THE DEVELOPMENT OF SCIENTIST-PRACTITIONER

DIFFERENTIATION AMONG UNDERGRADUATES

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THE DEVELOPMENT OF SCIENTIST-PRACTITIONER DIFFERENTIATION AMONG UNDERGRADUATES

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THE DEVELOPMENT OF SCIENTIST-PRACTITIONER DIFFERENTIATION AMONG UNDERGRADUATES

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VITA

Karen Frances (Morris) Manning, daughter of Marian (Land) Morris and the late Daniel Lee Morris, was born December 22, 1971, in Baton Rouge, Louisiana. After spending the 1987-88 school year as a foreign exchange student in Norway for the Educational Foundation for Foreign Study, she graduated from Henry A. Bradshaw High School in 1989. She graduated from Auburn University in December, 1992, with a Bachelor of Arts degree in Anthropology. She then received a Bachelor of Science degree in Environmental Biology from the University of North Alabama in May, 1995. On October 26, 1996 she married Jacob Allen Manning, son of Justice and Evelyn (Jacobs) Manning. She entered Graduate School, Auburn University Montgomery, in January, 1998, and gave birth to a daughter, Laurel Rose Manning, on June 16, 2000.

THESIS ABSTRACT

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This study investigated the development of interests in scientist activities and practitioner activities among psychology undergraduates. Participants consisted of undergraduate psychology majors from all class levels at Auburn University Montgomery. Students were recruited from scientific methods and statistics classes. The results showed that for undergraduates, participating in research classes is correlated with a change in scientist interests but not practitioner interests. We also found that undergraduate students tend to start out with a high correlation between science and practice, and as they take more classes, that correlation becomes lower. When students were exposed to statistics and design classes most students tended to lose interest in research. Unexpectedly, those with high Investigative inclinations, on average, lost more interest than those with high Social inclinations. Implications for the Trait-Factor Model are discussed.

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Introduction to the Problem

One of the longest standing conflicts in American psychology has been the conflict between scientists and practitioners. Scientific psychology began as an academic profession, and when the American Psychological Association was founded by G. Stanley Hall in 1892, one of the requirements for membership was having at least one published research article after receiving a Ph.D. degree. With psychology's strong tradition in basic research, there have always been academic psychologists opposed to the idea of an applied psychology - what some call "smoke and mirrors" psychology. At the same time, many applied psychologists have disagreed with the conventional notion of scholarship accepted by most academics. Tension was inevitable.

The scientist-practitioner controversy is most evident in debates about training for clinical and counseling psychologists. According to the Boulder model or the (*scientist-practitioner model,*) clinical and counseling psychologists are trained to be scientists and practitioners. The ideal outcome of the Boulder model was supposed to be the production of clinical psychologists who were both practicing researchers and clinicians. Unfortunately, the true scientist-practitioner psychologist is hard to find because practitioners rarely actively engage in research and researchers have limited interest in the practitioner's professional

problems.

The negative relationship between scientist and practitioner interests poses a problem for implementation of the Boulder model. Some (Dana,1982, Frank,1984.) have even suggested that scientist and practitioner interests are diametrically opposed trait-like variables. If scientist interests and practitioner interests are similar to bipolar personality traits, then students will be more likely to be interested in, and to want careers in either science or practice, but not both. Any student interested in one but not the other will be less likely to conform to the scientist-practitioner ideal which the Boulder model promotes, and they will be even less likely to act as scientist-practitioners when they exit school. This makes the problem of how to train students to be both scientists and practitioners difficult to resolve.

When measuring scientist and practitioner interests among graduate students, Zachar and Leong (1989) found that scientist interests and practitioner interests are negatively correlated. The more interested students are in research, the less interested they are in clinical practice - and vice versa. However, when the Scientist-Practitioner Inventory (SPI) was given to undergraduates, scientist and practitioner interests were positively correlated. This raises two questions. Why are graduate students' interests negatively correlated while undergraduates' interests are positively correlated? If students come to psychology without a scientist-practitioner split, does it develop as a result of the classes they take? Perhaps certain classes such as Statistics and Design influence students with certain personality characteristics to begin to prefer one specific area of psychology over another. This study improves on Zachar and Leong's by looking at how interest change over the course of a term.

If we think of a basic personality trait such as extroversion as a first-order trait, John Holland's occupational types such as Social and Investigative could be considered second-order traits. Following this way of talking about traits, domain-specific interests such as scientist and practitioner interests could be considered third-order traits. If scientist and practitioner interests are third-order traits that develop out of second order traits, then people may come to the field of psychology with second-order inclinations to lean one way or the other. This study will begin to address some of these questions by looking at the relationship between Holland types and scientist and practitioner interests, and how scientist and practitioner interests change when students are exposed to core scientific course work.

Literature Review

Psychology has always been a diverse field. One of the most important conflicts in the field began long ago and still exists today. This is the conflict between pure scientific psychologists and the applied psychologists. The rift to goes back to the creation of clinical psychology as a specific field of study. I will discuss the history of this scientist-practitioner split in three sections: 1921-1944, 1945-1964, and 1965-present.

1921-1944

The psychoanalysis of the early 20th century was still the domain of psychiatrists. Although Freud argued that psychoanalysts did not need medical training, American physicians disagreed and made it difficult for psychologists to enter the therapy profession. Even so, scientific psychologists developed increasing interests in applications -especially psychiatric applications. For example, in 1920 John Watson and Rosalie Rayner showed that fear could be conditioned in their work with little Albert. Four years later, Mary Cover Jones (1924) showed that just as conditioning can induce fears, counter-conditioning can also remove them (Phares & Trull, 1997).

By the early 30's, applied psychologists were becoming increasingly dissatisfied with their second-class status within the scientifically oriented American Psychological Association. They realized that the creation of a socially accepted and well-defined practice of psychology on the same level with physicians and other professions could not be realized in an association devoted exclusively to psychology as a science. Therefore, in 1930, a group

of New York applied psychologists formed a national organization, the Association of Consulting Psychologists (ACP). This organization wanted the states to establish legal standards for the definition of psychologists. They wrote a set of ethical guidelines for psychological practice and begin publishing The Journal of Consulting Psychology.

Many psychologists, still committed to a unified discipline, urged the APA to get involved in defining and setting standards for practitioners of psychology, but the APA refused. As a result of this refusal, in 1938 the psychologists in the clinical section of the APA resigned their membership and joined with the ACP to create the American Association for Applied Psychology (AAAP).

Immediately following the break between the AAAP and APA, however, negotiations with the aim of reuniting psychologists under a single association began. This process was greatly accelerated by the approaching involvement of the U.S. in World War II. In an attempt to reunify psychologists, the APA eliminated its requirement that all prospective members must have published research beyond the dissertation. This enabled many applied psychologists who had no interest in doing research to become full members of the APA.

As World War II began, psychologists were already established in diagnostic testing, including the diagnosis of psychiatric problems. They were also involved in guidance - both child and vocational. Because there were not enough psychiatrists to handle all the mental health issues of the traumatized soldiers, psychologists were given some responsibilities for group and individual therapy as well.

In 1943, an emergency committee set up by the Intersociety Constitutional Convention, composed of representatives from APA, the AAAP, the Society for the

Psychological Study of Social Issues, and the National Council of Women Psychologists, met to create a new APA. The new APA would be an organization of autonomous divisions representing the various interests of psychologists (Leahey,1992). In addition to the APA's traditional purpose of advancing psychology as a science, it now accepted the goal of advancing psychology as a profession as means of promoting human welfare.

This new mission was reflected in the election of Carl Rogers, the author of 1942's Counseling and Psychotherapy, as president of the APA in 1946-1947. According to Hergenhan (1997) in 1944 the new bylaws were ratified, and the journal American Psychologist was created to be the voice of the new united psychology.

1945-1964

World War II left many veterans with psychological problems. So many men and women needed psychiatric treatment that military physicians were unable to provide care for them all, and psychologists were asked to continue to fill this gap. The Veterans Administration (V.A.) was responsible for providing care and rehabilitation for these veterans, and therefore increased the availability of mental health professionals by providing substantial financial support for their training. For example, the V.A. provided financially attractive internships for graduate students in approved clinical psychology Ph.D. programs. Through this policy, the V.A. played an important role in upgrading the professions of clinical and counseling psychology. The money flowing into psychology departments helped ease whatever concerns academics had about the growing importance of applied psychology.

In 1947 an APA committee chaired by David Shakow, created the scientist-professional model for training psychologists (Shakow, 1976). According to this committee,

the clinical psychologist would integrate experienced-based knowledge about people with a questioning scientific attitude. The defining characteristic of a scientist-practitioner psychologist would be the skilled acquisition of knowledge, and the attitude of constant search for new and better knowledge.

As clinical psychologists were becoming a more recognized group, a conference on graduate education in clinical psychology was held in Boulder, Colorado in 1949. According to Hayes, Barlow, and Nelson-Gray (1999), seventy-one representatives from training universities, mental health service agencies, and allied professions met daily for two weeks. All of the existing clinical psychology training programs were represented. This conference saw the official introduction of Shakow's scientist-practitioner model for training clinical psychologists. What became known as the Boulder Model stated that

(a) clinical psychologists will receive training in university departments,

(b) they will be trained as psychologists first and clinicians second,

(c) they will be required to serve a clinical internship,

(d) they will become competent in diagnosis, psychotherapy, and research, and

(e) they will contribute an original research project to the field that will culminate in a Ph.D. degree.

In other words, the clinical psychologist would be both a scientist and a practitioner Stricker, 1997, Belar & Perry, 1992).

By 1953, the APA began to take more of an activist stance with respect to the profession of psychology, claiming that psychotherapy was an integral function of clinical psychologists. At this time, the APA published ethical standards, codifying ethical behavior

for psychologists. These standards addressed both clinical and academic issues.

1965-PRESENT

In the early sixties concerns arose about the difficulty of training students in scientific methods and statistics when large amounts of time were needed for professional training. Many students in clinical psychology were not even interested in science - and clearly did no research after receiving their degrees. Some psychologists thought that in order to train students with the knowledge and skills needed for competent practice, research training needed either to be reduced or eliminated. As a result of these concerns the Doctor of Psychology (Psy. D.) was introduced. The Psy. D. degree was supposed to be a professional degree, akin to the M.D. and the J.D., where practical training was enhanced and research training was minimized. In 1968 the first Psy. D. program was established at the University of Illinois (Phares & Trull, 1997).

In July of 1973, the Vail Conference endorsed the implementation of the Psy. D. degree and rejected the notion that the Boulder Model is the only appropriate model for training clinical psychologists. There were two important outcomes of the Vail Conference, first, professional schools that could offer advanced degrees in clinical psychology were sanctioned, even if they were administratively autonomous from university psychology departments, and second, the Psy. D. degree was recognized (Hergenhan, 1997).

Even though professional degrees had been established, a scientifically-based clinical psychology continued to grow – especially in the areas of psychological diagnosis, health psychology, and brief therapy. In the 1980's research in psychopathology increased tremendously after the publication of the Diagnostic and Statistical Manual of Mental

Disorders-III. This research sought to evaluate the reliability, validity, and utility of the operationalized criteria listed in the manual. Psychologists' attempt to contribute to the DSM was so successful that they were prominent members of the committee that created the DSM-IV in 1994.

Because of research supporting the role of psychological factors in the course of treating physical illness, the area of health psychology took off in the 1980's. The role of health psychology is likely to increase as the priorities of primary care physicians and managed-care companies gain ascendancy.

In the mid 1980's, brief or time effective therapies also became more accepted as many people could not afford years of psychotherapy. Their acceptance was based partly on research support. Besides the fact that brief forms of therapy were seen to be as effective as traditional therapy, managed-care companies became unwilling to reimburse clinicians for more than a few sessions. With brief therapy came the introduction of manualized forms of treatment that were supported by research. The manuals outlined treatment goals for each session, as well as techniques to be used. They can be completed in 10 to 15 sessions or less. In the early 21st century, the importance of empirically validated treatments is a hot topic of debate.

By the 1980's applied psychologists, who were once the second-class citizens of the APA, now made up the majority of its members. Because the APA was also using the majority of its resources to address the needs of practitioners, scientific psychologists felt that it no longer adequately represented their interests. Afraid that the APA was becoming a professional rather than a scientific organization, research psychologists called for a

reorganization of the APA. After several attempts, a restructuring plan that included an alliance of semiautonomous societies representing the major constituent identities of the APA was passed by the APA Council. The Assembly of Scientific and Applied Psychologists supported the plan, but a number of practice-oriented groups opposed it, feeling that the scientists' complaints could be accommodated with some minor adjustments. Those in the Assembly of Scientist-Practitioner Psychologists, still considering clinical work to be an applied science were caught in the middle.

The reorganization plan was defeated by the APA membership (Rice, 1997). After this defeat, in 1988, a group of scientific psychologists broke away from the APA and founded the American Psychological Society (APS) in 1988. This organization, dedicated solely to the science of psychology, began publishing its journal Psychological Science in 1990. Membership of APS had grown from 500 to over 15,000 by 1994 and is still increasing (Hergenhan, 1997, Phares & Trull, 1997).

Once again, psychology as a science and psychology as a profession seem to be separating. This is reflected in the two professional organizations, the APA and APS, and in the two degree programs, the Ph.D. and Psy.D. There are more than one hundred and forty accredited Ph.D. programs in the U.S. that prepare practitioners, and there are about 30 accredited Psy.D. programs with more waiting for accreditation. According to Rice (1997), more than 15 percent of those receiving doctorates in 1993 received Psy.D. degrees. In clinical psychology, nearly a quarter of the doctoral recipients received this degree. At the turn of this century, conflict between academic and applied psychology is still strong.

Scientist-Practitioner Differences Among Psychologists: Current Research

The Trait-Factor Model states that people have stable personality traits and they seek work environments that are congruent with those traits. Trait-Factor theorists believe that the better the match between an individual's personal characteristics and the requirements of their job, the better the probability that productivity and job satisfaction will occur. Congruence occurs when the needs of the individual are met by the job, and the demands of the work environment are met by the individual. This is a dynamic process because the needs of the individual and the job demands can change overtime.

The Trait-Factor Model and John Holland's model of Vocational Preference parallel each other. Holland's theory is based on the assumption that vocational interests are aspects of personality. By looking at the description of an individual's vocational interests, one can describe the individual's personality. Vocational personality traits are identified by preferences for particular types of occupations. Holland has hypothesized that most people can be categorized predominantly as one of six types with one or two secondary types. These types are Realistic, Investigative, Artistic, Social, Enterprising, or Conventional (RIASEC). The more a person resembles a particular type, the more likely they are to have some of the behaviors and traits associated with this type. Working environments can be classified into these six types as well, and these work environments tend to be populated by individuals with matching personality types. The behavior of a person is influenced by the interaction

between his personality and characteristics of his work environment.

Holland's six personality types are described as follows: *Realistic* individuals prefer activities that involve the systematic manipulation of machinery, tools, or animals. *Investigative* individuals tend to be analytical, curious, methodical, and precise. *Artistic* individuals are expressive, nonconforming, original, and introspective. *Social* individuals enjoy working with and helping others but avoid systematic activities. *Enterprising* individuals enjoy activities that entail manipulating others to reach organizational goals or economic gain. *Conventional* individuals enjoy the systematic manipulation of data, filing records, or reproducing materials (Brown, Brooks & Associates, 1987).

Holland's Vocational Preference Inventory (VPI) requires clients to indicate their interests or lack of interest in 160 occupational titles. The scores that are yielded provide data about the individual's personality and personal characteristics. When Holland codes are used to define psychologists, the codes most commonly found are a combination of Artistic, Social and Investigative. Clinical-counseling psychologists are typically defined as SIA while the more experimental psychologists are ISR. Mallenkrodt, Gelso, and Royalty (1990) found that Holland personality variables accounted for more variance in research interests then did training environment factors.

Hoshmand and Polkinghorne (1992) state that psychology has long been described as having two poles, with the scientists on one end, and the practitioners at the other. Those most committed to research, see psychology as almost a pure science, to be studied and experimented in a kind of "knowledge for knowledge's sake". Stricker (1997) states that

those most committed to practice feel that psychology should be applied and made useful for the population. They have a more humanistic service-oriented approach to psychology.

The most radical accounts of the rift between scientists and practitioners have been offered by Dana (1982) and Frank (1984). Dana proposes that two kinds of psychologists exist, Alpha psychologists and Beta psychologists. According to Dana, Alpha psychologists perceive reality objectively and tend to be conforming and conventional. Beta psychologists use intuition to understand reality, where right and wrong are seen as based on higher laws, not societal laws. Beta psychologists also tend to be more liberal and unconventional. Frank (1984) made a similar proposal, suggesting a strong dichotomy between scientists and humanists.

Dana also suggests that alpha psychologists have taken the major role in deciding what the field of psychology should be like. He argues that alpha psychologists decide who is hired and who is promoted in academic departments. Training programs have become alpha environments. Regardless of their interests and personality, all graduate students are expected to participate in alpha-oriented scientific research training. These are not ideal learning environments for beta type people.

More recently, Altman (1987) states that psychology graduate students have become less educated in the traditional sense in favor of a vocational-technical type of training. Students interested in practice tend to focus on the area of applied psychology only. Students mainly interested in research focus only on research. Graduate work is now made up of the development of highly specialized skills in one area of the field, allegiance to a strong faculty member, and the acquisition of a list of publications. This trend has contributed to the

centrifugal direction of psychology by reducing students exposure and identification to the entire field of psychology. As their perspective narrows, students are less likely to have been well versed in the history and values of psychology and more are strongly identified with one area or the other.

The attitudes held by many psychologists do nothing to help bridge this gap. Stricker (1997) says that a truly scientist-practitioner approach fails to succeed because of the *incompatibility* of the attitudes and values of science and practice. Researchers often argue that practitioners are ill equipped and uninformed in their efforts to help patients. Practitioners argue that researchers over simplify and do not address the day-to-day needs and struggles of therapists and patients.

Beutler, Williams, & Wakefield (1993), however, found that practitioners evaluate and seek out scientific knowledge more than previously thought. Practitioners seem to accept a different definition of science and look to secondary sources usually written by nonscientists rather than research journals. Clinicians use scientific knowledge, but search for this knowledge in unscientific places such as professional newspapers rather than empirical journals. Clinicians report that they do find research writings useful and try to incorporate these findings into their work. Even Beutler, Williams, Wakefield & Entwistle (1995) found the scientist-practitioner split strong on the scientist side. Academic clinical psychologists were found not to acknowledge the value of clinical practice and were less likely to use and read clinical writings than clinicians reading scientific writings.

Research by Mallenkrodt, Gelso, and Royalty (1990) indicates that many psychology students are ambivalent about the role that research will play in their careers and professional

lives, and a large number of students do not take part in research after graduation. Brems, Johnson, & Gallucci, (1996) found that only a very small portion of clinical psychologists actually contribute to research literature. They also found that the majority of psychologists in residential treatment centers do not combine the roles of research and practitioner.

Contradicting Dana's more radical hypothesis, research indicates that not all students have the same feelings about the scientist-practitioner model of training. Aspenson; Brooks; Bulger; Galassi; Gersh; Kerick; Perot; and Schroeder,(1993) found that graduate students could be placed in one of three groups according to their feelings about the Boulder Model, positive, ambivalent and negative.

The members belonging to the pro-Boulder model group see the combination of research and practice as a desirable goal for all psychologists, and see research and practice as interdependent. Most of these graduate students have strong interests in research before entering the program as well as having positive research experiences while in graduate school.

The ambivalent group is made up of participants who have mixed feelings and perceptions regarding the scientist-practitioner model of training. These graduate students see the model positively but doubt its personal relevance or its importance for the field of psychology. This group also views the scientist-practitioner model as more of a manner of thinking rather than an activity. The frustration of this group comes not from the model, but from how it is implemented in their training, specifically the belief that science is defined solely as the production of research. Many persons in the ambivalent group claim that they had positive experiences with research and the scientist practitioner model before graduate

work. They also report having their enthusiasm dampened by their current program. Students in this category had a variety of career interests including practice and academia. Although all students in this group were interested in academia, this interest was motivated more by a desire to teach then to produce research.

The anti-Boulder model group describes the science and practice aspects of the model as separate realms of activity. Graduate students in this group are more inclined to advocate separate tracks for training. They also see research training as requiring more of an effort than it is worth, and would rather spend time and energy on the clinical aspects of their training. They do not view the scientist-practitioner model as personally relevant and they reported little actual exposure to the scientist-practitioner model before entering graduate school. This group's goal was exclusively practice-oriented, and all of them included private practice as one of their professional goals.

Some themes were true for all groups. Almost all students equated science with research. They also saw the Boulder model as having two distinct components, science and practice. Many felt they had few faculty role models who function both as scientists and practitioners (Aspenson, Gersh, Perot, Schroeder, Kerick, Bulger, and Brooks, 1993).

Leong and Zachar (1991) examined the scientist-practitioner split among psychology graduate students by designing the Scientist Practitioner Inventory (SPI). The SPI measures the extent to which individuals are interested in the activities of scientists and the activities of practitioners. The correlation of -.65 between the scientist and practitioner scales suggests that those interested in science tend not to be interested in practice and those interested in practice tend not to be interested in science.

Leong and Zachar found that scientist interests were positively correlated with investigative interests as measured by John Holland (1985). They were also negatively correlated with social interests. Showing the opposite pattern, practitioner interests were positively correlated with social and artistic interests and negatively correlated with investigative interests.

Leong and Zachar also found that interest in scientific activities were correlated with an objective outlook as measured by Coan (1979) and practitioner interests were positively correlated with a subjective outlook. Objectivists favor behavioral observation and quantitative description. Subjectivists favor holistic descriptions and qualitative analysis. (Holland, 1985, Coan, 1979, Zachar, & Leong, 1992).

Zachar and Leong (2000) have shown that scientist-practitioner interests remain stable over a ten-year period. Negative correlations between science and practice also remain relatively high over the ten-year period. They also found that 1989 interests can predict 1999 work behaviors. Interests in graduate school are also reflected in actual work activities such as research productivity and the amount of clinical work performed by people who become Ph.D. level psychologists.

Brooks & Peterson (1994) used the SPI to examine whether or not clinicians have interests and behaviors consistent with the Boulder model. They found that only 13% of their participants have interests that are consistent with the model and only 14% have behaviors consistent with it. The relationship between research and practitioner activities according to the answers given to the brief form of the SPI, the SPI - 20 (Leong & Zachar, 1993) showed that time spent on research is significantly correlated with scientific interests.

Time spent on practitioner activities is significantly correlated with practitioner interests.

Leong and Zachar (1991) and Zachar and Leong (1992) found that while graduate students and doctoral-level psychologists tend to differentiate between scientist activities and practitioner activities, undergraduates did not. Rather than showing a preference for one type of activity over another, undergraduates tended to have either high scores for both scientist and practitioner interests or low scores for both.

Because of this positive correlation between scientist and practitioner interests in undergraduates, Kenney and Rohrbaugh (1997) asked how comprehension of terminology on the SPI affects undergraduate students of preferences. They administered the SPI as well as an SPI related terminology test. The SPI terminology test consisted of 10 true-false statements that made appropriate or inappropriate use of terminology in the SPI and 10 open-ended questions regarding terms used on the SPI. The data showed an improvement in terminology test scores as more psychology courses are completed. This might suggest that the comprehension of terms used on the SPI, can affect the results on the SPI, i.e. the positive relationship between preference for scientist and practitioner activities lessens as knowledge of terminology increases.

Statement of the Problem

In giving graduate students the SPI, Leong and Zachar (1991) found a negative correlation between scientist interests and practitioner interests. Students more interested in practice were less interested in research, and students more interested in research were less interested in practice. However, when the SPI was given to undergraduate psychology majors, scores on the SPI for scientist activities and practitioner activities were positively correlated. This study extends Leong and Zachar's research by focusing on undergraduate psychology majors. Specifically, it will focus on both the correlation between scientist interests and practitioner interests, and the changes in that correlation that occur during the school term.

The high test-retest reliability, and the high correlation between scientist interests and practitioner interests with the Investigative and Social codes in John Holland's model supports the hypothesis that scientist and practitioner interests are trait-like variables. Although interests in scientist activities and interests in practitioner activities are clearly not raw personality variables, students may still come to psychology with an inclination to develop in certain ways. At the beginning of their psychology education it is still only a potentiality. This inclination becomes more actualized as the students learn more about psychology.

In order to test Kenney and Rohrbaugh's (1997) hypothesis that the familiarity with

psychology affects the correlation between scientist and practitioner interests in a negative direction, number of psychology classes will be used to operationalize experience. The more classes students have taken, especially of a scientific and clinical nature, the more their patterns of interest should approximate the pattern seen with graduate students.

In this study, Holland codes will be used in order to measure the pre-existing vocational inclinations of psychology students. Given the logic of Holland codes, and the findings of past research by Leong and Zachar, students with Holland traits of low Investigative interests and high Social interests, who are in Methods of Research classes and Statistics classes, should begin to more explicitly lose interest in scientist type activities and those with high Investigative, low Social interests should gain interest in scientist type activities.

The hypotheses of this study are:

(1) Students who are new to psychology will have a positive correlation between their level of interest in scientist activities and practitioner activities. As they take more classes, their interest pattern will begin to approximate the pattern of interest seen in graduate students, i.e., a negative correlation between interest in science and interest in practice.

(2) In Research Design and Statistics classes, the higher the interest people have in Social occupations, the more they will lose interest in scientist-type activities. Having higher interests in Investigative occupations will be related to either maintaining or gaining interest in scientist activities.

Method

Participants

The participants were 71 psychology majors at Auburn University Montgomery. The students included all class levels: freshman, sophomore, junior, and senior. Eighty four percent (84%) of the participants were female and 16% were male. Seven percent (7%) of the participants were freshmen, 11% were sophomores, 30% were juniors and 47% were seniors. Ages ranged from 54 years to 19 years, with 73% of the participants being born between 1973 and 1980. Students were recruited from scientific methods and statistics classes. They were told that participation was strictly voluntary and that they were free to withdraw from the study at any time (see informed consent, Appendix I). Some students were awarded extra credit for participation.

Instruments

Scientist-Practitioner interests were measured by Leong and Zachar's (1991) Scientist-Practitioner Inventory (SPI). The SPI is a forty-two question inventory, with twenty-one questions measuring interest in scientist activities and twenty-one questions measuring interest in practitioner activities. Each scale is composed of several sub-scales. The SPI uses a five point Likert scale ranging from very low interest (1), to very high interest (5). For the current sample, internal consistency as measured by Cronbach's alpha was .92 for scientist pretest, .91 for practitioner pretest, .92 for scientist post-test, and .92 for

practitioner post-test. The alphas for the sub-scales used in this study are as follows: pre-therapy .89, pre-research .87, pre-statistics & design .80, post-therapy .89, post-research .88, and post-statistics & design .83.

Zachar and Leong (2000) have shown that, for psychologists, scientist and practitioner interests are stable over a ten year period. They are also related to actual work activities including research productivity and amount of direct service clinical work performed.

Vocational personality was measured with the Vocational Preference Inventory (Holland, 1985). This is a 160 item test that asks about preferences for various occupations. People complete the inventory by noting what occupations on the list appeal to them (e.g., astronomer, author, cashier). The six scales used in this study were : Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Holland conceptualizes these scales as measuring personality types. According to Holland (1985), these interest scales have moderate validity for predicting a person's occupation and field of training. The VPI scales have comprehensive data supporting their construct validity in a range of populations from age 15 to age 80 . For the current sample the Cronbach's alpha for the VPI scales were Realistic = .84, Investigative = .87, Artistic = .85, Social =.82, Enterprising =.87, and Conventional= .91.

Procedures

Students were invited to participate in this study and told that the interests and preferences of psychology students were being studied. They were also told to use their birth

date rather than their name to protect anonymity, and to use these same numbers on both the pretest and post test (see questionnaire 1 in Appendix II and questionnaire 2 in Appendix III). Students were administered the questionnaire containing the demographic data, the Scientist-Practitioner Inventory, and the Vocational Preference Inventory during the first week of class (pre-test). The post-test was administered at the end of the quarter, and included the SPI and some demographic questions such as whether or not they planned to attend graduate school.

Results

The means and standard deviations of the variables used in this study are presented in Table 1.

Table 1

Means and Standard Deviations for SPI Pre-test (n = 71), SPI Post-test (n = 59), and Holland's VPI.

Variable	Mean	Standard Deviation
Pre scientist interests	**59.61**	**14.51**
Post scientist interests	**54.02**	**16.47**
Pre practitioner interests	**76.55**	**12.81**
Post practitioner interests	**74.39**	**13.90**
Pre therapy activities	**48.82**	**9.02**
Post therapy activities	**47.66**	**9.24**
Pre research activities	**27.94**	**6.51**
Post research activities	**24.76**	**7.33**
Pre statistics and design	**7.41**	**2.68**
Post statistics and design	**7.03**	**2.88**
REALISTIC	**1.73**	**2.63**
INVESTIGATIVE	**4.15**	**3.84**
ARTISTIC	**4.84**	**3.98**
SOCIAL	**7.87**	**3.55**
ENTERPRISING	**3.37**	**3.65**
CONVENTIONAL	**2.34**	**3.61**

The Holland scales Social, Artistic, Investigative, and Enterprising had the highest means, Social was the highest and Enterprising was the weakest. This is similar to the

standard VPI profile for most psychologists, which is SIA or a related order (eg. IAS, ISA, etc.). Relative to most college students, this group is high on Social, and low on Enterprising (Holland, 1985). Relative to psychology graduate students, they are low on Investigative and Artistic, and high on Enterprising and Conventional (Leong & Zachar, 1991). As a whole, this group scored low on the Investigative variable, meaning that the group was low on interest in scientific activities. This pattern is not consistent with the pattern seen in students who want to get an advanced degree in psychology.

T-tests examining the decrease in scores from pre-test to post-test for students taking research design only, are presented in Table 2. Relative to all the participants, people in this group had a more limited exposure to core scientific course work before taking the pre-test. A Bonferoni correction was used to control for the family-wise error rate. The alpha level needed for significance is .01.

Table 2

Repeated Measures *t*-Test Examining Differences Between Pre-Test and Post-Test for Students Taking Research Design.(n=45)

	Pre-Test		Post-Test				
Variable	mean	sd	mean	sd	df	t-Value	Sig.(2-tailed)
Scientist	**58.69**	14.46	**51.60**	14.96	44	3.94	.000 *
Practitioner	**75.71**	13.35	**72.64**	13.47	44	1.77	.083
Therapy	**47.78**	9.40	**46.27**	8.68	44	1.17	.250
Research	**27.40**	6.32	**23.49**	6.32	44	4.74	.000 *
Statistics	**7.29**	2.69	**6.69**	2.75	44	1.56	.127

* $p < .01$

According to Table 2, students' loss of interest in scientific activities and loss of interest in research activities was statistically significant. Their loss of interest in statistics and loss of interest in practitioner activities was non-significant.

Two methods were used to test Hypothesis 1. For the first method, students were placed in one of three groups. The first group included students who have completed four or fewer psychology classes (n=24). The second group included students who have completed five to eight psychology classes (n=13). The third group included students who have completed nine or more classes (n=19). The correlation between science and practice for the low number of classes group was r = .70, p=.000. The correlation between science and practice for the medium number of classes group was r = .37, p =.218. For the high number of classes group the correlation was r = .13, p=.599. This suggests that the strong correlation between science and practice is attenuated as students progress through a degree program. In other words, a significant positive correlation between science and practice becomes a non-significant correlation.

Students with a high number of classes who plan to go to graduate school were compared with students with a high number of classes who either do not plan on going to graduate school or are unsure about graduate school. The graduate school group (n=12) had a non-significant negative correlation between science and practice of -.13. The non-graduate group (n=7) had a significant positive correlation between science and practice of .40. When students who had fewer than eight classes and who want to go to graduate school (n=16) were analyzed they had a significant correlation of .49.

An odds-ratio analysis was also used to test Hypothesis 1. Students were placed in one of two groups. Those having seven or fewer psychology classes were placed in a low number of classes group. Those with more than seven psychology classes were placed in high number of classes group. Two further categories were also constructed for comparison, an undergraduate pattern group, which indicates interest in both science and practice, and a graduate pattern group, which indicates high interest in either science or practice, but not both. In effect," high and low number of classes" group membership is being considered a risk factor for demonstrating a specific pattern of interests.

The *undergraduate pattern* category includes those students who have an average scientist interest score of 3 or better and an average practitioner interest score of 3.3 or better. Meaning they are high on both science and practice. Based on past research (Zachar & Leong, 2000), the graduate interest pattern category includes anyone who is high on one, and low on the other. In other words, either

(a) an above average scientist score (>=3.4) and a below average practitioner score (< = 2.7), or

(b) a below average scientist score (<=2.7) and an above average practitioner score (>=3.4).

The categories used in the hit rate analysis classified sixty participants. Eight participants had seven or fewer classes and had a graduate pattern of interest. Twenty six participants had seven or fewer classes and had an undergraduate pattern of interest. Seven participants had eight or more classes and had a graduate pattern of interest. Fifteen participants had eight or more classes and had an undergraduate pattern of interest.

The Mantel-Haenszel odds ratio estimate for the number of classes by the pattern of interest was .659. The 95% confidence interval was between .199 and 2.183, and the chi-square was not significant (X^2 (1, n=56) = .468, p<.494). This means that number of classes does not predict pattern of interest. If we had just predicted that all undergraduates would have an undergraduate pattern of interest, we would have had a 73% hit rate. Using the number of classes to modify predictions about pattern of interest lowered the hit rate to 58%.

According to Hypothesis 2, the Social variable should be positively correlated with scientific interests on the pre-test, and on the post-test, after exposure to the course material, students should produce a lower correlation as they become more discriminating. The Investigative variable should be positively correlated with scientist interests on the pre-test, and on the post-test scores should either stay the same or show an increased correlation. An inter-correlation matrix between relevant Holland variables and pre and post-test scientist and practitioner variables is presented in Table 3.

Table 3

Inter-correlation Matrix Between Relevant Holland Variables and Pre-Test and Post-Test Scientist and Practitioner Variables(n=45)

Variable	Investigative	Artistic	Social	Enterprising
pre scientist	.43 **	.17	.10	.40**
post scientist	.39 **	.11	.19	.11
pre practitioner	.18	.11	.35 *	.43**
post practitioner	.19	-.10	.36 *	.17
pre research	.35 *	.06	- .01	.24
post research	.34 *	.06	.11	.06
pre statistics & design	.29	.21	-.02	.27
post statistics & design	.24	.16	.11	.10
pre therapy	.10	.12	.26	.31*
post therapy	.18	-.08	.32 *	.07

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

According to Table 3, the Social variable was not correlated with scientist interests pre or post. The Investigative variable was correlated with pre-scientist interests at r =.43, and with post-scientist interests at r =.39. It was also correlated with pre-research at r =.35, and post-research at r =.34.

Another way to test hypothesis 2 begins with identifying people who are high Investigative or high Social. Based on Holland's (1985) norms, we defined people as high Investigative if their score on the Investigative scale was 4.2 or greater. Twenty-two people were classified as high Investigative. We then looked at t-tests, examining the difference between pre-scientist and post-scientist interests for this group. The mean for pre-scientist

interests was 68.3 and the standard deviation was 13.4. The mean for post-scientist interests was 63.3, and the standard deviation was 14.4. The difference between pre and post was significant, t (2.01), =21, p<.05.

Based on Holland's norms, we defined people as high Social if their score on the social variable was 7.2 or greater. Thirty-nine people were classified as high Social. The mean for pre-scientist interests was 58.5, and the standard deviation was 14.5. The mean for post-scientist interests was 55.3, and the standard deviation was 15.9. The difference between pre and post was not significant t (1.70), =38, p≥.05).

To further test hypothesis 2, at the beginning of the term students were asked on the pre-test "how interesting do you think this class will be for you" (initial interest) and at the end of the term, on the post-test, were asked "how interested are you in learning more about the material in this specific area of psychology" (continued interest). They were asked to rate their interest on a five-point Likert scale with 1 = low interest and 5 = high interest. The Social variable was correlated with initial interest at .04 p =.741 and with continued interest at .28 p =.037. The Investigative variable was correlated with initial interest at .10 p =.379, and with continued interest at .16 p =.224.

For students who were high in Social interests the correlation between the social variable and initial interest was -.21 p =.170, the correlation for continued interest was -.04 p =.776. For those high in Investigative interests, the correlation between the Investigative variable and initial interest was .13 p =.528 and the correlation for continued interest was .29 p =.216.

One other way to examine the issue is to study difference scores, specifically pre-test minus post-test scores (pre - post = difference). For example, the score resulting from scientist pre-test minus scientist post-test will be positive if the group loses interest in scientist activities, it will be near zero if the group does not lose interest, and it will be negative if the group gains interest. T-tests examining the mean difference score in the sample will indicate whether or not the average difference score deviates from zero at a statistically significant level.

For the full sample, the average scientist difference score was 4.87 (SD=1.60). This score was significantly different from zero in the positive direction, indicating that students lost interest in scientist activities moving from pre- to post-test, t (3.02) =58, p=.004. For the full sample, the average practitioner difference score was 1.69 (SD=1.48). This score was not significantly different from zero, indicating that students did not lose or gain interest in practitioner activities, t (1.14) =58, p =.259. For those 22 students who scored high on the investigative variable, the average scientist difference score was 5.00 (SD=2.48). This score was significantly different from zero in the positive direction, indicating that high investigative students lost interest in scientist activities moving from pre to post, t (2.01) =21, p=.05. For those 39 students who scored high on the social variable, the average scientist difference score was 3.23 (SD = 1.89). This score was not significantly different from zero, indicating that students did not lose interest in scientific activities moving from pre- to post, t (1.70) =38, p=.097.

A final test examined the difference between those who plan to go to graduate school and those who do not plan to go or are unsure about going to graduate school. Student's

t-tests examining differences between those who plan on going to graduate school (n=30) and those who do not plan on going to graduate school or are unsure about graduate school (n=25) for all the theoretically relevant variables are presented in Table 4. Because of the number of *t*-tests completed, test-wise Bonferoni corrections were used to control for family-wise error rate. Starting with the .05 alpha level as a base, for the 4 SPI main scales, the alpha level needed for significance was .01. For the 6 SPI factor scales, the alpha level needed for significance was .008. For the 4 VPI scales, the alpha needed for significance was .01.

Table 4

Student's *t*-Test Examining Differences Between Those Who Plan To Go To Graduate School (n = 30) And Those Who Do Not Or Are Undecided (n = 25)

	Graduate School		No Graduate School				
Variable	mean	sd	mean	sd	df	t-value	Sig.(2-tailed)
pre scientist	**63.37**	13.15	**52.96**	15.43	53	2.70	.009 *
post scientist	**55.20**	16.51	**49.96**	15.56	53	1.20	.234
pre practice	**79.00**	12.23	**72.00**	13.61	53	2.01	.050
post practice	**75.60**	13.06	**70.52**	14.15	53	1.38	.173
pre research	**29.57**	5.89	**25.36**	6.95	53	2.43	.018
post research	**25.27**	7.24	**22.84**	6.91	53	1.26	.212
pre statistics	**7.87**	2.62	**6.48**	2.74	53	1.91	.061
post statistics	**7.23**	2.90	**6.36**	2.71	53	1.15	.257
pre therapy	**50.50**	8.43	**45.20**	9.53	53	2.19	.033
post therapy	**48.33**	8.60	**44.88**	8.98	53	1.45	.152
Investigative	**4.13**	3.79	**3.84**	3.77	53	0.29	.775
Artistic	**3.97**	4.24	**5.00**	3.54	53	-.97	.337
Social	**7.97**	3.02	**7.60**	4.22	42	0.36	.718
Enterprising	**3.63**	3.80	**2.44**	2.79	52	1.34	.186

* $p < .01$ Using test-wise Bonferoni correction
** $p < .008$ Using test-wise Bonferoni correction

According to Table 4, there was a significant difference between those who plan on going to graduate school and those who do not with respect to the pre-scientist variable only. There were no significant differences between the groups for post-scientist, pre practitioner, post practitioner, pre-research, post-research, pre-statistics & design, post-statistics & design, pre-therapy and post-therapy, and for the Holland variables.

Interestingly, those planning on going to graduate school demonstrate a loss of interest in scientific activities from pre to post-test, $t(3.58), =29, p =.001$, while those not

planning on going to graduate school started out with low interests and did not lose interest from pre to post-test, t (.218), =24, p =.832.

Discussion

The data showed that students in science-based classes tend to lose interest in scientist activities over time. This might suggest that before students take scientific research classes they are unfamiliar with what scientific work actually entails, and they may have unrealistically wide expectations of what they would like to do were they to become psychologists. As they progress through their classes, students discover more about the scientific activities of psychology, and what they involve, and may then decide that they are not as interested in the science aspect of psychology as they previously thought. Another factor that could contribute to loss of interest in science over time, might be how difficult the class was for the student. If the student had difficulty, they may decide that the scientific area of psychology is "too hard" and begin to avoid it.

The same results also showed that the students did not lose interest in research design classes, statistics, or practice activities. Most students at AUM take mathematical statistics early on in their undergraduate careers, this prior experience with statistics may have enabled students to form an opinion about whether or not they were interested in statistics before they took the pre-test. If that was the case, students' post-test score would not have been affected by the science-based class they had just completed. No interest was lost in psychological practice activities. This could be because the classes did not have anything to do with the practice aspect of psychology and therefore students were neither encouraged or dissuaded in

their preferences for practice activities.

Undergraduates tended to have a positive correlation between science and practice interests, and as more classes were taken, students became more likely to show a pattern similar to the one graduate students have, the positive correlation between science and practice becomes less positive. This change in correlation could be due to the tendency for students new to the major to be interested in all aspects of psychology. As students take more classes they acquire the information and experience needed to begin discriminating what they are really interested in from what they are not. This causes the correlation between science and practice to become weaker as students become better versed in the diverse areas of psychology.

If we talk about the graduate pattern of interest as being high in science or practice but not both, the number of classes does not predict whether or not a student falls into a particular category. That pattern seems to be evenly split between those with few classes and those with many classes. Even though it does seem that more students with a low number of classes claim they are interested in both science and practice, a lot of students with a high number of classes also claim to be interested in both science and practice. It may be that undergraduate psychology majors and doctoral level graduate students are overlapping but distinct populations.

The data clearly fails to show that having a high score on the Social variable causes one to lose interest in scientific activities over time in research design classes. There were even signs in the data that some high social students gained interest in scientist activities. Although, contrary to our expectations, this finding is consistent with what Aspenson et.al.

found - that some practice oriented students, especially those with positive experiences with research, are more likely to appreciate the ideals of the Boulder Model. Those lacking positive exposure to research are more likely to deprecate the model (Aspenson et.al.1993).

The Investigative variable was positively correlated with both scientist interests and research interests. This suggests that the Investigative variable does affect scientist interests. As the Investigative variable becomes greater, so do interests in science and research. The Investigative variable was positively correlated with scientist interests on both pre and post-test. However, people high on Investigative tended to lose interest in science over time, contrary to what we expected. One reason for this may be that Investigative people exaggerate interest in science early on and although they do not become uninterested in science they do lose some interest.

When those who plan on going to graduate school were compared with those who do not, one difference became apparent. The students who were not planning on going to graduate school did not lose interest in scientific activities from pre to post-test. However, the prospective graduate school students lost interest in scientific activities from pre to post-test.

Why did those planning on graduate school lose interest while those who do not did not lose interest? One possible explanation could be that pre-graduate school students are more enthusiastic and more likely to feel that they are interested in the whole field of psychology. This could contribute to these students having higher scores than those who are not as interested in going to graduate school. This also could help explain why these students lost more interest from pre to post-test, as they would have more room to lose interest than those who started out with lower interests in psychology. Those who don't plan on going to

graduate school might be more realistic about what areas of psychology they are interested or not interested in, and may not be as affected as much by what they experience in class.

The Trait-Factor Model receives mixed support from this study. Ignoring for a moment the importance of significance levels in interpreting a correlation, those high on the Social variable tend to have low interests in science initially, but upon exposure to a research environment, some of them gain interest. The Social variable was only unrelated to scientific interests, not negatively correlated. The Social variable was also unrelated to whether or not students wanted to study more design and statistics. Contrary to the Trait-Factor Model it may be that so-called "traits" such as interest in social activities, are not quite fixed at the college level. The Investigative variable is positively correlated with scientist interests. Having a high interest in investigative activities is positively correlated with scientist interests. However, even the students with high Investigative inclinations lost interest in science.

With respect to the points raised at the beginning of this paper, if Holland variables are second order traits that influence the development of third order traits such as scientist and practitioner interests, they do not influence them in a simple linear fashion. Pre-dispositions may influence people to be interested in certain activities, but actual exposure to those activities itself determines level of interest as well.

Limitations

The limitations of this study included the fact that at Auburn University Montgomery, prior to 1999, a mathematical statistics course was required before students could take psychological statistics. This affected the study because many students in the psychology

statistics classes had already been exposed to statistics, and they may have already formed an opinion on whether or not they were interested in statistics. We were assuming that we would be studying people's initial exposure to statistics, seventy-three percent (73%) of the students in research design claimed to have taken statistics as well.

The major limitation was the small number of participants, especially for those taking a statistics class. There were a limited number of psychology students in the relevant classes initially, and some of these students dropped out of the study before it had been completed, either by dropping the class or failing to complete the SPI post-test. The low number of participants reduces statistical power. For example, the obtained correlation between science and practice for students who had a high number of psychology classes was -.27. Although this change toward a negative correlation matched predictions exactly, with only eighteen participants this correlation was not significant. Non-significant correlations technically have to be considered zero correlations.

Another limitation is the order in which Psychology majors take their classes. Our (incorrect) assumption was that design and statistics would be taken relatively early on, however, most students at AUM put off taking statistics until late in their undergraduate careers, and some take methods late in their careers. This increased the likelihood that they have had more exposure to the different aspects of psychology and better know what they are interested in.

Because no one was tested in classes other than methods and statistics, no control group existed to compare the change in scientist interests. This makes it impossible to

determine how much of the change in interest was due to methods or statistics classes, and how much was due to other reasons - such as exposure to psychology itself.

Direction for Future Research

More data could be collected from the undergraduate population to increase the number of participants. It would also be interesting to test undergraduate students' pattern of interest development upon exposure to practice-oriented classes such as abnormal psychology or better yet, clinical skills. We could also include some control group classes such as developmental psychology and biological psychology

Future research could follow psychology majors as they move through their undergraduate psychology program to observe the changes that take place over time. Students could be given a Scientist-Practitioner Inventory every semester. Ideally, those students could then be observed as they enter graduate school to determine if students' interests in science and practice continue to become negatively correlated as they begin graduate school. It would also be useful to run a pre-post study looking at changes in both scientist and practitioner interests and Holland codes. Perhaps as students lose or gain interest in scientist activities, they reevaluate their interest in investigative occupations.

Undergraduates who do research practica could also be studied to see how exposure to and familiarity with research, i.e. helping a professor collect data, or participating in studies, affects interest in scientist type activities. Based on the literature, this should lead even social type people to gain interest in research.

Conclusions

We expected that students come to psychology with certain traits, such as the predisposition for being attracted to social occupations or the predisposition for being attracted to investigative occupations. We thought that those who are predisposed to be attracted to investigative occupations would be more interested in scientific activities in a psychological setting than those attracted to social occupations, and that these Investigative students would gain or maintain interest upon exposure to scientific material. This is not what we found. Investigative inclinations are related to loss of interest in scientific activities upon exposure. We also expected that Social inclinations would be correlated with loss of interest in science upon exposure. Again, this is not what we found. Social students tend not to be that interested in science to begin with, but when they are exposed to scientific course work, some of them actually gained interest.

The Trait-Factor Model appears to be a more dynamic model than we considered. It is not just a matter of having a predisposition or trait and seeking an environment that matches that trait. People may have predispositions, assumptions, and stereotypes about what they might like, but when those assumptions are tested by experience with activities, sometimes people learn that their assumptions are wrong.

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Appendix I

Informed Consent Form

I am a graduate student at Auburn University Montgomery, and I am inviting you to participate in a study, which will be used for the completion of my Master's degree. I am studying the interests and preferences of undergraduate psychology majors in order to understand how interests in the occupation of psychology develop over time. You are being asked to participate because you are majoring in psychology. If you agree to participate you will be asked to complete a questionnaire which asks about both your preference for types of activities performed by psychologists and your preference for certain occupations. It will also include some brief demographic information about you. At the beginning of the term you will be given the first questionnaire. At the end of the term, you will be asked to respond again to the 42 questions about the interest in psychological activities. The total time for the administration of the original questionnaire is 30 minutes. The time needed for the follow up questionnaire is 10 minutes.

Your participation is voluntary and you may withdraw from this study at any time. There are no risks from participating in this study. Your responses to the questionnaire items will remain confidential. Please use your birth date to identify your questionnaire so we can match the responses you give now with the responses you give at the end of the term. Your confidentiality will be maintained at all times.

Your decision whether or not to participate in this study will not prejudice your future relations with Auburn University Montgomery, or Loras College.

For any questions you have that I do not answer at this time, or concerns about your participation in this study, please contact Dr. Peter Zachar, at Auburn University Montgomery at (pzachar@strudel.aum.edu), (334) 244-3306.

Thank you very much for your time and willingness to participate in this study.

Karen F.M. Manning
Psychology Graduate Student
Auburn University at Montgomery

YOU ARE MAKING A DECISION WHETHER OR NOT TO PARTICIPATE. YOUR SIGNATURE INDICATES THAT YOU HAVE DECIDED TO PARTICIPATE, HAVING READ THE INFORMATION PROVIDED ABOVE.

_____ _____

Signature of Participant Date

_____ _____

Witness Date

This study has been approved by the AUM Human Subjects Committee. It poses no risks, and protects participant confidentiality.

Appendix II-Pretest

This questionnaire is divided into three sections. Please use a number two lead pencil for all your responses.

Section I: Scientist Practitioner Inventory. Blue scanning sheet.

The following questions ask about interest in activities often performed by psychologists. Please indicate your answer by marking the appropriate number on the blue scanning sheet using the following scale:

1 = very low interest
2 = low interest
3 = medium interest
4 = high interest
5 = very high interest

1. Writing an article commenting on research findings.
2. Conducting a psychotherapy session with an individual client.
3. Analyzing data from an experiment you have conducted.

4. Conducting a diagnostic interview with a client.
5. Presenting research findings at a conference.
6. Planning a behavior modification program for a client.

7. Formulating a theory of a psychological process.
8. Designing a new treatment method for a mental health agency.
9. Designing an experiment to study a psychological process.

10. Administering a psychological test to a client.
11. Writing a scientific book for psychologists.

12. Conducting couples and family therapy.
13. Supervising student's research projects.
14. Consulting with school personnel about a new prevention program.
15. Collecting data on a research project you designed.

16. Organizing a treatment program in a mental hospital.
17. Reviewing journal articles.
18. Presenting a report during a case conference.

19. Applying for research grants.
20. Supervising practicum students in clinical and counseling psychology.
21. Writing research papers for publication.

22. Reading about new approaches to psychotherapy.
23. Reviewing the literature on an issue in psychology.
24. Giving advice about psychological problems on a radio talk show.

25. Working for a funded research institute.
26. Interpreting a test battery for a client.
27. Serving as an editor for a scientific journal.

28. Helping a client get in touch with feelings.
29. Learning new strategies for dealing with psychological problems.
30. Writing a statistical program.

31. Reading a book on innovative research designs.
32. Going through therapy to make yourself a better person.
33. Learning about a new statistical procedure.

34. Attending a conference on psychotherapeutic techniques.
35. Brainstorming about possible research with colleagues.
36. Consulting with other psychologists about a particular client's concerns.

37. Helping a colleague understand confusing statistical findings.

38. Reviewing an agency's intake form for a new client.
39. Developing new explanations of well accepted empirical studies.
40. Reading a book written by a famous psychotherapist.
41. Conducting group psychotherapy sessions.
42. Serving on a thesis or dissertation committee.

Section II: Vocational Preference Inventory

This in an inventory of your feelings and attitudes about many kinds of work.

1. On the red scanning sheet mark the occupations which interest or appeal to you by filling in a 1 for "yes".

2. Indicate the occupations which you dislike or find uninteresting by filling in a 2 for "no".

1 = Yes 2 = No

1. Criminologist
2. Private Investigator
3. Restaurant Worker
4. Detective
5. Photoengraver
6. Truck Gardener
7. Physical Education Teacher
8. Humorist
9. Photographer
10. Diplomat
11. Airplane Mechanic
12. Meteorologist
13. Poet
14. Sociologist
15. Speculator
16. Bookkeeper
17. Deep Sea Diver
18. Stock Clerk
19. Dramatic Coach
20. Lawyer
21. Fish and Wildlife Specialist
22. Biologist
23. Symphony Conductor
24. High School Teacher
25. Buyer
26. Business Teacher
27. Wrecker (Building)
28. Veterinarian
29. Elementary School Teacher
30. Physician
31. Auto Mechanic
32. Astronomer
33. Musician
34. Juvenile Delinquency Expert
35. Advertising Executive
36. Budget Reviewer
37. Prizefighter
38. Post Office Clerk
39. Experimental Laboratory Engineer
40. Bartender
41. Carpenter
42. Medical Laboratory Technician
43. Author
44. Speech Therapist
45. Manufacturer's Representative
46. Certified Public Accountant
47. Firefighter
48. Airplane Ticket Agent
49. Entertainer
50. Novelist
51. Hunting or Fishing Guide
52. Anthropologist
53. Commercial Artist
54. Marriage Counselor
55. Television Producer
56. Credit Investigator
57. Wild Animal Teacher
58. Administrative Assistant
59. Physical Therapist
60. Cashier
61. Surveyor
62. Zoologist
63. Free Lance Writer
64. School Principle

65. Hotel Manager
66. Court Stenographer
67. Stunt Man/Stunt Woman (Movies)
68. Route Salesperson
69. Professional Athlete
70. Flight Attendant

71. Construction Inspector
72. Chemist
73. Musical Arranger
74. Playground Director
75. Business Executive
76. Bank Teller
77. Jockey
78. Interior Decorator
79. Airplane Pilot
80. Banker

81. Radio Operator
82. Independent Research Scientist
83. Journalist
84. Clinical Psychologist
85. Restaurant Manager
86. Tax Expert
87. Motorcycle Driver
88. Sports Promoter
89. Referee (Sporting Events)
90. Mail Carrier

91. Electronic Technician
92. Writer of Scientific Articles
93. Portrait Artist
94. Social Science Teacher
95. Master of Ceremonies
96. Inventory Controller
97. Blaster (Dynamiter)
98. Police Officer
99. English Teacher
100. U.N. Official

101. Tree Surgeon
102. Editor of a Scientific Journal
103. Concert Singer
104. Director of a Welfare Agency
105. Salesperson
106. IBM Equipment Operator
107. F.B.I. Agent
108. Probation Agent
109. Astronaut
110. College Professor

111. Bus Driver
112. Geologist
113. Composer
114. Youth Camp Director
115. Real Estate Salesperson
116. Financial Analyst
117. Mountain Climber
118. Cook/Chef
119. Stage Director
120. Ticket Agent

121. Locomotive Engineer
122. Botanist
123. Sculptor/Sculptress
124. Personal Counselor
125. Publicity Director
126. Cost Estimator
127. Explorer
128. Nursery School Teacher
129. Quality Control Expert
130. Judge

131. Machinist
132. Scientific Research Worker
133. Playwright
134. Psychiatric Case Worker
135. Department Store Manager
136. Payroll Clerk
137. Test Pilot
138. Computer Programmer
139. Clothing Designer
140. Truck Driver

141. Electrician
142. Physicist
143. Cartoonist
144. Vocational Counselor
145. Sales Manager
146. Bank Examiner
147. Racing Car Driver
148. Forester
149. Social Worker
150. Sales Clerk

151. Funeral Director
152. Mind Reader
153. Architect
154. Shipping and Receiving Clerk
155. Criminal Psychologist
156. Insurance Clerk
157. Barber

158. Bill Collector
159. Ward Attendant
160. Masseur/Masseuse

Section III:

161.GENDER: (mark the appropriate number)
1 = MALE
2 = FEMALE

162.CLASSIFICATION: (mark the appropriate number)
1 = FRESHMAN
2 = SOPHOMORE
3 = JUNIOR
4 = SENIOR

163. HAVE YOU TAKEN AND COMPLETED STATISTICS?
1 = YES
2 = NO

164. HAVE YOU TAKEN AND COMPLETED METHODS OF PSYCHOLOGICAL RESEARCH?
1 = YES
2 = NO

165. HAVE YOU TAKEN AND COMPLETED ABNORMAL PSYCHOLOGY?
1 = YES
2 = NO

167. WHICH CLASS ARE YOU TAKING THIS TEST FOR?
1 = INTRODUCTION TO PSYCHOLOGY
2 = STATISTICS
3 = METHODS OF PSYCHOLOGICAL RESEARCH
4 = ABNORMAL PSYCHOLOGY

168. YOU ARE TAKING THESE INSTRUMENTS AS PART OF A PSYCHOLOGY COURSE. HOW INTERESTING DO YOU THINK THIS CLASS IS GOING TO BE FOR YOU?

1 = VERY UNINTERESTING
2 = UNINTERESTING
3 = MILDLY INTERESTING
4 = INTERESTING
5 = VERY INTERESTING

Appendix III-Post-Test

This questionnaire is divided into three sections. Please use a number two lead pencil for all your responses.

Section I: Scientist Practitioner Inventory. Blue scanning sheet.

The following questions ask about interest in activities often performed by psychologists. Please indicate your answer by marking the appropriate number on the blue scanning sheet using the following scale:

1 = very low interest
2 = low interest
3 = medium interest
4 = high interest
5 = very high interest

1. Writing an article commenting on research findings.
2. Conducting a psychotherapy session with an individual client.
3. Analyzing data from an experiment you have conducted.

4. Conducting a diagnostic interview with a client.
5. Presenting research findings at a conference.
6. Planning a behavior modification program for a client.

7. Formulating a theory of a psychological process.
8. Designing a new treatment method for a mental health agency.
9. Designing an experiment to study a psychological process.

10. Administering a psychological test to a client.
11. Writing a scientific book for psychologists.
12. Conducting couples and family therapy.

13. Supervising student's research projects.
14. Consulting with school personnel about a new prevention program.
15. Collecting data on a research project you designed.

16. Organizing a treatment program in a mental hospital.
17. Reviewing journal articles.
18. Presenting a report during a case conference.

19. Applying for research grants.
20. Supervising practicum students in clinical and counseling psychology.
21. Writing research papers for publication.

22. Reading about new approaches to psychotherapy.
23. Reviewing the literature on an issue in psychology.
24. Giving advice about psychological problems on a radio talk show.

25. Working for a funded research institute.
26. Interpreting a test battery for a client.
27. Serving as an editor for a scientific journal.

28. Helping a client get in touch with feelings.
29. Learning new strategies for dealing with psychological problems.
30. Writing a statistical program.

31. Reading a book on innovative research designs.
32. Going through therapy to make yourself a better person.
33. Learning about a new statistical procedure.

34. Attending a conference on psychotherapeutic techniques.
Brainstorming about possible research with colleagues.
36. Consulting with other psychologists about a particular client's concerns.

37. Helping a colleague understand

confusing statistical findings.
38. Reviewing an agency's intake form for a new client.
39. Developing new explanations of well accepted empirical studies.

40. Reading a book written by a famous psychotherapist.
41. Conducting group psychotherapy sessions.
42. Serving on a thesis or dissertation committee.

43. You are taking this test as a part of a psychology class. How interested are you in learning more about the material in this specific area of psychology?
1 = very low interest
2 = low interest
3 =medium interest
4 = high interest
5 = very high interest

44. Did you take a statistics class this term?
1 = YES
2 = NO

45. Did you take a methods class this term?
1 = YES
2 = NO

46. Did you take abnormal psychology this term?
1 = YES
2 = NO

47. How many other psychology classes have you taken?
(I WILL GIVE A LIST OF ALL PSYCHOLOGY CLASSES OFFERED AT UNIVERSITY HERE.)

48. Do you plan to go on to graduate school in psychology?
1 = YES
2 = NO
3 = UNDECIDED