, director of the Institute for Experimental Endocrinology in Germany, has launched several studies to investigate the effect of estrogen injections on the pituitary production of LH hormones in adult homo- and heterosexual men. Dörner reported that homosexual males responded to the injections with an LH increase—a reaction more typical of females than heterosexual men. From his findings, he theorized that homosexual men may have a testosterone deficiency before birth, which enables the brain to develop in a primarily female manner. All hormonal theories about sexual orientation—including identity and orientation—may be shaped by sex hormones, while in the womb.

Scientists and psychiatrists do agree that all hormonal theories about sexual orientation must be subject to more research before they can provide true insight into homo- or even heterosexuality.

CHERYL COLLINS

## 1. DEVELOPMENT DURING THE PRENATAL PERIOD

ologic studies have not shown a close relationship between the XYY genetic endowment and higher levels of testosterone in all XYY men.

Some medical and correctional authorities, for example, would like to show that the assaultive behaviors of violent criminals are due, in part, to their higher levels of testosterone or the abnormal sensitivity of tissues in their brain to circulating testosterone. If this were the case, dealing with the complex social, economic, psychological and other factors involved in criminal behavior would be reduced to the simple expedient of treating the criminal's hormone levels. But at this point, no one knows if hormones and behavior are so related.

Drugs have been used to lower the testosterone levels of violent sexual offenders in hopes of reducing their sexual urges and impulsive acts. It has turned out, however, that physicians must prescribe so much of the drug that the person's testosterone levels are reduced 50 to 70 percent below normal, not simply to normal levels. Drugs do not seem to reduce non-sexual violent behaviors; and when they do, it is more because they lower excitability in general and not because they have a specific effect.

There is no clear connection between levels of testosterone in normal men and their levels of resentment, hostility, assaultive behavior or irritability. On the other hand, there is some evidence to show that violent and assaultive prisoners have higher than normal levels of circulating testosterone, especially prisoners with long histories of violent behaviors. Separating cause from effect

The significance of these complex issues of turning on and off genes and their enzyme products and the secrets of the silent X chromosome remain a mystery of evolutionary history.

is a problem; for it is not clear whether the environmental and social conditions provoking the violence raises the testosterone levels or whether the already raised testosterone levels predisposes the person to act violently.

---

## Hormones and behavior

TESTOSTERONE HAS MANY EFFECTS on tissues of the body other than developing sexual tissues, including the brain. It would be surprising if hormones affected the brain and not behavior. The central nervous system plays such an important role in controlling mating behaviors, the selection of mates, the timing of mating, hormonal changes in pregnancy, rearing the young and so forth, it would be surprising indeed if the brain and hormones were not intimately related.

Anecdotal evidence and crude experiments have shown that this is the case. Recently, careful experiments to show precisely what parts of the brain have receptors for sex hormones have proved the case. Many male behaviors are controlled by centers in the brain prompted by androgens circulating in the blood.

As with so many of these experiments, the work has been done with animals, not people, and so it is difficult to generally apply the results to human beings. That genes affect hormones, hormones affect the brain, the brain affects behavior is a reasonable hypothesis, however. But human beings, perhaps unlike the rest of the animal kingdom, have powerful social and psychological determinants of behavior, as well as the chemical determinants. Hormones make a difference but they cannot account for the entire difference between men and women or between violent and less violent individuals.

Sex hormones do account for some of the sexual differences in nonsexual tissues. In some mammals (mice, for instance), the male kidney is larger than the female kidney because of the effects of testosterone. In many mammals, including human beings, there are sex-related differences in how the liver metabolizes steroids and drugs and in the proteins the liver secretes. Exposure to testosterone is responsible for the differences. Likewise, the red blood cell

produces hemoglobin in response to the protein erythropoietin but also in response to testosterone. But the most dramatic effect of testosterone on non-sexual tissue of the body is in the growth of muscle. Men as a group are larger and more muscular than women because of the greater concentrations of testosterone circulating in their blood streams.

Hormones make a difference but they do not account for the entire difference between men and women or between violent and less violent individuals.

Testosterone also affects the brain. In animals, such "male" behaviors as courtship, aggressiveness, defense of territory and so on, are directly related to testosterone levels in the blood. In the brain, receptors recognize the presence of testosterone and trigger the appropriate reproductive and nonreproductive behaviors. In lower animals, testosterone is related to:

- Regulation of gonadotropin and prolactin;
- Courtship and other reproductive behaviors;
- Activity levels;
- Aggressiveness;
- Play;
- Taste preferences;
- Scent marking;
- Feeding and body weight;
- Learning;
- Circadian rhythms;
- Brain function.

In human beings, the role of hormones in determining behavior is not quite so clear. There is considerable evidence, however, that hormones do play a major role in shaping behavior.

There have been studies of the relationship between hormones and rearing in the development of sexual definition and gender identity. Most information has come from studies of children born without clear biological sexual definition.

## Unclear sexual definition

### Testicular feminization and congenital adrenal hyperplasia

For a variety of reasons, the genetic definition of sexual identity may not agree with the outward signs of sexual definition. When this happens, parents raise their children as the opposite of the child's biologic definition. Biologic boys are raised as girls in a condition known as testicular feminization, for example; and biologic girls are raised as boys in the condition known as congenital adrenal hyperplasia. In the first, males are born with normal testes and produce normal testosterone but the tissues of the rest of the body lack receptors (or somehow fail to get the message) for testosterone and fail to develop in the normal male pattern. The boy takes on feminine characteristics. In the second, a biologic female has an abnormal adrenal gland that produces testosterone rather than cortisone. As a result, the girl's tissues throughout the body respond to testosterone and she develops male characteristics.

## Sexual definition and gender orientation

IF LEFT UNTREATED, TESTICULAR feminization and congenital adrenal hyperplasia create serious problems when biologic and gender identities conflict. It is an odd fact of human psychology, however, that gender identity is stronger than biologic sexual identity. Even when secondary sexual characteristics of the opposite sex begin at puberty, the child raised as a girl continues to think of herself as a girl; the child raised as a boy continues to think of himself as a boy.

When these conditions are treated early, gender identity and sexual identity are in harmony. (Hormones and sexual identity were in conflict only during the time of gestation.) The unfortunate condition nonetheless gives researchers the opportunity to study the relative contributions of hormones and rearing to sexual identity. Much research has now been devoted to the question of whether abnormally high or low androgens, progestogens or estrogens in fetal development have a continuing effect on the person's behavior. The hypothesis is that, even when the hormonal abnormalities are corrected after birth, prenatal exposure to high levels of androgens will produce "male" behavior and high levels of estrogens or low levels of androgens will


produce "female behaviors."

Researchers have studied several behaviors:

- Activity levels, outdoor play and athletic skills;
- Physical and verbal fighting;
- Play as rehearsal of the parent role;
- Preference in clothes, grooming, jewelry

The research shows that prenatal hormone levels do not affect gender identity. Even in children with abnormalities leading to opposing biologic and gender sex identities, the gender identity given by the child's rearing dominates. However, the research also shows that behaviors are determined by prenatal androgen levels.

Biologic females exposed to high levels of androgen before birth have been shown to prefer intense outdoor play, associate with boys for the most part, think of themselves and be labeled by others as tomboys. They do not play with dolls or rehearse parental roles.



The function genes is to deck repeatedly so that individuals of a species differ from each other.

They are more likely to engage in body contact sports.

Boys can also have abnormalities that expose them to excessive levels of androgens before birth. Naturally these

## The Nature vs. Nurture Debate

It is well-known that hormones play an essential role in the development of physical differences in males and females. But to what extent an individual's sexual identity is influenced by hormones versus his or her social environment has long been debated by scientists.

As in other areas of hormone research, studies are complicated by the difficulty of investigating the subtleties of physiology without harming human subjects. To understand healthy functioning, said Dr. Judith Vaitukaitis, professor of Medicine and Physiology at Boston University Medical Center, researchers often must work backward to find out what went wrong, and then infer what is "normal." In fact, it was in this way—the retrospective study of abnormalities of nature—that medical researchers recently provided insight into the "nature versus nurture" issue of gender identity.

In 1979, researchers from the Cornell University Medical College and the National University Pedro Henriquez Ureña reported in the *New England Journal of Medicine* a study of a group of boys from the Dominican Republic who were born with "female-appearing" external genitalia and who were subsequently raised as girls. The condition was caused by deficiency of an

enzyme that in normal boys activates testosterone before birth to stimulate growth of male genitalia.

The Dominican Republic boys, lacking male genitalia, were raised as girls during childhood. The onset of puberty, however, resulted in normal increases in testosterone, which, in turn, stimulated the long-delayed development of a penis and scrotum. The boys consequently underwent an identity transition over the course of several years, passing through stages of "no longer feeling like girls, to feeling like men, to the conscious awareness that they were indeed men."

The researchers wrote that of 18 subjects "unambiguously" raised as girls, 16 changed to a "male-gender role," despite social pressure that included parental amazement and confusion. Because the boys made the transition with relatively little difficulty—in spite of a cultural environment that emphasizes a "definite socialization of children according to sex"—the researchers concluded that "environmental or sociocultural factors are not solely responsible for the formation of a male-gender identity. Androgens make a strong and definite contribution."

JON QUELDO



## 1. DEVELOPMENT DURING THE PRENATAL PERIOD

**B** Biologic females exposed to high levels of androgen before birth have been shown to prefer intense outdoor play, associate with boys for the most part, think of themselves and be labeled by others as tomboys.

boys are physically and genetically male; there is no ambiguity as in the case of females exposed to androgens. But these boys differ from normally developing boys in being more active, more interested in physical contact sports and perhaps have higher levels of aggressiveness.

In contrast, boys with testicular feminization, whose androgen levels during prenatal development are normal but incapable of stimulating male development in tissues of the body, are stereotypically feminine. The problem with such research, however, is that these

biologic males are reared as females because they lack characteristic male appearance. There is no way to separate the effects of rearing from those of hormones.

Most researchers are quick to point out that sexual orientation is the result of complex and little understood psychological, social, environmental factors, as well as genetic and hormonal ones. Few people would argue that hormones alone strictly define sexual orientation. That they play a role, however, is clear.

### *Can you recognize the problem?*

A woman and her husband have been trying to conceive a child for almost two years. She has had her period regularly every 28 to 32 days and is apparently in good health.

Her gynecologist tested her to be certain that she had no infection and that her tubes were not blocked. Her husband was also examined and the tests showed that his sperm was entirely normal. At this point, she is told by her

physician that there is nothing wrong with her, she should just relax, and nature will take its course. Is the physician right?

- A. Yes
- B. No
- C. Can't be certain

**ANSWER:** The answer is C. The physician cannot be certain, and the wife should be tested further if she and her husband want to have children. Approximately 15 to 20 percent of couples trying to conceive cannot although there is no immediately obvious reason for the difficulty. Nevertheless, in such cases a woman may be abnormal endocrinologically. She may have regular menstrual bleeding and appear normal but still have anovulatory cycles in which no mature egg is produced. More sophisticated testing is required before both husband and wife can be given a clean bill of health. Ironically, it is just these apparently normal cases that are the most difficult to diagnose and treat. The more marked the menstrual disturbance, the easier it is to correct, provided there are potentially fertilizable eggs in the follicles within her ovary.

# LIFE Before Birth

Geraldine Youcha

According to the traditional view, life before birth is the ultimate idyll. Clean, serene, protected from noxious substances by the complex filtering system of the placenta, shielded from the jolts, noise and stress of the world a few inches away, the fetus sleeps. Cradled in warm fluid, blissfully insensate, it floats cozily until it is thrust into the atmosphere and its brain, eyes and ears switch on for the first time. A pretty picture—but an inaccurate one. Scientists now know what the mother hears, feels and swallows can affect her baby. The placenta, that intricate web of blood vessels and membranes, is not a barrier but more like a sieve that lets many viruses, drugs and bacteria slip through and do their damage. One study investigated boys and girls who had been exposed to synthetic male sex hormones as fetuses when the drugs were given to their mothers to prevent miscarriage. Presented with hypothetical conflict situations, they reacted more aggressively than children who had not been exposed. The fetus spends some of its time sleeping and some of its time awake, and the mother's coughing, vomiting, twisting or turning can interrupt the serenity of the fetus's sleep.

Moreover, the noises it hears when awake are likely to be the rumblings of its mother's swallowing and digestion rather than the rhythmic pulsing of her heart. The fetus, it has recently become clear, also experiences muffled hints of the sounds that await it on the outside. As a matter of fact, researchers studying fetal hearing recently concluded that "the auditory experience of the fetal mammal

may be considerably more extensive and... possibly of greater postnatal significance than has been believed."

## REHEARSAL FOR LIFE

The fetus also sees the watery light that penetrates the thinned abdominal wall in late pregnancy and, in a rehearsal for later life, "breathes," sucks, grabs and sleeps. When it is born it is already like no other human being, having lived through unique experiences that its developing brain has recorded, reacted to—and perhaps even remembered.

What is life in this aquatic world really like? The fetus develops symmetrically, without flat areas from resting on one spot or another, because it is suspended in a fluid bath that exerts its pressure equally. In its sealed pool, the unborn baby swims and floats effortlessly, and after it emerges it can swim long before it can walk. In France and in Russia, in fact, there are unorthodox hospitals in which babies are delivered underwater as the mother relaxes in a pool. Still attached to the umbilical cord, the baby is able to stay afloat. Perhaps this should not surprise us. According to evolution theory, our ancestors crawled out of the primordial sea onto dry land, and we may still carry vestiges of our aquatic beginnings.

Another holdover from the prehistoric sea-to-land progression may be the newly discovered ability of the fetus to respond to sounds at frequencies its parents cannot hear. Adults usually detect sounds between 30 and 18,000 hertz. Does the fetus's sensitivity indicate a kinship with other water-borne mammals such as dolphins and whales, which can hear sounds at frequencies ranging from 16 to 180,000

hertz? What happens to this capacity? And is it located in the ears or somewhere else? The mystery is still to be investigated. One theory suggests that it is the skin, the oldest and largest of our sense organs, that responds to the vibrations.

Normal hearing, too, develops early. Midway in pregnancy a fetus will jump in a startle reaction at a loud noise such as a slamming door. At six months, the fetus can be tested accurately for deafness by experiencing a tone-producing vibrator to the mother's abdomen and recording sudden changes in the baby's heartbeat as the tone goes on and off. As the time to be born approaches, the fetus can even distinguish different tones and rhythms.

When three researchers at the Institute of Animal Physiology in Cambridge, England, implanted hydrophones inside the amniotic sacs of pregnant ewes, they found to their amazement that even the sounds of ordinary conversation penetrated the uterus. One thing they were not able to hear was the sound they had expected—the maternal heartbeat. Perhaps, they speculate, other studies found this the dominant sound because they monitored noise with a microphone that was outside the amniotic fluid. Although they caution that what applies to sheep may not apply to human beings, they are convinced that a fetus hears more than has been assumed and that the influence thereof is only dimly understood.

In studies done after spontaneous abortions or abortions performed for medical reasons, scientists have found that very early in its development—when the embryo is only four inches long—stroking the skin in the area where the mouth will eventually develop makes the tiny crea-

## 1. DEVELOPMENT DURING THE PRENATAL PERIOD

*These unique shots of the live human organism differ from classic photographs, which depict aborted fetuses at a later stage in development. These were taken through the window in the amniotic sac, a point at which a thinner wall allows a view inside. The means of approach? An endoscope that contains a series of lenses and a fiber-optic light source, inserted through the cervix.*



**[Above] A human foot, nine weeks. [Above right] The sex organ at nine weeks. Sexual differentiation is not apparent until the 18th or 19th week; the organ above could still form either penis or clitoris.**

ture pull away, indicating the existence of a rudimentary nervous system.

In a University of North Carolina study, newborn infants less than three days old learned to suck on a nonnutritive nipple in such a way as to elicit their mother's voice in preference to that of another female. In this ingenious experiment the mothers recorded part of a Dr. Seuss children's story shortly after delivery. Babies got their own mother's recording by sucking in one way and another voice if they sucked differently.

Though they were all in traditional nurseries with many female caretakers and were with their mothers only briefly for daytime feedings, they consistently chose their own mothers' voices. Perhaps, the researchers speculate, the babies

learned to recognize their mothers' voices very quickly, or—and the possibility is astonishing in its implications—they became familiar with her voice while still in the womb, even though the sound was filtered through flesh and fluid.

Now that we know sounds penetrate the uterus and that the fetus is a discriminating listener, shouldn't we ask what effect violent TV programs might have on it? How about loud arguments between husband and wife?

The notion that the mother's emotions affect the fetus is just beginning to gain



reluctant scientific respectability. For years, the idea of prenatal "impressions" was laughed at as fanciful folklore. But tests now show that the mother's anxiety increases the baby's heart rate because maternal anxiety causes an increased flow of hormones such as epinephrine, which constricts blood vessels and so interferes with uterine blood supply.

There are even hints that stress could predispose women to premature births or affect the rate of growth of the fetus, perhaps by causing muscle tension and changes in hormone levels. This sensitivity to its mother's feelings is evidently exquisitely tuned. In one experiment, pregnant women who smoked were deprived of cigarettes for 24 hours. The next day they were offered cigarettes again, and fetal hearts started beating faster even before their mothers could light up. Thus, although the fetus floats alone in its amniotic sac, it is intimately connected to another human being whose emotions and actions have profound effects.

Prenatal life as a glimpse of the future is evident in the development of the brain, and a hint of what the brain may be capable of comes earlier than had been thought. "Brain life," according to Dr. Dominick Purpura, dean of the Stanford

University School of Medicine, begins as early as the seventh month of gestation. And electroencephalograms of the fetus shortly before delivery show brain waves strikingly similar to those of an infant who has already been born, shaking the old assumption that entry into the world is necessary to turn on the brain.

All the phases of sleep, including Rapid Eye Movement, or REM, have been recorded in an unborn baby. In adults and children, REM often indicates dreaming. Does the fetus dream? Of what? If dreams are based on experience, does the fetus dream of a mother's indigestion or of the sensation of somersaulting in a warm, supportive solution?

The fetus may also "breathe" while floating in its watery first home. The regular rising and falling of the fetus's chest has been recorded by plotting the echoes of low-frequency sound waves bouncing off the fetus. Changes in these movements may be a better indicator of trouble than monitoring the fetal heartbeat.

Ultrasound pictures also show the fetus sucking its thumb, grabbing at the umbilical cord, hiccupping and smiling. It also kicks, rolls and stretches. All these movements are rehearsals for important later activities, and we know now that the fetus's day-to-day activity level in the womb is a good predictor of its activity level as late as the toddler age. The Chinese, who say that at birth a child is already one year old, could be closer to the truth than Westerners who think life begins at birth. The development of the brain, nervous system and endocrine system that began in the womb continues for many months after delivery. As the noted embryologist Keith L. Moore, of the University of Toronto, puts it, "Although it is customary to divide development into prenatal and postnatal periods, it is important to realize that birth is merely a dramatic . . . change in environment."

One of the most remarkable new discoveries of intrauterine research is that the placenta contains beta-endorphins, natural morphine-like substances produced by the brain. The mother's bloodstream, too, contains these natural painkillers, and their levels go up as delivery approaches. If the psychoanalysis are right and we all long to return to the snug safety of the womb, perhaps it is really because that was the time when we were blissfully high on a substance three times as powerful as morphine.

# Aging

## What Happens to the Body as We Grow Older?

Given our medical ignorance and the fact that the body does not age all at once—we can have a young kidney and an old heart—the whole concept of aging needs careful re-examination.

**I**s it possible to describe "typical" aging? Not really. We talk about someone who has begun to be forgetful, whose skin shows signs of losing elasticity, whose lung capacity is diminished because of emphysema, whose cardiac reserve is diminished because of atrophy of the heart muscle, whose organ functions (for instance, kidney or liver functions) are at a fraction of what they once were, whose skeletal structure is softened, whose hair is grey, whose eyes are clouded by cataracts and whose hearing is diminished—that is a caricature of a typical old person.

This stereotypical image of aging, however, does not hold true among all individuals. The debate continues over how much of elderly appearance is the result of natural aging and how much is the result of abuse of the body. According to William Kannel, one of the principal investigators of the Framingham Heart Study, "The issue of what constitutes aging and normal aging is an enigma that has never been satisfactorily solved." In epidemiology, there are several approaches that try to answer the question.

One approach is employed by the Veterans Administration Normative Aging Study, which seeks to find people who might eventually develop certain diseases but, at the beginning of the study are free of any ailment. By studying what happens to people over time, project director Pantel Vokonas and co-workers are trying to identify the effects of age. The researchers are looking at the signs of growing older that can be attributed to age rather than illness or disease.

The normative aging approach is, in a sense, a quest for immortality. The assumption is that if we could remove all these diseases, people would live, if not forever, at least for much longer than they now do. Unfortunately, it is virtually impossible to find people totally free of the disabilities sooner or later associated with old age. Even if a person seems to be free of heart or kidney damage, for example, there is no way of being sure that these organs are still in their pristine state.

Another approach to aging is that taken by the Framingham Heart Disease Epidemiology Study, underway since 1949, in which a whole population is followed as they age to see what problems they encounter. "Ours is a more pragmatic approach," said Kannel. "We are interested in seeing what kinds of things cause people who reach advanced age to no longer have much joy in living. We don't care whether it is cardiovascular disease, opaqueness of the lens, poor hearing, soft bones, arthritis, strokes, mental deterioration or normal aging. We're studying the ailments that afflict an age population and take the joy out of reaching a venerable stage in life."

According to Kannel, "The reward for reaching a venerable stage of life is too often a cardiovascular catastrophe." Cardiac function, muscle, skeleton and so on all decline with time, although recent evidence suggests that cardiac function in a non-diseased heart remains amazingly stable well into old age. Some of this decline must be due to wear and tear, but according to Kannel, "it is just too difficult to dissociate from the long-term effects of noxious influences."

## 6. DEVELOPMENT DURING ADULTHOOD AND AGING

With respect to cardiac function, for example, decline is not necessarily unpreventable. It has been shown that 65-year-olds can be trained to improve their levels of performance. It is easy, for example to train somebody to resist his or her exercise capacity and measure cardiac function and oxygen utilization. We have the technology to measure these things. But how do you train a kidney? Moreover, it is still not clear what noxious influences cause the decline in function in most of the organ systems. If we did know, we would be able to remove the noxious influences and watch the recovery. "For many of the organ declines, we really have poor information," said Kannel. "It just so happens that for cardiovascular disease, we have a good body of data on what risk factors there are. And it turns out that many of these are modifiable."

Given our medical ignorance and the fact that the body does not age all at once—we can have a young kidney and an old heart—the whole concept of aging needs careful re-examination. The assumption that all the organs fail in concert is not borne out by experience. There are many people who are alert and showing few signs of diminished intellectual capacity, but have a failing heart or damaged liver. People have different rates of organ decline.

The Framingham Heart Study, however, is showing that many of the risk factors for the young are still operative in the elderly. Even though it may take decades for the disastrous effects of a habit like smoking to show up, there is still good reason to quit. One might think that once a lifetime of smoking has put someone on the track for cancer, eliminating smoking in advanced years will not remove that risk of cancer. The risk does remain, but there is no good reason to multiply the risk by continuing to smoke.

But beyond that, there are other good reasons for elderly people to give up smoking. Smoking contributes to chronic bronchitis, emphysema and may precipitate coronary attacks, peripheral vascular disease and perhaps even stroke. Quitting smoking will not bring the person back to total normal function; but it helps slow deterioration. With coronary disease, in particular, the advantage seems to occur regardless of how long one has smoked. According to Kannel, the data show an immediate 50 percent reduction in the risk of coronary disease whether

"The issue of what constitutes aging and normal aging is an enigma that has never been satisfactorily solved."

WILLIAM KANNEL

the person has smoked 10 years, 20 years, 30 or 40 years. In terms of coronary attacks, there is trouble showing the benefit of quitting. But for coronary deaths and peripheral vascular disease, there is no difficulty at all showing that quitting helps.

"I think that the elderly are becoming increasingly health conscious," said Kannel. "It's curious: One would think that young people, who have so much life ahead of them, would take things more seriously. But the elderly, they are the ones who are driving more carefully, avoiding doing stupid and reckless things because they more acutely feel the approach of the grim reaper."

Some of the other effects commonly attributed to aging may well be preventable. Data from the Framingham studies show that a great deal of the high-frequency hearing loss in the elderly male can be laid at the door of noisy industries. We can predict, from the popularity of loud music among the young today, a generation of deaf elderly in 50 or 60 years. Osteoporosis, too, could be reduced if people were kept more active and ate more calcium-rich foods. In other words, the conclusions drawn from the Framingham Heart Study are that prevention is possible, that it must be started early and that it takes sustained effort. The burden of these common and disabling conditions, whether or not we term them aging phenomena, are the sources of a great deal of discontent in the elderly.

There is also a strong genetic component in the process of aging. "People with superb genes are able to withstand a lifetime of abuse because they may be better able to cope with an overload of fat in the diet, too many calories, too much salt, too much trauma, too little exercise, smoking. If they have been blessed with superb metabolic machinery, they somehow survive. Other people, with inferior metabolic machinery, may avoid all these risks and live longer than the great risk taker. There is a lot to be said for genetics."

"Even with bad genes, one can do something effective to reduce the liability," stated Kannel.

There is also a mistaken notion, he continued, that following a healthy lifestyle entails considerable sacrifice. "Diet, exercise and the like need not be so austere that they are painful. We are only recommending a Mediterranean or Asian diet. If you follow the specifics of this, you get the fat content, lower cholesterol, lower calories that you need. That is hardly a gastronomic nightmare. These are good foods. Ham and eggs need not be the epitome of gastronomic experience. One can eat very well following a prudent diet, as recommended by the American Heart Association."

"Exercise is something we need to build back into daily living," added Kannel. "We have taken it out by all the modern conveniences. A better way of living is to exercise naturally without the contriving. If you can walk to work instead of driving and parking right next to the door, you are better off. Try not to use escalators in two-story buildings. We have engineered exercise out of our lives: the time has come to engineer it back."

## The Effects of Aging

It is difficult to measure the rate of aging. One study (Hodgson and Buskirk) has shown that the maximal oxygen intake declined after age 25 at the rate of 0.40 to 0.45 ml of oxygen taken in per minute per kilogram of body weight each year. Grip strength went down about 0.20 kg per year. The investigators also found, however, that training at age 60 could improve the maximal oxygen intake by about 12 percent.

### Average decline in human male, from age 30 to age 75

Factor	% Decline
Brain weight	47
Number of axons in spinal nerve	34
Velocity of nerve impulse	10
Number of taste buds	64
Blood supply to brain	20
Output of heart at rest	30
Number of glomeruli in kidney	44
Vital capacity of lungs	44
Maximum oxygen uptake	60

"There is controversy about how much of the decline reported is a result of aging as opposed to disease."

## 44. Aging

Of all the biological changes associated with growing old, young people are probably most acutely aware of the cosmetic changes. Hair greys, wrinkles become pronounced and shoulders tend to narrow with advancing age.

In American society, these changes are greeted with less than enthusiasm because, in a society that seems to cherish youth, these changes make one look old.

Cosmetic changes affect the sexes differently. Women may be outraged or humiliated by physical changes that lead to what Susan Sontag has called the process of "sexual disqualification." Women may be forced into roles of helplessness, passivity, compliance and non-competitiveness. Men, on the other hand, may

enjoy the assertiveness, competency, self-control, independence and power—all signs of "masculinity"—that come with age.

What creates the common cosmetic changes in aging? Wrinkles begin below the skin's outer layer (epidermis) when the dermis, a layer of tissue filled with glands, nerve endings and blood vessels, begins to shrink. At the same time, the dermis begins to atrophy, changes in the fat, muscle and bone create the deep wrinkles. Other factors—exposure to the sun, environmental toxins, heredity and disease—also affect the wrinkling of the skin.

Greying of the hair is the result of progressive loss of pigment in the cells that

give hair its color. Age spots are caused by the accumulation of pigment in the skin. But the shortened stature and flabby muscles are the result of lack of exercise and other behavioral factors. These, and many other so-called effects of aging, may be reversed.

After a while, time does take its toll. Between the ages of 35 and 80, the maximum work a person can do goes down by 60 percent. The strength of the grasp by the dominant hand (right in right-handers) goes down 50 percent and the endurance to maintain the strongest grasp goes down 30 percent. For some reason, not understood, the other (subordinate) hand, which was weaker to begin with, does not lose as much strength and

### Alzheimer's Disease: The Search for a Cure Continues

It is difficult to paint anything but a bleak picture of Alzheimer's disease.

Named after the German neurologist Alois Alzheimer (1864-1915), it is a relentless and irreversible form of dementia that has been known to strike adults as young as 25, but most often appears in people over 70. For the estimated one to three million afflicted Americans, the early symptoms often involve memory loss, apathy and difficulties with spatial orientation and judgment. As these problems worsen, victims become increasingly depressed, confused, restless and unable to care for themselves.

In the final stages, Alzheimer patients may become so helpless that they are bedridden until they die from secondary problems such as pneumonia caused by accidentally inhaling food. Unfortunately, the victims of Alzheimer's often include the patient's stressed family and caregivers who, despite their devoted efforts, must watch loved ones turn into unmanageable strangers.

At this juncture, the exact cause, diagnosis and treatment of Alzheimer's continues to elude medical researchers. An abundance of new clues and insights into this mysterious disease is being uncovered, however. In addition, growing public awareness has led to the development of support groups and experi-

mental programs to help families and caregivers cope with caring for Alzheimer patients. "I'm amazed that researchers have progressed so far in such a short time," noted Professor Marot Sinex, from the School of Medicine's Department of Biochemistry, who has been researching the disease for the past 12 years.

Sinex pointed to many advances in the past decade, including improvements in drug therapy that ease symptoms. There is an increased understanding of possible genetic causes, of the subtle differences in neurotransmitters in the brains of victims and how they change over time and of anatomical changes in the brain that relate to memory loss and other cognitive problems. In addition, improved medical technology—such as the PET scan, which allows scientists to visualize the living brain—is adding new insights. "We now have a dynamic anatomy of the disease," said Sinex. "We can visualize its progression, which we couldn't do before. In other words we're dealing with a real, three-dimensional problem now, whereas before we only had two-dimensional understanding."

Although the exact cause of Alzheimer's is not known, Sinex noted that researchers now know it is associated with an excess of genetic material on a particular chromosome—an abnor-

malty that, interestingly, has already been linked to Down's syndrome. (Several Boston University researchers are independently investigating biochemical, genetic and physical similarities seen in Down's syndrome—a congenital disease whose victims are born moderately to severely retarded with distinctive physical traits—and Alzheimer's disease.) Scientists also know the disease can be inheritable and that—despite the fact that it can strike relatively young adults—it is "strongly age-dependent," with most cases not appearing until people are in their 70s. In addition to these factors, researchers are looking at other possible causes; for example, Sinex is investigating the possibility that a virus may be involved.

As for diagnosis, the best physical evidence researchers have is the "plaques and tangles"—filamentous material whose nature and origin scientists are not exactly sure of—found in the brains of autopsied victims. (Although similar plaques and tangles are found in the brains of normally aging people, in Alzheimer victims the structures appear more frequently and in specific areas.) Sinex pointed out, however, that today "a really good clinic" can accurately diagnose the disease about 85 percent of the time by eliminating other problems such as stroke, a tumor,

drug poisoning or unrelated depression. Fortunately, research is advancing in this area as well. For example, Mark Moss, an assistant research professor in the School of Medicine's Department of Anatomy, recently developed a "gamelike" diagnostic test that the National Institute on Aging has recommended for clinical use and that "will help us understand the brain structures responsible for memory impairment."

The best method of treating Alzheimer victims today, explained Sinex, involves prescribing medications that "fall in the general category of antidepressants." Apart from drug therapy, Sinex pointed out that organizations such as the Eastern Massachusetts Chapter of the Alzheimer's Disease and Related Disorders Association, of which he is president, can be helpful to both victims and their caregivers by providing information on connecting people with support groups.

Given this variety of recent advances, Sinex concluded optimistically, "It's simply a lot less traumatic to have Alzheimer's now than it was 10 or 15 years ago."

**Editor's Note:** Researchers in Boston University's Medical Center—including the School of Medicine and several affiliated hospitals—comprise one of the largest Alzheimer's disease research efforts in the country. *Bostonia* will take a closer look at these projects in an upcoming Insights issue.

JON QUELLO

## 6. DEVELOPMENT DURING ADULTHOOD AND AGING

endurance. The speed of nerve conduction is slower. The volume of blood pumped throughout the body goes down 50 percent. The maximum volume of air a person can inhale goes down 50 percent and oxygen diffuses from the lungs to the red cells of the blood 30 percent more slowly. Blood flow to the kidneys at age 80 is considerably less than that of age 20 in many, but not all. And, by age 70, the bones of the coccyx (the "tail bone" at the base of the spine) fuse. In short, our bodies slow down and stiffen as we age. This is natural and occurs even in the absence of disease.

Vision, hearing, taste, smell and touch have all been reported to change with age. New research suggests, however, that the effects of aging per se may not be as major a factor as originally believed on declining senses.

Probably the most familiar changes are those in seeing. Presbyopia (presby = old + opia = vision) is a sign of the gradual inability of the lens of the eye to focus on near objects—hence, the growing need for "reading glasses" or bifocals as people age. There are other relatively harmless changes, as well. Almost from birth, the lens of the eye begins to get more rigid. By around age 45, printed pages must be held at arm's length or farther to get them into focus. But, of course, at that distance, the letters are usually too small to read. As people age, their eyes may become more sensitive to glare and bright lights. They

Smoking  
contributes to  
emphysema and may  
precipitate coronary  
attacks. Quitting  
smoking will not bring  
the person back to  
absolutely normal  
function; but it  
helps slow the  
process down.

may also be less able to discriminate between gradations of color.

More serious eye conditions increase with age as well. Approximately seven percent of all people between the ages of 65 and 74 have serious visual deficits. After age 75, the proportion more than doubles to 16 percent. Approximately two-thirds of all severe visual impairments occur in people 65 or older.

Macular degeneration is the most serious cause of low vision in the elderly in the United States. The macula is a spot on the retina of the eye needed for very fine focusing. With age, this region can degenerate and become obstructed with fine blood vessels.

Other visual impairments include: glaucoma, which is a dangerous and

painful increase of pressure within the eye; diabetic retinopathy, which is a destruction of the fine blood vessels in the eye, destroying parts of the retina, associated with uncontrolled diabetes; and cataracts, which are cloudy eye lenses.

Just as presbyopia is a vision deficit associated with advancing age, so presbycusis (presby = old + acusis = sound) is a progressive hearing loss associated with aging. This is especially true for the higher frequencies. Of the estimated 14.2 million Americans with measurable hearing loss, about 60 percent of those with the most severe hearing problems are older than 65.

Hearing loss associated with aging may be of several causes. Genetic factors, infection and a lifetime of noise certainly contribute. Poor personal hygiene, build-up of ear wax, may also reduce hearing. Certain medications (for example, drugs of the streptomycin group) can injure the hair cells in the ear and interfere with both hearing and the sense of balance.

While these physical and sensory changes occur in all people as they age, keep in mind that the degree to which they affect individuals varies greatly. The key is how we take care of ourselves. The pleas from the medical profession to cut down smoking, drinking and to exercise are grounded in heavy evidence. Keeping yourself active and healthy throughout your life can result in an old age that is productive and rewarding.

### Osteoporosis The Stooping Disease

An estimated five million people in the United States are afflicted with osteoporosis—a disease marked by loss of bone mass that weakens the skeleton and may result in spontaneous fractures. Although everyone loses bone mass as they age, this process is accelerated in women. In the first 10 years after menopause, women lose bone at twice the rate men do.

Healthy bone is constantly changing. In childhood and adolescence, bones form at a faster rate than they are reabsorbed. In healthy adults, up until age 40, peak bone mass is maintained through a balance between the processes of bone formation and loss. Peak bone mass, which usu-

ally occurs around age 30, is influenced by hormones, calcium intake, level of physical activity and the stress of weight bearing. Heredity also plays a role. From about age 40, bone absorption is more rapid than bone formation.

There is no way to diagnose the early stages of osteoporosis. The bone loss that characterizes the disease does not show up on x-rays until a substantial portion of the bone is already lost. At its later stages, however, osteoporosis produces extreme visible changes: loss of height, rounding of the upper back ("dowager's hump"), forward thrust of the head, protruding abdomen and expansion of the chest. These symptoms are all due to

the collapsed vertebrae weakened by osteoporosis.

What causes osteoporosis is not yet understood. Because post-menopausal women are at elevated risk, some investigators have suggested that it involves estrogen deficiency and should be treated with hormones. This cannot be the case, however, because not all post-menopausal women develop osteoporosis.

At highest risk are white women with a family history of osteoporosis, of northern European descent, with small bone frames and of normal or less than average weight. Certain dietary and behavioral factors can increase the risk: drinking more than four to six cups of coffee a day, smoking, heavy use of alcohol and lack of calcium in the diet all increase the risk. On the other hand, physical exercise

decreases the risk.

University Hospital is currently planning to open a clinic at the end of February to treat osteoporosis victims. The clinic will be multidisciplinary involving orthopedic surgery, endocrinology, nutrition and internal medicine. All patients referred to the clinic will be prescreened by a special x-ray test which will determine bone mineral content. A specialized blood work-up will be done to rule out metabolic causes for metabolic bone disease and other appropriate studies as indicated by each case. Also a program of functional bracing will be started. Questions concerning the clinic should be directed to the Department of Orthopedic Surgery, University Hospital, (617) 638-8905.

---

 Article 6
 

---

*The newborn's brain: registering every flash of color, caress, scent, and other stimuli vital to the*

# MAKING OF A MIND

KATHLEEN McAULIFFE

"Give me a child for the first six years of life and he'll be a servant of God till his last breath."

—Jesuit maxim

A servant of God or an agent of the devil, a law-abiding citizen or a juvenile delinquent. What the Jesuits knew, scientists are now rapidly confirming—that the mind of the child, in the very first years, even months, of life, is the crucible in which many of his deepest values are formed. It is then that much of what he may become—his talents, his interests, his abilities—are developed and directed. The experiences of his infancy and childhood will profoundly shape everything from his visual acuity to his comprehension of language and social behavior.

What underlies the child's receptivity to new information? And why do adults seem to lose this capacity as they gain more knowledge of the world around them? Why is it that the more we know, the less we can know?

Like a Zen koan, this paradox has led scientists down many paths of discovery. Some researchers are studying development processes in infants and children; others search the convoluted passages of the cortex for clues to how memory records learning experiences. Still others are studying the degree to which learning is hard-wired—soldered along strict pathways in the brains of animals and humans.

Another phenomenon recently discovered: Long after patterns of personality have solidified, adults may tap fresh learning centers in the brain, new nerve connections that allow intellectual growth far after fourscore years.

Although much research remains to be

done, two decades of investigation have yielded some dramatic—and in some instances unexpected—insights into the developing brain.

An infant's brain is not just a miniature replica of an adult's brain. Spanish neuroscientist José Delgado goes so far as to call the newborn "mindless." Although all the nerve cells a human may have are present at birth, the cerebral cortex, the gray matter that is the seat of higher intellect, barely functions. Surprisingly, the lower brain stem, the section that we have in common with reptiles and other primitive animals, dictates most of the newborn's actions.

This changes drastically in the days, weeks, and months after birth, when the cerebral cortex literally blossoms. During this burst of growth, individual brain cells send out shoots in all directions to produce a jumble of interconnecting nerve fibers. By the time a child is one year old, his brain is 50 percent of its adult weight; by the time he's six, it's 90 percent of its adult weight. And by puberty, when growth trails off, the brain will have quadrupled in size to the average adult weight of about three pounds.

How trillions of nerve cells manage to organize themselves into something as complex as the human brain remains a mystery. But this much is certain: As this integration and development proceeds, experiences can alter the brain's connections in a lasting, even irreversible way.

To demonstrate this, Colin Blakemore, professor of physiology at Oxford University, raised kittens in an environment that had no horizontal lines. Subsequently, they were able to "see" only vertical lines. Yet Blakemore had tested their vision just before the experiment began and found that the kittens had an equal number of cells that responded to each type of line.

Why had the cats become blind to horizontal lines? By the end of the experiment, Blakemore discovered that many more cells in the animals' brains responded to vertical lines than horizontal lines.

As the human brain develops, similar neurological processes probably occur. For example, during a test in which city-dwelling Euro-Canadians were exposed to sets of all types of lines, they had the most difficulty seeing oblique lines. By comparison, the Cree Indians, from the east coast of James Bay, Quebec, perceived all orientations of lines equally well. The researchers Robert Annis and Barne Frost, of Queens University, in Kingston, Ontario, attributed this difference in visual acuity to the subjects' environments. The Euro-Canadians grow up in a world dominated by vertical and horizontal lines, whereas the Indians, who live in teepees in coniferous forests, are constantly exposed to surroundings with many different types of angles.

The sounds—as well as the sights—that an infant is exposed to can also influence his future abilities. The phonemes *ra* and *lah*, for instance, are absent from the Japanese language, and as might be expected, adults from that culture confuse English words containing *r* and *l*. Hence the offering of steamed "rice" in sushi bars. Tests reveal that Japanese adults are quite literally deaf to these sounds.

Infants, on the other hand, seem to readily distinguish between speech sounds. To test sensitivity to phonemes, researchers measure changes in the infants' heartbeats as different speech sounds are presented. If an infant grows familiar with one sound and then encounters a new sound, his heart rate increases. Although the evidence is still incomplete, tests of babies from linguistic backgrounds as varied as Guatemala's



Spanish culture. Kenya's Kikuyu-speaking area, and the United States all point to the same conclusion: Infants can clearly perceive phonemes present in any language.

The discovery that babies can make linguistic distinctions that adults cannot caused researchers to wonder at what age we lose this natural facility for language. To find out, Janet Werker, of Dalhousie University, in Nova Scotia, and Richard Tees, of Canada's University of British Columbia, began examining the language capabilities of English-speaking adolescents. Werker and Tees tested the subjects to see whether they could discriminate between two phonemes peculiar to the Hindi language.

"We anticipated that linguistic sensitivity declines at puberty, as psychologists have commonly assumed," Werker explains.

The results were surprising. Young adolescents could not make the distinction, nor could eight-year-olds, four-year-olds, or two-year-olds. Finally, Werker and Tees decided to test infants. They discovered that the ability to perceive foreign phonemes declines sharply by one year of age. All the six-month-olds from English-speaking backgrounds could distinguish between the Hindi phonemes. Werker says that by ten to twelve months of age, the babies were unable to make this distinction.

The cutoff point, according to Werker, falls between eight and twelve months of age. If not exposed to Hindi by then people require a lot of learning to catch up. Werker found that English-speaking adults studying Hindi for the first time needed up to five years of training to learn the same phoneme distinctions any six-month-old baby can make. With further testing, Werker succeeded in tracking down one of the learning impairments that thwarted her older subjects. Although there is an audible difference, the adult mind cannot retain it long enough to remember it.

"The auditory capabilities are there," Werker says. "It's the language-processing capabilities that have changed."

Even a brief introduction to language during the sensitive period can permanently alter our perception of speech. Werker and Tees tested English-speaking adults who could not speak or understand a word of Hindi, although they had been exposed to the language for the first year or two of life. They found that these adults had a major advantage in learning Hindi, compared with English-speaking adults who lacked such early exposure.

Werker and Tees's studies show that there is an advantage in learning language within the first year of life. But when it comes to learning a second tongue another study has revealed some startling findings: Adults actually master a second language more easily than school-age children do.

For four years Catherine Snow, of the Harvard Graduate School of Education, studied Americans who were learning Dutch for the

first time while living in Holland. "When you control for such factors as access to native speakers and the daily exposure level to the language," Snow says, "adults acquire a large vocabulary and rules of grammar more quickly than children do. In my study, adults were found to be as good as children even in pronunciation, although many researchers contend that children have an advantage in speaking like natives."

Obviously not all learning stops when the sensitive period comes to a close. This observation has led some researchers to question the importance of early experience. What would happen, for example, if a child did not hear a single word of any language until after one year of age? Would the propensity to speak be forfeited forever? Or could later exposure to language make up the deficit?

Because of the unethical nature of per-

---

☛ It's probably  
fair to say that if you want  
bright kids,  
you should cuddle them a lot  
when they're  
babies because that increases  
the number  
of neural connections. ☛

---

forming such an experiment on a child, we may never know the answer to that question. But some indications can be gleaned from animal studies of how early deprivation affects the development of social behavior.

In *An Outline of Psychoanalysis*, Sigmund Freud refers to "the common assertion that the child is psychologically the father of the man and that the events of his first years are of paramount importance for his whole subsequent development." At the University of Wisconsin Primate Laboratory, the pioneering studies of Harry and Margaret Harlow put this belief to the test on our closest living relative—the rhesus monkey.

"Our experiments indicate that there is a critical period somewhere between the third and sixth month of life," write the Harlows, "during which social deprivation, particularly deprivation of the company of (the monkey's) peers, irreversibly blights the animal's capacity for social adjustment."

When later returned to a colony in which there was ample opportunity for interacting with other animals, the experimental monkeys remained withdrawn, self-punishing,

and compulsive. Most significantly, they grew up to be inept both as sexual partners and parents. The females never became impregnated unless artificially inseminated. We don't know whether humans, like Harlow's monkeys, must establish close bonds by a certain age or be forever doomed to social failure. But an ongoing longitudinal study, the Minnesota Preschool Project, offers the encouraging finding that emotionally neglected four-year-olds can still be helped to lead normal, happy lives. To rehabilitate the children, the teachers in the project provide them with the kind of intimate attention that is lacking at home.

Perhaps one of the Harlows' observations sheds light on why the project was successful. During the critical period for social development, the Harlows found that even a little bit of attention goes a long way. During the first year of life, for example, 20 minutes of playtime a day with other monkeys was apparently sufficient for the animals to grow into well-adjusted adults. L. Alan Sroufe, codirector of the Minnesota Project, tells the story of one four-year-old boy who was constantly defiant—the kind of child who would hit the other children with a toy fire truck instead of sending him to corner, the teacher was instructed to remove him from the group and place him with another teacher. The message they hoped to impart: "We are rejecting your behavior, but we're not rejecting you. Within a few months, the antisocial little boy learned to change his behavior."

If children aren't exposed to positive social situations until adolescence, however, the prognosis is poor. Like any complex behavior, human socialization requires an elaborate series of learning steps. So by adolescence, the teenager who missed out on many key social experiences as a child has a tremendous handicap to overcome.

Researchers are finding that each stage of life demands different kinds of competencies. This may be why sensitive learning periods exist. "When a baby is born it has to do two things at the same time," says biochemist Steven Rose, of England's Open University. "One is that it has to survive as a baby. The second is that it has to grow into that very different organism, which is a child and then finally an adult. And it is not simply the case that everything the baby does is a miniature version of what we see in the adult."

For example, the rooting reflex, which enables the baby to suckle, is not a preliminary form of chewing. There's a transitional period in which the child must begin eating solid foods. And then other sorts of skills become necessary—the child must learn to walk, talk, form friendships, and when adulthood is reached, find a sexual partner. "But the child does not have to know all that at the beginning," Rose says. "So sensitive periods are necessary because we have to know how to do certain things at certain times during development."

## 2. DEVELOPMENT DURING INFANCY

During the course of a sensory system's development, several sensitive periods occur. In the case of human vision, for example, depth perception usually emerges by two months of age and after that remains relatively stable. But it takes the first five years of life to acquire the adult level of visual acuity that allows us to see fine details. And during that prolonged period, we are vulnerable to many developmental problems that can cause this process to go awry. For example, a drooping lid or an eye covered by a cataract—virtually anything that obstructs vision in one of the child's eyes for as few as seven days—can lead to a permanent blurring of sight. This condition, known as amblyopia is one of the most common ophthalmological disorders. Treatment works only if carried out within the sensitive period, before the final organization of certain cells in the visual cortex becomes fixed. After five years of age, no amount of visual stimulation is likely to reorganize the connections laid down when the young nervous system was developing.

Like molten plastic, the nervous system is, at its inception, highly pliable. But it quickly settles into a rigid cast—one that has been shaped by experience. Just what neurological events set the mold is not known. Some suggestive findings, however, come from the research of John Cronly-Dillon, a professor of ophthalmic optics at the University of Manchester Institute of Science and Technology, in England.

Working with colleague Gary Perry, Cronly-Dillon studied growth activity in the visual cortex of rat pups reared under normal light conditions. To measure growth, researchers monitored the rate at which certain cells synthesized tubulin, a protein vital for forming and maintaining nerve connections. The researchers found that tubulin production in the visual cortex remained at a low level until day 13, which marks the onset of the sensitive period for visual learning. It coincides with the moment when the animal first opens its eyes. At that time, tubulin production soars, indicating a rise in growth activity.

Cronly-Dillon and Perry found that the rat's visual cortex continues to grow for the next week and then declines. By the end of the critical period, when the pup is roughly five weeks old, tubulin production drops to the level attained before the eyes open.

To Cronly-Dillon the surplus of tubulin at the beginning of the critical period and its subsequent cutback have profound implications. "It means that an uncommonly large number of nerve connections can exist at the peak of the critical period, but only a small fraction of them will be maintained at the end," he says. "So the question, of course, is which nerve connections will be kept?"

If Cronly-Dillon is correct, experience probably stabilizes those connections most often used during the sensitive period. "So

by definition," he says, "what remains is most critical for survival."

Cronly-Dillon's work elaborates on a theory Spanish neurophysiologist Ramon Y Cajal advanced at the turn of the century. According to this view, which has been gaining broader acceptance in recent times, brain development resembles natural selection. Just as the forces of natural selection ensure the survival of the fittest, so do similar forces preserve the most useful brain circuits.

The beauty of this model is that it could explain why the brain is as exquisitely adapted to its immediate surroundings, just as the mouthparts of insects are so perfectly matched to the sexual organs of the flowers they pollinate. The textures, shapes, sounds, and odors we perceive best may have left their imprint years ago in the neural circuitry of the developing mind.

There is also a certain economic appeal to this outlook. Why, for example, should Japanese adults keep active a neural circuit that permits the distinction between *r* and *l* sounds when neither of these linguistic components is present in their native tongue?

Yet another economic advantage of the theory is that it would explain how nature can forge something as intricate as the brain out of a relatively limited amount of genetic material. "It looks as though what genetics does is not to make a brain," Blakemore says. "We only have about one hundred thousand genes—and that's to make an entire body. Yet the brain alone has trillions of nerve cells, each one forming as many as ten thousand connections with its neighbors. So imagine the difficulty of trying to encode every step of the wiring process in our DNA."

This vast discrepancy between genes and connections, according to Blakemore, can be overcome by encoding in the DNA the specifications for a "rough brain." "Everything gets roughly laid down in place," Blakemore says. "But the wiring of the young nervous system is far too rich and diffuse. So the brain overconnects and then uses a selection process to fine-tune the system."

The brain of an eight-month-old human fetus is actually estimated to have two to three times more nerve cells than an adult brain does. Just before birth, there is a mass death of unnecessary brain cells, a process that continues through early childhood and then levels off. Presumably many nerve connections that fall into disuse vanish. But that is only part of the selection process—and possibly a small part at that.

According to Blakemore, many neural circuits remain in place but cease to function after a certain age. "I would venture a guess," he says, "that as many as ninety percent of the connections you see in the adult brain are nonfunctional. The time when circuits can be switched on or off probably varies for different parts of the cerebral cortex—depending on what functions they control—and would coincide with the sensitive period of

learning. Once the on-off switch becomes frozen, the sensitive period is over."

This doesn't mean, however, that new circuits can't grow. There appears to be a fine-tuning of perception coinciding with these developmental events. And as the brain becomes a finer sieve, filtering out all but a limited amount of sensory input, its strategy for storing information appears to change.

"Studies indicate that as many as fifty percent of very young children recall things in pictures," says biochemist Rose. "And by the time we're about four or five, we tend to lose our eidetic [photographic] memory and develop sequential methods of recall."

To Rose, who is studying the neurological mechanisms that underlie learning, this shift in memory process may have an intriguing logic. "To be a highly adaptable organism like man, capable of living in a lot of different environments, one must start out with a brain that takes in everything," Rose explains. "And as you develop, you select what is important and what is not important to remember. If you want on remembering absolutely everything, it would be disastrous."

The Russian neurologist A. R. Luria had a patient cursed with such a memory—the man could describe rooms he'd been in years before, pieces of conversations he'd overheard. His memory became such an impediment that he could not hold even a clerk's job; while listening to instructions, so many associations for each word would arise that he couldn't focus on what was being said. The only position he could manage was as a memory man in a theatrical company.

"The crucial thing then," Rose says, "is that you must learn what to forget."

Some components of the brain, however, must retain their plasticity into adulthood—otherwise, no further learning would be possible, says neuroscientist Bill Greenough, of the University of Illinois, at Urbana-Champaign. "But the adult brain cannot generate new brain cells, Greenough has uncovered evidence that it does continue to generate new nerve connections. But as the brain ages, the rate at which it produces these connections slows.

If the young brain can be likened to a sapling sprouting shoots in all directions, then the adult brain is more akin to a tree, whose growth is confined primarily to budding regions. "In the mature brain," Greenough says, "neural connections appear to pop up systematically, precisely where they're needed."

Early experience, then, provides the foundation on which all subsequent knowledge and skills build. That's why it's extraordinarily difficult to change certain aspects of personality as an adult," says neuroscientist Jonathan Winson, of Rockefeller University. "Psychiatrists have an expression: 'Insight is wonderful, but the psyche fights back.' Unfortunately, one of the drawbacks of critical-period learning is that is a lot of misconceptions and unreasonable fears can become

frozen in our minds during this very vulnerable period in our development."

Greenough acknowledges that the system isn't perfect; nevertheless, it works to our advantage because you can't build on a wobbly nervous system. "You've got to know who your mother is, and you've got to have perceptual skills," he explains. "These and other types of learning have to jell quickly, or all further development would halt."

Can these insights into the developing brain help educators to devise new strategies for teaching?

"We're a very long way from being able to apply the work of neurobiologists to what chalk-faced teachers are trying to do," says Open University's Rose.

But he can see the rough outline of a new relationship between neurobiology and education, which excites him. "We can now say with considerable certainty that there are important advantages to growing up in an enriched environment," he says. "That does not mean that you should be teaching three-year-olds Einstein's theory of relativity on the grounds that you will be turning them into geniuses later on. But it's probably fair to say

that if you want bright kids, you should cuddle them a lot as babies because that increases the number of neural connections produced in the brain."

Although early learning tends to overshadow the importance of later experience, mental development never ceases. Recent studies indicate that our intellectual abilities continue to expand well into our eighties, provided the brain has not been injured or diseased. Most crucial for maintaining mental vigor, according to Greenough, is staying active and taking on new challenges. In his rat studies, he found that lack of stimulation—much more than age—was the factor that limited the formation of new neural connections in the adult brain.

As long as we don't isolate ourselves as we grow older, one very important type of mental faculty may even improve. Called crystallized intelligence, this ability allows us to draw on the store of accumulated knowledge to provide alternate solutions to complicated problems. Analyzing complex political or military strategies, for example, would exploit crystallized intelligence.

## 6. Making of a Mind

There is a danger in believing that because the brain's anatomical boundaries are roughly established early in life, all mental capabilities are restricted, too. "Intelligence is not something static that can be pinned down with an I.Q. test like butterflies on a sheet of cardboard," says Rose. "It is a constant interplay between internal processes and external forces."

To be sure, many types of learning do favor youth. As violinist Isaac Stern says, "If you haven't begun playing violin by age eight, you'll never be great." But in the opinion of Cronly-Dillon, the best time for learning other types of skills may be much later in life. Although he will not elaborate on this until further studies are done, he believes we may even have sensitive periods with very late onsets. "There's a real need," Cronly-Dillon says, "to define all the different types of sensitive periods so that education can take advantage of biological optimums."

It is said that the ability to learn in later life depends on the retention of childhood innocence. "This old saw," insists Cronly-Dillon, "could have a neurological basis."

Appendix K  
Human Development  
Exercises

## Human Development Exercise

Dear Participant:

You, along with several others, are being asked to complete a series of written and groups exercises related to various topics of human development. Each week, for the next four weeks, you will read a different article on human development and complete a series of questions related to the article. You also will be included in a small group session in which discussion of the articles will occur. The group session will consist of five to seven individuals, similar to yourself in age and college experience.

The four articles you will be reading are on the role of genes in development, prenatal development, brain development, and aging.

If you need clarification of any item or assistance as you answer the questions, do not hesitate to ask the aide.

ID# \_\_\_\_

## Week #1

For this first session you are being asked to read the article "Genes: Our Individual Programming System" and to complete written responses to the questions listed below. Answer the questions as completely as possible in the space provided. Your answers will serve as a basis for your contribution in a small group discussion of this article later this week.

1. What are some of the functions of genes in the human body?
2. Describe the relation between genes and hormones in regard to how they play determining roles in the sex of the child.
3. How do male sex hormones contribute to the "masculinization of the child"? What does this phrase mean?
4. What prenatal occurrences may interrupt normal development of the male?

ID# \_\_\_\_\_

5. What evidence is there, if any, that hormones shape behavior in humans?
  
  
  
  
  
  
  
  
  
  
6. What evidence is there to suggest a hormonal explanation for homosexuality.
  
  
  
  
  
  
  
  
  
  
7. What may cause discrepancies between biological identity and gender identity?
  
  
  
  
  
  
  
  
  
  
8. What are some of the effects of abnormally high or low prenatal levels of androgens on males and females?

ID# \_\_\_\_\_

## Week 2

In this session you are being asked to read the article "Life Before Birth" and to answer the questions given below. A discussion of this article, using a similar format as last week, will follow later this week.

1. Describe what the fetus is likely to hear from both the mother's internal functioning and external stimuli.
  
2. What are the abilities of the fetus which are thought to stem from humans' evolutionary aquatic beginnings?
  
3. What evidence is there to show that newborns, less than three days old, prefer their mother's voices to the voices of others? What may account for such a phenomenon?
  
4. What effects do the emotions of mothers have on fetuses?





## Week 3

In this session you are being asked to read the article "Aging: What Happens to the body as We Grow Older?", and to answer the questions given below. A discussion of this article, using a format similar to the last two weeks, will follow later this week.

1. Describe as completely as possible the two approaches to aging taken by the Veterans Administration Normative Aging Study and the Framingham Heart Disease Epidemiology Study.
2. If an individual smokes throughout most of his/her life, will quitting smoking later in life improve one's health? If so, in what ways?
3. It is commonly thought that many of the effects on the body of aging are inevitable. Based on the article, do you agree with this statement? What preventative measures can someone take to minimize the effects of aging?
4. How may one's genetic makeup influence the process of aging?





ID# \_\_\_\_\_

5. Define amblyopia? Why is treatment of this disorder only effective before five years of age?
  
  
  
  
  
  
  
  
  
  
6. Explain the relation between brain development and natural selection.
  
  
  
  
  
  
  
  
  
  
7. Why does the fetus brain of eight months have more nerve cells than the adult brain?
  
  
  
  
  
  
  
  
  
  
8. Why is our ability to forget some of what has been perceived so important.
  
  
  
  
  
  
  
  
  
  
9. Based on what you have read in the article, define "sensitive" or "critical" periods.

Appendix L  
Control Group  
without Interaction  
Schedule Sheet

ID# \_\_\_\_\_

Thank you for your participation in this research project. Your part in the study is to complete the questionnaires given today and to complete an additional set given Monday through Friday during the week of May 8 - 12. You may come in between 9 and 5 on one of these days to complete the materials. Plan about 1 to 1-1/2 hours to complete this session.

You will be contacted in a few weeks to remind you again of the specific times for the second session. Thank you again for your assistance in this project.

Appendix M  
ANOVA Tables



Ego Identity Scale

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	163.51	2	81.75	.94	.397
Subjects Within Group (Error A)	4075.74	47	86.72		
Time	48.24	1	48.24	3.29	.076
Group x Time	8.01	2	4.00	.27	.763
Error	689.99	47	14.68		

EPIS Trust

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	383.74	2	191.87	2.58	.087
Subjects Within Group (Error A)	3495.93	47	74.38		
Time	47.56	1	47.56	2.99	.090
Group x Time	18.00	2	9.00	.57	.571
Error	746.76	47	15.89		

EPIS Autonomy

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	299.60	2	149.80	2.80	.071
Subjects Within Group (Error A)	2513.00	47	53.47		
Time	15.75	1	15.75	.90	.347
Group x Time	3.18	2	1.59	.09	.913
Error	819.82	47	17.44		

EPIS Initiative

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	137.86	2	68.93	1.77	.182
Subjects Within Group (Error A)	1833.24	47	39.01		
Time	0.08	1	0.08	.01	.937
Group x Time	27.26	2	13.63	1.09	.343
Error	585.70	47	12.46		

EPIS Industry

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	242.10	2	121.05	2.40	.102
Subjects Within Group (Error A)	2374.00	47	50.51		
Time	1.05	1	1.05	.10	.750
Group x Time	10.97	2	5.48	.54	.586
Error	477.32	47	10.16		

EPIS Identity

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	580.01	2	290.01	3.71	.032
Subjects Within Group (Error A)	3669.72	47	78.08		
Time	88.62	1	88.62	5.09	.029
Group x Time	11.13	2	5.57	.32	.728
Error	818.16	47	17.41		

EPIS Intimacy

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	351.16	2	175.58	2.13	.131
Subjects Within Group (Error A)	3881.10	47	82.58		
Time	54.11	1	54.11	4.49	.039
Group x Time	3.24	2	1.62	.13	.874
Error	566.00	47	12.04		

Ideological Diffusion

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	62.40	2	31.20	.77	.471
Subjects Within Group (Error A)	1915.00	47	40.74		
Time	1.78	1	1.78	.20	.659
Group x Time	23.10	2	11.55	1.28	.288
Error	424.46	47	9.03		

Ideological Foreclosure

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	140.54	2	70.27	1.65	.204
Subjects Within Group (Error A)	2006.35	47	42.69		
Time	24.25	1	24.25	1.63	.208
Group x Time	4.17	2	2.08	.14	.870
Error	700.32	47	14.90		

Ideological Moratorium

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	44.55	2	22.27	.34	.711
Subjects Within Group (Error A)	3053.20	47	64.96		
Time	33.50	1	33.50	4.21	.046
Group x Time	17.13	2	8.56	1.08	.349
Error	373.88	47	7.95		

Ideological Achievement

<u>Source of Variation</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Sign. Level</u>
Group	205.62	2	102.81	3.26	.047
Subjects Within Group (Error A)	1482.76	47	31.55		
Time	196.73	1	196.73	14.14	.000
Group x Time	34.66	2	17.33	1.25	.297
Error	653.70	47	13.91		

Appendix N  
ANCOVA Tables

An EIS Posttest by Group(Treatment, Engaged Control, Maturation Control) Analysis of Covariance Using EIS Pretest Scores as the Covariate

---

Source of Variation	SS	DF	MS	F	Sign of F
EIS Pretest Score	1308.22	1	1308.22	47.50	0.00
Group	11.93	2	5.96	0.22	0.81
Error	1266.89	46	27.54		

---

An EPIS Identity Subscale Posttest by Group(Treatment, Engaged Control, Maturation Control) Analysis of Covariance Using EPIS Identity Subscale Pretest Scores as the Covariate

---

Source of Variation	SS	DF	MS	F	Sign of F
EPIS Pretest Score	1022.48	1	1022.48	31.84	0.00
Group	48.48	2	24.24	0.75	0.48
Error	1477.14	46	32.11		

---



An Ideological Diffusion Posttest By Group (Treatment, Engaged Control, Maturation Control) Analysis of Covariance Using Ideological Diffusion Pretest Scores as the Covariate

---

Source of Variation	SS	DF	MS	F	Sign of F
Pretest Score	746.66	1	746.66	40.46	0.00
Group	46.10	2	23.05	1.25	0.30
Error	848.92	46	18.45		

---

An Ideological Foreclosed Posttest by Group (Treatment, Engaged Control, Maturation Control) Analysis of Covariance Using Ideological Foreclosure Pretest Scores as the Covariate

---

Source of Variation	SS	DF	MS	F	Sign of F
Pretest Score	583.56	1	583.56	19.28	0.00
Group	4.81	2	2.40	0.08	0.92
Error	1392.38	46	30.27		

---

An Ideological Moratorium Posttest By Group (Treatment, Engaged Control, Maturation Control) Analysis of Covariance Using Ideological Moratorium Pretest Scores as the Covariate

---

Source of Variation	SS	DF	MS	F	Sign of F
Pretest Score	1007.74	1	1007.74	72.61	0.00
Group	14.03	2	7.02	0.51	0.61
Error	638.44	46	13.88		

---

An Ideological Achieved Posttest by Group (Treatment, Engaged Control, Maturation Control) Analysis of Covariance Using Ideological Achieved Pretest Scores as the Covariate

---

Source of Variation	SS	DF	MS	F	Sign of F
Pretest Score	205.30	1	205.30	8.63	0.01
Group	120.21	2	60.11	2.53	0.09
Error	1094.14	46	23.79		

Appendix O  
Cronbach Alpha for  
the EOM-EIS Pretest  
Scores Prior to  
Subsampling

Internal Consistency of the Extended Objective Measure of  
Ego Identity Status (EOM-EIS) for Pretest Scores Prior to  
Subsampling (n=96)

---

Identity Status	Time
	Pretest
Diffusion	.3743
Foreclosure	.7652
Moratorium	.6755
Achievement	.6197
Mean	.6087

---

Appendix P  
Intercorrelations Between  
the Ideological Identity  
Subscales of the EOM-EIS  
Subscales for Pretest  
Scores Prior to Subsampling

Intercorrelations Between the Ideological Identity Subscales  
of the Extended Objective Measure of Ego Identity Status  
(EOM-EIS) for Pretest Scores Prior to Subsampling

---

EOM-EIS Subscales	EOM-EIS Ideological Subscales			
	Diffusion	Foreclosure	Moratorium	Achievement
Diffusion	$\underline{r=}$ $\underline{p=}$			
Foreclosure	$\underline{r=}$ .056 $\underline{p=}$ .293			
Moratorium	$\underline{r=}$ .475 $\underline{p=}$ .000	-.119 .124		
Achievement	$\underline{r=}$ -.374 $\underline{p=}$ .000	-.139 .088	-.310 .001	

---