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ABSTRACT

This study found no overall significant differences in open-closed mindedness between students majoring in education and those majoring in other fields as measured by the Rokeach D and F Scales. The sample consisted of 1,016 junior and senior students from Utah State University (USU) and 893 from Weber State College (WSC). At USU, differences among the means of the various majors were not significant for the D or F Scales, nor was the difference among the majors significant for the D Scale means for WSC. On the F Scale at WSC, however, the mean score for education majors was found to be significantly higher than the mean for social science majors. An additional analysis compared prospective secondary teachers and non-teachers in each academic major. There were no significant differences at USU, but at WSC non-teaching engineers scored significantly lower than did engineers who planned to obtain teaching certificates, while English non-teachers scored significantly higher on the D Scale than their teaching counterparts. Further analysis of data involved the factors of sex, city size of childhood residency, religion, church attendance, and state of childhood residency. The only overall significant difference found was for sex, with male students at each institution scoring higher than female students on both scales. The conclusion is that in general students entering teaching are no more closed minded than other college students. (RT)

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OPEN-CLOSED MINDEDNESS OF STUDENTS IN TEACHER EDUCATION AND IN OTHER COLLEGE FIELDS

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U.S. DEPARTMENT OF
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ACKNOWLEDGMENTS

Research which involves extensive cross-campus sampling such as was the case with the project reported here calls for a great deal of co-operation and support. Fortunately, individuals on both the Utah State University and Weber State College campuses were most gracious in providing us with the needed assistance.

At Utah State University, the contact with the central administration was through Vice-Provost Stanford Cazier. At Weber State College, Academic Vice-President Helmut P. Hofmann was particularly helpful in soliciting cross-campus support. On both campuses, the deans of the various colleges and schools went out of their way to assist us in contacting department heads and faculty in identifying those courses in which we would find majors in their areas. Above all, the faculty members upon whom we had to depend for the classes to whom our tests were administered were extremely cooperative. In only one case were we denied access to a class that had been selected for our sample. Although they will likely never see this report, we would also like to express our appreciation to the many students who took their time to fill out the data sheets which were the foundation of the entire study.

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We should also note that our secretary, June Andrews, has gone out of her way to provide the typing and other secretarial services necessary during the seemingly inevitable last minute rush of trying to meet research and research report deadlines.

CHAPTER I

INTRODUCTION

It is so widely recognized that our world has become an environment of change that it is commonplace and trivial to say so. But the implications for education are so broad that the obvious needs to be restated. The old methods, facilities, and modes of organization for instruction are no longer adequate, and means of continuous innovation must be built into the educational system (Lippitt, et al., 1958).

Paul Mort (1946) reported that when an educational innovation was introduced to meet some need, approximately 15 years would elapse before even three percent of the nation's schools instituted the change. However, complete diffusion would require as much as 50 years. Rogers (1966) indicated that 2.5 percent of the schools in the country were innovators, 13.5 percent were early adapters, 34 percent were late followers, with 34 percent being very late followers and 16 percent notorious laggards.

In the euphoria of enthusiastic curriculum development following Sputnik, it was predicted that the decade beginning in 1957 would be one of innovation and change in American education. Yet, in 1965 Francis C. Ianni, at the time director of the Division of Educational Research, U.S. Office of Education, stated, "the last ten years of research have not brought about the far reaching changes in practice that we hoped for. . ." (Carnegie Corporation of New York, 1965, p. 6).

The major area of resistance to change in education appears to be within the school system itself (Bhola, 1966). Teachers and administrators have often failed to accept the inevitability of change or to comprehend the increased rate of change (Glines, 1967). As teachers are an important link in any change involving the classroom, one might well ask, Do teachers tend to possess inappropriate personality characteristics for curricular innovation? If teachers are to be a part of meaningful and effective change in education, they must be psychologically open to change. According to Frymier:

> If they are defensive, closed, inadequate, and fearful, they will not be able to get at the new ideas "inside" their central nervous system to give it [sic] new meaning for them. Unless they can do this, the innovation can only be utilized mechanically and unthinkingly, or not at all. (1968, p. 2)

Or, as Sears put it:

> Those who reject information contrary to their belief-systems and stress hierarchial interpersonal relationships are more likely to hold an educational philosophical orientation which stresses a conservatism of the status quo in teaching and social relationships, and impersonal relationships with students. (1967, pp. 51-52)

An Approach to Cognitive Closedness

Milton Rokeach, concerned with general authoritarianism, developed a construct of open-closedness in belief and disbelief systems. As reported in The Open and Closed Mind (1960), a central proposition of Rokeach's theory is that the cognitive systems of closed minded (dogmatic) persons are highly resistant to change because of the very nature of their organization.[1]

Rokeach assumes that all people possess comprehensive belief-disbelief systems containing personal, religious, social, philosophical, scientific, political, and psychological beliefs.

> We mean it [the belief system] to include each and every belief and disbelief of every sort the person may have built up about the physical and social universe he lives in. We mean it to represent each man's total framework for understanding his universe as best he can. (Rokeach, 1960, p. 35)

People vary in the extent to which their systems are open to new beliefs. So, in that sense, varying degrees of openness to change are built into their psychological makeup.

Along these same lines, Harvey (1969) concluded that individuals whose belief systems may be characterized as being less authoritarian and/or dogmatic are more likely to have the prerequisites for innovation than persons whose belief systems are more authoritarian and/or dogmatic. If teachers are to effectively cope with the new and unexpected, Harvey suggested, they must be able to withstand uncertainty and stress, be committed to openness, and avoid over-generalization.

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[1]Discussed in greater detail in Chapter II.

There are research findings which support the idea that Rokeach's construct of open-closed mindedness is related to the acceptance of change by educators. For example, Childs (1966) found a significantly ($p<.01$) greater proportion of teachers and administrators with "open belief systems"[2] in innovative school districts (of course, we cannot be sure the relationship indicates cause and effect). Also, teachers who were closed minded identified significantly greater numbers of barriers to curriculum change (using the Dempsey Curriculum Barrier Questionnaire) than did teachers with open belief systems (Kerelejza, 1968). Ehrlich and Lee (1969, p. 249) concluded that a review of studies of dogmatism and resistance to change verified "the basic principle that closed-minded persons are less able than open-minded persons to learn new beliefs and to change old beliefs. . .". Childs (1966, p. 6) also concluded "that a relationship does exist between the adoption of a new practice and the degree to which an individual has an open belief system." Averill (1967) found a positive relationship ($p<.001$) between openness and participation in innovative activities. Meaningful and effective change in education, then, seems to some extent to be related to the psychological openness of educators.

Another consideration confronting education, besides the capability for educational change, is the influence and effect of the teacher in the classroom. Advances in transportation and communication, along with the explosions of population and knowledge, have created dramatic and dynamic problems for man--and, consequently, for education. It is becoming more important that individuals be capable of weighing data and values in order to make appropriate decisions to cope with modern problems. It is argued that the schools must concentrate on improving thinking.

The emphasis on thought process as an educational goal raises several questions. For example, what influences do closed minded teachers have upon their students? Soderbergh (1964) questioned whether students could develop creativity if taught by teachers who assumed to know the only answers to questions and who had discontinued searching for the truth. What impact does the teacher have when he refuses to admit that reasonable alternatives to his fixed opinions and procedures exist? Is it possible that Bertrand Russell (1950) was correct when he commented that pupils all too often have to go outside the classroom to discover what the vigorous minds of the time are saying?

In a study of the influence of dogmatism on critical thinking, Kemp (1960) reported that dogmatism was negatively related to performance on a test of critical thinking. According to Kemp, the closed minded person has difficulty in tolerating ambiguities and reaches "closure" prior to giving full consideration to the contributing evidence. On the other hand, "the more open-minded perceptually examine all aspects of the experience, try to clarify the ambiguity, and strive to see the relationship among parts" (Kemp, 1960, p. 318).

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2 As defined by scores on Rokeach's scale of dogmatism which is discussed in Chapter II.

Other research is relevant. For example, self-actualized teachers have been reported to be significantly more open minded than non-self-actualized teachers and to use a greater variety of teaching behaviors which encouraged the development of self-directed learning among their students (Smith, 1968). These findings, as well as other aspects of closed mindedness to be discussed in Chapter II, raise serious questions as to whether or not students will be brought to their creative and reflective potential when taught by closed minded teachers.

Educators faced with the need for significant change have used different approaches in attempting to change the schools. They have attempted to alter the curriculum, the pattern of school organization, the methods of instruction, and the leadership activities. All of these efforts, according to Frymier (1969),have generally been less than successful. He maintained that:

> In the past, many teacher educators hoped that prospective teachers would be able to modify their personality through experience on the job. They permitted such persons to move forward because they felt this was probably best for them as individuals. Consideration for the feelings and concerns of prospective teachers is important but not at the expense of the children they will teach. Difficult as it is, teacher educators and the profession at large have to work to draw a line at which they will admit some persons to educational practice, but not others. One criterion in drawing that line must be made to screen out those persons whose psychological makeup is such that they cannot entertain innovative ideas and propositions for change. (Frymier, 1968, p. 4)

The Focus and Purpose of This Study

Given the concern for innovation and for having open minded teachers in the classroom, it is of interest to ask "How do education students, preparing to enter the teaching profession, compare with college students in other fields regarding open-closed mindedness?"

Friedenberg (1959) has, for example, contended that selective factors are in operation which seemingly attract to the teaching profession people who are conceptually "timid and constrained". The profession may attract a disproportionate number of persons for whom security is more important than freedom in the conduct of their life or their professional activity. Halpin (1966) in his discussion of open and closed climates[3]

[3]Halpin contends that the climate is to the school system organization what personality is to the individual.

in schools raised some challenging questions:

> To what extent should we be concerned about the pool from which candidates for degrees in education have been drawn? Is there evidence to suggest that those students who choose teaching as their profession possess personality characteristics which predispose them to the very kinds of behavior that characterize the closed climate? (p. 234)

As will be noted later, little research has actually investigated the open-closed mindedness of prospective teachers, let alone compared them with other academic majors. What research has been reported on teacher personality has usually been tangential to open and closed mindedness.

The problem which is the basis for this study, is, then, the lack of research comparing the open-closed mindedness[4] of students majoring in education and in other academic fields.

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[4]Terminology presents some problems in a study such as this one. Typically, in this report "authoritarianism" refers to the personality syndrome measured by the F Scale, "dogmatism" to that measured by Rokeach's D Scale, and "open-closed mindedness" encompasses both. In practice, usage is not always clear because of Rokeach's use of closed mindedness and dogmatism as synonyms.

CHAPTER II

REVIEW OF RELATED RESEARCH

The purpose of this chapter is two-fold: (1) to give the reader a general overview of the theory of open and closed mindedness and the research based on it, and (2) to identify research particularly relevant to this study. It is not the intent of this review to provide an extensive coverage of all aspects of open-closed mindedness. Exhaustive reviews have been provided by Titus and Hollander (1957), Christie and Cook (1958), Kirscht and Dillehay (1967), Shaver and Richards (1968), Titus (1968), and Vacchiano, Strauss, and Hockman (1969).

The Authoritarian Personality

A consideration of open-closed mindedness must begin with the early research growing out of a concern with fascism. Prior to and during World War II, the concern for anti-Semitism, particularly as evidenced in Nazi Germany, motivated the American Jewish Committee to initiate a five-year study exploring the relationship between personality and political and social discrimination. This study resulted in The Authoritarian Personality written by Adorno, Frenkel-Brunswik, Levinson, and Sanford (1950).

In conceptualizing the authoritarian personality, Adorno and his associates were primarily concerned with the way in which an individual perceives and responds to authority--fascism in particular--with its extreme political-social ramifications. To measure these factors, they developed the F (Fascist) Scale[1] to get at potentially antidemocratic attitudes, or what they called the authoritarian personality. There were two objectives underlying the development of the F-Scale:

> . . .it was designed to be used as an indirect measure of prejudice without mentioning the names of any specific minority group; and it was designed to measure underlying personality predispositions toward a fascistic outlook on life. . . . (Rokeach, 1960, p. 12)

Following is a brief discussion of (1) the authoritarian personality syndrome, (2) the validity of the F Scale as used to measure the authoritarian personality, and (3) the reliability of the F Scale.

Description of the Authoritarian Personality

The Berkeley investigators were concerned with a syndrome of personality variables, all dynamically related to prejudice. The

[1]A copy of one form of this scale is contained in Appendix B.

variables are listed below, together with a brief description of each (Sanford, 1956, p. 1):

1. Conventionalism. Rigid adherance to conventional middle class values.

2. Authoritarian Submission. Submissive, uncritical attitude toward idealized moral authorities of the in-group.

3. Authoritarian Aggression. Tendency to be on the lookout for, and to condemn, reject, and punish people who violate conventional values.

4. Anti-intraception. Opposition to the subjective, the imaginative, the tenderminded.

5. Superstition and Stereotypy. Belief in mystical determinants of the individual's fate; the disposition to think in rigid categories.

6. Power and toughness. Preoccupation with the dominance-submission, strong-weak, leader-follower dimension; identification with power figures; exaggerated assertions of strength and toughness.

7. Destructiveness and Cynicism. Generalized hostility, vilification of the human.

8. Projectivity. Disposition to believe that wild and dangerous things go on in the world; the projection outward of unconscious emotional impulses.

9. Sex. Ego-alien sexualtiy; exaggerated concern with sexual "goings on", and punitiveness toward violators of sex mores.

Although the subparts of the authoritarian syndrome can be listed in this manner, they were thought of as interrelated parts of an enduring personality structure that rendered the person receptive to anti-democratic propaganda. Each item of the F-Scale presumedly measures one or more of the nine categories of authoritarianism, and the total score is supposedly a measurement of antidemocratic trends in a person.

Validity of the F Scale

Christie and Cook (1958) listed 230 titles through 1956 in their review of the research related to the authoritarian personality. In their summary of the research, they concluded:

> Although there are serious problems in evaluating the research, the over-all picture shows consistency of findings in many of the most intensively studied areas. The E [Ethnocentrism] and F Scales are found to be significantly correlated in a wide array of samples and predictions of relationships with attitudinal measures are most invariably confirmed. (Christie & Cook, p. 189)

At later dates, reviews by Brown (1965, p. 524), Shaver and Richards, (1968), and Warr, et al., (1969) generally supported this conclusion.

Attempts to establish the validity of the F Scale have been made using classroom observations of teachers. McGee (1954) obtained a .58 correlation between the F Scale and ratings of the observed overt, non-verbal behavior of teachers obtained in a single 50-minute classroom setting. He also reported that in the case of the 95 subjects on whom repeat observations were available, the correlation raised to .63--"A finding which strongly suggests that the relationship between an individual's verbal responses and other overt, non-verbal responses is closer than appears at first glance" (p. 109). If sufficient time for repeat observations were made available, McGee claimed, "it seems safe to conclude that teachers' classroom behavior can be predicted with fair accuracy from scores on the F-Scale" (p. 114).

Lambert (1958) verified McGee's finding by using 40 teachers and 20 principals selected from the upper quartile and the lower quartile of F Scale scores. Scoring 30 minute group discussions, his judges were able to identify the authoritarians and non-authoritarians correctly 90% of the time.

Wells and his associates (1957) used another method to gather validity data. Using a "Guess Who Technique", the investigators had college students rank five fraternities on an authoritarian-nonauthoritarian reputation continuum. They then administered the F Scale and compared the mean scores for the members of the five fraternities. They obtained significant F-Ratios ($p<.01$, $p<.001$) for data collected for each of two years. Jones (1954) found that authoritarian individuals were considered less able in their perceptions, and judgments, and Frymier (1959a) found they were rejected more often by their peers.

One concern with the F Scale that has plagued researchers--e.g., Cronbach (1955), Bass (1955), Jackson and Messick (1958), Chapman and Campbell (1957), Altemeyer (1969)--is the role of response bias or acquiescence set.[2] Kirscht and Dillehay (1967), after reviewing 252 separate research studies, considered the problem of acquiescence as the most endemic shortcoming of the F Scale.

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[2]When a subject selects (agrees with) categories of response regardless of the content of the question, it is called acquiescence set.

The most vigorous critique of the effects of response set on the F Scale (as well as on the Dogmatism Scale to be discussed later) came from Peabody (1966). He maintained that response set was likely to be operating because the F Scale is ambiguous (vague, unstructured, difficult to understand). Using the MMPI as an example of a test free of response bias (Block, 1965), Peabody used sentence length as an operational measure of ambiguity. He reported a sentence mean of 11.2 words for the MMPI, with means of 17.3 and 20.9 words for the F and D Scales. Because of the sentence length, Peabody concluded, "The specific content of [F, D, and Anti-Semitism] statements is highly ambiguous. . ." (1966, p. 13).

Rokeach (1967), in response, pointed out that Peabody also used the PEC (Political Economic Conservatism) in his analysis. Rokeach contended that if sentence length is a valid measure of ambiguity (as contended by Peabody), the number of words per sentence on the PEC Scale should be low. Yet, Rokeach reported that the average word per sentence length of that test was 18.5. He also claimed that

> the dogmatism items were deliberately constructed to be as unambiguous as possible; if they are still ambiguous, this is so despite painstaking efforts over a 3-year period to word them unambiguously. (Rokeach, 1967, p. 350)

Rokeach also noted his doubts that the authors of the other scales (F, Anti-Semitism) had deliberately constructed ambiguous statements.

In attempting to correct the tendency to agree with the items regardless of content (response bias), researchers (e.g., Bass, 1955; Chapman & Campbell, 1957) have attempted to balance the F Scale by wording half of the original items as reversal statements rather than having all items worded "positively".

Christie, Havel, and Seidenberg (1958) and Peabody (1961) concluded that since subjects agreed (or disagreed) with both the originals and their "opposites"[3], response acquiescence was definitely a factor affecting the F Scale.

Other investigators (Block, 1965; Rokeach, 1963, 1967; Rorer, 1965) have contended that their findings indicate that it is inadvisable for theoretical reasons to use reversals in authoritarianism scales. Basically there are two reasons: (1) Using two content-related factors could

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[3]Double agreement according to Rokeach (1967) occurs when a person agrees with a statement on a scale and also with its opposite. He indicated three possible reasons for double agreement: Response bias, telling the truth one time and lying the next, or "because he believes both statements, yet remains unaware of the contradiction through an act of compartmentalization or because he has a weak need for logical consistency" (p. 349).

account for double agreements, e.g., pro-fascists tend to agree with F "positive" items because they are "true" and with F "negative" items because it is socially the thing to do (Rokeach, 1960); (2) "Working with the premise that agreement is an aspect of authoritarianism, several investigators [Leavitt, Hax, & Roche, 1955; Gage, Leavitt, & Stone, 1957; Gage & Cattergee, 1960] have concluded that use of the F positive items enhances the discriminability or validity of the scale" (Kirscht & Dillehay, 1967, p. 23).

Rorer (1965), in his 28-page review of response biases and response sets, indicated that the F and D Scales are composed of items which are phrased so that agreement with them indicates authoritarianism. He concluded

> the inference that response styles are an important variable in personality inventories is not warranted on the basis of the evidence now available. . .there is no reason to believe that respondents are guessing when they respond to objective personality, attitude, or interest inventory items. Therefore, it should not be assumed that results obtained in guessing situations can be generalized to apply to inventory responses.[4] (Rorer, 1965, p. 150-151)

In a recent article on response set, Altemeyer (1969) reported his research investigating reversal statements. He constructed 15 reversed items, and reported means (for 84 Manitoba undergraduate subjects) of 99.9 on the original scale and 100.0 on the balanced F Scale. He summarized by stating, "if there is no difference [in the subsequent results using the two scales], one might well conclude that a 'balanced' scale is measuring essentially the same thing that the unbalanced one does, which would seem to conform Rorer's emphatic reservations" (Altemeyer, 1969, p. 418).

Another methodological procedure for attempting to establish the empirical validity of the F Scale is to consider the results of studies conducted in cultures or subcultures which are known to be more authoritarian.[5] Cross cultural studies usually have strongly supported the validity of the F Scale.

Cohn and Carsch (1954) reported a mean item F Scale score of 5.26 for a group of German workers, which was the highest mean reported to

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[4]Rorer attributed the concept of response set to Cronbach who popularized the idea in research reported in 1941, 1942, 1946, and 1950. Cronbach reported that less bright students were forced to guess more and therefore he concluded that if the "true" and "false" ratio were not equivalent, the test had a response set. Rorer referred to response style as a myth which does not apply to personality and attitude inventories.

[5]"Method of Known Groups" (Rokeach, 1960).

that date. This study appeared to verify the common stereotype that Germans are authoritarian. Shaver and Richards (1968; Shaver, Hofmann, & Richards, in press) reported a mean item score of 3.84 for their sample of German education students. When compared with the mean (3.15) of a sample of American teachers, the difference was significant beyond the .001 level.

Melikan (1959) reported higher F scores for Egyptian than American subjects. Diab (1959) also reported a significantly higher F Scale score for Arabian students attending American universities than for American subjects attending the same universities.

Cross cultural findings must be interpreted with caution in that translation of items may not be accurate; or, even if accurate, cultural differences may provide a different meaning for an item on the scale (Gordon & Kikuchi, 1966; Coladarci, 1959; Niyekawa, 1967). Caution must also be exercised in interpreting subcultural studies because differences are likely to be confounded with other factors such as education, religion, or urban-rural background.

Significant differences have been reported in subcultural studies in America in which rural and urban Ss were used. Frymier (1960), using the F Scale with two matched subgroups of 52 high school students from urban Michigan and rural Alabama and controlling for age, sex, time in area, race, and grades, found the southern rural group to be significantly ($p<.001$) more authoritarian than the northern urban group.

Sales and Rosen (1967) contended that their data from urban and rural factory workers indicated that caution should be exercised in interpreting F Scale scores. Validity from one population cannot be assumed to hold for another population or even for all subgroups within a given population. They further contended that the validity of the F Scale has been established only for the middle-class urban Americans, and that the validity of the scale for other socio-economic groups was still open for question.

Using 282 freshmen from a negro state college in Maryland, Kelman and Barclay (1963) reported a significantly ($p<.01$) lower mean item score (4.39) for the subjects born in Maryland and surrounding states as compared to the mean score (4.75) of their southern subjects.

The relationships of other variables, such as conformity, to authoritarianism have also been studied, with conflicting results. Some researchers (Kemp, 1960, 1962a, 1962b; Harvey, 1963; Allport, 1964; and Kirtley, 1968) have reported positive correlations between authoritarianism and conformity, while others (Hardy, 1957) have reported a lack of correlation between F Scale scores and conformity. Johnson and Steiner (1967) concluded from their research that

> both authoritarianism and conformity are susceptible to cultural influences. Consequently, it seems probable that subjects drawn from markedly different societies, or strata within a society might provide data that would indicate rather different relationships between these two variables. (p. 203-204)

Intelligence is another variable which has received considerable attention in the research in an attempt to support the validity of the F Scale.

Several major reviews (Titus & Hollander, 1957; Christie & Cook, 1958; Kirscht & Dillehay, 1967; Shaver & Richards, 1968) have reported correlations between intelligence and F Scale scores as being generally negative. Representative of the correlations reported in the research are: -.48 between F and Otis I.Q. scores (Adorno, 1950), -.48 between F and I.Q. scores (Cohn, 1952), -.24 ($p<.05$) between F and Naval General Classification Test scores (Davids & Ericksen, 1957), negative correlations ($p<.001$) with five measures of intelligence (Jacobson & Rettig, 1959). Davids (1956) claimed that a -.60 correlation between F scores and college grades tended to support the hypothesis of a negative relationship between intelligence and F Scale scores. However, Kuhlen and Dipboye (1959) reported a nonsignificant correlation between scores on the American Council on Education Examination on the F Scale, and Shaver and Richards (1968) reported nonsignificant correlations with Otis I.Q. scores.

The negative relationships between F scores and intelligence have been cited in support of the F Scale's validity, but have also raised some concern for its validity. It may be argued that more intelligent people read more or have more education and, therefore, are likely to be more open, or that educated and intelligent people are more test wise and simply figure out the response which tends toward a more democratic, acceptable response.

A serious question regarding the validity of the F Scale which has been a concern to researchers (e.g., Shils, 1954; Christie & Jahoda, 1954; Barker, 1963; Rokeach, 1960; Plant, 1965; Hanson, 1968) is, "Does the F Scale differentiate subjects varying from the political left to the political right in beliefs?"

Inasmuch as the Dogmatism Scale is a direct outgrowth of this last concern with the validity of the F Scale, studies in regard to the measurement of closed mindedness in the political left and right are discussed later in this chapter under the subheading, "Validity of the D-Scale."

Reliability of the F Scale

Generally, reliability coefficients for the F Scale have been consistently high, e.g., split half correlations have been reported by McGee (1954), r = .90; Rokeach (1956), r = .81, .78; Lambert (1960), r = .88; Rokeach & Fruchter (1965), r = .84. Rowan (1963) reported a test-retest coefficient of .86 over an eight-year lapse in time. However, Shaver and Richards (1968) reported an F Scale reliability coefficient (split half corrected with the Spearman Brown Formu of only .55. They suggested that this low reliability estimate for the F Scale might be due to a chance poor split of items. Applying the Kuder Richardson Formula 21[6], they obtained an r = .90. This indicated that the true reliability of the F Scale with their subjects was likely higher than the split-half estimate.

Dogmatism: The Open and Closed Mind

The intent of this section is to provide a discussion of (1) the theoretical construct of dogmatism and its origin, (2) the characteristics of open and closed minded people, (3) the validity and the reliability of the D (Dogmatism) Scale.

Theoretical Development of the D Scale

After publication of The Authoritarian Personality, several psychologists (Rokeach, 1954; Shils, 1954; Christie & Jahoda, 1954;) argued that the F Scale tapped only authoritarianism of the political right. Stirred by this concern for the validity of the F Scale, Rokeach (1956, 1960; Rokeach & Fruchter, 1956; Fruchter, Rokeach, & Novak, 1958) undertook investigations to establish a more general concept of authoritarianism in which intolerance, anti-Semitism, and ethnocentrism would be theoretically and operationally linked to more than "rightist" or "fascist" authoritarianism. In his effort to find a description of cognitive functioning that would apply equally to extremists of the political left and the political right, Rokeach (1960) developed a theory of dogmatism as a general extension of the construct of authoritarianism. In doing so, he synthesized "three highly related sets of variables: (1) closed cognitive systems, (2) authoritarianism, and (3) intolerance", (Rokeach, 1954, p. 194).

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[6]"The formulas used in the Method of Rational Equivalence tend to give slight underestimates of the 'true' value of the reliability coefficient. The authors believe that it is better to overestimate the relative amount of measurement error than to underestimate it" (Richardson & Kuder, 1939, p. 684).

At the cognitive level, Rokeach viewed all cognitive systems as having three major organizational dimensions: A belief-disbelief dimension, a central-peripheral dimension, and a time perspective dimension.

The belief dimension represents all of the beliefs, expectations, sets of hypotheses (conscious or unconscious) that an individual at a given moment in time accepts as true. The disbelief dimension is composed of a number of subsystems and contains all of the claims and expectations (conscious or unconscious) that a person rejects (to one degree or another) as false (Rokeach, 1960, p. 33).

The central-peripheral dimension is composed of three regions: central, intermediate, and peripheral (Rokeach, 1960, pp. 40-51). Central beliefs are a person's "primitive" beliefs (basic assumptions about the nature of the world and his "self"). The intermediate region contains beliefs concerning the nature of authorities and their assistance in interpreting the world. The peripheral region is made up of all non-primitive beliefs and disbeliefs based on authority, even though the derivation from authority may not be consciously perceived.

The potential for communication among the three central-peripheral regions is always present. However, the parts may or may not be in communication. The degree to which communication exists is a part of the structure of the system or the "how" of the belief-disbelief system. "It is precisely this isolation [lack of communication] or segregation of parts which describes their relationship and makes possible certain predictions about behavior"[7] (Rokeach, 1960, p. 33).

In regard to the time perspective dimension, Rokeach considered closed cognitive systems to be organized in a relatively future-oriented or past-oriented direction rather than in a balanced orientation of past, present, and future. The manner in which these three time dimensions are related to each other within the belief-disbelief system determines the breadth or perspective of time. A narrow time perspective is one in which a fixation is on the past, present, or future with little regard given to the continuity and relationship that exists between them. Consequently, according to Rokeach, "persons who have a completely past-, or present-, or future-oriented time perspecrive are all seen to have equally narrow time perspectives even though their perceptions of the past or of the future may cover a very long time span" (Rokeach, 1960, p. 51).

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[7]"The more closed the system, the more will a change in a particular peripheral belief be determined by a prior change in the intermediate (authority) region. Further, the primitive and intermediate regions are assumed to control not only what will be represented in the peripheral region but also what will not be represented, that is, narrowed out." (Rokeach, 1960, p. 78)

These three organizational dimensions (belief-disbelief, central-peripheral, and time perspective) of the belief-disbelief system are interrelated and work "together theoretically to produce a mind which, in its totality, can be fruitfully described as varying [along a continuum] in the degree to which it is an open and closed mind" (Rokeach, 1960, p. 53). A person who is relatively closed minded is referred to as dogmatic.

Belief-disbelief systems can be further described "in terms of [the] formal content of centrally located belief, especially those having to do with beliefs about authority and people in general" (Rokeach, 1954, p. 195). Dogmatism then, according to Rokeach, (1954, p. 195) involves

> (a) a relatively closed cognitive organization of beliefs and disbeliefs about reality, (b) organized around a central set of beliefs about absolute authority which, in turn (c) provides a framework for patterns of intolerance and qualified tolerance toward others. A cognitive organization is considered to be closed to the extent that there is (a) isolation of parts within the belief systems and between belief and disbelief systems,[8] (b) discrepancy in the degree of differentiation between belief and disbelief systems, (c) dedifferentiation within the belief system, (d) a high degree of interdependence between central and peripheral beliefs, (e) a low degree of interdependence among peripheral beliefs, and (f) a narrowing of the time perspective.

The hypothetical construct of dogmatism affords a useful way of looking at cognitive functioning. One might ask, then, what has research contributed to the attempt to describe the dogmatic individual.

Description of the Open and Closed Minded Person

It has been argued that the traits defining the so-called open and closed minded person are merely part of a "broad dimension of personality which underlies all social attitudes, including the religious, political, artistic, moral, punitive and scientific" (Wilson, 1968, p. 58).

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[8] The more closed the system, the more the central parts correspond to absolute beliefs in or about authority and the more the peripheral parts correspond to beliefs and disbeliefs which are perceived to emanate from such authority.

The dogmatic personality[9] may be defined by a number of variables, with different combinations from person to person. No one individual can be said to possess all the characteristics attributed to either the open or closed minded person. However, a general description is becoming more feasible as a result of research based on Rokeach's theoretical construct.

Plant and his associates (1965), employing the Allport, Vernon, and Lindsey Study of Values (AVL) and five scales of the California Psychological Inventory (CPI), found high dogmatics to be psychologically immature, impulsive, defensive, and stereotyped in their thinking. In other studies, high dogmatics have been reported to be less tolerant, flexible, and secure (Korn & Giddan, 1964), low in ego strength, anxious, lacking in confidence in themselves and lacking in self-acceptance or self-satisfaction and self esteem (Vacchiano, et al., 1968; Pannes, 1963), unable to accept changing conditions (Fillenbaum & Jackman, 1961; Fillenbaum, 1964; Engle, 1961; Harvey, 1969), low in cognitive complexity and more leader oriented (Nidorf & Argabrite, 1968). The dogmatic individual has also been found to be less creative (Zagona & Zurcher, 1964) and likely to experience "great difficulty in the examination of ideas on the basis of intrinsic worth and the integration of ideas into a new system" (Kemp, 1962a, p. 14). Closed minded indi iduals also were considered to be less self-actualized (Smith, 1968).

Vacchiano and his associates indicated:

> In regard to their conservatism, the dogmatic subjects are confident in what they have been taught to believe, accept as tried and true despite inconsistencies, and are cautious and compromising in regard to new ideas, generally going along with tradition. (1968, p. 4)

Fillenbaum and Jackman (1961) found that subjects with low scores on the D Scale had relatively low scores on a measure of anxiety. Those subjects with high anxiety scores also had high D-Scale scores. Research by Zagona and Zurcher (1964) has indicated that highly dogmatic people are characterized by a strong need to structure their stimulus environments. This need is related to anxiety in that the more structure that the high dogmatic provides, the less his anxiety (Rokeach and Fruchter, 1956).

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[9]Dogmatism is considered to be a more inclusive measure of authoritarianism than that defined by Adorno and his associates. In Rokeach's words, "were it not so clumsy, we would have preferred to call this scale, 'The Open-Closed Belief System Scale.' The term dogmatic will be used throughout as synonymous with closed. Persons scoring high on this scale will be assumed to have relatively closed systems, and persons scoring low will be assumed to have relatively open systems." (Rokeach, 1960, pp. 19-20)

Eckhardt (1968) reported that the high dogmatic identified himself with upper-class people and values, opposed himself to lower-class people, and was inclined to repress lower-class values in regard to sex and aggression in himself. "Projective studies suggested that these represented desires were projected upon people believed to be inferior" (Eckhardt, 1968, p. 33). High dogmatics tend to project overt aggression (Newsome & Gentry, 1963) against low status subjects, but not toward high status subjects (Gladstone, 1969).

Conway (1963, 1967), after studying problem solving in small groups as a function of open-closed mindedness, reported that groups composed of all closed minded individuals warded off threats by refusing to contribute to the situation and by avoiding taking a stand on the belief in question. However, in mixed groups (containing both open and closed minded college students), more like the usual classroom situation,

> The closed minded person cannot deter a conflicting belief through silence, instead, he must externalize irrelevant internal pressures, vocalizing or verbalizing frequently so as to direct the discussion away from the merging threat. (Conway, 1963, p. 89)

Conway (1969) suggested again that closed minded students who are not in agreement with the instructor's goals attempt to protect their threatened belief systems by argumentative verbalizations. He concluded that, in a classroom in which the instructor is attempting to foster the freedom to explore concepts and to listen to opposing points of view, an opportunity might be created for exploitation by the closed minded person. The highly dogmatic person would aggressively defend his system of beliefs to prevent its alteration.

In another study (Zagona & Zurcher, 1964), 30 undergraduate subjects with high dogmatism scores were assigned to one discussion section and 30 with low dogmatism scores to another section. The subjects were observed for one college quarter. The dogmatic subjects preferred lecture to discussion, and they preferred objective and structured examinations. This group also showed a greater dependence upon the professor and they were reported as being more anxious and compulsive in behavior. In addition, Zagona and Zurcher (1964) conducted two smaller experiments in which groups from each of the two sections of high and low dogmatics met and discussed controversial issues. When the professor challenged the consensus reached by these groups, the agreement of the high dogmatics disappeared; however, the consensus in the nondogmatic groups was not altered by the professor's challenge.

Kirscht and Dillehay (1967) maintained that looking at specific belief items or behavioral responses contributed little to the understanding of the phenomenon of dogmatism. They claimed it was more useful to define general authoritarianism or dogmatism in terms of cognitive style:

> The genuine authoritarian [dogmatic] lacks ability to deal with novel cognitive material, seeks rapid closure when exposed to new situations and ultimately depends heavily on external authority for support of his belief system. To be sure, the style is mediated and maintained through a set of beliefs and through patterns of behavior which themselves are subject to social reality. The particular beliefs and behaviors vary from person to person, but the style of cognition is relatively permanent. To identify the closed-minded person, an observer would need to see a range of responses, especially reactions to situations involving issues of central concern to the subject. (p. 131)

Taken together, the above findings "form a logical personality profile which substantiates Rokeach's formation of internal belief-structures, that is, attitudes characterized as dogmatic or nondogmatic, and extends the concept of dogmatism from an attitude system to a personality pattern" (Vacchiano, et al., 1968, p. 84-85).

Considerable research has been directed toward Rokeach's statement that:

> [A] basic characteristic that defines the extent to which a person's system is open or closed. . .[is] the extent to which the person can receive, evaluate, and act on relevant information received from outside on its own intrinsic merits, unencumbered by irrelevant factors in the situation, arising from within the person or from the outside. (1960, p. 57)

Most research in this area (e.g., Fillenbaum & Jackman, 1961; Mikol, 1960; Kaplan & Singer, 1963; Burke, 1966; Masella, 1967; Jacoby, 1969) has supported this concept. Still other researchers (e.g., Restle & Rokeach 1964; Costin, 1965; 1968; Kemp, 1960, 1962a, 1963; Wu, 1968; Ehrlich & Lee, 1969) have attempted to test Rokeach's statement through research concerned with learning. Their findings have supported the general hypothesis that high dogmatics would be less able to learn new concepts than would low dogmatics. However, B.R. Johnson's (1966) findings did not support the hypothesis that the more dogmatic a person was, the less efficiently he would perform on tasks involving perceptual synthesis. He reported a curvilinear relationship between D Scale scores and performance on perceptual-cognitive analysis tasks, with medium dogmatics doing better than high and low dogmatics. Johnson concluded that the curvilinear relation between the D Scale and performance called to question Rokeach's theory by implying that extreme open mindedness can be as disruptive intellectually as closed mindedness.

Uhes and Shaver (1970) have noted that studies have often been designed so that curvilinear relationships between authoritarianism and learning could not be investigated. Vacchiano et al., (1969) also pointed out that "most researchers [e.g., Levy & Rokeach,(1960), Clark (1968), Zagona & Kelly (1966), Tosi, Quartana, Frumkin (1968), Kleck & Wheaton (1967)] fail to include a full range of dogmatism scores in their study samples, using only HD [high dogmatics] and LD [low dogmatic] extremes" (p. 209).

Rokeach's construct of dogmatism is basically a description of how individuals organize belief systems. Because high dogmatics tend to have impermeable lines between the various regions of their belief systems, there is some question as to how well they would remember inconsistent ideas.

Smith (1968), using 592 Protestant students attending a church related college (mean D Scale score of 141.63), found that individuals do tend to know and believe more facts which support their opinions than facts which logically contradict their opinions. Yet, Smith did not find support for the hypothesis that the proportion of individuals knowing and believing more supporting than contradictory facts would be greater for high dogmatics than low dogmatics. Instead, he found that highly dogmatic subjects were more likely to be characterized by more information contractory to their opinions than were low dogmatics.

Smith explained the unexpected finding as follows:

> . . .low dogmatics, when highly interested, place their cognitive items in logical juxtaposition and change their opinions to fit the knowledge they know and believe while high dogmatics successfully compartmentalize the cognitive items, thereby retaining and believing information which is actually contradictory to the opinions they hold on the issue. (Smith, 1968, p. 259)

Validity of the D Scale

The studies discussed in the previous section support the validity of Rokeach's construct of dogmatism, and of the Dogmatism Scale, in that high dogmatics do tend to have the characteristics he proposed. In terms of the validity of the scale based on that construct, it is of interest to ask whether the D Scale does, in fact, measure something different from the F Scale.

Even though the authors of The Authoritarian Personality (1950) admitted that they had emphasized primarily the study of pre-fascist tendencies, with general authoritarianism as a secondary concern, many researchers proceeded to use the F Scale as a measure of general authoritarianism. Earlier in this chapter, we discussed the F Scale as a measure of only the political right. Several studies have investigated the D Scale as a measure of both the political right and left.

Plant (1960), using 2350 college students, substantiated Rokeach's contention that the Dogmatism Scale was a better measure of general authoritarianism than the F Scale in that the D Scale "picks up" those individuals of both the political right and political left. More recent studies (e.g., Barker, 1963; Hanson, 1968) have verified this finding.

Rokeach (1956, 1960) in his work with the Opinionation Scale[10] and F and D Scales reported that F Scale scores correlated .54 with right-opinionation, but only .02 with left-opinionation; on the other hand, dogmatism scores correlated positively with both left and right opinionation (.21 and .35 respectively), even though left- and right-opinionation correlated negatively with one another (Rokeach, 1967, p. 353). Rokeach (1960, pp. 112-114) found that New York nonbelievers (in religion) and English communists scored high on dogmatism and left-opinionation, but relatively low on right-opinionation and on the F and Ethnocentrism Scales.

In general, reviews (Vacchiano,Strauss, & Hockman, 1969; Shaver & Richards, 1968; Kirscht & Dillehay, 1967) of the D Scale have been much less critical than the earlier reviews of the F Scale. For example, the concern with negative correlations between F Scale scores and intelligence scores has not been presented because correlations between D Scale scores and intelligence scores have generally been small and non-significant (Rokeach, 1960, pp. 105, 109, 210, 222, 262). Shaver and Richards (1968), citing 14 references on intelligence and dogmatism concluded, "In any event, although some studies report significant dogmatism-intelligence relationships in contradistinction to Rokeach's findings, it is clear that the relationship, if any, is negative and small" (p. 26). This conclusion was verified by results obtained in their Utah State University sample of college education students.

A major criticism (e.g., Peabody, 1966) of the D Scale has been that the items are stated so that agreement indicates dogmatism. This makes the D Scale subject to the same type of response bias problems as discussed previously in regard to the F Scale. Rokeach (1967) in his comment on Peabody's work pointed to the lack of independent evidence confirming the ambiguity of the scale items and he reiterated the corroborative findings linking D Scale scores to general authoritarianism.

Another concern has been that correlations between the D and F Scales are relatively high, ranging from .54 to .82 (Kelly, 1956, 1960; Rokeach & Fruchter, 1956; Fruchter, et al., 1958; Pettigrew, 1958).

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[10]The Opinionation Scale was "designed to measure individual differences on the extent to which we accept or reject others depending on whether they agree or disagree with us." (Rokeach, 1960, p. 20) It was primarily constructed to measure intolerance. The scale contains 40 items, 20 of which were left- and 20 right-opinionation items.

Therefore, the criticism is offered that the two scales are measuring the same trait. However, Rokeach (1960, p. 121) has maintained that if one scale measures a general form of authoritarianism and the other a particular form, then we should expect to get sizeable positive correlations between the two measures.

Although numerous studies of the F and D Scale have been reported, comparatively little attention has been given to the factor structure of the two scales. Considerable support for the distinctiveness of the two measures come from a study by Kerlinger and Rokeach (1966). Applying the principal axes method and oblique proequamax rotations (p. 392), they factor analyzed responses to individual scale items by 1,239 subjects (537 Michigan State University undergraduates, 371 Louisana State University undergraduates, 331 Division of General Education at New York University adult students--business men, housewives, etc.).

Correlations between the total F and D Scale scores in all three samples were substantial--from .65 to .77 (p. 392). Of the 10 first-order (oblique) factors, three were mixed between the F and D Scale, three factors were F, and four factors were D. The factors reported were (Kerlinger & Rokeach, 1966, p. 394-395):

Factor I: Virtuous Self-Denial (Mixed items from F and D Scales)
Factor II: Belief in One Cause (D Scale Items)
Factor III: Authoritarian Aggression (F Scale items)
Factor IV: Submission to Ingroup Authorities (F and D Scale items)
Factor V: Projectivity and Superstition (F Scale items)
Factor VI: Belief in One Truth (D Scale items)
Factor VII: Isolation-Alienation (D Scale items)
Factor VIII: Impulse Control (F Scale items)
Factor IX: Self-Proselytization (D Scale items)
Factor X: (Unnamed) (D Scale items)

Further factor analyses yielded three second order factors: Dogmatism, Fascistic Authoritarianism, and Authoritarian Aggression and Submission (p. 397). Kerlinger and Rokeach concluded that the F and D Scales were factorially discriminable even though both are measures of authoritarianism.

Warr, Lee, and Joreskog (1969), utilizing the data from the Kerlinger and Rokeach (1966) study, carried out two different analyses. In one analysis, 21 factors rather than the 10 factors described by Kerlinger and Rokeach were obtained. However, the factors were similar in nature. In another analysis using the Joreskog method and varimax rotations they again found factors similar to those reported by Kerlinger and Rokeach.

In a second study Warr and his associates (1969) utilized a sample of 421 subjects from England, the D Scale, and their own F Scale. They obtained similar results and noted that "despite high F-D inter-correlations and our initial skepticism, we have to conclude that dogmatism may validly be separated from authoritarianism" (Warr, et al., 1969, p. 123).

Factor analyses involving only the D-Scale were conducted by Vacchiano, Schiffman, and Strauss (1967). They employed three independent factor analyses of the items on the Dogmatism Scale for three groups of data (87 males, 89 females, and a combined male and female group). Item factors tended to form around Rokeach's (1960) definition of D Scale items and the authors concluded that the D Scale had empirical validity.

Another method employed to check the validity of the D Scale has been to obtain correlations between scores on it and on other personality instruments. One such study was conducted by Vacchiano, Strauss, and Schiffman (1968). Using the Edwards Personal Preference Schedule (EPPS) (based upon a need-structure theory), Catell's Sixteen Personality Factors (based upon a source-trait theory), the Tennessee Self-Concept Scale (based upon a multidimensional self-concept theory), and the Experimental Mach V Scale (used to investigate the relationship of Machiavellianism and social desirability to dogmatism), Pearson product-moment correlations were computed for 59 scale scores. These accounted for 81 percent of the total variance in dogmatism.

> . . .It is apparent that a logical and relatively consistent dogmatic personality pattern emerges from these correlations. This was particularly evidenced in the EPPS, where dogmatism was found to be related to need for succorance (dependency on others) and inversely related to needs for change (avoidance of change in behavior and environment) and intraception (lack of understanding of the motives of oneself and others). (Vacchiano, et al., 1968, p. 83-84)

In short, various studies indicate that although scores on the F and the D Scales are related, as one would expect from two measures of authoritarianism, they are factorially discriminable--and the D Scale appears to be measuring general authoritarianism (authoritarianism of both the left and the right) in comparison with the F Scale's emphasis on pre-fascist tendencies. To this point, research supports the validity of Rokeach's construct of dogmatism and the Scale he developed to assess general authoritarianism.

Reliability of the D Scale

The reliability coefficients reported for the D Scale have been uniformly high. Rokeach reported test-retest reliability coefficients over one to six months with a median of .74 (1960, pp. 89-90). Using split-half reliability, the following coefficients, corrected by the Spearman-Brown Prophecy Formula, have been obtained: .88 for 40 student teachers and 40 cooperative teachers (Brumbaugh, et al., 1966, p. 334); .78 for a sample of English workers, .81 for a small sample of English college students (Rokeach, 1960); .84 for a sample of 400 male college freshmen and .85 for a sample of 400 female college freshmen (Plant, 1965); .82 for 391 Utah State University College of Education majors and .90 for 1297 education majors from various universities (Shaver & Richards, 1968, p. 40).

Problems of Research Associated with Open and Closed Mindedness[11]

One of the perplexing problems for researchers using the D and F Scales has been the number of inconsistent findings. This may be due in part to the small numbers of subjects used in many studies--e.g., Brumbaugh, et al., (1966), 40 student teachers; Davids (1956), 22 undergraduates matched with 20 subjects from a previous study; Desoto, et al., (1960), 36 introductory psychology students; Ends (1966), 26 education interns; Feather (1967), 30 subjects from three religious groups and 10 atheists; Fish (1962), 18 elementary teachers; and, Wu (1968), 36 student teachers.

Along with the small samples the methods employed to select experimental subjects have undoubtedly contributed to the conflicting results. In a number of instances, convenient or volunteer subjects were used--e.g., Adams and Vidulich (1962) used volunteers; Jacoby (1969) used 42 male and three female graduate students in a class entitled Human Behavior in Organizations; Bending and Hauntrey (1959) used educational psychology classes; Christensen (1963) used introductory psychology students; Ehrlich (1961) used introductory sociology classes; Costin (1965) used introductory psychology classes.

Generally, researchers have neglected to give proper consideration in selection of their samples to the various intervening variables which might affect authoritarianism or dogmatism scores--e.g., sex, age, religious affiliation, church attendance, education, type of college major, and geographical and sociocultural factors.

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[11]Some of the studies reported here bear on the validity of the F and D Scales. They are discussed in a separate section because the variables investigated bear directly on the present study.

After investigating differences among several samples of teacher education students, Shaver and Richards (1968) concluded:

> More careful attention to sample characteristics, along with more uniform definition of experimental conditions and dependent variables, could contribute a great deal to building the consistency necessary before the authoritarianism and dogmatism measures can be of much use in applied areas such as teacher selection and education. (p. 141)

In this review of literature, it was deemed important to survey the research findings on several intervening variables considered relevant to the study of open and closed mindedness of college students. Inasmuch as the variables are likely to present similar problems for both the F and the D Scales, research with the two scales will be discussed concurrently, with appropriate differences being noted.

Age

Age has been included and reported only as an incidental factor in F and D Scale studies. Age is sometimes confounded with other factors, such as college attendance. For example, Gregory (1957) reported a significant relationship (r = .52) between F-Scale scores and age for 599 subjects--but college attendance and church attendance were confounded with age. The range of age was from under 21 to over 71 (80 percent were 21 to 30 years old), with the younger subjects being college students and the older ones coming from church groups. In a study by Smith (1967), policemen attending college, ages 25-29, were significantly ($p<.01$) more authoritarian than those 21 to 24 years of age. Age and education may again be confounded, with closed minded policemen perhaps more likely to attend college at an older age.

The studies using school personnel or prospective teachers have been plagued by inconsistencies. For example, Jones and Gaier (1953) found no significant relationship between F Scale scores and the age of subjects in three groups (teachers, pre-teachers, and non-teachers). Shaver and Richards (1968, p. 62) also reported a negligible correlation between age and F and D Scale scores with their national sample of teacher education students. Wilcox (1957) reported a positive, but nonsignificant relationship between age and F Scale scores in his sample of 465 teachers and administrators.

However, Gubser, (1969) reported that age was significantly ($p<.01$) correlated with scores on the F Scale. Teachers over 45 years of age had higher scores than those under 45. Hoagland (1966) studied the relationship between teacher job satisfaction and dogmatism against background differences in the organizational climate of schools. He reported that

> differences in mean scores on the Dogmatism Scale were significant for three factors: age, experience, years in the same school. Only when grouped by the factor of age did the differences in mean scores reach the prescribed level of significance [p = .05] on all three instruments [D Scale, OCDQ, and Purdue Teacher Moral Inventory]. (p. 437)

Each of these studies (Wilcox, 1957; Gubser, 1969; Hoagland, 1966) confounded age with vocational retention. That is the seeming correlation between age and F scores may be due to more closed minded teachers remaining longer in the teaching profession. Nevertheless, Gubser concluded that the variable of age "was so influential on such personal factors as 'type of preparatory school attended' and 'years of teaching' that it overshadowed the significance of any relationship between these factors and other variables" (1969, p. 38).

MacKinnon and Centers (1956) reported the results of 460 interviews in Los Angeles County using a modified form of the F Scale. Authoritarianism increased with age, becoming more pronounced in the later decades (60 and 70) of life. One striking contrast was that the authoritarianism of non-manual workers showed a marked decrease between age groups 20 and 30 years old, although manual workers showed a generally gradual increase from the twenties through the fifty and older age classification. Because the data were not longitudinal for the same individuals, the differences between the younger and older groups of manual and non-manual workers must be interpreted with caution.

Sex

As with age, findings on the relationship between sex and the F and D Scales have been inconsistent because sex has been confounded with other variables. For example, Frymier (1959b) reported that high school girls, regardless of locale (Alabama, Florida, or Michigan) were more authoritarian than boys. However, church attendance might also be related to authoritarianism and dogmatism, and the girls in Frymier's sample attended church more often than the boys.

Some studies (Rokeach, 1960; Anderson, 1962; Lehmann, 1962a) report no significant differences between male and female dogmatism scores, while other studies have reported significant differences.

Nidorf and Agrabite (1968) found that females were significantly ($p<.001$) more complex cognitively than males and that dogmatism was curvilinearly related to complexity (middle range dogmatics were least complex). Sex and dogmatism interacted significantly, with high dogmatic males being more complex than low dogmatic males; the situation was reversed for females, with low dogmatics being more complex than hign dogmatics. A possible explanation was offered:

> The sex by dogmatism interaction may be understood by considering. . .that the male's stimulus environment is more stressful than that of the female. . . . In effect, the high dogmatic male is impelled to differentiate his stimulus environment to a relatively greater degree than the female who encounters less stress in her environment. (Nidorf and Agrabite, 1968, p. 597)

They further concluded that women are better equipped than men to perceive and code the diversity of their interpersonal environments. This supports the popular notion that females are more sensitive to other people than are males.

In the factor analysis conducted by Vacchiano, et al. (1967), the comparison of factors for male and female psychology students indicated that the scale was not measuring the same dimensions of dogmatism for the two sexes. They concluded that

> The sex difference is due partly to the varying cultural roles played by men and women and the opportunities afforded them for expressing dogmatism. . .exploration of the dogmatic personality using Rokeach's Dogmatism Scale may lead to misinterpretation and theoretical difficulties if the multidimensional character of the scale and sex variables are not considered. (p. 851)

Plant (1965), using 2332 college subjects, reported a significant ($p<.01$) difference between mean male and female D Scale scores. Males and females with four semesters or more of college were reported as having means of 157.48 and 153.79 respectively. For subjects with one to three semesters, the mean for males was 159.99 and for females 149.75. Those subjects who intended to attend college but didn't had mean scores of 167.03 and 160.78 for males and females respectively. In another study Plant, Telford, and Thomas (1965) used a separate analysis for males and females because of the repeated findings of significant sex differences on the D Scale.

With data on 2746 of 2983 freshman students at Michigan State University, Lehmann (1962a, 1962b) found that males were significantly more stereotypic and dogmatic than females, and then analyzed his data separately for males and females.

Alter and White (1966), in reviewing several studies, reported that mean dogmatism scores for males were consistently higher than those for females (see Table 2). In their sample of University of Utah freshmen subjects, the difference was significant at the .01 level, with means for males being 151.95 and females 147.08.

Alter and White attributed the sex differences to only a few items on the scale. For example, when male and female responses to the item, ". . .I would like to be a great man like Einstein. . .", were omitted they reported that the difference between male and female means was reduced by 1.11 points--women agree less strongly with the item than men (p. 967). The exclusion of this one item did not, however, eliminate the significant difference between the means of males and females in their sample.

Studies involving teachers and students in education have also produced inconsistent results. Jones and Gaier (1953) using 195 subjects (57 teachers, 76 students in education, and 62 students not in education) from the University of Illinois, and Perez (1966) with data from 387 public school teachers, reported non-significant relationships between sex and F Scale scores. Shaver and Richards, with their data on 391 Utah State University teacher education students, reported no significant difference between mean scores for males and females on the F or D Scales. McGee (1954, p. 170), however, with an available sample of 150 California public school teachers, reported that men scored significantly ($p<.01$) lower on the F Scale. Wilcox (1957), on the other hand, with a sample of 354 teachers and 111 administrators and supervisors from California reported a significant difference between men and women fc the variable of authoritarianism (F Scale) and the role orientation held by school personnel with women being more authoritarian and conservative than men.

Vacchiano, et al., (1969) suggested that differences between the sexes in dogmatism might be due to the different cultural roles imposed on each sex. Alter and White (1966) further suggested that subcultural differences exist and the establishment of geographical norms for the D Scale may be required for interpretation of data.

Education

Researchers have generally regarded education, in particular, as likely to have an important influence on F and D Scale scores. In a large number of studies, negative relationships between education and F and D Scale scores have been reported. Authoritarianism and dogmatism mean scores have been found to decrease with an increase in the number of years the subjects have attended college (e.g., Hill, 1960; Festinger, 1955; Greenberg, et al., 1959; Frumkin, 1961; Fox, 1965). Typically these studies measured freshmen students and then compared their mean scores with mean scores obtained at the same time from senior subjects. Experimental mortality--the differential loss of respondents--(Campbell & Stanley, 1963) was not considered. Also, in most instances, the samples were taken from convenient classes without regard for a representative cross section of the total college pupulation.

Kamenske (1966) found in her study of technological changes in an insurance company that people with less education were more dogmatic and resistant to change.

In a study involving policemen attending and not attending college, Smith (1967) reported college students scored significantly ($p<.01$) lower on the D Scale than non-college students. This result may have been due to selection (i.e., non-dogmatics perhaps were more likely to attend college) and not the effect of attendance.

In another study, graduate students tended to be more open minded than undergraduate students (Bendig, 1960). Foster (1961) reported that a value-oriented education tended to decrease authoritarianism and dogmatism in students as measured by the F and D Scales. He further concluded that "changes in attitudes and beliefs. . .tend to take place in the first two years of college. In the last [senior] year there appears to be even a slight reaction against the previous direction of change." (Foster, 1961, p. 6) Foster's research design entailed two different comparisons; (1) a cross-sectional study of freshmen, sophmores, juniors and seniors, and (2) a test-retest on a longitudinal basis (3-year period). Approximately 90 percent of all the male student body at Santa Clara, where the study was conducted, were Catholic.

Lehmann (1962b) sampled 1436 males and 1310 females at Michigan State University and then four years later drew a sample of 1051 seniors (70 percent of the college seniors) from the same group. He found that 33 percent of the original sample was still in school. He concluded that males and females became less stereotypic in their beliefs from the freshman to senior years. They were more flexible, less rigid, and less authoritarian, with females changing more than males. Females, however, tended to be "both at the beginning and at the end of college more oriented toward conformity and sociability--to do things to please others" (Lehmann, 1963, p. 308).

An excellent research design was employed by Plant (1965) to test changes in tolerance and authoritarianism for subjects differing in the amount of college education over a two-year and a four-year period. At San Jose State College, three groups were identified: (a) those who had attended college for a two-year or a four-year period, (b) those who had attended for a portion of this time, and (c) those who had intended to attend college but did not. Data were collected by administering the Ethnocentrism (E) Scale, Gough's Modified Authoritarianism (F) Scale, and Rokeach's Dogmatism Scale. Groups were tested during 1958, 1960, and 1962. Those students attending 7-8 semesters of college started with the lowest mean score of the groups of students and ended with the lowest mean scores. Plant concluded:

> . . .the greatest changes in authoritarianism and intolerance occurred with all groups of students from 1958-1960 [2 year period]. . . . it is probably the case that greater change occurred during the first two years than in the last two years. . .we interpret this to mean that with young persons who aspire to a college education, there is a change in authoritarianism and intolerance underway regardless of whether or not they attend college. Perhaps this demonstrates something about the development of authoritarianism or anti-authoritarianism) and intolerance (or tolerance) in college aspiring and presumable academically able young persons. (Plant, 1965, p. 280-281)

The research by Plant sheds considerable light on the possible relationship between education and changes in open and closed mindedness. His research indicates that a decline in the degree of dogmatism occurs among aspirers to higher education regardless of whether they actually attend college.

We cannot conclude from Plant's research whether the same downward trend occurs in young people who do not aspire to college. However, the MacKinnon and Centers (1956) study referred to earlier would tend to support the contention that young people who do not seek further education are inclined to be more authoritarian and this authoritarianism continues to increase into old age. They reported a tetrachoric correlation of -.48 between college attendance and nonattendance and authoritarianism scores.

It appears that freshmen are likely to be more closed minded than sophomores, with the greatest decline in closed mindedness occurring during the freshmen and sophomore years. It also seems apparent that subjects who attend college are more open minded than those who don't and that a tendency toward greater openness is present in students who continue on into graduate school.

Geographical Residency and Some Sociocultural Factors

The attention of researchers has been attracted to the variability of the results reported for F and D Scale studies in different parts of the United States (see Tables 1 and 2[12]). Some researchers have attempted

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[12] One must be cognizant that in many of the studies listed in these tables, the sampling technique was not reported, leading one to wonder if the differences in means might not be due to sampling biases. Failure to consider different sample characteristics--e.g., religious affiliation or year in school--makes the findings of research into subcultural variations difficult to interpret.

TABLE 1

Summary of F Scale Means and Standard Deviations
From Previous Studies of College Subjects

Authors	University	Class	N	Item $\bar{X}$	Standard Deviation
Adorno, et. al. (1950)	U. of Oregon and U. of California	Fr.-Soph.	58	3.51	.92
Christie & Garcia (1951)	U. of California	Fr.	386	3.30	.83
	Southwest City U.		114	4.10	.77
Stott (1954)	U. of Utah	Fr.	450	4.07	.79
Kelman & Barclay (1963)	Maryland Negro College	Fr.	282	4.54	.84
Kerlinger & Rokeach (1966)	Michigan State U.		1239	3.49	.63
	Louisiana State U.			3.57	.69
	New York U.			3.66	.79
	New York U. Gen Ed.			3.56	.70
Shaver & Richards (1968)	Utah State U.	Jr.-Sr.	390	3.46	*
	Boston U.	Jr.-Sr.	122	3.32	
	U. of Michigan	Grad.	65	2.99	
	Ohio State	Jr.-Sr.	317	2.98	
	U. of California	Jr.-Sr.	66	2.86	
	U. of Washington	Grad.	34	2.83	
	Peace Corps	Grad.	57	2.81	
	Harvard	Grad.	108	2.47	

* Standard deviations reported for total test scores.

TABLE 2

Summary of D Scale Means and Standard Deviations
From Previous Studies of College Subjects

Authors	University	Class	Sex	N	Mean	Standard Deviation
Alter & White (1966)	U. of Utah	Fr.	M	1000	151.95	21.34
			F	1000	147.08	22.83
Plant (1962)	San Jose State	Fr.	M	778	155.86	24.52
			F	335	171.00	22.52
	Michigan State	Fr.	M	1436	168.19	25.36
			F	1090	154.57	26.36
	U. of So. Cal.	Fr.	M	287	166.00	21.62
			F	1310	163.56	25.47
Rokeach (1960, p. 90)	Ohio State	?	M-F	21	142.6	23.3
Rosenfeld (1969)	East Carolina Coll.		M-F	60	144.6	20.5
Shaver & Richards (1968, p. 65)	Utah State U.	Jr.-Sr.	M-F	390	146.71	23.18
	Boston U.	Jr.-Sr.	M-F	122	142.63	23.44
	Oklahoma U.	Jr.-Sr.	M-F	118	142.04	23.86
	Ohio State	Jr.-Sr.	M-F	317	140.62	22.77
	U. California	Jr.-Sr.	M-F	66	133.88	21.04
	U. of Michigan	Grad.	M-F	85	133.87	24.16
	U. of Washington	Grad.	M-F	34	131.58	23.55
	Peace Corps	Grad.	M-F	57	129.44	22.22
	Harvard	Grad.	M-F	108	126.50	23.69
Smith (1968)	Small Church Related College	Volunteers	M-F	592	141.63	
Telford & Plant (1963)	Junior College (California)	Fr.	M	448	162.37	26.91
		Fr.	M	734	168.18	27.43
		Fr.	F	340	153.79	25.80
		Fr.	F	458	162.02	31.23

to identify the influence of subcultural factors in their studies, while others have conducted their research without giving consideration to the possible influence of subcultural variables such as size of the university, prestige of the university, class rank, year in which the data were collected, college major, geographical residency of subjects.

Research which has indicated that response to the F and D Scale content was not independent of some sociocultural factors has been carried out by a number of researchers—e.g., Christie and Garcia (1951), Davidson and Kruglov (1953), Davids and Ericksen (1957), Frymier (1958, 1959b, 1960a), Hyman and Sheatsley (1954), Lehmann (1962b), Niyekawa (1966), Alter and White (1966).

Lehmann (1962b) with a sample of 2,746 entering freshmen at Michigan State University (92 percent of the freshman class) reported that the most dogmatic males lived the major portion of their lives on a farm, while their female counterparts came from cities with a population of 25,000-100,000. Lehmann concluded, "It is readily evident that there are significant differences in attitudes in stereotypy and dogmatism, traditional values, rigidity and those values measured by the A-V-L [Allport, Vernon, Lindsey Scale] among the various sociocultural groups" (p. 7).

Rhodes (1960) in a study involving rural and urban high school students concluded that "contrary to the contention of some psychologists and psychoanalysts, the F-Scale performances of high school students are not independent of such 'sociological' variables as socio-economic status and rural or urban residence" (p. 104). He reported authoritarianism was negatively correlated with urban residence and socio-economic status. MacKinnon and Centers' (1956) data also supported socio-economic differences with a tetrachoric correlation of -.31 between the lower, working and middle, upper socio-economic classes and authoritarianism.

Alter and White (1966) reported the ranges of mean D Scale scores (124.0 to 183.2) and standard deviations (15.9 to 35.5) from six different studies involving 27 different populations and calculated an overall mean of 159.2 for all subjects (12,977) and a standard deviation of 31.4. They concluded that "while a lack of reliability in the D Scale itself may account for the variation in mean scores. . .a more reasonable explanation would be that the scale is likely sensitive to subcultural differences" (Alter and White, 1966, p. 969).

Religion

According to the theory underlying open and closed mindedness, authoritarians are made not born. Generally, closed mindedness has been found to be related to religious affiliations. "Some religious beliefs fit more easily into authoritarian patterns, and the cognitive structure of authoritarianism finds particular types of religion more congenial" (Kirscht & Dillehay, 1967, p. 70).

Lehmann (1962a), studying students from three different types of universities (Presbyterian, Congregational, and a large state university), hypothesized that they selected a particular college in an attempt to satisfy certain basic needs. He reported that males scored significantly higher on the D Scale at the Congregational than at the Presbyterian school, with the later in turn scoring significantly higher than the males from the state university. The same order of significant differences on the D Scale was reported for females. It was impossible to ascertain whether the significant differences were due to religious affiliation, to the type and size of school attended, or some other factor.

Rhodes (1960) concluded from his study of authoritarianism and fundamentalism that attitudes of an authoritarian character (F Scale) expressed by high school students were not independent of religious preference. The confounding of religious affiliation and factors such as city size is present in most studies of authoritarianism and dogmatism.

A number of researchers have ranked their subjects according to religious affiliation and scores on the F and/or D Scale. The results to be discussed next are frequently inconsistent and difficult to compare because of the different religious classifications used and probable influence of subcultural differences.

In several studies (Lehmann, 1962b; Remmers, 1964; Levinson & Schermerhorn, 1951), Catholics as a group have ranked higher in being stereotypic and dogmatic than Protestants or Jews. Hill (1960), using college students from Australia, also reported that entering Catholic freshmen tended to be more authoritarian than non-Catholic students. Quinn (1964), however, reported a different rank order for religious affiliation and closed mindedness--public school Catholics, Jews, and then Protestants.

Shaver and Richards (1968) in their "nationwide" sample of teacher education students employed 17 different religious classifications. They concluded that subjects who belonged to fundamentalist faiths were more authoritarian and dogmatic. On F Scale scores, Mormons and Baptists (fundamentalist beliefs) ranked first and second respectively, with Catholics, eighth and Jews fourteenth. On the D Scale, Mormons, Baptists, Catholics and Jews ranked second, fourth, twelfth, and seventh respectively.

Since the present study was conducted in Utah and involves one of the same institutions as included in the study by Shaver and Richards, it was interesting to note that "with the Utah State University campus sample, . . .the only significant [$p<.05$] difference between the Mormons and non-Mormons was on the F-Scale" (p. 139) The mean F and D Scale scores (96.99 and 146.71 respectively) were higher for their Utah State University sample (a state institution with an approximately 70 percent Mormon student body) than for their other eight samples of teacher education students (see Tables 1 and 2). The lowest college group means were reported for students from the Harvard Graduate School of Education (F Scale score, 69.27, D Scale score 126.50).

Allen (1955) with a sample of Mormon subjects from Brigham Young University (a Mormon institution in Utah), found that his subjects scored significantly higher on the F Scale than did four of five other college samples. Alter and White (1966), however, selected a University of Utah sample involving 2000 subjects (primarily freshmen[13] of which 70 percent were Mormon) and reported a lower mean score (males 151.95, females 147.08) than 22 of the 35 other samples cited in their study. All of the college samples with lower mean scores contained 143 or fewer subjects.

Rhodes (1956) concluded that the relationship between authoritarianism and religious beliefs supports the thesis that closed mindedness is positively related to the degree of fundamentalism. Later Rhodes (1960) studied a sample of 1027 seniors from eight Tennessee high schools and concluded that Protestant fundamentalism varied with authoritarianism. Yet he inferred there was more variation among Protestants than between Protestants and Catholics with respect to authoritarianism. Therefore, Rhodes did not recommend that the trichotomy of Catholics, Protestants and Jews be used to classify religious orientation for research purposes.

In a study involving religious (Student Christian Movement, Evangelical Union, and Newman Society) and atheist student groups, Feather (1967) reported that the fundamentalist Evangelical Union group was highest in dogmatism and intolerance of ambiguity, with the atheist group lowest in this regard. Low dogmatics have also been found to be more alert to religious symbols from other religions than high dogmatics (LoScuito and Hartley, 1963).

Another factor to receive considerable attention in some studies of authoritarianism and religious affiliation has been the influence of church attendance. A clear pattern of relationship between church attendance and degree of open and closed mindedness is not available from the studies reported. Studies by Jones and Gaier (1953), Nalder, et al., (1959) using the F Scale, Harvey, et al., (1968) and Meredith (1968) using the D Scale, and Rokeach (1970) employing the Rokeach Value Survey, reported a significant relation between church attendance and authoritarianism. Jones (1958), using naval aviation cadets (with at least two years of college) as subjects to provide him with a "national university sample", carried out a study to determine the relationship of F Scale scores and items on the revised Allport-Vernon Study of Values. Correlating F scores with "church affiliation" and "church attendance", he obtained significant (.001 level) relationships. Jones concluded that "all in all, religious associations would seem to be at the very least a prominent feature in the background of authoritarian cadets" (p. 86).

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[13]Alter and White surveyed freshman students who generally have a mean higher than sophomores, juniors, or senior students. (See the section, "Education", of this chapter.)

Frymier (1959b), however, reporting data from 288 high school students, indicated that correlation coefficients between authoritarianism (as measured by the F Scale) and frequency of church attendance were small and none reached a level of significance. He did report that girls with a mean item F Scale score of 4.71 attended church 4.88 times during a four week period, while the boys had a mean score of 4.54 and a church attendance of 3.58. The difference between boys and girls on church attendance was significant. Brickman (1967) concluded that church attendance and reception of the sacraments were unrelated to a person's open-closed mindedness.

Allport (1964) and Stark, et al. (1970) asserted that churchgoers in general are more bigoted than non-churchgoers, with the occasional churchgoer being most bigoted and prejudiced of all. However, on the basis of data from a national survey involving 1000 adult Americans ranging in ages from 21 to 80, Rokeach (1970) arrived at a conclusion at variance with those of Allport and Stark. He maintained "that the religiously devout on the average are more bigoted, more authoritarian, more dogmatic and more antihumanitarian than the less devout" (Rokeach, 1970, p. 33).

The conclusions reached by Harvey, Prather, White, and Hoffmeister (1968) seem appropriate with which to conclude this review of the relationship between religious affiliation and open and closed mindedness. They concluded from their study of 3000 college students and 289 public school teachers that the only significant demographic variable centered around religion. Factors such as socio-economic background, educational level of subjects or their parents, or intelligence were not related to D Scale scores; however, they found that their subjects differed significantly on religious related behavior with frequency of church attendance being related positively to authoritarianism scores.

Open and Closed Mindedness and College Majors

College Majors Other than Teacher Education

Max Weber (1958) has indicated that the choice of a vocation involves the intersection of the person's personality and his social setting. Knowledge about this intersection is necessary if the person's occupational choices are to be understood, and open-closed mindedness is a personality construct which may be of some importance in that intersection. For example, reasoning that the curriculum for prospective engineers is characterized by impersonal subject matter containing a high degree of structure, one may well expect to find specific types of students attracted to the engineering field.

Kanter (1968), in fact, developed a hypothetical personality construct describing traits antagonistic to the role of engineering which he called Heightening of Affectivity. Its elements included: A diminished need for cognitive structure, increased self-awareness, desire

for inter-personal involvement, and a broad and humanistic set of interests. Kanter hypothesized that the greater the individual's Heightening of Affectivity score, the weaker the commitment to becoming an engineer. In a study involving more than 500 undergraduate engineering students, he found that the students who transferred out of engineering were significantly ($p<.001$) higher on the Heightening of Affectivity scale than those who remained, and that those remaining who were dissatisfied were significantly ($p<.001$) higher on the scale than satisfied students.

Augustine (1966) concluded from another study on engineering students that those who quit the engineering profession seemed to have a strong need for upward social mobility and attached more importance to working with people than with things. Regan's work as cited by Kanter (1969) indicated that engineering students at the University of California at Davis felt more comfortable in a structure-order environment. They disliked ambiguities and uncertainties, were not particularly interested in artistic and aesthetic matters, and their intellectual curiosity was limited to a rather narrow range of concrete ideas. The engineering students were also found to be less open minded than other college majors.

After studying 347 engineering students and students who had transferred out of engineering by their sophomore year, Anthanasiou (1968) reported that a greater proportion of transfers were non-Christians than would be expected by chance ($p<.02$); they also were more "open" than "closed" ($p<.02$), and more unconventional than conventional ($p<.001$). "From these and other similar data one may infer that the brighter [as indicated by the SAT scores], more liberal-oriented students tend to leave the engineering school for greener pastures" (Anthanasiou, 1968, p. 1187).

Nordstrom and his associates (1967, 1961) advanced the thesis that brighter students also tend to leave the sciences. Their research into reasons for leaving the natural sciences led them to conclude: First, many students found science to be a grind. They saw that "the average student could expect to spend most of his life hammering away at a narrowly defined task without ever having much opportunity to develop a real feeling for the over all purpose of his work" (Nordstrom, et al., 1967, p. 4). Second, the "science dropouts", though less successful academically than those students who remained in science, "clearly were far better educated than the continuants. They were also concerned with personal self-integration and maintenance of a healthy spirit of inquiry and had come to see a scientific education as an impediment to this concern" (p. 5).

Further support for the idea that a selective process operates on students entering or remaining in the sciences is given in a progress report on the "Program Plan for 1970 and Beyond" from the Center for Research and Development in Higher Education at the University of California. Medsker (1969) concluded from the Heist-Henry study of a science institute famous for its "tough" program:

> The data show that very few of the students who persisted through this difficult program exhibited, at the time of graduation, the characteristics of creative or innovative research scientists. . . . This finding is of particular significance for the future of a society entering the technetronic age, depending as it must on the creative scientist. The problem is all the more important since the particular school under study (like other institutes of science) has encountered in recent years a serious dropout problem. Many very capable, and many of its most highly creative students, as judged by measures made when they entered the program, dropped out. (p. 28)

Some studies on career selection have specifically attempted to isolate the relationship of the open-closed mindedness of the person to his choice of a career. For example, in a six-year follow-up study of the relation of vocation choice to dogmatism, Kemp (1964b) concluded that closed minded subjects were likely to change positions in the direction of those occupations which offered more security and more opportunity to exercise direction and control. With an all male sample, Moser and Kuder (using the Kuder Preference Record, and not the F or D Scale) found that teacher and lawyer groups scored significantly higher than other vocational groups on the category designated "Activities Involving Authority and Power" (Roe, 1956, p. 158).

In a sample of 460 Southwest College students, Greenberg and Fare (1959) found that subjects in liberal arts had significantly lower mean F Scale scores than other majors. Business administration majors were significantly lower than engineering and agricultural students, while engineering and agriculture students were not significantly different. They concluded that there was a relationship between the area of major interest in college and authoritarianism. Fox (1965), employing his own measure, added further evidence on authoritarianism and career selection. He reported social science majors to be more equalitarian than art and science majors.

Stern (1962), utilizing the Inventory of Beliefs (a measure of "stereopathy-authoritarianism"), described the authoritarian undergraduate of the University of Chicago as one who usually did poorly (holding intelligence constant) in the social sciences and the humanities and who strongly disliked both areas. Their "occupational choice was law, business, medicine, or eigineering" (Stern, 1962, p. 694).

In another study, using three scales (F, Political Economic Conservatism, and Pseudopatriotism) with 492 subjects from City College of New York, Davidson and Kruglov (1953) reported that a significantly larger number of the more democratic, flexible, and tolerant students tended to select a major in the liberal arts field rather than engineering. They further reported that college subjects who were more rigid, conforming, and authoritarian tended to select an area of major interest which was "technological and impersonal" in its orientation as contrasted to careers characterized as "social and personal".

Generally, from the studies reviewed on college majors (other than teacher education) one can conclude that the more conforming, rigid, and authoritarian individuals will tend to select technological and impersonal areas of study. On the other hand, those individuals who are more liberal and open minded may select areas with broad social and humanistic orientations. Teaching may be classified as one of the latter areas as one is involved with others; yet teaching also encompasses a wide array of subject areas varying from humanistic to technological ("thingism") approaches, e.g., from literature to physics. Do less humanistic areas of teaching (e.g., science) attract more closed minded students than a more humanistic area (e.g., English); and, if so, are prospective science teachers more open minded (since they are involved with people) than science majors who do not enter teaching? Questions such as these have not been answered by the research to date.

Teacher Education

As with other college majors one may well ask the question, "Does teaching as a specialized occupation attract persons who resemble each other in some personal characteristics?" First, what does the research say about characteristics of the persons attracted to the teaching profession in general; and, second, what does research say about the characteristics of the person who selects specific subject matter majors within the teaching profession?

Several instruments (e.g., the Edwards Personal Preference Schedule, Guilford-Zimmerman Temperament Survey, Manifest Anxiety Scale, Minnesota Teacher Attitude Inventory, California Psychological Inventory) have been used in studies to assess personality differences among young men and women who have selected different occupations, including teaching. People who selected public school teaching have been found to have relatively low achievement needs (Kemp, 1964a), low nurturance (need to help others) (Kulen & Dipboye, 1959; Adams, et al., 1959), low need to change (Kulen & Dipboye, 1959), and, for male teachers, the needs to defer and to be self abasing (Kulen & Dipboye, 1959). Those selecting teaching have also been found to be high in deference (courteous and respectful), orderliness and endurance, and low in exhibition and heterosexuality (Jackson & Guba, 1957; Guba, et al., 1959; Johnson, 1959). These findings appear to fit the stereotyped model of teachers as sexually impotent, compliant, patient, and socially inept (Jackson & Guba, 1957).

Adams, Blood and Taylor (1959) attempted to differentiate between male and female subjects. They administered the Edwards Personal Preference Schedule (EPPS) to 300 experienced teachers and college students in education, sociology, and anthropology courses and reported that women were significantly ($p<.01$) different from men on deference, affiliation, succorance, endurance, and heterosexuality. They concluded that women public school teachers were more docile than education students who were more docile than arts and science students.

D.L. Cook, et al. (1963), employing the EPPS and the Guilford-Zimmerman Temperament Survey (GZTS), carried out a factor analysis with a group of student teachers and engineering students. The factor "authoritarianism" emerged for their education subjects, but failed to emerge for the engineers. W.W. Cook and his associates (1951) had declared earlier that the authoritarian personality generally has been taken as an operational definition of a "poor teacher".

Attempts have been made to determine the degree of authoritarianism and/or dogmatism of persons entering the teaching field (Shaver & Richards, 1968; Rabkin, 1966). However, the number of research studies specifically directed toward comparing the open-closed mindedness of students in teacher education with that of students in other college groups has been extremely small and has yielded conflicting findings.

As mentioned in Chapter I, Soderbergh concluded from his experience that "some veteran public school teachers are excessively and for the most part unwittingly, dogmatic" (Soderbergh, 1946, p. 245). Rabkin (1966) attempted to answer Soderberg's claim with a study involving a convenient sample of 107 teachers enrolled in summer course work at the University of Washington. He reported his sample to be more open minded, as determined by the D Scale, than any of the six college groups reported by Rokeach (1960, p. 95). Rabkin's conclusions are questionable in that his sample was small, not random, the subjects were public school teachers enrolled in summer school courses and were mostly females and Protestants.

Jones and Gaier (1953), using 138 University of Illinois students (76 pre-teachers, 62 students not interested in teaching) and 57 teachers, found that, on the F Scale, pre-teachers had a significantly lower mean score. However, little credence can be given to the comparison because of the sampling procedures. The 62 nonteachers were students in two journalism classes, and a conveniently available group of experienced teachers was used.

What does research say about open and closed mindedness of the person who selects specific majors in the teaching profession? A recent study by Cappeluzzo and Brine (1969) attempted to answer the questions, "Are prospective teachers dogmatic?" and "Is the degree of dogmatism a function of their subject matter preference?" They used 254 students in education classes at the University of Massachusetts. The mean D Scale scores were similar to those reported by Rokeach for his Ohio State University groups (Rokeach, 1960, p. 90) and were significantly higher than the scores obtained by Rabkin at the University of Washington.

However, an adequate experimental design to answer the questions asked was lacking. Mean D scores of education students at the University of Massachusetts were compared with mean scores of students from different universities to arrive at the conclusion that education students were no more dogmatic than other college groups. In addition, education students were not classified according to elementary or secondary education or year in college. Because of the possibilities of subcultural

differences and the influence of other variables discussed elsewhere in this paper, education majors at the University of Massachusetts should have been compared with students in other majors at the same institution in order to determine whether or not education students are more or less dogmatic.

While Capelluzzo and Brine (1969) reported no significant difference among dogmatism scores for the various teaching majors (Table 3), Shaver and Richards (1968) reported significant differences ($p<.05$) at Utah State University between the mean Dogmatism Scale scores of students in vocational education and English, vocation education and home economics, music and home economics, science and social studies, science and English, science and home economics, business and home economics, and mathematics and home economics.

In comparing the mean D Scale scores of the three samples contained in Table 3, the means of English and social studies majors are consistently low, and mathematics majors high; although the mean for natural science majors was found to be low by Capelluzzo and Brine, and for Richards and Shaver's "nationwide" sample, at USU, science (natural and physical) majors scored third from the bottom in a list of 12 majors.

In another study, Brumbaugh, et al., (1956) used chi-square analyses to check the association between subject matter area and the dogmatism of 40 student teachers at the University of Akron. The subjects were seniors and post-graduate students. Student teachers in math, sciences and social studies were significantly ($p<.02$) more likely to be closed minded than were students in areas of foreign language, English and fine arts.

An extensive study of the open-closed mindedness of students in teacher education was conducted by Shaver and Richards (1968). Among other objectives, their study was concerned with comparing the authoritarianism (F Scale), dogmatism (D Scale), and rigidity (Gough-Sanford Rigidity Scale) of students in different teacher education majors (see Table 3). Although Shaver and Richards did not include samples of non-teacher education college majors in their study, they concluded:

> Inspection of the mean F- and Dogmatism Scale scores of the teacher education students in the "nationwide" sample of this study as against those reported for university students in earlier studies provides no evidence that students in teacher education are more authoritarian than university students in general. Obviously, this conclusion must be taken with a great deal of caution. The findings may be due to the particular subgroups of teacher education students sampled for this study or to a general reduction in authoritarianism and dogmatism in this society over the few years between earlier studies and the present one. (p. 142).

TABLE 3

Summary of D Scale Means and Standard Deviations
From Previous Studies of Teacher Education Students

Authors	Area of Specialization	N	Mean	Standard Deviation
Shaver & Richards (1968) (American education majors p. 106)	Language	24	151.46	24.11
	Business Ed.	47	148.45	19.49
	Music	18	148.44	28.96
	Mathematics	46	147.63	18.12
	Vocational Ed.	13	146.69	26.49
	Physical Ed.	53	145.02	19.19
	Art	22	143.86	25.93
	Speech	27	143.67	22.54
	Science	79	141.35	25.67
	Home Economics	30	137.30	22.76
	Social Studies	160	135.19	22.05
	English	132	134.67	24.80
	Special Ed. & Remed. Reading	5	132.60	33.03
		656		
Shaver & Richards (1968) (Utah State U. education majors, p. 123)	Vocational Ed.	7	160.57	22.45
	Music	6	157.33	21.72
	Science	30	154.20	25.23
	Art	18	152.11	23.45
	Business Ed.	29	150.72	20.21
	Math	17	150.71	15.82
	Languages	12	149.08	26.82
	Physical Ed.	40	145.35	18.93
	Speech	15	144.27	22.17
	Social Studies	37	141.59	21.40
	English	46	139.04	23.07
	Home Economics	8	127.00	20.01
		265		
Capelluzzo & Brine (1969) (U. of Massachusetts education majors)	Mathematics	21	149.2	27.11
	Other	43	147.9	19.50
	Special Education	68	145.1	24.42
	Social Studies	45	142.1	22.99
	Natural Sciences	19	138.9	36.99
	English	58	133.8	26.07
		254		

Another approach to answering the question on open and closed mindedness of the members of the teaching profession has been to study practicing teachers. Using the mean F Scale scores of persons with various educational assignments, Wilcox (1957) ranked educators from the highest to lowest on authoritarianism: (1) elementary school teachers, (2) junior high teachers, (3) junior and senior high teachers, (4) elementary school principals, (5) senior high school teachers, and (6) supervisors.

Ericksen (1963) and Gubser (1969) found younger teachers to be not only less authoritarian, but "they also appear least satisfied with the profession, and discontented with their status and salaries and have poor rapport with their principal" (Gubser, 1969, p. 38). Gubser contended that his findings suggested a selection process in which more liberal teachers quit the teaching profession with the more authoritarian teachers continuing to remain in the profession.

Some students, as they seek a college major, may see education as being less restrictive than some professions, with opportunities for rich experiences with people. As they enter the profession, they may find the structure more stifling than expected. The more open minded ones may then leave the field.

Summary

Even though we have been selective in the types of studies included in the review of literature, any attempt to summarize them is difficult because of the diversity and number of studies using the F and D Scales.

The validity of the F and D Scales was reviewed at length. A number of researchers have criticized the scales because they are composed of items all phrased in one direction (positively) so that agreement with them indicates authoritarianism thus resulting in response bias. Several investigators have attempted to balance the F Scale by wording half of the items in reverse (negatively). Rorer's conclusion, that response styles are not an important variable in personality inventories, appears to be most sound because results obtained in guessing situations or under conditions in which the subject may agree when actually he disagrees cannot be generalized to apply to the responses on the D and F Scales.

Even though the literature reveals a concern for the validity of the F Scale (e.g., being a measure primarily of the political right) from which a more valid instrument to measure general authoritarianism (the D Scale) was developed, the fact still remains that comprehensive factor analytic studies find the two instruments to be measuring discriminable aspects of authoritarianism. Because they were considered to be measuring different aspects of authoritarianism, both scales were used in the present study.

Reliability coefficients for the D and F Scale, using the split-half correlation technique, have ranged generally from .78 to .90.

A general overview of Rokeach's theoretical construct of dogmatism and its origin was presented. From the plethora of studies of the closed minded personality, various conclusions about the characteristics of closed minded individuals were found to be common. Highly dogmatic individuals were generally found to be characterized as psychologically immature, impulsive, less tolerant, less flexible, and less secure, lacking in self-acceptance or self-satisfaction, more leader oriented, less creative, accepting the tried and true despite inconsistencies, cautious and compromising in regard to new ideas, resistant to change with a strong need to structure their stimulus environment. The dogmatic person seems to lack the ability to deal with novel cognitive material; he seeks rapid closure when exposed to new experiences and often relies heavily upon authority for direction and support of his belief system. The particular patterns of behavior and intellectual content vary from person to person, yet the cognitive style is relatively consistent.

The literature characterized the low dogmatic person in opposite ways--as more enterprising and outgoing, calm and patient, mature, efficient, creative and clear in his thinking.

In addition, researchers frequently failed to control or investigate intervening variables--e.g., sex, age, religious affiliation, church attendance, education, geographical residency, size of city in which the subject grew up, and college major--and this may well account for some of the inconsistent findings reported in the literature. Concern with these factors has helped shape the objectives and the design of the present study.

The relevance of age for the present study was not great because only junior and senior students were used. Not only is the age range limited, but changes in open and closed mindedness seem most likely to occur in the freshman year, with increased stability by the junior and senior years.

Many researchers have concluded that authoritarianism is positively related to religious fundamentalism. Other investigations have indicated that very frequent church goers score lower than irregular attenders on the authoritarian scales, although the findings on the influence of church attendance are not consistent. Generally, closed mindedness has been found to be related to religious affiliation.

As with age and religious affiliation, findings on the relationship between sex and the F and D Scales are difficult to interpret because sex has been confounded with other variables. It appears that as size of sample increases and as the sample becomes more representative of the population, the more likely it is that sex differences will be significant. Where sample sizes are small and drawn from a convenient source (e.g., introductory psychology courses), significant sex differences are less likely to be found.

It appears that certain academic areas and vocational interests may attract persons with different personality characteristics. Academic fields that are oriented toward things and away from broad social and humanistic interests may tend to attract more closed minded individuals. Education may attract people similar to those attracted to the social sciences and humanities because teaching is oriented toward people. However, education majors cover a wide range of academic subject matter areas. Certain subject areas (e.g., math, science) apparently attract more closed minded people than do other areas (e.g., English and social studies). Nevertheless, no studies are available comparing the open-closed mindedness of education students and other majors or education students with different academic majors on the same campus.

Chapter III

PURPOSE AND PROCEDURES

Purpose of the Study

As already noted, there has been speculation about the authoritarianism and dogmatism of students who go into teacher education. This is a matter of some concern because of indications that closed minded persons are likely to be less open to innovation--a necessity in today's dynamic society--less creative, less effective as thinkers, and perhaps even less able to empathize with others.

Despite the assumption that the teaching profession attracts people who are more authoritarian and dogmatic, no empirical data have been collected comparing teacher education majors with students in other fields within the same college or university. That was the major purpose of this study--i.e., to determine if teacher education students at two institutions of higher education were more authoritarian or dogmatic than students in other fields of study. In addition, the study was designed to explore the relationship of other variables--such as sex and religion--to open-closed mindedness in order to better understand the results in relation to our major objectives.

Objectives

In order to accomplish the above purposes the following objectives were set forth:

1. To determine if there are significant differences among the mean F Scale and Dogmatism Scale scores of students in education and students majoring in other fields.

2. To determine if there are significant differences between the mean F and D Scale scores of teacher education students in secondary education and college students in the same academic fields but not preparing to teach.

As noted in Chapter II, there was reason to believe that scores on the F and D Scales would not be independent of factors other than college majors. Three general types of variables seemed relevant to understanding the comparisons of teachers and other majors: (1) personal characteristics, such as age, sex, religious affiliation, and church attendance, (2) demographic background in terms of city size and state in which the student was a resident, and (3) educational characteristics, i.e., college major,

institution attended, teacher certification plans, and whether majoring in elementary or secondary education. The data gathered provided a more comprehensive framework from which to interpret the findings relevant to the major purposes of the study and were used to answer the following questions:

1. Is there a significant difference between the mean F and D Scale scores of female and male students?

2. Is there a significant difference between the mean F and D Scale scores of males and females majoring in education and other fields?

3. Is there a significant difference between the mean F and D Scale scores of female education students and male education students?

4. Is there a significant difference between the mean F and D Scale scores of male elementary teacher education students and male secondary teacher education students?

5. Is there a significant difference among the mean F and D Scale scores of students with different religious affiliation?

6. Is frequency of church attendance associated with scores on the F and D Scales?

7. Do religion and frequency of church attendance, religion and state of residence, or church attendance and size of town of childhood residence interact to affect mean F and D Scale scores?

8. Is there a significant difference between the mean F and D Scale scores of in-state and out-of-state students?

9. Is the size of the town in which the student grew up associated with F and D Scale scores?

10. Is there a significant difference among the mean F and D Scale scores of students majoring in various secondary education academic fields?

11. Is there a significant difference between the mean F and D Scale scores of students in elementary and secondary education?

12. Is there a significant difference between the mean F and D Scale scores of subjects from Weber State College, Ogden, Utah and Utah State University, Logan, Utah?

Procedures

Population and Sample

The study involved an intensive investigation across the academic fields of two institutions of higher education: Utah State University (USU) and Weber State College (WSC).

Utah State University is located in rural northern Utah, in the city of Logan (population 22,604 in 1970[1]). The total student enrollment during the Fall Quarter of the 1969-70 academic year was 8,547, of which 7,297 were undergraduate students.

Weber State College, a four-year institution without a graduate school, is located in the urban setting of Ogden (population 68,480, with a metropolitan area census figure of 124,035 for the 1970 estimate[2]). The student body contained 7,169 students in the Fall Quarter of 1969. These two institutions are situated 50 miles apart, with the Ogden school being 35 miles north of Salt Lake City and Logan 50 miles further to the northeast.

Utah State University had nine colleges at the time of this research[3]: Agriculture, Business, Education, Engineering, Natural Resources, Family Life, Humanities and Arts, Social Science, and Science. In addition, a general college is maintained for students who have not yet declared a major. Weber State College is divided into four schools: Arts, Letters, and Sciences; Business and Economics; Education; and Technology and Trade Education. To provide common categories for classifying students at the two institutions, the USU classifications (Figure 1) were used.

From the data summarized in Table 4 (page 51), the percentages of the total junior and senior population in each college for each of the two institutions were calculated (see Figure 1). The colleges ranked by the size of enrollment at Utah State were: Education (15.1%), Business (13.4%), Humanities (13.0%), Engineering and Technology (12.2%), Social Science (10.7%), Natural Resources (10.2%), Science (8.1%), Family Life (6.3%), General (5.6%), and Agriculture (5.4%). At Weber State, the percentages were Business (17.4%), Education (16.7%), Engineering and

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[1]Obtained from the Logan City offices using the 1970 preliminary census figures of March 31, 1970. The Nineteenth Decennial Census of the United States, Census of Population 1970 had not been published at the time this report was written.

[2]Obtained from the Ogden City and Weber County Planning Commission using the preliminary census records for March 1970.

[3]The College of Humanities and Arts and the College of Social Science have since been combined.

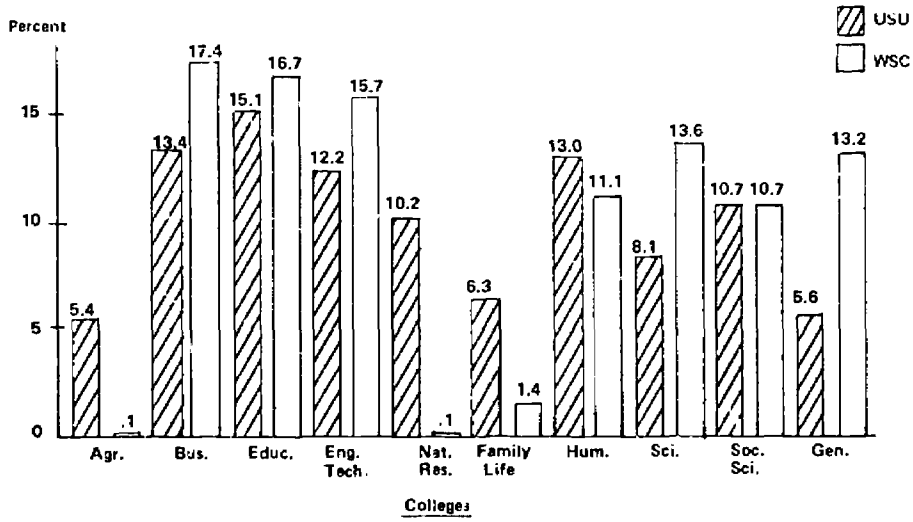

Figure 1. Percentage of total junior and seniors grouped by college major classification (USU system of college classification used for both institutions).

Technology (15.7%), General (13.2%), Humanities (11.1%), Social Science (10.7%), Science (13.6%), Family Life (1.4%), with Natural Resources and Agriculture (.1%), being of little import.

The population for this study was limited to junior and senior students. This decision was made for three reasons: (1) by the junior year students have typically declared their major field of study, (2) the commitment to remain in college, to graduate, and to enter a professional career is fairly high by this time, and (3) research indicates that students' dogmatism scores decrease most sharply in the first two years of college and are more stable during the junior and senior years.

Even though total enrollments (freshmen through seniors) at the two institutions closely approximate one another, differences in size were found between their junior and senior classes. Utah State University had a junior-senior population of 2,943 or 40.4 percent of the total four-year enrollment; Weber State College reported 2,083 juniors and seniors or 29.1 percent of the total enrollment.

Sampling Procedure

Undoubtedly the difficulty of arranging for and carrying out test administration on a campus-wide basis is the primary reason for the scarcity of studies comparing the authoritarianism and dogmatism of college students in different fields of study. In order to have an adequately large sample to make various breakdowns for the analyses, it was decided to test at least 25 percent of the juniors and seniors at each school, college, or department at both institutions. No freshmen, sophomores, graduate students, or foreign students were included in the sample.

To obtain the minimum sample of 25 percent of the junior and senior students at the two institutions on a random basis would have presented some extremely difficult problems. Rather than use a random sampling procedure, an alternate plan was devised to increase the chances of obtaining a typical sample. Deans or department heads (depending upon the size of the particular school or college) identified those courses which all departmental majors were required to take during their junior or senior years and which were not typically taken by students from other departments. Testing was conducted in those classes.

This procedure was considered to have the advantage of insuring: (1) that only students fairly well committed to their college majors were included, (2) that a sampling of the typical students in the colleges would be obtained, and (3) that duplication of test taking would be reduced to a manageable size.

The deans and department heads at both institutions agreed: (1) to grant permission to proceed with the study, (2) to permit the collection of data during the 1969-70 academic year, (3) to contact each professor directly or grant permission for the investigators to make the necessary arrangements with each professor for administering the tests, and (4) to work with the investigator to ensure a cross section of classes for each department in the school or college and to check enrollment figures so that a minimum sample of 25 percent of the students in the department would be represented in the sample.

In all cases the final approval of class time and date for administration of the instrument rested with the professor. At the two institutions, professors were contacted for 111 classes (46 at WSC and 65 at USU). Of this number 110 agreed to provide the necessary 30 minutes of class time to carry out the project. Only one professor declined to cooperate with the research project and an additional class in that department was made available to bring the final number to 111 classes. Approximately 89 percent of the total number of tests were administered within a three-week period with 100 percent of the testing being completed within a seven-week period.

The F and D Scales were administered to 1252 students at Utah State University and 955 students at Weber State College. However, of the USU respondents, 193 (67 sophomores, 60 graduate students, 63 foreign students, and 13 incompleted tests) were excluded from the sample. This reduced the sample size to 1049. At WSC, 118 respondents (94 sophomores, 9 graduate students, 8 foreign students, and 7 incomplete tests) failed to meet the criteria, thus reducing the sample size to 837 subjects.

Sample Characteristics

Size. Table 4 presents a breakdown for the total population of junior and senior students in each academic major, the sample size, and the percentage of the total population included in the sample.

The sample for Utah State University included 35.6 percent (1049) of the junior and senior population (2943 students) and for Weber State College, 40.2 percent (837) of the total junior and senior population (2083 students).

Religious Affiliation and Church Attendance. The two samples are similar in some aspects. With regard to religious affiliation (Figure 2), the Latter-Day Saint (Mormon) religion accounted for 68.8 percent and 70.2 percent of the USU and WSC subjects, respectively. This came as a surprise because WSC, being located in a city with some variety of churches, was anticipated to have a considerably lower percentage of Mormons on its campus than USU. According to the Utah Council of Protestant Churches[4], the Greater Ogden Area is approximately 64 percent Mormon. However, a large number of Catholics and members of protestant faiths (e.g., Baptists) live in the Spanish-American and black communities from which apparently a small percentage attend college.

Those subjects who left religion blank were combined with those who marked agnostic and amounted to 6.5 and 5.5 percent of the USU and WSC samples, respectively.

Regarding church attendance (Figure 3), 59.1 percent of the USU students said they attended at least once a week, 11.7 percent said they

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[4]Kenneth Edwards, President of the Utah Council of Protestant Churches, indicated by telephone that Ogden City was approximately 55% LDS, with the smaller communities in Weber County having as high as 85% LDS, Salt Lake City was 58% LDS, Logan City 90% LDS (college population excluded), with an overall average for the State of Utah being 68% LDS. These figures were generally confirmed by telephone with the Historian's Office of the LDS Church in Salt Lake City. They reported 60.7% LDS in Weber County (which includes the city of Ogden) and 69% for Davis County. These two counties are in close proximity to WSC and have an estimated 1970 total population of 231,300 according to the Ogden City and Weber County Planning Commission.

Table 4

Utah State University and Weber State College
Junior and Senior Enrollment* And Sample Size by College for Fall Quarter 1969-70

Major by College and/or department	Utah State University					Weber State College				
	Male	Female	Total	Sample	%Total	Male	Female	Total	Sample	% Total
Agriculture:	155	4	159	62	39.0	2		2	3	
Business:	316	78	394	97	24.6	322	41	363	95	26.2
Education:										
Elementary	26	272	298	197	66.1	18	158	176	132	75.0
Physical Education	64	42	106	42	39.6	65	40	105	46	43.8
Psychology	31	9	40	20	50.0	55	11	66	25	37.9
			444	259	58.3			347	203	58.5
Engineering:										
Civil, Elect. Mgt.	215	1	216	55	25.5	87	0	87	85	97.7
Ind. Tech. & Ed.	141	1	142	36	25.4	238	3	241	27	11.2
			358	91	25.4			328	112	34.1
Natural Resources:	295	5	300	104	34.9	3	0	3	3	100
Family Life:	7	179	186	59	31.7	1	28	29	10	34.5
Humanities:										
Audiology-Speech, Theater Art	27	41	68	38	55.9	13	12	25	7	28.0
English, Journalism	34	90	124	38	30.6	32	57	89	54	61.8
Landscape Architecture	48	1	49	17	34.7	0	0	0	0	-----
Foreign Language	18	18	36	9	25.0	13	14	27	11	40.7
Art	34	38	72	40	55.6	44	14	58	35	60.4
Music	27	13	35	22	62.9	16	16	32	17	53.1
			384	164	42.7			231	117	53.7
Science:										
Math, Computer Science, Statistics	57	20	77	28	36.3	40	7	47	23	48.9
Botany, Bact., Plant Ph.	8	3	11	5	45.5	29	6	35	22	62.9
Chemistry, Physics, Geo.	56	4	60	39	65.0	96	0	96	27	28.1
Zoology, Pre Med, Tech.	74	15	89	13	14.6	76	21	97	61	62.9
Science Comp.	0	0	0	2	----	0	0	8	6	75.0
			237	87	36.7			283	139	49.1
Social Science:										
History	63	27	90	46	51.1	47	18	65	43	64.6
Political Science, Pre Law	92	15	107	29	27.1	48	3	51	39	76.5
Sociology, Social Work	55	63	118	38	32.2	74	30	104	42	40.4
Social Science Comp.	0	0	0	6	----	2	0	2	6	----
			315	119	37.8			222	130	58.6
General: (No specific major)	135	31	166	2	1.2	208	67	275	12	4.4
Other Majors				2	----				4	-----
TOTALS	2038	1014	3943	1049	35.6	1531	550	2083	837	40.2

* Total enrollments data were obtained from the records of the registrar of each institution.

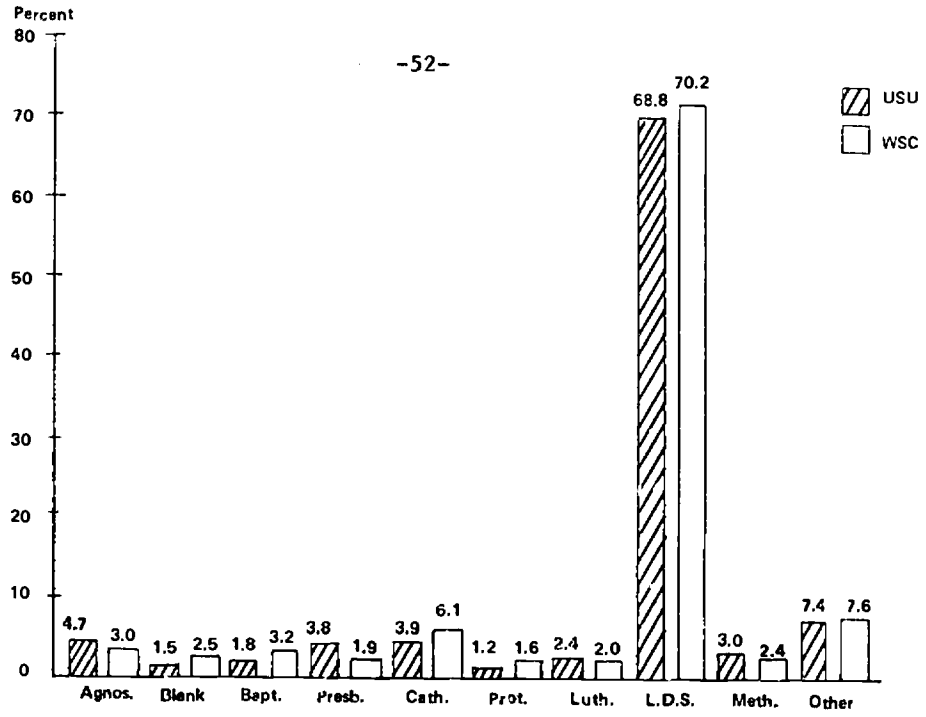

Figure 2. Percentage of Religious Affiliation of USU and WSC Subjects.

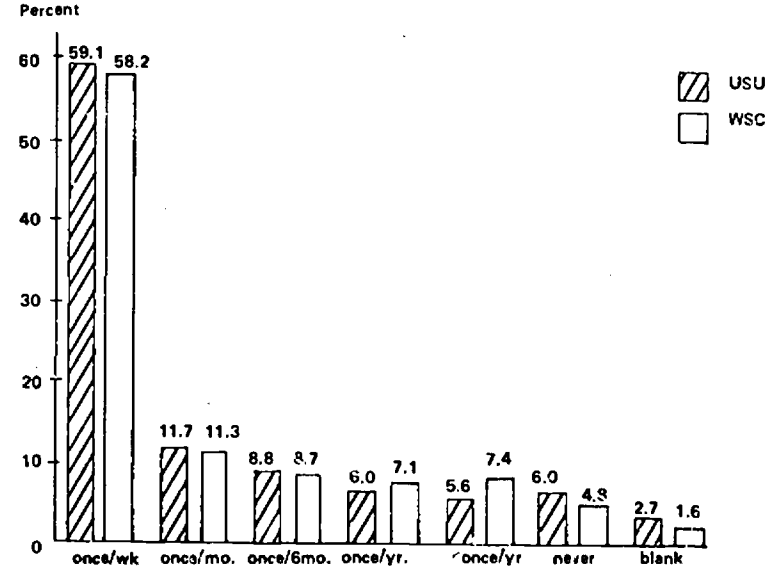

Figure 3. Percentage of Church Attendance of subjects at USU and WSC for Fall Quarter 1969.

attended at least once a month, 8.8 percent indicated attendance at least once every six months. The four last categories (at least once every six months, at least once a year, less than once a year, never) were grouped to eliminate cell vacancies in subsequent analyses of the data. Those saying they attended church less than at least once every six months contained 20.3 percent of the subjects. At Weber State College, 58.2 percent of the subjects said they attended church at least once a week, 11.3 percent said at least once a month, 8.7 percent indicated at least once every six months, with 20.9 percent saying they attended less than at least once every six months.

Academic Fields. Figure 4 presents percentages of the total junior and senior enrollment included in the sample, grouped by colleges for the two institutions. Majors in agriculture and natural resources at WSC (Table 4, page 51), were rare, so no comparisons between the two institutions were possible in the two areas. The total number of 29 juniors and seniors majoring in family life at WSC provided a limited population from which to draw a sample. Only 10 students, 34.5 percent, were included, while at USU 59 family life students, 32.3 percent of the total population, were included.

The sample sizes for the Colleges of Humanities, Sciences, and Social Sciences were larger than the 25 percent minimum required for this sample (Figure 4). Primarily this was because of (1) large enrollments in the classes sampled or, (2) small enrollments in some departments and an attempt to include class(es) from all departments of the college (e.g., art, photography, speech).

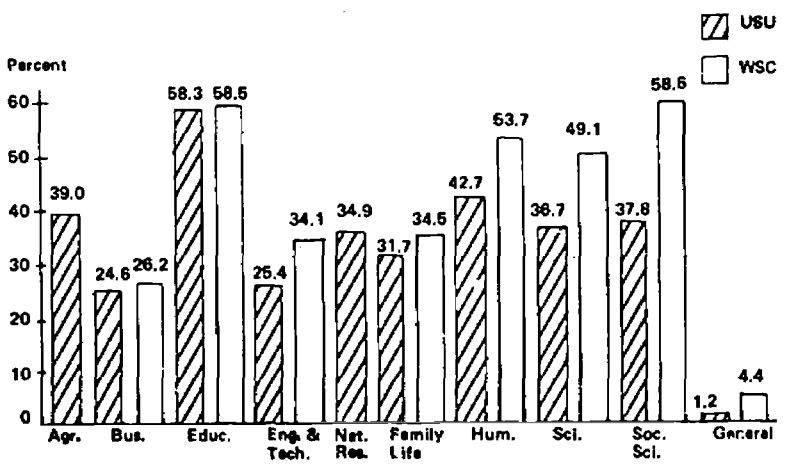

Figure 4. Percentage of total junior and senior enrollment included in the sample college for the two institutions.

The sample for the College of Education contained 58.3 percent and 58.5 percent of its total enrollment for USU and WSC, respectively. These samples were increased beyond the 25 percent minimum requirement at both institutions in order to provide adequate numbers to eliminate inadequate cell frequencies when the data were broken down for various analyses.

Note should also be made of the major listed as "general" (Figure 1) into which 5.6 percent of the students at USU and 13.2 percent for WSC fell, according to the registrar's enrollment figures. That these students were not proportionately represented in the sample--only two students at USU and 12 at WSC--is not surprising when one recalls that we were sampling junior and senior departmental major courses.

Tables 5 and 6 give a breakdown of majors by religion. Majors in which 50 percent or less of the students were Mormon included; psychology, forestry, landscape architecture, political science, and general for USU subjects; at WSC, only the social science composite, general, others, and agriculture majors were less than 50 percent Mormon (each of these areas at WSC contained 10 or fewer students). Those majors containing 80 percent or more Mormon students were elementary education, family life, music, botany, social science composite, and others at Utah State Univeristy; at WSC, elementary education, psychology, family life, art, computer science and math, and science composite were 80 percent or more Mormon (Tables 5 and 6).

Size of Community and State of Residency. One of the larger percentage differences between the USU and WSC samples was in regard to the city size in which the students grew up (Figure 5). In the WSC sample, 31.6 percent was from cities with a population of 50,000 or greater, while the USU sample contained only 16.5 percent from cities of 50,000 or more in population. For the analyses, the two classifications "under 1,500" and "1,500 to 2,499" were combined. For the USU sample, 40.9 percent was from cities of 2,499 or less, while only 24.7 percent of the WSC sample was from areas of this size.

Another difference between the two samples occurred in the category of "in state" and "out of state" students. Weber State College had 71.7 percent of its students growing up within the state of Utah; on the contrary, only 58.5 percent of the USU students came from Utah (Figure 6). Some majors were primarily composed of Utah students while others contained a small percentage of students from Utah. For example, USU elementary education and family life majors had the highest percentages from Utah. These majors at WSC ranked seventh and twenty-first, respectively, in the percentage of students from Utah (Tables 7 and 8). The College of Natural Resources group at USU had the lowest percentage (29.8) of its students from Utah (Table 7), and its students represented the widest range of religious affiliations (Table 5).

Table 5

NUMBER* AND PERCENTAGE OF MAJORS BY RELIGIOUS AFFILIATION—USU

Religion	Agr.	Bus.	El. Ed.	P.E.	Psy.	C.Eng.	I. Eng.	Forestry	P. Life	Th. Art Speech	English	L. Arch.	F. Lang.	Art	Music	Comp. Math	Botany	Chemistry	Zoology	Sci. Com.	History	Pol. Sci.	Soc.	Soc. Comp.	General	Other	Total	% for Religion
LDS. (Mormon)	76.1 (68)	78.3 (76)	87.3 (173)	64.2 (27)	50.0 (10)	65.4 (36)	61.1 (22)	35.5 (37)	22.1 (52)	71.0 (27)	73.6 (28)	23.5 (6)	66.7 (6)	65.0 (26)	90.9 (20)	75.0 (21)	80.0 (4)	58.9 (23)	69.2 (9)		63.0 (29)	61.3 (17)	57.8 (22)	83.3 (5)	50.0 (1)	80.0 (4)	722	68.8
Catholic		3.0 (3)	4.0 (8)	14.2 (6)	10.0 (2)	10.9 (6)	5.5 (2)	15.3 (16)	1.6 (1)	2.6 (1)	5.2 (2)	4.7 (2)		.5 (1)		7.1 (2)		2.5 (1)	7.6 (1)		8.4 (3)	2.6 (4)	2.6 (1)				62	5.9
Agnostic	6.4 (4)	6.1 (6)	1.5 (3)	2.3 (1)	25.0 (5)	3.6 (2)		2.8 (3)		7.8 (3)	13.1 (5)	5.8 (1)	33.3 (3)	12.5 (5)	4.5 (1)			10.2 (4)		50.0 (1)	13.0 (6)	20.7 (6)	7.8 (3)	16.6 (1)	50.0 (1)		63	
Presbyterian		4.1 (4)	4.0 (8)			3.6 (2)	2.7 (1)	5.4 (6)	1.6 (1)	5.2 (2)		35.2 (6)		5.0 (2)		3.5 (1)			7.6 (1)			3.4 (1)	13.1 (5)				40	3.8
Methodist		2.0 (2)	.5 (1)	2.3 (1)		.18 (1)	2.7 (1)	12.5 (13)	1.6 (1)	(	2.6 (1)	5.8 (1)				7.1 (2)	20.0 (1)	10.2 (4)			2.1 (1)	3.4 (1)	2.6 (1)				32	3.0
Lutheran	3.1 (2)		.5 (1)	4.7 (2)		3.6 (2)	.5 (2)	8.6 (9)	1.6 (1)	2.6 (1)		5.8 (1)							2.5 (1)			4.3 (2)	3.4 (1)	2.6 (1)			26	2.4
Baptist	3.1 (2)	2.0 (2)	.5 (1)	4.7 (2)		.8 (1)		2.8 (3)	3.3 (2)	2.6 (1)					4.5 (1)						4.3 (2)		5.2 (2)				19	1.8
Left Blank	1.5 (1)				5 (1)	1.8 (1)	.9 (1)							2.5 (1)								3.4 (1)					6	
Protestant	3.1 (2)						3.3 (3)	3.8 (4)						5.0 (2)		3.5 (1)					2.1 (1)						13	1.2
Christian		2.0 (2)				1.8 (1)		.9 (1)						5.0 (2)				5.1 (2)		50.0 (1)		3.4 (1)	2.6 (1)				11	1.0
Episcopalian	1.5 (1)							2.8 (3)		2.6 (1)		11.7 (2)							7.6 (1)		2.1 (1)	3.4 (1)					10	0.9
Jewish			.5 (1)	2.3 (1)				.9 (1)										5.1 (2)									5	0.4
Buddist	1.5 (1)	1.0 (1)			10.0 (1)													2.5 (1)									5	0.4
Moslem						3.6 (2)	2.7 (1)									3.5 (1)											4	0.3
Congregational		1.0 (1)						1.9 (2)																			3	0.2
Ch. of Christ		1.0 (1)		2.3 (1)																			2.6 (1)				3	0.2
Unitarian										2.6 (1)											2.1 (1)						2	0.1
Christian Sci.			.5 (1)					.9 (1)																			2	0.1
Nazarene																		2.5 (1)									1	0.0
Other	3.1 (2)	1.0 (1)		2.3 (1)		1.8 (1)	5.5 (2)	3.8 (4)	1.6 (1)	2.6 (1)	5.2 (2)			2.5 (1)					7.6 (1)			3.4 (1)	2.6 (1)			20.0 (1)	20	1.9
First Christ																											0	
Jehovah Wit.																											0	
Seventh Day																											0	
United Christ																											0	
Total Nos.	53	97	197	62	20	55	36	104	59	38	38	17	9	40	22	28	5	39	13	2	46	29	38	6	2	5	1049	
% of Total	5.9	9.2	18.7	6.0	1.9	5.2	3.4	9.9	5.6	3.6	3.6	1.6	.8	3.8	2.0	2.6	.6	3.7	1.2	.1	4.3	2.7	3.6	.5	.1	.4		99.9

*The N is enclosed in parentheses.

Table 6

Number and Percentage* of Majors by Religious Affiliation of WSC Subjects

Religion	Agr.	Bus.	El. Ed.	P.E.	Psychology	E. Eng.	F. Lng.	Forestry	F. Life	Speech Th. Arts	English	F. Language	Art	Music	Computer Math	Botany	Chemistry	Zoology	Sci. Comp.	History	Pol. Sci.	Sociology	Soc. Comp.	General	Other	Total	% for Religion
LDS (Mormon)	33.3 (1)	66.3 (63)	88.6 (117)	78.2 (36)	80.0 (20)	55.2 (47)	55.5 (45)	66.7 (2)	80.0 (8)	57.1 (4)	70.9 (39)	66.7 (8)	80.5 (29)	70.5 (12)	82.6 (19)	72.7 (16)	66.7 (18)	72.1 (44)	83.3 (5)	60.4 (26)	58.9 (23)	69.0 (29)	16.6 (1)	50.0 (5)	25.0 (1)	583	70.2
Catholic		10.5 (10)	1.5 (2)	6.5 (3)	4.0 (1)	4.7 (4)	7.4 (2)		10.0 (1)		7.2 (4)	16.6 (2)		5.9 (1)	13.0 (3)	9.0 (2)	11.1 (3)	4.9 (3)		6.9 (3)	10.. (4)	4.7 (2)	16.6 (1)			51	6.1
Baptist	33.3 (1)	3.1 (3)	2.2 (3)	2.1 (1)		5.8 (5)	7.4 (2)				3.6 (2)			5.9 (1)				1.6 (1)	16.6 (1)		7.6 (3)	4.7 (2)	16.6 (1)	20.0 (1)		27	3.2
Agnostic		1.0 (1)	1.4 (2)		4.0 (1)	1.1 (1)				28.5 (2)	5.4 (3)	8.3 (1)	11.1 (4)				3.7 (1)	3.6 (1)		13.0 (4)	10.2 (4)	4.6 (2)		10.0 (1)		28	3.4
Methodist		3.1 (3)	1.5 (2)	6.5 (3)		5.8 (5)	7.4 (2)				1.8 (1)			5.9 (1)		4.5 (1)				2.3 (1)		7.1 (3)			25.0 (1)	23	2.7
Left Blank	33.3 (1)	1.0 (1)	.7 (1)			4.7 (4)	3.7 (1)		10.0 (1)				2.7 (1)			9.0 (2)		8.2 (5)		4.6 (2)	2.5 (1)	2.3 (1)	16.6 (1)			22	2.6
Lutheran		1.0 (1)	.7 (1)			7.0 (6)		33.3 (1)					2.7 (1)	5.9 (1)		4.5 (1)		3.2 (2)		2.3 (1)	2.5 (1)		16.6 (1)			17	2.0
Presbyterian		3.1 (3)		2.1 (1)		1.1 (1)	7.4 (2)				1.8 (1)						3.7 (1)	4.9 (3)				7.3 (1)	16.6 (1)	20.0 (2)		16	1.9
Protestant		3.1 (3)	.7 (1)			1.1 (1)					3.6 (2)						3.7 (1)	3.2 (2)		2.3 (1)		2.3 (1)	16.6 (1)		25.0 (1)	14	1.4
Episcopalian		1.0 (1)	.7 (1)	2.1 (1)		1.1 (1)	3.7 (1)								4.3 (1)						5.1 (2)	2.3 (1)				9	1.1
Congregational		1.0 (1)			4.0 (1)	2.3 (2)	3.7 (1)																			5	0.6
Buddist						3.5 (3)														2.3 (1)		2.3 (1)				5	0.6
Jewish		3.1 (3)	.7 (1)			1.1 (1)																				5	0.6
Christian				2.1 (1)		1.1 (1)														4.6 (2)						4	0.5
Moslem																	3.7 (1)			2.3 (1)				10.0 (1)	25.0 (1)	4	0.5
Ch. of Christ		1.0 (1)				1.1 (1)					1.8 (1)															3	0.4
Jehov. Wit.						1.1 (1)						8.3 (3)	2.7 (1)													3	0.4
Nazarene						1.1 (1)	3.7 (1)																			2	0.2
Unitarian											1.8 (1)			5.9 (1)												2	0.2
First Christ		1.0 (1)																								1	0.1
United Christ					4.0 (1)																					1	0.1
Other			.7 (1)		4.0 (1)					14.2 (1)	1.8 (1)						7.4 (2)			4.6 (2)						8	0.9
Christian Sci.																										0	----
7th Day Ad.																										0	----
Total	3	95	132	46	25	85	27	3	10	7	55	12	36	17	23	22	27	61	6	43	39	43	6	20	4	837	
% of Total	.3	11.9	15.8	5.5	3.0	10.2	3.2	.4	1.2	.8	5.6	1.4	4.1	2.2	2.7	2.6	3.2	.7	.7	5.1	4.8	5.0	.7	1.2	.4		99.9

*The N is enclosed in parentheses.

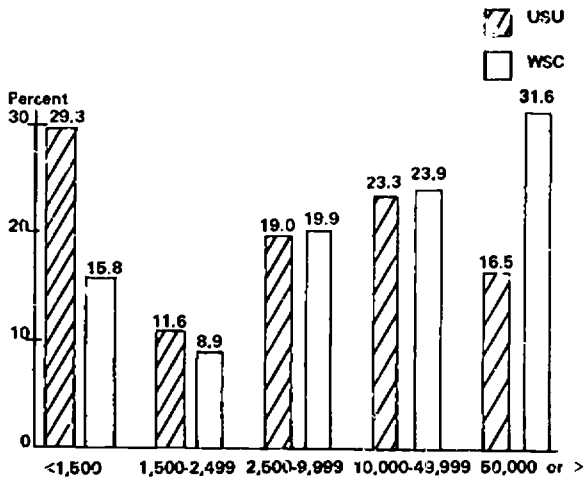

Figure 5. City size in which USU and WSC subjects spent their childhood.

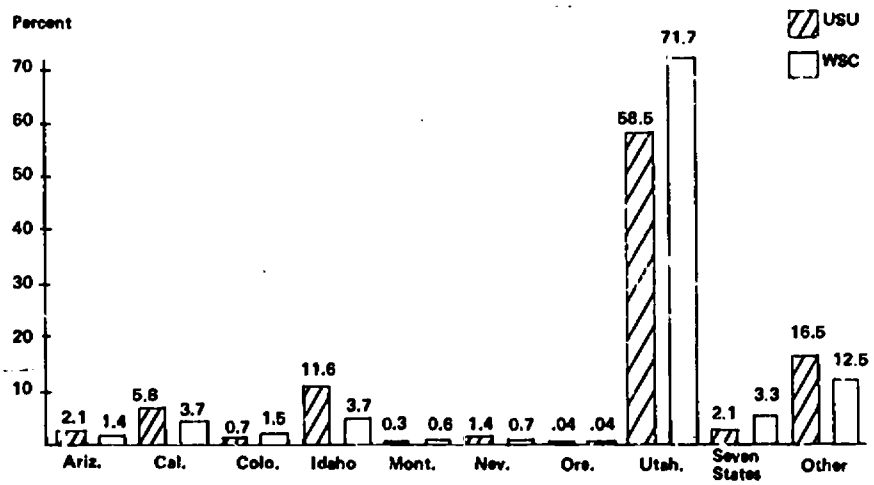

Figure 6. State of residence in which USU and WSC subjects grew up.

Table 7

Number and Percentage* of Majors by State of Residence in which Students Grew Up--USU

State	Agr.	Bus.	El. Ed.	P.E.	Psy.	C. Eng.	E. Eng.	Forestry	P. Life	Speech Th. Arts	English	L. Arch.	F. Lang.	Art	Music	Computer Math	Botany	Chemistry	Zoology	Sci. Comp.	History	Pol. Sci.	Soc.	Soc. Comp.	General	Other	Total	Total % of Total
Arizona	4.5 (1)		1.0 (2)	6.9 (3)	15.0 (3)		5.5 (2)	1.9 (2)	3.3 (2)		2.7 (1)			5.0 (2)				2.5 (1)			6.5 (3)		2.6 (1)				23	2.2
California	1.5 (1)	8.2 (8)	4.5 (9)	2.3 (1)	5.0 (1)	5.4 (3)	5.5 (2)	11.6 (9)		2.7 (1)	10.5 (4)	5.8 (1)		15.0 (6)	9.0 (2)	3.5 (1)		5.1 (2)		50.0 (1)	8.6 (4)	0.4 (1)	7.8 (3)				60	5.7
Colorado			.5 (1)			3.6 (2)	2.7 (1)	2.8 (3)					11.1 (1)										2.6 (1)				9	.9
Idaho	31.7 (20)	18.5 (18)	8.1 (16)	6.9 (3)	5.0 (1)	16.3 (9)	13.8 (5)	2.8 (3)	6.7 (4)	15.7 (6)	13.1 (5)	5.8 (1)		15.0 (6)	13.6 (3)	10.7 (3)	20.0 (1)	5.1 (2)	7.6 (1)		10.8 (5)	3.7 (4)	10.5 (4)	16.6 (1)		20.0 (1)	122	11.6
Hawaii				4.6 (2)				.9 (1)		2.7 (1)												3.4 (1)					4	.4
Illinois				2.3 (1)				1.8 (2)		2.7 (1)		8.5 (2)						2.5 (1)			2.1 (1)	0.4 (1)					10	1.0
Iowa			.5 (1)				2.7 (1)	1.9 (2)						2.5 (1)													5	.5
Mass.		1.0 (1)	.5 (1)					1.9 (2)										2.5 (1)	7.6 (1)								6	.6
Maryland			.5 (1)					.9 (1)								3.5 (1)			7.6 (1)								4	.4
Montana	1.5 (1)							.9 (1)		2.7 (1)				2.5 (1)													4	.4
Nebraska															4.5 (1)				7.6 (1)			6.8 (2)					4	.4
Nevada		12.8 (2)	1.5 (3)	2.3 (1)		1.8 (1)		2.8 (3)								14.2 (4)											15	1.5
New Jersey								2.1 (5)				5.8 (1)							7.6 (1)		2.1 (1)		2.6 (1)		50.0 (1)		10	1.0
New Mexico		1.0 (1)			5.0 (1)	1.8 (1)		1.9 (2)	1.7 (1)																		6	.6
New York	3.2 (2)					16.8 (6)		9.6 (10)				17.6 (3)		2.5 (1)	4.5 (1)			5.1 (2)					5.2 (2)	16.6 (1)			28	2.7
Oregon			.5 (1)				2.7 (1)			2.7 (1)											2.1 (1)		2.6 (1)				5	.5
Penn.			.5 (1)			5.4 (3)		1.9 (2)		5.4 (2)	2.7 (1)	7.6 (3)								50.0 (1)	2.1 (1)						14	1.3
Texas						1.8 (1)		.9 (1)			4.7 (1)					3.5 (1)											4	.4
Utah	52.3 (33)	59.7 (58)	78.6 (155)	61.9 (26)	60.0 (12)	43.6 (24)	47.2 (27)	29.8 (31)	84.7 (50)	60.5 (23)	65.7 (25)	17.6 (3)	77.7 (7)	47.5 (19)	54.4 (12)	50.0 (14)	60.0 (3)	64.1 (25)	53.8 (7)		52.1 (24)	62.0 (18)	55.2 (21)	50.0 (3)	50.0 (1)	80.0 (4)	615	58.6
Virginia			.5 (1)				2.7 (1)	1.9 (2)																			4	.4
Washington					5.0 (1)									5.0 (2)	4.5 (1)	3.5 (1)					5.5 (3)		2.6 (1)				9	.9
Wisconsin				4.6 (2)				.9 (1)							4.5 (1)												4	.4
Wyoming			2.0 (2)	1.0 (2)	2.3 (1)		1.8 (1)	2.8 (3)	1.7 (1)	2.7 (1)	2.7 (1)				4.5 (1)			2.5 (1)	7.6 (1)		2.1 (1)						17	1.6
Other	7.9 (5)	2.0 (2)	1.0 (2)	4.6 (2)		3.6 (2)	11.1 (6)	7.4 (14)	1.7 (1)			5.8 (1)		5.0 (2)		7.0 (2)		10.2 (6)			2.1 (1)		7.8 (3)				45	4.3
Sev. States**		5.1 (5)	.5 (1)		5.0 (1)	3.6 (2)	2.7 (1)	2.8 (3)		2.7 (1)		5.8 (1)	11.1 (1)			3.5 (1)	20.0 (1)				2.1 (1)	6.8 (2)		16.6 (1)			22	2.1
Total	63	97	197	42	20	55	36	104	59	38	38	17	9	40	22	28	5	39	13	2	66	29	28	6	2	5	1049	
% of Total	5.9	9.2	8.7	4.0	1.9	5.2	3.4	9.9	5.6	3.6	3.6	1.6	.8	3.8	2.0	2.6	.4	3.7	1.2	.1	6.3	2.7	3.6	.5	.1	.4		

* Percentages of Ss in major by states.
**States represented by less than 4 students are included in this group.

Table 8

Number and Percentage* of Majors by State of Residence in Which Students Grew Up--WSC

State	Agr.	Bus.	El. Ed.	P.E.	Psy.	C. Eng.	L. Eng.	Forestry	P. Life	Speech Th. Arts	English	F. Lang.	Art	Music	Computer Math	Botany	Chemistry	Zoology	Sci.Com.	History	Pol. Sci.	Soc.	Soc. Comp	General	Other	Total	% of Total
Arizona			1.5 (2)	2.2 (1)		3.5 (3)					1.8 (1)		2.8 (1)					1.6 (1)		2.3 (1)		2.4 (1)				11	1.3
California		3.5 (3)	2.3 (3)	4.3 (2)	4.0 (1)	3.5 (3)			10 (1)		3.6 (2)	16.7 (2)	2.8 (1)	11.8 (2)	8.8 (2)		3.7 (1)	1.6 (1)	16.7 (1)		2.5 (1)	4.7 (2)	16.7 (1)	20.0 (2)		31	3.6
Colorado		1.0 (1)	1.5 (2)	4.3 (3)		7.0 (6)					1.8 (1)							3.3 (2)			2.5 (1)					15	1.8
Idaho		5.0 (5)	5.3 (7)		7.0 (1)	2.7 (4)	3.7 (1)	33.3 (1)	10 (1)		3.6 (2)				4.4 (4)			4.9 (3)			5.1 (2)	4.7 (2)				30	3.5
Hawaii			8 (1)			1.2 (1)																2.4 (1)	16.7 (1)		25.0 (1)	5	.6
Illinois			2.0 (2)	8 (1)	4.3 (2)																			10.0 (1)		6	.7
Iowa				2.2 (1)		1.2 (1)									4.4 (1)		3.7 (1)			2.3 (1)						5	.6
Kansas		1.0 (1)	1.5 (2)						10 (1)		3.6 (2)															6	.7
Michigan			.9 (1)										2.8 (1)				7.4 (2)					2.4 (1)				5	.6
Minnesota		1.0 (1)	.8 (1)			2.4 (2)																				4	.5
Montana							11.1 (3)				1.8 (1)			5.9 (1)												5	.6
Nevada			3.0 (4)				3.7 (1)											1.6 (1)								6	.7
New York		1.0 (1)			4.0 (1)	7.0 (6)				14.3 (1)	5.5 (3)															12	1.4
Ohio						1.2 (1)			10 (1)		1.8 (1)							1.6 (1)								4	.5
Oklahoma			.8 (1)				7.4 (2)				1.8 (1)								16.7 (1)							5	.6
Oregon						1.2 (1)												2.6 (4)						20.0 (2)		4	.5
Penn.			2.5 (2)								1.8 (1)							1.6 (1)								4	.5
Texas		2.0 (2)									1.8 (1)			5.9 (1)							2.5 (1)	2.4 (1)				5	.6
Utah	66.7 (2)	76.0 (75)	77.2 (92)	71.7 (33)	86.0 (21)	56.4 (44)	66.7 (18)	61.7 (2)	50 (5)	71.4 (5)	65.4 (36)	58.3 (7)	86.1 (31)	53.0 (9)	78.2 (18)	90.9 (20)	77.7 (21)	75.4 (46)	66.7 (4)	85.3 (35)	74.3 (29)	66.7 (28)	50 (3)	30 (3)		599	71.7
Washington		1.0 (1)	.8 (1)	4.3 (2)		2.4 (2)	3.7 (1)							5.9 (1)				1.6 (1)				2.4 (1)	16.7 (1)			11	1.3
Wyoming		1.0 (1)	1.5 (2)			2.4 (2)					1.8 (1)	8.3 (1)					3.7 (1)			2.3 (1)					20. (2)	12	1.4
Other	33.3 (1)	3.5 (3)		21.3 (2)		3.5 (3)			10 (1)			8.3 (1)	2.6 (2)	5.9 (1)	4.4 (1)	4.6 (1)		1.6 (1)		4.6 (2)	2.5 (1)	7.1 (3)			25. (1)	24	2.9
Several States*		2.1 (2)		2.2 (1)	4.0 (1)	2.4 (2)	3.7 (1)			13.3 (1)	3.5 (2)	8.3 (1)		11.8 (2)		4.5 (1)	3.7 (1)	3.3 (2)		7.0 (3)	10.3 (4)	4.7 (2)		20.0 (2)		28	3.4
Total Nos.	3	95	130	46	25	85	27	3	10	7	55	12	36	17	23	22	27	61	6	43	39	42	6	10	4	837	
% of Total	.3	11.9	15.8	5.5	3.0	10.2	3.2	.4	1.2	.9	6.6	1.4	4.3	2.2	2.7	2.6	3.2	.7	.7	5.1	4.8	5.0	.7	1.2	.4		

* Percentage of Ss in major by states.
\+ States represented by less than 4 students are included in this group.

We have noted that there were no major differences between the two institutions on religion (Figure 2). However, a larger proportion of the students at USU (41.5 percent compared to 28.3 at WSC) grew up in states other than Utah (Figure 6) and thus that sample contains a greater number of students who grew up away from the more concentrated LDS Church influence in Utah (Tables 5, 6, 7, and 8).

Age and Sex. The USU and WSC samples contained 49.7 and 48.7 percent juniors and 50.5 and 51.3 percent seniors, respectively (Figure 7). However, the students at USU were somewhat younger (Figure 8) with 83.3 percent under 24 years of age. Only 74.4 percent of the WSC subjects were in this age classification. The Weber State sample had 5.6 percent in the classification of over 35 years and the USU sample had only 2.5 percent in this category. This difference in age may be because more WSC students work (particularly male) in the urban area while going to school and therefore take longer to finish their schooling[5] or because, in the urban area, more subjects come back for schooling at an older age.

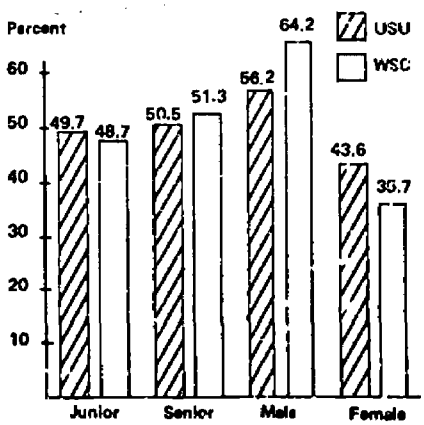

Figure 7. Percentage by class rank and percentage by sex of USU and WSC subjects.

[5] This is reflected in the evening school enrollments of the two institutions. The evening school at WSC has an enrollment of more than 2500 students per quarter, while USU has approximately 500 students in its evening program.

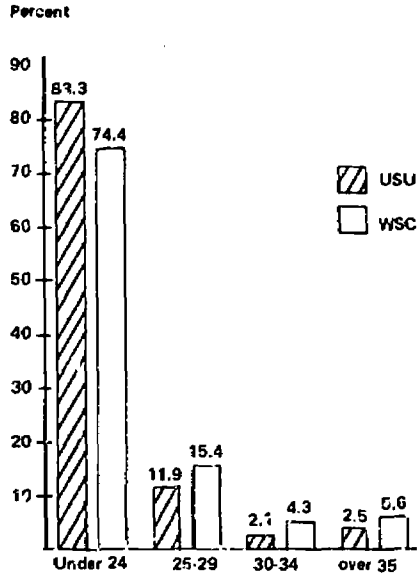

Figure 8. Age classification percentages for USU and WSC subjects.

There was a higher percentage of males in the WSC sample than in the USU sample--64.2 and 56.2 percent respectively (Figure 7). This was to be expected since a greater proportion of males were found in the WSC population (74.0%) than was reported for the USU population (69.2%) (calculated from Table 4).

Certification Plans. Regarding teacher certification plans, 53.2 percent of the USU sample indicated that they had plans for becoming teachers, while 43.3 percent of the WSC students planned on becoming teachers (Figure 9). The difference between the two schools may be even greater because a smaller percentage of all elementary teachers at USU (66.1) as compared with WSC (75.0) was included in the sample. (Table 4, page 51). Comparable figures are not available for secondary majors because the registrar's records did not show how many students were enrolled in secondary education at either of the two institutions.

F and D Scale Means

The measures used in this study, to be discussed further in the next section, were the F and D Scales. Contrasting the raw score means for this study with those earlier studies seems important to describing our sample.

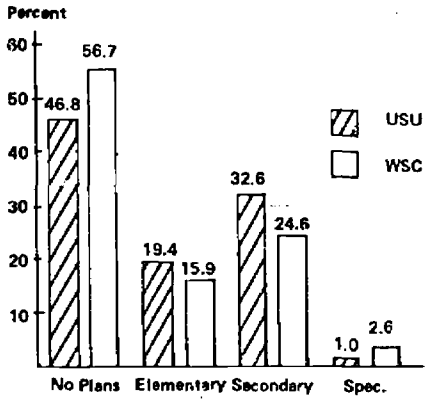

Figure 9. Certification plans by percentage of USU and WSC subjects intending to obtain a teaching certificate.

The raw score mean on the D Scale for our 1049 USU students was 149.83, with a standard deviation of 25.81. The Weber State College raw score mean for 837 students was 148.83, with a standard deviation of 25.71 (Table 9). These means were somewhat higher (not tested for significance) than that reported for the Shaver and Richards' (1968) USU sample. That study used only education students and obtained a mean of 146.71. Alter and White (1966) used 2000 freshmen students at the University of Utah and obtained a raw score mean of 149.40.

Table 9

Means and Standard Deviations on the F and D Scales

		F Scale*		D Scale	
	N	Means	S.D.	Means	S.D.
USU	1049	101.00	21.78	149.83	25.81
WSC	837	99.93	22.10	148.83	25.71

*Twenty-eight item scale (see "Instrumentation" section of this chapter).

A general overview of studies conducted on numerous college campuses was given in the review of literature (see Tables 1 and 2). Of the 24 studies presented in Table 2, only 10 reported a higher mean D Scale score than the raw score means for our USU and WSC samples. It is interesting to note that all 10 of these studies used freshmen subjects while the present study used only junior and senior subjects. As indicated in the review of literature, freshmen have been found to have higher scores than upper classmen.

For the F Scale, the 1049 USU subjects had a raw score mean of 101.00 with a standard deviation of 21.78, and the mean score of subjects from WSC was 99.93 with a standard deviation of 22.10 (Table 9). The mean item raw scores were 3.61 and 3.57 for USU and WSC, respectively. Shaver and Richards (1968) reported a 3.46 item raw score mean for their USU sample of education students. From Table 1, a comparison of item scores from 17 studies can be made. The item score means for the present study were exceeded by item scores from only four other studies. Two of the higher means came from studies (Christie & Garcia, 1951; Kerlinger & Rokeach, 1966) conducted in the south (an authoritarian subculture?) and from a study (Kerlinger & Rokeach, 1966) at a negro college in Maryland; the fourth study (Stott, 1954) used a group of freshmen from the University of Utah.

Instrumentation and Data Collection

Measures

To obtain quantitative estimates of authoritarianism and dogmatism, two scales were used: The California F Scale, Form 40-45 (Adorno, et al., 1950, pp. 255-257) and the 40-item Dogmatism Scale, Form E (Rokeach, 1960, pp. 72-80). The F Scale was originally composed of 29 items. However, for this study, only 28 items were used. Item 22 of the original F Scale, "It is best to use some prewar authorities in Germany to keep order and prevent chaos", seemed historically out of context for college students in the 1970's. A replacement was not constructed and, therefore, one must keep in mind that the total mean scores are based on 28 rather than 29 items. Where feasible, mean items scores will be reported for comparing the subjects of this study with other studies using the F Scale.

Items from both measures were printed in one instrument using the instructions and form established by Rokeach (1960, p. 72; see also Appendix B). A specially printed Data and Answer Sheet (on an IBM 552 form) was used (Appendix B). The items of the two scales are similar enough so that they cannot be distinguished from one another without using a key.

Instructions. The Opinion Questionnaire (Appendix B) was administered by four graduate assistants. All the testing was conducted on the Weber State campus by one individual, with the other three assistants working at USU.

In addition to the instructions on the Data Answer Sheet (Appendix B) and the Opinion Questionnaire, the graduate assistants were instructed to make the following statements:

1. Your professor has provided thirty minutes of class time for you to assist in a research project. Students at Weber State College and Utah State University are participating in a research project. In addition to your response on the Opinion Questionnaire which contains its own written instructions, may I call your attention to the example on the first page of your booklet. Your responses for Item A (on major) and Item B (on religion) require that you mark two rows as shown in the example. The response on the religious item, as well as any other items, is optional. There is, however, no attempt being made to identify you personally. Please do not put your name on the answer sheet.

2. A computer will be used to score your data and answer sheet.

3. Your own personal opinion is what we are interested in obtaining.

4. Because of the time limit we do not want you to take too much time on each question. Your personal opinion is the best answer.

5. Is there anyone who has not received a booklet, answer sheet, or a number two marking pencil?

6. Are there any questions? You may proceed with the questionnaire.

Any additional instructions and points of concern for test administrators are included in Appendix A.

Scoring

The F and D Scales were marked and scored similarly. The subjects marked each item in terms of the extent to which they agreed or disagreed with it (note: no middle or neutral option was provided):

+1 - I agree a little	-1 - I disagree a little
+2 - I agree on the whole	-2 - I disagree on the whole
+3 - I agree very much	-3 - I disagree very much

This Likert method of scale construction was used by Rokeach. He assumed that six possible responses gave subjects the best chance to record clearly felt differences in strength of agreement or disagreement.

Responses were converted, for scoring purposes, to a 1-to-7 scale by adding a constant of 4 to each item score to eliminate negative numbers. If any item on the response sheet was left blank, it was considered a neutral response and a value of four was assigned to it. The total test score for each measure (F and D) was the sum of scores obtained on all its items. The minimum and maximum scores for the F and D Scale are 28-196 and 40-280, respectively.

Reliability

Most research studies have used split-half correlations corrected with the Spearman-Brown Prophecy Formula to estimate the reliability of the F and D Scales. According to Richardson and Kuder (1939):

> The split-test Spearman-Brown technique assumes equal standard deviations of the two halves, and also implicitly assumes that the correlation coefficient between the two halves is representative of the many different coefficients that could be obtained if the test were halved in different ways. The particular way of splitting the test that is adopted in any given situation determines the value of the reliability coefficient that will be obtained. The particular split may not select a representative value from the many different estimates possible. The lack of uniqueness of a split-test estimate, plus the fact that the standard deviations of the two half-tests are not often equal, operate to make the method rather unsatisfactory in practice. (p. 681)

Since the present study involved heterogeneous samples in which cultural factors might affect responses to individual items, a test for reliability seemed desirable in which each test item was considered rather than one which relied upon a chance split of the test items.

The Kuder-Richardson Formula 21 was devised by its authors with equivalence defined in terms of the items or elements of the test: "The departures from the exact equivalence are rationally defined, and are not dependent upon the experimenter's inevitable failure to construct two test forms which are closely equivalent" (Richardson & Kuder, 1939, p. 682).

Formula 21, used to compute the reliability coefficients, was:

$$r = \frac{n}{n-1} \cdot \frac{S.D.^2 - \bar{X}(n-\bar{X})}{S.D.^2}$$

Explanation of symbols:

r = Reliability coefficient of test
n = Total possible points on the test (i.e., the F Scale was 28 x 7= 196 and D Scale was 40 x 7 =280)
S.D.= Standard deviation of the scores on the test
$\bar{X}$ = The mean score on the test

As noted earlier[6], the method of rational equivalence tends to slightly underestimate the true value of the reliability coefficient. "This formula [No. 21] will in most cases underestimate, and will never overestimate, the reliability coefficient. . . . Formula (21) may be regarded as a foot-rule method of setting the lower limits of the reliability coefficient, or the upper limit of error" (Richardson & Kuder, 1939, p. 684).

Employing the Kuder-Richardson Formula 21, reliability coefficients of .90 were obtained for both the F and D Scales for the WSC and USU samples. These reliability coefficients were similar to those reported by Shaver and Richards (1968, p. 62) for the F and D Scales (.90, .88, respectively) using Formula 21.

Correlations Between the Two Measures

As was mentioned before (Chapter II), correlations between the F and D Scale scores have been relatively high (.54 to .82). Using the Pearson product-moment correlation, an r of .78 was obtained for Utah State University and an r of .76 at Weber State.

Statistical Analysis

The major concern of the study was to compare teachers and non-teachers on the D and F Scales. Also, related questions were to be

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[6]See footnote 6 on page 13.

answered, including some about interactions between various factors in affecting D and F Scale scores. It seemed likely that scores on the D and F Scales would not be independent of variables such as major, religion, sex, teaching plans, church attendance, and state and size of city in which subjects grew up. Consequently, analysis of covariance--usually a factorial model, but sometimes a simple one--was used to adjust for these effects.

Because our subgroups were not equal in size (we drew proportionate samples from different size groups), we could not assume that factors which might be related to D and F Scale scores would be equally represented in the various subgroups. According to Winer (1962), when working with intact groups having unequal sizes, it is desirable to adjust dependent variable means for the effects of varying group sizes. To cope with the unequal cell frequencies (unbalanced design), the general least-squares (GLS) solution was used.[7]

The general least-squares (GLS) approach to the factorial analysis of covariance is not as commonly employed in the behavioral sciences as are other solutions (e.g., unweighted means). However, according to Hurst (1970) and Winer (1962), this mathematical model is appropriate for the common research situation of unequal size groups.

The GLS solution, with its adjustments for unequal group sizes, will result in differing estimates of the main effects and interaction effects, depending on which factors are included in the mathematical model--because this results in different subgroup breakdowns. The general least-squares approach has been discussed by Hurst (1970), Graybill (1961), Harvey (1960, 1964), and Winer (1962).

An IBM S/360 model 44 digital computer was used.[8] In order to provide for a replication of results, data from the two institutions (Utah State University and Weber State College) were subjected to separate analyses, except, of course, when differences between the two institutions were analyzed.

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[7]An attempt was made to analyze our data assuming a balanced design (factorial analysis of covariance with unweighted means). Negative sums of squares were obtained for the interaction components due to the disproportionality of cell frequencies. These results indicated the importance of using an unbalanced model with the general least-squares solution in which means were weighted. According to Winer, the general least-squares solution for the analysis of covariance is computationally more difficult than the unweighted means solution, but "the resulting tests. . .are more powerful" (1962, p. 224).

[8]The specific program employed was designed by Dr. Rex L. Hurst, Head, Department of Applied Statistics, Computer Science at Utah State University, Logan, Utah, 84321.

Comparisons of Pairs of Means

According to Snedcor and Cochran (1967) and Bancroft (1968), the usual tests of pairs of means (e.g., the Duncan, Tukey, or Student-Newman-Keul Tests) are not appropriate for comparisons of differences between "adjusted means even though the adjusted means are regarded as better estimates of the treatment effects than the unadjusted means because one (or more) of the sources of experimental error has been removed by the adjustments" (Snedcor & Cochran, 1967, p. 431). To determine whether or not the differences between pairs of adjusted means were significant, linear comparisons were used in this study. To use the linear comparison portion of the statistical package, the pairs of means to be compared had to be selected in advance of the computer run. The differences between pairs of main effect means were tested for significance in every analysis. However, because of the large number of cell means in some analyses, it was not feasible to compare all possible combinations of mean differences. The linear comparison option was normally programmed where significant differences between cell means were expected or an a priori hypothesis called for the analysis.

In some instances, unanticipated comparisons between cell means were deemed desirable after an analysis had been run. Because of unequal cell sizes, the formula for finding an approximation to an F-test for the differences between two adjusted means when linear comparisons had not been made was:

$$\frac{\bar{X}_1 - \bar{X}_2}{\left(\frac{1}{n_1} + \frac{1}{n_2}\right) MS} \rightarrow F$$

The equation assumes zero covariance. The F-Ratio obtained from the comparison of mean differences had one degree of freedom in the numerator and the degrees of freedom for the denominator were those for the error term used in the calculation and obtained from the original analysis of covariance.

Adjusted and Unadjusted Means

The analysis of covariance with the general least-squares solution provided an output of means adjusted for the covariates included in the model and for unequal cell frequencies. Therefore, the means reported in the next chapter, "Analysis of Data", are all adjusted means, unless otherwise specifically noted.

Unadjusted means and their standard deviations were calculated for college students grouped by academic major and by religious affiliation. These are reported in Appendix C--Tables 70 and 71--for readers who may want to compare them with their own data or results from other studies.

Summary

The major purpose of this study was to determine whether differences existed between the open-closed mindedness of students in education and students in other college fields. Two major questions and 12 additional questions concerning three general types of variables (personal characteristics, demographic background data, and educational characteristics) were asked.

The data were collected from two institutions: Utah State University and Weber State College. Departments (subject matter areas) were classified insofar as possible according to the nine colleges at Utah State University to provide a common basis upon which to compare the academic majors from the two institutions.

The sampling procedures consisted of having deans and department heads of each school and college for the two institutions identify upper division classes which contained primarily junior and senior students. Only junior and senior students were used for the analyses. The sample was to contain a minimum of 25 percent of the students majoring in each college or school. The data were collected from 111 classes and represented 35.6 (1049) percent of the junior and senior students at USU and 40.2 (837) percent of that population at WSC.

The subjects have been described in terms of their religious affiliations, church attendance, age, major, state and city size in which they grew up, sex, class rank and certification plans.

To obtain estimates of open and closed mindedness , the F Scale (Adorno, et al., 1950) and the Dogmatism Scale (Rokeach, 1960) were administered. The reliabilities for the instruments were estimated using the Kuder-Richardson Formula 21. The reliability coefficients were were .90 for both instruments at both institutions. The correlation coefficients between the two scales were .76 at WSC and .78 for the USU sample.

Analysis of covariance, simple and factorial, was used to analyze the data. The analyses were computed by the general least-squares solution. This model permitted adjustment for unequal cell frequencies, as well as for covariates. Differences between pairs of means were tested for significance using linear comparisons.

Chapter IV

ANALYSIS OF DATA

The dependent variables analyzed in this study were the responses of junior and senior college students to the F and D Scales as measures of authoritarianism and dogmatism. The subjects were from two institutions of higher education located in northern Utah. The purpose was to assess the open and closed mindedness of college students, with particular emphasis on comparing students majoring in education to college students in other fields. Two major questions and several minor questions were generated for the study. These served as the basis for the null hypotheses tested by the analyses.

Vocational Choice

Our earlier discussion of the choice of a vocation indicated (Weber, 1958) that specialized occupations are likely to attract persons who somewhat resemble one another in personality characteristics. The major question of this study was "Do the D and F Scales scores differentiate college students in regard to their choice of teaching or other vocations?" The hypothesis that was formulated and tested was:

(1) There is no significant difference among the mean Dogmatism or F Scale scores[1] of the students in education and students majoring in other fields.

The subjects included in the analyses related to this hypothesis were 1016 students from Utah State University and 793 from Weber State College. All subjects who indicated they planned to receive a teaching certificate were classified as education majors. The major of physical education was not included in the analysis for either institution since the number of physical education students not planning to obtain a teaching certificate was less than five at both institutions. Those physical education majors who were planning to obtain certificates, however, were pooled with the other education majors. Landscape architecture as a major was also omitted since the number was small (all non-teachers) and there was no other group with which it made sense to pool them.

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[1] D and F Scales were analyzed separately, but the hypotheses were stated in this manner to avoid repetition.

As was mentioned earlier, in order to provide for a replication of results, the data from the two institutions were subjected to separate analyses. A simple analysis of covariance using the general least-squares solution was used to compare students with different majors. All the other factors considered in the study, e.g., religion, sex, church attendance, state of childhood residency, and size of city in which subjects grew up, were used as covariates.

Utah State University

Examination of the results of the analyses of covariance for the USU data (Table 10) reveals that the differences among the means of the majors

TABLE 10

Analyses of Covariance for D Scale and F Scale Mean Scores of 1016 Utah State University Subjects Grouped by Vocational Choice

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Major	D	10	12577.74	1257.74	.89	>.05
	F	10	15338.27	1533.83	.95	>.05
Covariates: Religion	D	4	16812.99	4203.25	3.97	<.05
	F	4	16896.85	4224.21	2.62	<.05
Sex	D	1	3766.16	3766.16	2.66	>.05
	F	1	1177.17	1177.17	.73	>.05
Church Attendance	D	3	43433.53	14477.78	10.24	<.01
	F	3	29236.43	9745.48	6.05	<.01
State	D	2	7449.94	3724.97	2.63	>.05
	F	2	9440.69	4720.35	2.93	>.05
City Size	D	4	15629.66	3907.42	2.76	<.05
	F	4	21757.29	5439.32	3.38	<.01
Linear Comparisons	D	1				
	F	1				
Error	D	991	1401746.00	1414.48		
	F	991	1595867.00	1610.36		
Total	D	1016	24631870.00			
	F	1016	12282910.00			

were not significant--F-Ratios of .89 ($p>.05$) and .95 ($p>.05$) for the D and F Scales, respectively.

The covariates of religion, church attendance, and size of city in which the subjects grew up contributed significantly to the reduction of the total variance for both D and F Scale scores. The covariates of sex and state did not make a significant ($p>.05$) reduction in variability for either scale.

The adjusted means of the D and F Scale scores for their rank order for the 1016 USU subjects are included in Table 11. Even though the

TABLE 11

Adjusted D and F Scale Means[1] and Their Rank Order for 1016 Utah State University Subjects Grouped by Vocational Choice

Vocational Choice	D Scale $\bar{X}$	D Scale Rank	F Scale $\bar{X}$	F Scale Rank
English	157.89	1	101.71	7
Agriculture	156.33	2	109.96	1
Engineering	155.40	3	107.36	2
Science-Math	153.67	4	102.41	6
Education[2]	153.07	5	104.23	4
Business	152.70	6	106.87	3
Natural Resources	148.72	7	103.33	5
Art-Music	145.29	8	94.59	9
Social Science	141.84	9	90.74	10
Family Life	141.13	10	96.91	8

[1]Means adjusted for unequal Ns, and for covariates of religion, sex, church attendance, state of childhood residency, and city size in which Ss grew up.

[2]Elementary and secondary education students were pooled.

F-Ratios for the differences among the mean D and F Scale scores of the various majors were not significant, it was interesting to note the size of the means and their rank order. Education majors were fifth on the D Scale and fourth on the F Scale when the 10 majors were rank ordered with highest mean being ranked first. Students choosing education as a vocational choice had a mean D Scale score of 153.07, as compared to the grand mean of 150.78 for the 1016 students included in the analysis. Education students had a F Scale mean of 104.23, compared to the grand mean of 102.01 for the 1016 students.

Weber State College

The same model of analysis of covariance was used for the Weber State College data. The majors of agriculture, natural resources, and family life had either no students or too few to be included in the analyses.

The F-Ratios for major on the WSC sample were larger than those reported for the USU analyses. The F-Ratio of 1.73 for the D Scale approached significance ($p<.10>.05$), while on the F Scale the F-Ratio for major (2.49) was significant ($p<.05$) with d.f. 7/793 (Table 12).

The significant covariates on the D Scale analysis were religion ($p<.05$), sex ($p<.001$), and church attendance ($p<.001$). Controlling for state of childhood residency did not significantly reduce the variance of D Scale scores. The only covariate which reached a level of significance for the F Scale was state of childhood residency ($p<.01$).

For the F Scale, where a significant F-Ratio was obtained for major, comparisons of all possible pairs of means (Table 14) were made. Social science students scored significantly ($p<.01$) lower on the F Scale than did students in engineering, business, science-mathematics, and education. None of the other differences between pairs of F Scale means was significant.

The Weber State College education subjects had a smaller D Scale mean (147.73, Table 13) than did the USU education subjects (153.07, Table 11). Among the seven majors at WSC, education subjects ranked 6th and 4th on the D and F Scales, respectively (Table 13). English majors not planning to teach ranked first with the highest mean D Scale score, as was also the case for the Utah State University sample. Likewise, social science non-teaching majors had the lowest D and F Scale scores for both institutions.

WSC students choosing education as a major had a mean D Scale score of 147.73 which was slightly less than the grand mean of 148.64 for the 793 students included in the analysis. On the F Scale, education students had a mean of 101.73, as compared to 102.74 for the grand mean.

TABLE 12

Analyses of Covariance for D Scale and F Scale Mean Scores of 793 Weber State College Subjects Grouped by Vocational Choice

Source of Variance		Scale	d.f.	SS	MS	F-Ratio	P
Major		D	7	7452.03	1064.58	1.73	>.05
		F	7	20443.15	2920.45	2.49	<.05
Covariates:	Religion	D	4	6547.48	1636.87	2.66	<.05
		F	4	9727.10	2431.78	2.07	>.05
	Sex	D	1	13829.90	13829.90	22.49	<.01
		F	1	2703.25	2703.25	2.30	>.05
	Church Attendance	D	3	12835.49	4278.50	6.96	<.01
		F	3	8313.02	2771.01	2.36	>.05
	State	D	2	321.05	160.52	.26	>.05
		F	2	12018.40	6009.20	5.12	<.01
	City Size	D	4	3939.33	984.83	1.60	>.05
		F	4	790.63	197.66	.17	>.05
Linear Comparisons		D	1				
		F	1				
Error		D	771	474129.60	614.95		
		F	771	905239.50	1174.11		
Total		D	793	18054730.00			
		F	793	9062905.00			

Summary

The analyses of covariance (Tables 10, 12), then, did not produce consistent findings for the two institutions. No significant differences among education majors and other college students were found to exist at Utah State University on either scale and the null hypothesis was not rejected. At Weber State College, the null hypothesis was rejected only for the F Scale ($p<.05$). Education majors scored significantly ($p<.01$) higher on the F Scale, as did students majoring in engineering, business and science-mathematics, than students majoring in social science.

TABLE 13

Adjusted D and F Scale Means[1] and Their Rank Order for 793 Weber State College Subjects Grouped by Vocational Choice

Vocational Choice	D Scale $\bar{X}$	D Scale Rank	F Scale $\bar{X}$	F Scale Rank
English	152.50	1	100.88	6
Engineering	151.74	2	105.36	1
Business	151.11	3	103.84	2
Science-Math	148.50	4	102.13	3
Art-Music	147.74	5	101.14	5
Education[2]	147.73	6	101.73	4
Social Science	142.03	7	89.99	7

[1]Means adjusted for unequal Ns and covariates of religion, sex, church attendance, state and city size in which subjects grew up.

[2]Elementary and secondary education students were pooled.

Academic Majors and Secondary Education

In answering our first major question, the analyses of our data indicated that the education majors in our samples were not generally more authoritarian or dogmatic than other students. To further explore the relative open-closed mindedness of students preparing to teach, we asked whether teaching majors were more authoritarian or dogmatic than non-teaching majors in the same subject fields. Although elementary and secondary teaching majors were pooled for the anslyses for Hypothesis 1, this question could only be asked for those preparing to be secondary school teachers because prospective elementary school teachers do not major in an academic field at either USU or WSC. The hypothesis tested for each academic area was:

TABLE 14

Mean Differences on the F Scale for 793
Weber State College Subjects Grouped by Vocational Choice

Academic Area	1	2	3	4	5	6	7
Engineering	1	2.52	4.23	4.63	5.22	5.48	16.37*
Business	2		1.71	2.11	2.70	2.96	13.85*
Science-Math	3			.40	.99	1.25	12.14*
Education	4				.59	.85	11.74*
Art-Music	5					.26	11.15
English	6						10.89
Social Science	7						

* Significant at .01 level (linear comparisons used to calculate significance).

(2) There is no significant difference between the mean D or F Scale scores of students preparing to teach in secondary education and college students in the same academic fields but not preparing to teach.

For the analyses, 751 subjects were available from the Utah State University sample and 597 from the Weber State College sample. Landscape architecture and physical education majors were not included because there were insufficient non-teachers or teachers in these majors.

The analysis of covariance model had two factors, academic major and teaching plans, with religion, sex, attendance, state and city size of childhood residency used as covariates. The significant ($p<.01$) covariates for the USU analyses for both scales were religion, sex, and church attendance. In addition, city size and state were significant ($p<.05$) for the F Scale. Significant for the WSC analyses were the covariates of religion ($p<.05$, F Scale), church attendance ($p<.01$, F and D Scale), and sex ($p<.01$, D Scale.

Academic Major

The test of the main effect of academic area (elementary students excluded) provided a comparison of the various academic areas in addition to those obtained by the analyses for Hypothesis 1. Using the within cell means, the means of teachers and non-teachers for each subject area were compared in order to test Hypothesis 2.

The reader will recall that the simple analyses of covariance for Hypothesis 1, using a larger group of USU (1016) and Weber State College (793) students including education as a major, yielded no significant differences among the means of the various majors for either the D or the F Scale at USU nor on the D Scale at WSC. However, the factorial analyses for Hypothesis yielded a significant F-Ratio (beyond the .01 level) for the F Scale for both institutions (Tables 15 and 16). Results for the D Scale for both institutions approached significance ($p<.10>.05$).

The significant differences between pairs of means for the F Scale are reported in Tables 17 and 18. Business majors at USU were, as a group, significantly more authoritarian than were the students in family life, science-mathematics, engineering, English, art-music and social science (Table 17). Subjects in natural resources at USU were also significantly more authoritarian than majors in engineering, English, art-music, and social studies. Those students at USU majoring in agriculture had significantly higher F Scale scores than did students in art-music and social science. Social science majors also had significantly lower F Scale scores than family life, science-mathematics, and engineering majors.

Engineering students at Weber State College were significantly more authoritarian than majors in science-mathematics, art-music, English, and social studies (Table 18). Business majors at Weber scored significantly higher on authoritarianism than did English and social studies majors. In addition, science-math and art-music students were significantly higher on the F Scale than were social science majors.

As may be recalled from the review of literature, we constructed a general thesis that students majoring in academic areas organized around people or "humanism" would be expected to be less closed minded or authoritarian than those students in academic areas organized around power, skill, or "thingism". The results of the F Scale analyses support this thesis. Majors in social science, art-music, and English had significantly lower F Scale scores than did the majors in business, natural resources, and agriculture (Table 17).

In summary, then, although no significant differences were found in earlier analyses with education included as a major, for the analyses for Hypothesis 2, there were significant differences among the F Scale means for students majoring in various academic fields. The differences among the academic fields also approached significance for the D Scale scores.

TABLE 15

Analysis of Covariance for D Scale and F Scale
Mean Scores of 751 Utah State University Subjects
Classified by Specific Academic Area and Secondary Teaching Plans

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Academic Major	D	8	9166.54	1145.82	1.95	>.05
	F	8	12498.26	1562.28	3.96	<.01
Sec. Tea. Plan	D	1	588.54	588.54	1.00	>.05
	F	1	145.61	145.61	.37	>.05
Major x Sec. Tea. Plan	D	8	8213.78	1062.72	1.75	>.05
	F	8	4421.39	522.67	1.40	>.05
Covariates:						
Religion	D	4	16303.46	4075.87	6.94	<.01
	F	4	14823.73	3705.93	9.40	<.01
Sex	D	1	5812.04	5812.04	9.90	<.01
	F	1	4402.97	4402.97	11.16	<.01
Church Att.	D	3	15602.69	5200.90	8.86	<.01
	F	3	7907.65	2635.88	6.68	<.01
State	D	2	2209.39	1104.69	1.88	>.05
	F	2	3253.16	1626.58	4.12	<.05
City Size	D	4	2394.38	598.60	1.02	>.05
	F	4	4077.44	1019.36	2.53	>.05
Linear Comparisons	D	1				
	F	1				
Error	D	719	422238.80	587.26		
	F	719	283572.70	394.40		
Total	D	751	17157160.00			
	F	751	7805759.00			

Secondary Teaching Plans by Academic Major

The main effect of teaching plans was not significant for either scale at either institution. Our a priori interest, however, was in

comparing the pairs of means obtained for each specific major (Tables 19, 20, 21, and 22).

TABLE 16

Analysis of Covariance for D Scale and F Scale
Mean Scores of 597 Weber State College Subjects
Classified by Specific Academic Area and Secondary Teaching Plans

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Academic Major	D	5	6886.20	1377.24	2.17	>.05
	F	5	8125.83	1625.17	3.59	<.01
Sec. Teaching Plans	D	1	133.38	133.38	.21	>.05
	F	1	.26	.26	.00	----
Major X Sec. Teach. Plans	D	5	6261.40	1252.28	1.98	>.05
	F	5	2130.46	426.09	.94	>.05
Linear Comparisons	D	1				
	F	1				
Covariates:						
Religion	D	4	5573.22	1393.31	2.20	>.05
	F	4	5679.53	1419.88	3.12	<.05
Sex	D	1	5499.32	5499.32	8.68	<.01
	F	1	869.86	869.86	1.91	>.05
Church Attendance	D	3	11363.56	3837.85	5.98	<.01
	F	3	6151.54	2050.51	4.51	<.01
State	D	2	142.45	71.23	.11	----
	F	2	370.90	185.45	.41	----
City	D	4	5680.36	1420.09	2.24	>.05
	F	4	3955.94	988.98	1.29	>.05
Error	D	571	361622.30	633.31		
	F	571	259842.30	455.07		
Total	D	597	13653560.00			
	F	597	5235253.00			

TABLE 17

Mean Differences on the F Scale for 751
Utah State University Subjects Grouped by Academic Areas[1]

Academic Area	1	2	3	4	5	6	7	8	9
Business	1	2.76	4.23	7.85*	8.51*	8.54*	8.90*	11.83**	15.18**
Nat. Resources	2		1.47	5.09	5.75	5.78*	6.14*	9.07*	12.42**
Agriculture	3			3.62	4.28	4.31	4.77	7.60*	10.95**
Family Life	4				.66	.69	1.05	3.98	7.33*
Science-Math	5					.03	.39	3.22	6.67*
Engineering	6						.36	3.19	6.64*
English	7							2.83	6.28
Art-Music	8								3.45
Social Science	9								

* Significant at the <.05 level

** Significant at the <.01 level

[1]Differences computed from the means reported in Table 20.

With only one exception (science-math for Weber State), the differences between D and F Scale scores for teachers and non-teachers were in the same direction for both scales (i.e., if teachers scored higher on the D Scale, they also scored higher on the F Scale). The direction of mean differences was evenly split between teachers and non-teachers at USU (Tables 19 and 20), non-teachers had four higher D and F Scale means (agriculture, engineering, English, science-math) and teachers had five higher means (business, natural resources, family life, art-music and social studies). At Weber State College (Tables 21 and 22), the split between teachers and non-teachers for the six subject areas yielded higher mean scores for teachers in four academic areas on the D Scale (engineering, art-music, science-math, and social science) and in two areas on the F Scale (engineering, art-music).

TABLE 18

Mean Differences on the F Scale for
597 Weber State College Subjects Grouped by Academic Areas[1]

Academic Area	1	2	3	4	5	6
Engineering	1	5.64	7.44**	7.53**	12.17**	16.79**
Business	2		1.80	1.89	6.53*	11.15**
Science-Math	3			.09	4.73	9.35**
Art-Music	4				4.64	9.26**
English	5					4.62
Social Studies	6					

* Significant at the .05 level

** Significant at the .01 level

[1]Differences computed from the means reported in Table 22.

In only two instances were teacher, non-teacher means significantly different. Both of these differences occurred at Weber State College. On the D Scale, engineering students planning to teach were more ($p<.05$) closed minded than their counterparts, and English non-teachers scored significantly ($p<.05$) higher than English students planning to teach.

Summary

When elementary students were excluded from the analyses, significant differences were obtained among the F Scale means for academic areas at both institutions. For D Scale scores, significant ($p<.10>.05$) differences were not obtained.

TABLE 19

D Scale Adjusted Mean Scores[1] of 751 Utah State University Subjects Grouped by Academic Areas and Secondary Teaching Plans[2]

Academic Area[3]	Teaching Plans[4] Non-Teacher	Teacher	Mean Differences	F-Ratio	P
Agriculture	154.21	143.37	10.84	2.23	>.05
Business	149.10	161.28	12.18	2.94	>.05
Engineering	151.94	148.10	3.84	.66	>.05
Natural Resources	145.03	155.07	10.04	.63	>.05
Family Life	139.14	154.16	15 02	2.53	>.05
English	154.50	143.88	10.62	3.70	>.05
Art-Music	143.73	154.25	10.52	1.42	>.05
Science-Math	150.29	147.05	3.24	1.07	>.05
Social Science	139.47	144.01	4.54	.17	>.05

[1]Means adjusted for unequal Ns,religion, sex, church attendance, stage and city size.

[2]The means are the within cell means for the analysis reported in Table 15.

[3]Physical education was not included because of insufficient number of non-teachers.

[4]Elementary students excluded from analyses.

The main effect of teaching plans was not significant for the D or F Scale means at either institution.

When the mean differences of teachers versus non-teachers were tested for each academic area, Hypothesis 2 was not rejected for either scale for the Utah State University sample. Nor was it rejected for the WSC F Scale data. Hypotheses 2 was rejected, however, for the D Scale

TABLE 20

F Scale Adjusted Mean Scores[1] of 751 USU Subjects
Grouped by Academic Areas and Secondary Teaching Plans[2]

Academic Area[3]	Teaching Plans[4] Non-Teacher	Teacher	Mean Difference	F-Ratio	P
Business	103.03	110.10	7.07	1.91	>.05
Natural Resources	99.57	108.93	9.36	1.08	>.05
Agriculture	107.24	98.33	8.91	1.91	>.05
Family Life	95.97	102.35	6.38	.63	>.05
Science-Math	99.47	97.52	2.95	.49	>.05
Engineering	103.46	93.49	9.97	2.98	>.05
English	99.99	96.24	3.75	.81	>.05
Art-Music	92.01	98.54	6.53	.93	>.05
Social Science	88.72	94.93	6.21	1.67	>.05

[1]Means adjusted for unequal Ns, religion, sex, church attendance, state, and city size.

[2]The means are the within cell means for the analysis reported in Table 15.

[3]Physical education was not included because of the insufficient number of non-teachers.

[4]Elementary students excluded from analyses.

at Weber State college for engineering students (those planning to teach were significantly--$p<.05$--more closed minded than those not planning to do so) and English (non-teachers were significantly--$p<.05$--more closed minded than their counterparts).

TABLE 21

D Scale Adjusted Mean Scores[1] of 597 Weber State College Subjects Grouped by Academic Areas and Secondary Teaching Plans

Academic Areas[2]	Secondary Teaching Plans[3] Non-Teacher	Teacher	Mean Differences	F-Ratio	P
Engineering	151.55	182.43	20.88	5.18	<.05
Art-Music	148.00	148.96	.96	.01	>.05
Science-Math	148.43	149.27	.84	.53	>.05
Business	150.64	137.82	12.82	3.09	>.05
English	149.20	138.12	11.08	3.93	<.05
Social-Science	140.36	144.74	4.38	.29	>.05

[1]Means adjusted for unequa.. Ns,religion, sex, church attendance, state and city size.

[2]Academic areas containing few numbers of teachers or on-teachers were not included, e.g., physical education, family life

[3]The means are the witnin cell means for the analy reported in Table 16.

Minor Hypotheses

In addition to the two major hypotheses of the study, several minor questions were asked in an attempt to determine more fully the relationship of certain variables (e.g., sex, religion, church attendance) to D and F Scale scores. These questions were formulated into null hypotheses to be tested.

TABLE 22

F Scale Adjusted Mean Scores[1] of 597 Weber State College Subjects Grouped by Academic Areas and Secondary Teaching Plans

Academic Areas[2]	Secondary Teaching Plans[3] Non-Teacher	Teacher	Mean Differences	F-Ratio	P
Engineering	106.91	108.78	1.87	1.72	>.05
Business	103.41	100.98	2.43	.13	>.05
Science-Math	101.17	99.62	1.55	.11	>.05
Art-Music	98.74	101.87	3.13	.28	>.05
English	99.20	92.14	7.06	1.72	>.05
Social Science	87.81	94.28	6.47	2.14	>.05

[1]Means adjusted for unequal Ns, religion, sex, church attendance, state and city size.

[2]Academic Areas containing few numbers of teachers or non-teachers were not included, e.g.,, physical education, family life.

[3]The means are the within cell means for the analysis reported in Table 16.

Sex, Teaching Plans, City Size and Interaction of these Factors

The factors of sex and city size in which subjects grew up have been found by some researchers (e.g., Rhodes, 1960; Frymier, 1959b; Vacchiano, 1969) to be associated with scores on the D and F Scale. However, as noted in the review of literature (Chapter II), the research on the variables of sex, city size or teaching plans has not yielded consistent results.

The null hypotheses tested for this subsection were:

(3) There is no significant difference between the mean D or F Scale scores of male and female students.

(4) There is no significant difference among the mean D or F Scale scores of subjects who grew up in different size cities.

(5) There is no significant interaction affect of sex and city size on the D or F Scale scores.

(6) There is no significant difference among the mean D or F Scale scores of students not planning to teach, majoring in elementary education, and majoring in secondary education.

The factorial analyses of covariance used to test these hypotheses included three factors and four covariates. The factors were sex, teaching plans (three levels--non-teachers, elementary, secondary), and city size (four levels--less than 2,500; 2,500 to 9,999; 10,000 to 50,000; greater than 50,000), with the covariates of major, religion, church attendance, and state. F-Ratios were calculated for the three factors, the covariates, the interaction terms for sex by teaching plans, sex by city size, and city size by teaching plans (Tables 22 and 27).

Utah State University

The total number of subjects included in the Utah State University analyses was 1003. The covariates of major, religion, and church attendance were significant ($p<.01$) for both the D and F Scale analyses; state residency also reached a significant level ($p<.05$) as a covariate for both scales (Table 22).

Sex. The main effect of sex was significant ($p<.001$) for both the D and F Scale (Table 23). The mean D Scale score for USU males was 153.63 and for females, 146.18. On the F Scale, the males had a mean score of 103.91 compared to the females' mean score of 98.35 (see Table 24).

City Size. The analyses of the USU data yielded significant ($p<.05$) results for both the D and F Scales for the factor of city size (Table 23). Since the F-Ratios were significant, the significance of differences for pairs of means for the four levels of city size were tested (Tables 25 and 26). Subjects from cities of less than 2,500 scored significantly ($p<.05$) higher on the D Scale (154.18) than those subjects from cities greater than 50,000 (144.75; Tables 24,and 25). On the F Scale, the mean for subjects from the rural areas (less than 2,500) was significantly ($p<.05$) higher than that for subjects coming from cities of 10,000-50,000 and greater than 50,000 (Tables 23 and 26).

TABLE 23

Analysis of Covariance for D Scale and F Scale Mean Scores of 1003 Utah State University Subjects Classified by Sex, Teaching Plans, and City Size

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Sex	D	1	5591.42	5591.42	9.70	<.01
	F	1	3118.05	3118.05	3.00	<.01
Teaching Plans	D	2	350.06	175.03	.34	>.05
	F	2	839.82	419.91	1.08	>.05
City Size	D	3	5793.80	1931.27	3.35	<.05
	F	3	7136.19	2378.73	6.10	<.05
Sex X Teaching Plans	D	2	1286.87	643.44	1.16	>.05
	F	2	54.92	27.46	.07	>.05
Sex X City Size	D	3	1782.58	594.19	1.03	>.05
	F	3	777.44	259.15	.66	>.05
Teaching Plans X City Size	D	6	3422.74	570.46	.99	>.05
	F	6	1558.76	259.79	.67	>.05
Covariates:						
Major	D	11	15108.84	1373.53	2.38	<.01
	F	11	18872.44	1715.68	4.40	<.01
Religion	D	4	13509.42	3377.36	5.86	<.01
	F	4	11246.46	2811.61	7.21	<.01
Church Atten.	D	2	21541.83	10770.92	18.68	<.01
	F	2	11636.07	5818.04	14.92	<.01
State	D	2	4861.30	2430.65	4.23	<.05
	F	2	4663.55	2331.77	6.23	<.05
Linear Comparisons	D	1				
	F	1				
Error	D	966	556935.70	576.54		
	F	966	37668.84	389.95		
Total	D	1003	23219720.00			
	F	1003	10734210.00			

TABLE 24

D Scale and F Scale Adjusted Mean Scores[1]
of 1003 Utah State University Subjects
Grouped by Sex and City Size[2]

Sex	Scale	City Size <2500	2500-9999	10,000-50,000	>50,000	Main Effect Means
Male	D	156.14	155.59	155.21	147.58	153.63
	F	107.59	106.46	101.57	100.00	103.91
Female	D	147.44	152.77	142.63	141.92	146.18
	F	99.53	104.60	95.32	93.96	98.35
Main Effect $\bar{X}$	D	151.79	154.18	148.92	144.75	149.91
	F	103.56	105.53	98.45	96.99	101.13

[1]Means adjusted for unequal Ns, major, sex, church attendance, and state.

[2]Means taken from the analyses reported in Table 23.

Teaching Plans. Differences among levels of teaching plans were not significant for either scale (Table 23). The means for the three levels of teaching plans for USU subjects for the D and F Scales are reported in Table 27.

Interactions. The interaction of sex and city size (Table 23) was not significant for the D or F Scales ($p>.05$); nor were the interactions of sex by teaching plans and teaching plans by city size significant ($p>.05$).

Weber State College

The total number of subjects included in the Weber State College analyses was 754. The significant covariates (Table 28) were major (D Scale, $p<.01$; F Scale, $p<.05$), religion (F Scale, $p<.05$), and church attendance (D and F Scale, $p<.01$).

TABLE 25

D Scale Mean Differences for 1003
Utah State University Subjects Grouped by City Size

City Size[1]	1	2	3	4
<2,500	1	-2.39	2.87	7.04*
2,500-9,999	2		5.26*	10.43**
10,000-50,000	3			4.17
>50,000	4			

* Significant at the <.05 level.

**Significant at the <.01 level.

[1]Mean differences obtained from Table 24.

TABLE 26

F Scale Mean Differences for 1003 Utah State University
Subjects Grouped by City Size

City Size[1]	1	2	3	4
<2,500	1	-1.97	5.11*	6.57*
2,500-9,999	2		7.08**	8.54**
10,000-50,000	3			1.46
>50,000	4			

* Significant at the <.05 level.
**Significant at the <.01 level.
[1]Mean differences obtained from Table 24.

TABLE 27

D Scale and F Scale Adjusted Mean Scores[1] of 1003 Utah State University Subjects Grouped by Teaching Plans and City Size[2]

Teaching Plans	Scale	City Size <2500	2500-9999	10,000-50,000	>50,000	Main Effects Means
Non-Teachers	D	149.65	152.73	144.64	147.22	148.56
	F	97.60	102.98	95.44	96.12	98.04
Elementary	D	153.21	158.98	149.98	140.99	150.79
	F	110.56	110.89	101.88	99.21	105.63
Secondary	D	152.51	150.83	152.14	146.04	150.38
	F	102.53	102.71	98.02	95.64	99.73
Main Effect $\bar{X}$	D	151.79	154.18	148.92	144.75	149.91
	F	103.56	105.53	99.95	96.99	101.30

[1]Means adjusted for unequal Ns, major, sex, church attendance and state.

[2]Means taken from the analysis reported in Table 23.

Sex. The main effect of sex was significant ($p<.01$) for both the D and F Scales (Table 28). Weber State College male subjects, as with Utah State University, were more dogmatic (mean of 154.30) than WSC females (mean of 142.18) (Table 29). On the F Scale, the males had a mean score of 103.69, compared to females' mean score of 95.96 (see Table 29).

City Size. The factor of city size was not significant for the Weber State College analyses with F Ratios for the D and F Scales of .56 and .34, respectively.

Although the difference among the D and F Scale means of Weber State College subjects who grew up in a different size city were not significant, the same trends as for the USU sample were generally present (Table 29).

TABLE 28

Analysis of Covariance for D Scale and F Scale Mean Scores of 754 Weber State College Subjects Classified by Sex, Teaching Plans, and City Size

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Sex	D	1	10386.13	10386.13	17.37	<.01
	F	1	3900.90	3900.90	8.90	<.01
Teaching Plans	D	2	435.82	217.91	.38	>.05
	F	2	821.00	410.50	.94	>.05
City Size	D	3	1004.59	334.86	.56	>.05
	F	3	448.30	149.43	.34	>.05
Sex X Teaching Plans	D	2	2066.33	1033.16	1.73	>.05
	F	2	728.29	364.15	.83	>.05
Sex X City Size	D	3	1973.94	657.98	1.10	>.05
	F	3	1493.74	497.91	1.14	>.05
Teaching Plans X City Size	D	6	6532.65	1088.78	1.82	>.05
	F	6	4332.70	722.12	1.65	>.05
Covariates:						
Major	D	7	8575.74	1225.11	2.05	<.05
	F	7	20314.50	2902.07	6.62	<.01
Religion	D	4	4929.67	1232.42	2.06	>.05
	F	4	4172.24	1043.10	2.38	<.05
Church Attendance	D	2	10412.26	5206.13	8.71	<.01
	F	2	6104.53	3052.27	6.97	<.01
State	D	2	2820.64	141.03	.24	>.05
	F	2	527.45	263.73	.60	>.05
Linear Comparison	D	1				
	F	1				
Error	D	721	431058.90	597.86		
	F	721	315884.60	438.12		
Total	D	754	17126290.00			
	F	754	7889609.00			

TABLE 29

D Scale and F Scale Adjusted Mean Scores[1] of 754 Weber State Subjects Grouped by Sex and City Size[2]

Sex	Scale	City Size <2500	2500-9999	10,000-50,000	>50,000	Main Effect Means
Male	D	158.43	150.28	152.80	157.69	154.80
	F	105.76	101.85	103.86	103.29	103.69
Female	D	142.11	143.60	141.98	141.03	142.18
	F	94.75	100.43	94.22	94.45	95.96
Main Effect X	D	150.27	146.94	147.39	149.36	148.49
	F	100.25	101.14	99.04	98.87	99.83

[1]Means adjusted for unequal Ns,major, sex, church attendance and state

[2]Means taken from the analyses reported in Table 28.

Again, subjects from cities of 2,500-9,999 had the highest F Scale mean score (101.14) and those from cities greater than 50,000 had the lowest mean score (98,97). On the D Scale, however, the WSC subjects coming from cities with less than 2,500 people had a higher mean score (150.27) than that of any of the other three classifications of city size (Table 29).

Teaching Plans. As with the USU analyses, teaching plan means were not significantly different for either the D or F Scales. The means are reported in Table 30.

Interactions. Again, as with the Utah State University analyses, none of the interaction terms (city size by sex, city size by teaching plans, teaching plans by sex) was significant at the .05 level.

Summary

Males at both institutions had significantly higher means than did females on both the D and F Scales. Hypothesis 3 was rejected.

TABLE 30

D and F Scale Adjusted Mean Scores[1]
of 754 Weber State College Subjects
Grouped by Teaching Plans and City Size[2]

Teaching Plans	Scale	City Size <2500	2500-9999	10,000-50,000	>50,000	Main Effect Means
Non-Teachers	D	152.12	153.54	144.99	147.39	149.51
	F	97.53	102.43	90.05	95.86	96.47
Elementary	D	150.25	139.72	147.96	157.35	148.82
	F	105.62	102.49	107.95	107.63	105.92
Secondary	D	148.44	147.56	149.22	143.34	147.14
	F	97.61	98.50	99.11	93.12	97.09
Main Effect X	D	150.27	146.94	147.39	146.36	148.49
	F	100.25	101.14	99.04	98.97	99.83

[1]Means adjusted for unequal Ns,major, sex, church attendance and state.

[2]Means taken from the analyses reported in Table 28.

Differences among the means for city size on the D and F Scales were significant for the Utah State University subjects. Those students coming from cities of less than 2,500 or 2,500-9,999 had significantly higher D and F Scale scores than those USU subjects coming from cities of 10,000 or more in population. The differences among the mean D and F Scale scores of Weber State students grouped according to city size were not significant. Hypothesis 4 could not be rejected for WSC; however, it was rejected for the D and F Scales at USU.

The analyses for both institutions and for both scales yielded no significant interactions among the three factors of sex, teaching plans, and city size; therefore, Hypothesis 5 was not rejected.

The differences among the three levels of teaching plans--non-teachers, elementary, secondary--were not significant, and Hypothesis 6 was not rejected for either institution.

Levels of Teacher Certification and Sex

Questions were also raised concerning differences between students majoring in elementary and secondary education, and about the differences in mean D and F Scale scores for males and females in elementary and secondary education.

The research findings regarding sex differences when using teacher education subjects have not been consistent (see Review of Related Research). The specific hypotheses to be tested were:

(7) There is no significant difference between the mean D or F Scale scores of elementary teacher education students and secondary teacher education students.

(8) There is no significant difference between the mean D or F Scale scores of female and male teacher education students.

(9) There is no significant difference between the mean D or F Scale scores of female elementary teacher education students and female secondary teacher education students.

(10) There is no significant difference between the mean D or F Scale scores of male elementary teacher education students and male secondary teacher education students.

The factors of sex and level of certification were combined as four treatments--male elementary, male secondary, female elementary, and female secondary--rather than classifying the data in a two-by-two table for a two-way analysis of variance. The means computed for the treatments--since they included both factors, sex and teaching level--were identical to the within cell means that would have been obtained had a two-way analysis been used. The "main effect" means for sex and certification were calculated by averaging the within cell means for each factor. Combining the two factors into four treatments permitted the use of linear comparisons to test the differences of all possible pairs of means in line with our a priori interest in these differences.

The covariates used in the analyses were major, religion, church attendance, state and city size.

Utah State University

Of the 1049 Utah State University subjects included in the study, 560 were planning to obtain teaching certificates and were used for these analyses.

Except for church attendance ($p<.01$ for both scales), significant results were not obtained for any of the covariates for either the D or F Scale analyses (Table 31).

TABLE 31

Analysis of Covariance for D Scale and F Scale Mean Scores of 560 USU Education Students Classified by Sex and Teaching Plans

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Sex and Teaching Plans[1]	D	3	4239.91	1413.30	.69	>.05
	F	3	1245.26	415.09	.16	>.05
Covariates:						
Major	D	11	38244.52	3476.78	1.69	>.05
	F	11	57595.18	5235.93	2.05	<.05
Religion	D	4	10700.28	2675.07	1.30	>.05
	F	4	9531.32	2382.83	.93	>.05
Church Atten.	D	3	46944.57	15648.19	7.59	<.01
	F	3	37533.69	12511.23	4.91	<.01
State	D	2	3764.38	1882.19	.91	>.05
	F	2	3668.00	1834.00	.72	>.05
City	D	4	16706.73	4176.68	2.03	>.05
	F	4	21460.08	5365.02	2.10	>.05
Linear Comparisons	D	1				
	F	1				
Error	D	532	1096347.00	2060.80		
	F	532	1356652.00	2550.10		
Total	D	560	14275330.00			
	F	560	7500831.00			

[1] Sex and teaching plans were analyzed as four treatments, i.e., male elementary, male secondary, female elementary, and female secondary. This technique was used to permit computer calculations for all the linear comparisons that were desired.

Differences among the four treatment levels of sex and teaching plans were not significant ($p>.05$) for either scale. The means obtained from the analyses are included in Table 32.

TABLE 32

D and F Scale Adjusted Mean Scores[1] of 560 Utah State University Education Students Grouped by Sex and Teaching Plans[2]

Scale	Sex and Teaching Plans	Mean
D	Male Teachers	156.58
	Female Teachers	148.78
	Elementary Teachers	152.79
	Secondary Teachers	152.56
	Male Elementary Teachers	158.29
	Male Secondary Teachers	154.88
	Female Elementary Teachers	147.30
	Female Secondary Teachers	150.25
F	Male Teachers	105.29
	Female Teachers	101.89
	Elementary Teachers	106.94
	Secondary Teachers	100.23
	Male Elementary Teachers	110.48
	Male Secondary Teachers	100.10
	Female Elementary Teachers	103.41
	Female Secondary Teachers	100.37

[1]Means adjusted for unequal Ns, major, religion, church attendance, state and city size.

[2]Means obtained from analyses reported in Table 27.

It is interesting to note (Table 33) that although male teacher education students had higher mean scores on both scales (156.29 for the D and F Scales, respectively) than did the female subjects (148.78, 101.89), none of the differences between the pairs of means was significant.

TABLE 33

Linear Comparisons for Adjusted Mean D and F Scale Scores for 560 Utah State University Education Students Grouped by Sex and Teaching Plans

Scale	Sex and Teaching Plans	Mean Differences[1]	F-Ratio	P
D	Male vs. Females	7.80	1.90	>.05
	Elementary vs. Secondary	.23	.00	>.05
	Male Elementary vs. Female Elementary	10.99	1.24	>.05
	Male Secondary vs. Female Secondary	4.63	.71	>.05
	Female Elementary vs. Female Secondary	2.95	.07	>.05
	Male Elementary vs. Male Secondary	3.41	.49	>.05
F	Males vs. Females	3.40	.29	>.05
	Elementary vs. Secondary	6.71	.24	>.05
	Male Elementary vs. Female Elementary	7.07	.41	>.05
	Male Secondary vs. Female Secondary	.27	.00	>.05
	Female Elementary vs. Female Secondary	3.04	.06	>.05
	Male Elementary vs. Male Secondary	10.38	.37	>.05

[1] Mean differences obtained from Table 28.

Weber State College

Of the 837 Weber State College subjects, 337 were planning to obtain teaching certificates. The same analysis of covariance with four treatment levels was used as for the USU sample. The difference among the four treatment combinations of sex and teaching plans was significant (beyond the .01 level) for the D Scale, but not for the F Scale (Table 34). The means obtained from the analysis are reported in Tables 35 and 36.

Again, as with the USU sample, all possible pairs of means were tested. Although the linear comparisons (Table 36) for the F Scale yielded no significant F-Ratios for the differences between the pairs of adjusted means, those for the D Scale yielded significant differences for three pairs of means (Table 36). Male teacher education subjects (mean of 153.49) were significantly ($p<.01$) more dogmatic than female teacher education students (mean of 139.75). Both male elementary and secondary teacher education students (152.83, 154.16, respectively) were significantly ($p<.05$, $p<.01$, respectively) more dogmatic than their female counterparts (138.75, 140.75, respectively).

Summary

Elementary teacher education students were not significantly more dogmatic or authoritarian than students planning to receive secondary teaching certificates at either Utah State University or Weber State College. Therefore, Hypothesis 7 was not rejected.

The results obtained for the analyses of male teacher education students versus female teacher education students were not consistent for the two samples. The analyses for Utah State University yielded no significant differences and Hypothesis 8 was not rejected for that sample. There were no significant differences for the F Scale means of Weber State College subjects grouped by sex. On the D Scale, however, significant differences were obtained at both the elementary and secondary levels between the sexes and for sex when elementary and secondary education students were pooled. Hypothesis 8, therefore, was rejected for the Weber State College sample.

When female elementary teacher education subjects were compared with female secondary teacher education subjects, the differences between the means were not significant for either scale or for either institution; nor were elementary and secondary males significantly different. Consequently, Hypotheses 9 and 10 were not rejected.

Sex Comparisons Within Selected Majors

In the analyses of the USU (1003 subjects) and WSC (754 subjects) samples for Hypothesis 3, males were found to be more dogmatic and

TABLE 34

Analysis of Covariance for D Scale and F Scale Mean Scores of 337 Weber State College Education Students Classified by Sex and Teaching Plans

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Sex and Teaching Plans[1]	D	3	9091.80	3030.60	5.55	<.01
	F	3	2346.14	782.05	.37	>.05
Covariates:						
Major	D	7	4374.34	624.91	1.14	>.05
	F	7	5818.71	831.24	.39	>.05
Religion	D	4	1827.75	456.94	.84	>.05
	F	4	5513.26	1378.31	.65	>.05
Church Attendance	D	3	12050.00	4016.67	7.36	<.01
	F	3	7162.41	2387.47	1.12	>.05
State	D	2	1367.70	683.85	1.25	>.05
	F	2	25021.54	12510.77	5.87	<.01
City	D	4	1940.71	485.18	.89	>.05
	F	4	9637.79	2409.45	1.13	>.05
Linear Comparisons	D	1				
	F	1				
Error	D	313	170869.70	545.91		
	F	313	666938.20	2130.79		
Total	D	337	7457155.00			
	F	337	4215147.00			

[1]Sex and teaching plans were analyzed as four treatments i.e., male elementary, male secondary, female elementary, and female secondary. This technique was used to permit computer calculations of all the possible linear comparisons deemed necessary to test the hypotheses.

authoritarian than females. In the analyses for Hypothesis 4 using only education subjects with two levels (elementary and secondary), 337 WSC males and females were significantly different from one another on the D

TABLE 35

D and F Scale Adjusted Mean Scores[1] of 337 Weber State College Education Students Grouped by Sex and Teaching Plans[2]

Scale	Sex and Teaching Plans	Mean
D	Male Teachers	153.46
	Female Teachers	139.75
	Elementary Teachers	145.79
	Secondary Teachers	147.45
	Male Elementary Teachers	153.83
	Male Secondary Teachers	154.16
	Female Elementary Teachers	138.75
	Female Secondary Teachers	140.75
F	Male Teachers	103.80
	Female Teachers	99.54
	Elementary Teachers	105.70
	Secondary Teachers	100.14
	Male Elementary Teachers	106.42
	Male Secondary Teachers	101.18
	Female Elementary Teachers	104.98
	Female Secondary Teachers	94.10

[1]Means adjusted for unequal Ns, major, religion, church attendance, state and city size.

[2]Means obtained from analyses reported in Table 34.

Scale whether they were pooled (elementary and secondary) or whether they were compared separately for each level (e.g., male elementary vs. female elementary). Results of the USU analyses for Hypothesis 4 were

TABLE 36

Linear Comparisons of Adjusted Mean D and F Scale Scores for 337 Weber State College Education Students Grouped by Sex and Teaching Plans

Scale	Sex and Teaching Plans	Mean Differences[1]	F-Ratio	P
D	Males v. Females	13.74	11.42	<.05
	Elementary vs. Secondary	1.67	.35	>.05
	Male Elementary vs. Female Elementary	15.08	3.80	<.05
	Male Secondary vs. Female Secondary	13.41	12.78	<.01
	Female Elementary vs. Female Secondary	2.00	.40	>.05
	Male Elementary vs. Male Secondary	1.33	.20	>.05
F	Males vs. Females	4.26	.28	>.05
	Elementary vs. Secondary	5.56	.22	>.05
	Male Elementary vs. Female Elementary	1.44	.01	>.05
	Male Secondary vs. Female Secondary	7.08	.91	>.05
	Elementary Female vs. Secondary Female	10.88	.32	>.05
	Elementary male vs. Secondary male	5.24	.08	>.05

[1]Mean differences obtained from Table 35.

not significant. In addition to the above analyses, we were also interested in the differences between males and females within the various majors at the two institutions.

The students were classified by the two levels of sex and by major, with the majors being business, elementary education, English, art-music, science-math, social science, and secondary education. Majors which contained few numbers of one sex or the other were excluded from the analyses (i.e., agriculture, engineering, natural resources, family life). In addition, physical education, as a specific major, was also omitted since fewer than five students were not planning to teach.

Each major, other than elementary and secondary education, included only students not planning to obtain teaching certificates (e.g., the major of English did not include any English students who were planning to teach).

The null hypothesis to be tested was:

(11) There is no significant difference between the mean D or F Scale scores of males and females in each academic major.

The model for the analyses, then, included two factors, sex and major, as well as the covariates of religion, church attendance, state and city size of childhood residency.

Utah State University

Of the 1049 USU subjects, 778 were included in th Analyses (Table 37). The covariates of church attendance ($p<.01$ for the D and F Scales) and city size ($p<.05$ for the D and F Scales) were significant. The main effects of sex and major were not significant ($p<.05$). These findings for the main effect of major are inconsistent with the analyses for Hypothesis 2. There, major was significant as a main factor and sex as a covariate. However, in those analyses, students majoring in engineering, natural resources, agriculture, and family life were included and elementary education majors and physical education majors were excluded. The last major was excluded from the present analyses. It was apparent that students (primarily male) in engineering, agriculture, and natural resources, had higher mean scores (Table 19); when they were not included in the present analyses, the results were not significant for the main effects of sex and major.

Differences between the mean D and F Scale scores of males and females (Table 38) were not significant for any major. The differences between male and female business students on the D Scale did, however, approach significance ($p<.10>.05$).

TABLE 37

Analyses of Covariance for D and F Scale Mean Scores of 778 Utah State University Students Grouped by Sex and Major[1]

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Sex	D	1	104.68	104.68	.62	>.05
	F	1	1847.07	1847.07	.92	>.05
	F					
Major	D	6	8784.41	1464.02	.73	>.05
	F	6	11118.39	1853.07	.92	>.05
Sex x Major	D	6	4182.05	697.14	.41	>.05
	F	6	2042.05	340.34	.17	>.05
Covariates:						
Religion	D	4	10806.71	2701.68	1.59	>.05
	F	4	11112.80	2778.20	1.38	>.05
Church Attendance	D	3	38564.70	12854.90	7.58	<.01
	F	3	27912.38	9304.13	4.62	<.01
State	D	2	3311.63	1655.82	.98	>.05
	F	2	4253.53	2126.76	1.06	>.05
City	D	4	17667.42	4416.85	2.63	<.05
	F	4	22195.59	5548.90	2.76	<.05
Linear Comparisons	D	1				
	F	1				
Error	D	751	1273812.00	1696.16		
	F	751	1511781.00	2013.02		
Total	D	778	19095080.00			
	F	778	9618746.00			

[1]Majors not containing both sexes in fairly large numbers were excluded, i.e., agriculture, engineering, natural resources, family life

Weber State College

The number of Weber State College students included in the analyses was 683. The significant covariates (Table 39) were religion, (D Scale, p<.05) and church attendance (D Scale, p<.01).

TABLE 38

Linear Comparisons of D and F Scale Adjusted Mean Scores[1] of 778 Utah State University Students Grouped by Sex and Major[2]

Major	Scale	Sex Male	Sex Female	Main Effect $\bar{X}$	Sex Mean Differences	F-Ratio	P
Business	D	155.36	143.78	149.57	11.58	2.76	>.05
	F	109.30	103.82	106.56	5.48	.53	>.05
Elementary	D	157.97	147.51	152.74	10.46	1.43	>.05
	F	108.31	101.77	105.04	6.54	.47	>.05
English	D	151.88	162.92	157.40	11.04	.27	>.05
	F	109.08	96.72	102.90	12.36	.29	>.05
Art-Music	D	140.68	155.26	147.97	14.58	.53	>.05
	F	99.74	90.69	95.22	9.05	.17	>.05
Science-Math	D	154.29	156.05	155.15	1.76	.02	>.05
	F	103.40	106.83	105.12	3.43	.06	>.05
Social Science	D	145.06	135.14	140.10	9.92	.77	>.05
	F	95.18	85.22	90.20	9.96	.60	>.05
Secondary	D	155.82	150.60	153.21	5.22	1.34	>.05
	F	105.76	104.61	105.19	1.51	.09	>.05
Main Effect Means	D	151.58	150.18	150.88			
	F	104.40	98.52	101.46			

[1]Means adjusted for religion, church attendance, state, city size, and unequal Ns.

[2]Majors not containing numbers of both sexes greater than five were not included, i.e., agriculture, engineering, natural resources, family life.

The main effect of sex was significant for only the D Scale (Table 39) at Weber State College. Male subjects again scored higher than females with mean scores of 151.76 and 143.00, respectively (Table 40).

TABLE 39

Analyses of Covariance for D and F Scale Mean Scores of 683 Weber State College Students Grouped by Sex and Major[1]

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Sex	D	1	4220.09	4220.09	6.71	<.01
	F	1	151.71	151.71	1.17	>.05
Major	D	6	5066.93	844.49	1.34	>.05
	F	6	10011.29	1668.54	1.29	>.05
Sex x Major	D	6	4702.39	783.73	1.25	>.05
	F	6	5410.82	901.80	.70	>.05
Covariates:						
Religion	D	4	6628.40	1657.10	2.64	<.05
	F	4	8562.41	2140.60	1.65	>.05
Church Attendance	D	3	9723.93	3241.31	5.15	<.01
	F	3	8133.71	2711.24	2.09	>.05
State	D	2	1236.76	618.38	.98	>.05
	F	2	17786.73	8893.36	2.09	>.05
City	D	4	2624.70	656.18	1.04	>.05
	F	4	1738.00	434.50	.34	>.05
Linear Comparisons	D	1				
	F	1				
Error	D	656	412523.30	628.85		
	F	656	849017.90	1294.24		
Total	D	683	15348870.00			
	F	683	7727971.00			

[1]Majors not containing both sexes in fairly large numbers were excluded, i.e., agriculture, engineering, family life.

As with the USU analyses, major as a main effect was not significant for either scale. The differences between male and female D Scale means within majors (Table 40) were significant for secondary education and social science. On the F Scale, no differences between male and female students were significant.

TABLE 40

Linear Comparisons of D and F Scale Adjusted Mean Scores[1] of 683 Weber State College Students Grouped by Sex and Major[2]

Major	Scale	Sex Male	Sex Female	Main Effect $\bar{X}$	Sex Mean Differences	F-Ratio	P
Business	D	155.48	149.74	152.61	5.74	.20	>.05
	F	106.14	107.05	106.59	.91	.00	>.05
Elementary	D	153.88	142.82	148.35	11.06	2.58	>.05
	F	102.53	102.95	102.74	.42	.00	>.05
English	D	146.95	154.85	150.90	7.90	.62	>.05
	F	90.10	109.58	99.96	19.48	1.83	>.05
Art-Music	D	154.05	137.93	145.99	16.12	2.66	>.05
	F	105.14	96.33	100.74	8.81	.39	>.05
Science-Math	D	151.49	148.49	149.99	3.01	.19	>.05
	F	104.15	99.69	101.92	4.46	.20	>.05
Social Science	D	147.45	133.29	140.37	14.16	6.68	<.01
	F	94.29	83.30	88.80	10.99	1.96	>.05
Secondary	D	153.02	136.68	148.85	16.34	21.55	<.01
	F	101.70	93.79	97.74	7.91	2.45	>.05
Main Effect Means	D	151.76	143.60	147.58			
	F	100.58	98.99	99.78			

[1]Means adjusted for religion, church attendance, state, city size, and unequal Ns.

[2]Majors not containing numbers of both sexes greater than five were not included i.e., engineering, family life.

Summary

The null hypothesis that no significant differences existed between the mean F Scale scores of males and females in selected majors was not rejected for the USU or the WSC sample, nor was the null hypothesis rejected for the D Scale at USU.

For the WSC sample, male secondary students (153.02) were significantly more dogmatic than female secondary education students (136.68). In addition, males majoring in social science scored significantly higher than their female counterparts on the D Scale.

Religion, Church Attendance, and State of Childhood Residency

Generally, researchers have found dogmatism and authoritarianism to be positively related to the fundamentalism of their subjects' religious affiliations (see Review of Related Research). Although church attendance and open-closed mindedness have also been studied, a clear relationship has not been established. As with city size, the state of childhood residency also appears to be related to closed mindedness (see Review of Related Research). For example, Shaver and Richards (1968) and Stott (1954) found Utah subjects to have higher D and/or F Scale scores than subjects from other selected states. Additional comparisons of studies by state are available in Tables 1 and 2.

Several null hypotheses were generated for tests in the relationships of religion, church attendance, and state of childhood residency to authoritarianism and dogmatism:

(12) There is no significant difference among the mean D or F Scale scores of students with different religious affiliations.

(13) There is no significant difference among the mean D or F Scale scores of subjects classified by three levels of church attendance.

(14) There is no significant difference among the D or F Scale mean scores of subjects from Utah, six surrounding states, and other states.

(15) The interaction effect of religion and frequency of church attendance on D or F Scale scores is not significant.

(16) The interaction effect of religion and state of childhood residence on D or F Scale scores is not significant.

(17) The interaction effect of state of childhood residence and church attendance on D or F Scale scores is not significant.

Three-way analysis of covariance was employed to test these hypotheses. The factors were religion, church attendance, and state of childhood residency. The covariates for the analyses were major, sex, teaching plans, and city size. All subjects at both institutions were included in the analyses, except those who did not indicate frequency of church attendance or state of childhood residency on their answer sheets.

The three-way analyses of covariance required some regrouping of the original data to avoid empty cells. This was particularly true for the 22 religious affiliations used in the collection of data (see Appendix C, Table 71). The categories of Catholic and Latter Day Saints (Mormons) were not grouped with any other religion because there were sufficient numbers available in the sample. A "Protestant" group was obtained by pooling four religions with considerable doctrinal differences: Baptists, Lutherans, Methodists, and Presbyterians. The category "Others" had the same type of shortcoming as did the Protestant classification, only more so. Sixteen different religious affiliations were pooled--e.g., Jew, Buddists, Unitarians, Moslems, etc. The fifth category for religion was called "Agnostic-blank". This group was obtained by pooling subjects who checked "agnostic", wrote in "none", or left the item of religious affiliation blank. The pooling of the first two groups was justified by Shaver and Richards' (1968) finding that subjects who declared they were "agnostic" or "none" had similar D and F Scale scores. However, Shaver and Richards suggested two possibilities when a subject did not respond to a question about religion: (1) He had no religious affiliation, or (2) he refused to declare his religious affiliation. According to Shaver and Richards (1968, p. 78), "Given the common claim that right wing authoritarians tend to resist 'prying into personal matters'. . . the 'left blank' category might contain many religious conservatives." The data to be presented later indicate that the latter factor may have been operative in the present study.

It was the intent of the statistical design to obtain data on the interaction of religion, church attendance, and state of childhood residency. Using the three pseudo-quantitative variables--Protestants, "Other", Agnostic-blank--reduced greatly the contribution this study could make to knowledge about open-closed mindedness and its relationship to the degree of religious fundamentalism.

Utah State University

Of the 1049 Utah State University subjects, 1027 were included in these analyses (Table 41). The covariates of major and city size significantly reduced the total variance for both the D and F Scales. Sex and teaching plans were not significant ($p>.05$) covariates.

In interpreting the main effects for the USU analyses, the reader should bear in mind that three significant interactions were obtained. Two of these were for religion by church attendance ($p<.05$) on the D and F Scales, and the other was on the D Scale for church attendance by state ($p<.05$).

A significant interaction between two factors indicates that the within cell means are different from what would be expected looking at the main effect means. One way to conceptualize an interaction is to graph a spatial representation of the means (see, for example, Campbell

TABLE 41

Analyses of Covariance for D and F Scale Means of 1027 USU Subjects Grouped by Religion, Church Attendance, and State

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Religion	D	4	12588.29	3147.07	2.32	>.05
	F	4	5375.29	1343.82	.80	>.05
Church Attendance	D	2	41623.82	20811.91	15.32	<.01
	F	2	38486.50	19243.25	12.59	<.01
State	D	2	12213.25	6106.63	4.49	<.05
	F	2	18786.53	9393.26	6.15	<.01
Religion x Church Attendance	D	8	25967.03	3245.88	2.39	<.05
	F	8	28337.89	3542.24	2.32	<.05
Religion x State	D	8	16442.48	2055.31	1.51	>.05
	F	8	22446.12	2805.76	1.18	>.05
Church Attendance x State	D	4	13547.65	3386.91	2.49	<.05
	F	4	13334.57	3333.64	1.53	>.05
Covariates:						
Major	D	11	39898.87	3627.17	2.67	<.01
	F	11	64542.21	5867.47	3.84	<.01
Sex	D	1	3462.39	3462.39	2.55	>.05
	F	1	871.64	871.64	.57	>.05
Teaching Plans	D	3	881.40	293.80	.22	>.05
	F	3	1113.34	371.11	.24	>.05
City Size	D	3	13630.70	4545.57	3.35	<.05
	F	3	18808.78	6269.59	4.10	<.01
Linear Comparisons	D	1				
	F	1				
Error	D	980	1331708.00	1358.88		
	F	980	1497473.00	1528.03		
Total	D	1027	24909070.00			
	F	1027	12440440.00			

and Stanley, 1963, pp. 27-29). However, as Marascuilo and Levin (1970, p. 41) pointed out:

> Sometimes after detecting a significant interaction, researchers may attempt to identify the reason for rejection by graphing the cell means and studying the differences and interactions that exist between the means. Unfortunately, such a procedure is risky to employ. For example, it is possible when making such subjective evaluations to conclude that certain mean differences are "significant" when, in a statistical sense, they are not. In other cases, the "eyeball" method may not be "powerful" enough to detect significant findings. While graphing is a useful descriptive and guiding procedure, it is subjective and certainly riddled with error.

In order to avoid the potential errors in judgment in "eyeballing" a graph, statistical post hoc comparisons can be conducted to determine which within cell means account for the overall significant interaction. When there is a zero overall interaction, one would expect the differences between any pair (row or column) of within cell means (within any level of a factor) to be equal to (within chance fluctuations) the difference between the corresponding main effect means and, therefore, to the corresponding means within any other level of the factor.

The linear comparisons of pairs of mean differences for detecting the location of significant interactions were selected and programmed for the computer run prior to the computation of the analyses of covariance. All possible pairs of mean differences were not selected for analysis. In addition to the limited comparisons of pairs of mean differences, the within cell means were graphed when an overall interaction was significant. This was done to provide the reader with a visual image of the interaction.

Religion. The main effect of religion was not significant for either scale for the Utah State University subjects. It should be noted, however, that the F-Ratio of 2.32 for the D Scale approached significance (an F of 2.37 was required with d.f.=4/1000).

Even though the differences among the means for the various classifications[3] were not significant, the means are given in Table 42 because some readers may be interested in them. The interaction of religion and church attendance is discussed in the following section on church attendance.

Church Attendance

Three levels were employed for the factor of church attendance--once a week (1/wk), at least once a month (1/mo), and less than once a month

---

[3]The unadjusted means and standard deviations of the religions classified in the Protestant group (Baptists, Lutherans, Methodists and Presbyterians), the 16 religions pooled to constitute the "Other" classification, Catholics, and Mormons, are presented in Table 71 of Appendix C. When the covariates are significant (as for this study), little credence can be given to the unadjusted means.

TABLE 42

The D and F Scale Adjusted Means[1] for 1027 Utah State University Subjects Grouped by Religion and Church Attendance

Scale	Religion	1/wk	1/mo	<1/mo	Main Effect Means[2]
D	Other	188.35	163.17	145.01	165.51
	LDS	166.95	135.21	151.98	151.38
	Protestant	165.23	143.67	144.37	151.36
	Agnostic-Blk.	180.64	119.37	141.50	147.17
	Catholic	152.73	136.77	127.59	139.03
	Main Effect Means	170.78	139.80	142.09	150.35
F	Other	139.26	98.23	95.17	110.89
	Protestant	113.45	98.36	98.59	103.47
	Agnostic-Blk.	144.74	81.51	79.59	101.95
	LDS	102.76	98.66	99.40	100.27
	Catholic	107.65	76.88	98.88	94.47
	Main Effect Means	121.57	90.73	94.33	102.21

[1]Means adjusted for unequal Ns, major, sex, teaching plans, and city size.

[2]Taken from analyses of covariance reported in Table 41.

(<1/mo). In order to avoid vacant cells in the three-way analyses of covariance, four categories of response were pooled to obtain the one of "less than once a month"--at least once every six months, at least once a year, less than once a year, or never.

The main effect of church attendance (Table 41) was significant beyond the .01 level for both the D and F Scales for the Utah State University subjects. The relationships between frequency of church attendance and mean scores on the D and F Scales were curvilinear (Table 42). Subjects who attended once a week scored significantly ($p<.001$) higher on both scales than those subjects who attended less frequently (Tables 43 and 44).

TABLE 43

Mean Differences[1] on the D Scale for 1027 Utah State University Subjects Grouped by Church Attendance

Church Attendance	1	2	3
At least once a week		30.98*	28.69*
At least once a month			-2.29
Less than once a month			

*Significant at the <.001 level.

[1]Differences obtained from church attendance main effect means in Table 42.

The interaction of religion and church attendance for the D and F Scales was significant ($p<.05$). Inspection of the within cell means (Table 42) indicated that the curvilinearity of the main effect means did not hold for all the five religious classifications.

Those subjects attending once a week had the highest mean D and F Scale scores (170.78, 121.57), those attending at least once a month had the lowest scores (139.80, 90.73), while those who attended church less frequently had main effect mean scores of 142.09 and 94.33 (Table 42). Looking at Figures 10 and 11, one can see that the relationship of church attendance to D and F Scale scores was curvilinear. This curvilinearity of the main effect D Scale means, however, did not hold up for the within cell means for the subjects classified as "Other" or Catholic, nor for "Other" or agnostic-blank for the F Scale.

TABLE 44

Mean Differences[1] on the F Scale for 1027
Utah State University Subjects Grouped by Church Attendance

Church Attendance	1	2	3
At least once/week		30.84*	27.24*
At least once/month			-3.60
Less than once/month			

*Significant at the <.001 level.

[1]Differences obtained from church attendance main effect means in Table 42.

Several null hypotheses had been formulated in advance of the computer run in an attempt to isolate significant interactions. The specific null hypotheses formulated to test the interaction of religion and church attendance were:

1. The difference between the mean D or F Scale scores of Catholics attending once a week and once a month will be equal to the difference between the means of LDS students attending once a week and once a month. This hypothesis may be stated:

   $(\bar{X}$ Cath. 1/wk - $\bar{X}$ Cath 1/mo) = ($\bar{X}$ LDS 1/wk - $\bar{X}$ LDS 1/mo)

2. ($\bar{X}$ Cath. 1/wk - $\bar{X}$ Cath. <1/mo) = ($\bar{X}$ LDS 1/wk - $\bar{X}$ LDS <1/mo)

3. ($\bar{X}$ LDS 1/wk - $\bar{X}$ LDS 1/mo) = ($\bar{X}$ Other 1/wk - $\bar{X}$ Other 1/mo)

4. ($\bar{X}$ LDS 1/wk - $\bar{X}$ LDS <1/mo) = ($\bar{X}$ Other 1/wk - $\bar{X}$ Other <1/mo)

5. ($\bar{X}$ Agn. 1/wk - $\bar{X}$ Agn. 1/mo) = $\frac{(\bar{X}\text{ Cath.+LDS+Prot 1/wk})}{3}$ - $\frac{(\bar{X}\text{ Cath.+LDS+Prot. 1/mo})}{3}$

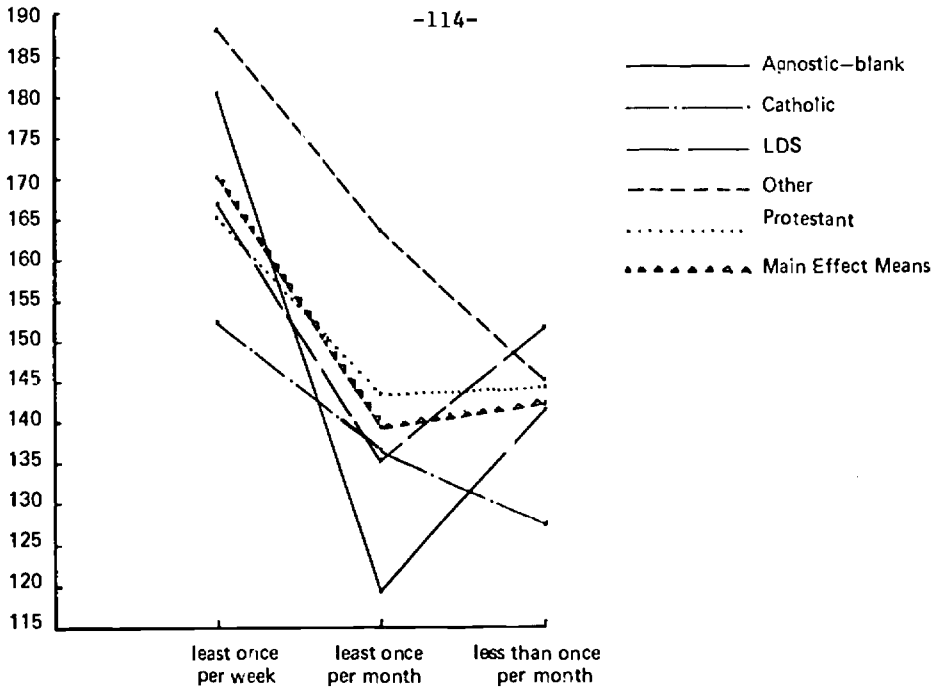

Figure 10. Religion by church attendance interactions for the adjusted mean D Scale Scores for 1027 Utah State University subjects (data taken from Table 42).

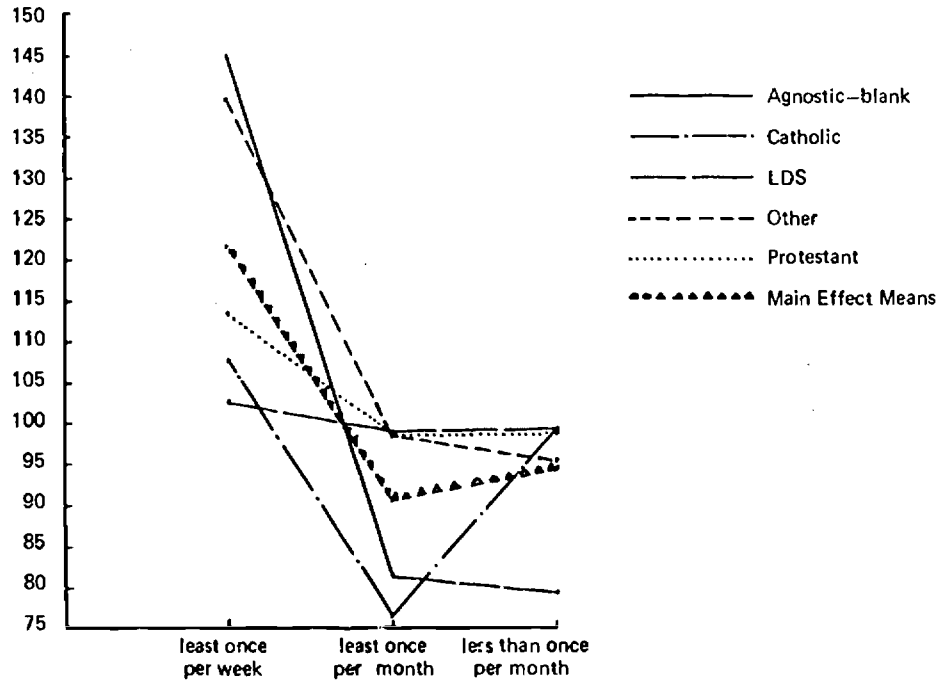

Figure 11. Religion by church attendance interactions for the adjusted mean F scale scores for 1027 Utah State University subjects (data taken from Table 42).

6. $(\overline{X}$ Agn. 1/wk - $\overline{X}$ Agn. <1/mo) = $(\overline{X}$ Cath.+LDS+Prot. 1/wk) - $(\overline{X}$ Cath.+LDS+Prot. <1/mo)

Of these six interaction null hypotheses for each scale, only one hypothesis (Number 6) was rejected, and that occurred with both scales (Table 45). The difference between the mean D or F Scale scores of

TABLE 45

Rejected Interaction Null Hypotheses for Mean D and F Scale Score Differences[1] of Religion x Church Attendance for USU subjects

Scale	Church Attendance	Agnostic Blank	Cath., LDS, Prot.	F-Ratio	P
D	1/wk.	183.57	$\frac{159.19 + 151.60 + 166.42}{3}$=158.74		
	<1/mo.	135.34	$\frac{145.61 + 148.95 + 143.13}{3}$=145.90		
	Differences Difference	48.23	13.18 35.05	4.03	<.05
F	1/wk.	144.74	$\frac{107.65 + 102.76 + 113.45}{3}$=107.95		
	<1/mo.	79.59	$\frac{98.88 + 99.40 + 98.59}{3}$ 98.96		
	Differences Difference	65.15	8.99 56.16	8.70	<.01

[1]Interaction means obtained from Table 42.

"agnostic-blanks" attending church once a week and less than once a week and less than once a month was not equal (D Scale, $p<.05$; F Scale, $p<.01$) to the difference between the means for Catholic, LDS, and

Protestant students attending once a week and less than once a month. The difference between the "once/week" and "less than once/month" means for subjects who declared themselves as "agnostic-blank"[4], was higher on both the D and F Scales than was the same difference for the pooled Catholic, LDS and "Others". Figures 12 and 13 graphically present the rejected interaction hypotheses.

State of Childhood Residency. On the answer sheets used to gather data, ten categories were listed for state of childhood residency. In order to avoid empty cells in a three-way analysis of covariance with five levels of religion and three levels of church attendance, the ten categories for state of residency were pooled. Three levels were used: Utah, surrounding states (Arizona, Colorado, Idaho, Montana, Nevada and Wyoming), and other states (Table 46). It was reasoned that Mormons in Idaho and the other sparsely populated surrounding states, which have fairly large proportions of Mormons in their populations, might be more like Utah Mormons than would those Mormons from California (or other states).

From Table 41, in which the analyses of covariance are reported, it can be seen that the factor of state was significant on both the D ($p<.05$) and the F Scales ($p<.01$). Comparisons of pairs of means (Tables 47 and 48) indicated that USU students who grew up in the State of Utah (159.17, 122.28) were significantly ($p<.001$) more closed minded and authoritarian than those students who grew up in the states surrounding Utah (149.76, 100.07) or states classified as "other" (143.73, 93.75). Students from surrounding states did not differ significantly from students from "other" states ($p<.05$) on either the D or F Scale.

Interaction of State and Church Attendance. It is interesting to note (Table 41) that the interaction of state and church attendance was significant for the D Scale at Utah State University ($p<.05$), but not for the F Scale ($p<.10>.05$).

Inspection of the within cell means (Table 46, Figure 14) indicates that the curvilinear relationship between dogmatism and the main effects of church attendance did not hold for all of the three levels of state of childhood residence. This is illustrated in Figure 14. The D Scale means for subjects from Utah bear a linear relationship to church attendance with those attending at least once a week (186.65) receiving the highest D Scale score and those attending less than once a month having the lowest score (142.28; Table 46).

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[4]Caution must be exercised in interpreting the agnostic-blank category in that it is difficult to conceive of subjects checking "agnostic" or "none" and yet attending church once a week.

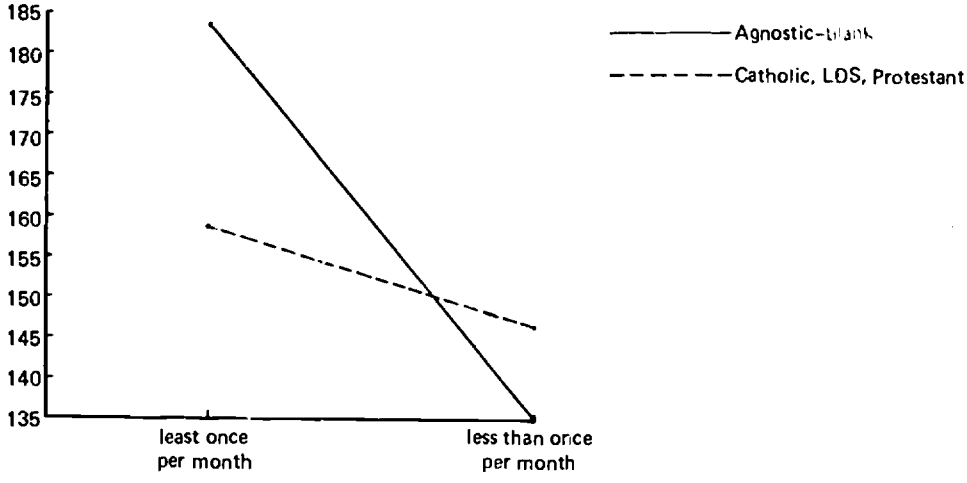

Figure 12. Mean D Scale Score differences of Agnostics and Catholics, LDS, Protestants by church attendance (once per week and less than once per month) for USU subjects (data taken from Table 45) for rejected interaction null hypothesis.

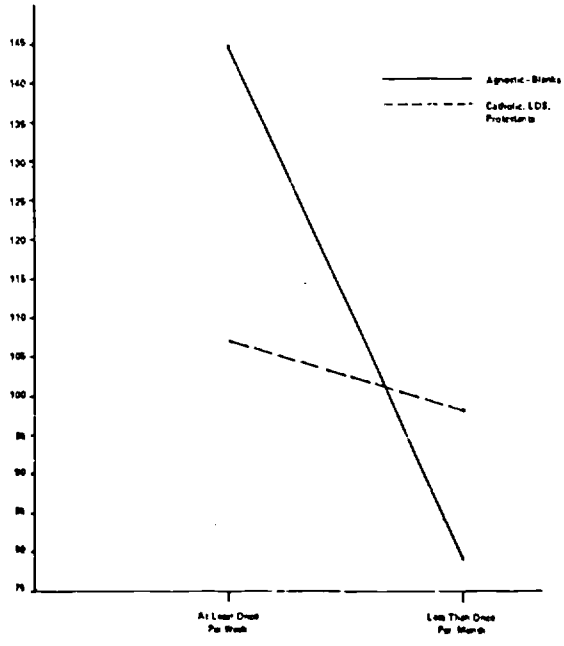

Figure 13. Mean F Scale score differences of agnostics and Catholics, LDS, Protestants by church attendance for USU subjects (data taken from Table 45) for rejected interaction null hypothesis.

TABLE 46

The D and F Scale Adjusted Means[1] for 1027 Utah State University Subjects Grouped by Church Attendance and State[2]

Scale	Church Attendance	Utah	Surrounding	Other	Main Effect Means
D	1/wk	186.65	165.60	160.06	170.77
	1/mo	148.13	139.79	131.53	139.80
	<1/mo	142.28	143.94	139.63	142.10
	Main Effect Means	159.17	149.76	143.74	150.89
F	1/wk	139.57	116.51	108.64	121.57
	1/mo	101.34	90.91	79.94	90.73
	<1/mo	97.54	92.79	92.66	94.33
	Main Effect Means	112.28	100.07	93.75	102.21

[1]Means adjusted for unequal Ns, major, sex, teaching plans, and city size.

[2]Means obtained from analysis reported in Table 41.

Again, on a priori basis, some differences between pairs of within cell means were analyzed to help pinpoint the interaction effect. The null hypotheses for the D Scale post hoc linear comparisons were:

TABLE 47

Mean D Scale Differences for 1027 Utah State University Subjects Grouped by State of Childhood Residency

State		1	2	3
Utah	1		9.41*	15.43*
Surrounding	2			6.02
Other	3			

*Significant at the <.005 level, linear comparisons used to calculate significance.

[1]Differences obtained from main effect means for state from Table 46.

TABLE 48

Mean F Scale Differences for 1027 Utah State University Subjects Grouped by State of Childhood Residency

State		1	2	3
Utah	1		12.74*	19.06*
Sorrounding	2			6.32
Other	3			

*Significant at the <.005 level (linear comparisons used to calculate significance).

[1]Differences obtained from the main effect means for state from Table 46.

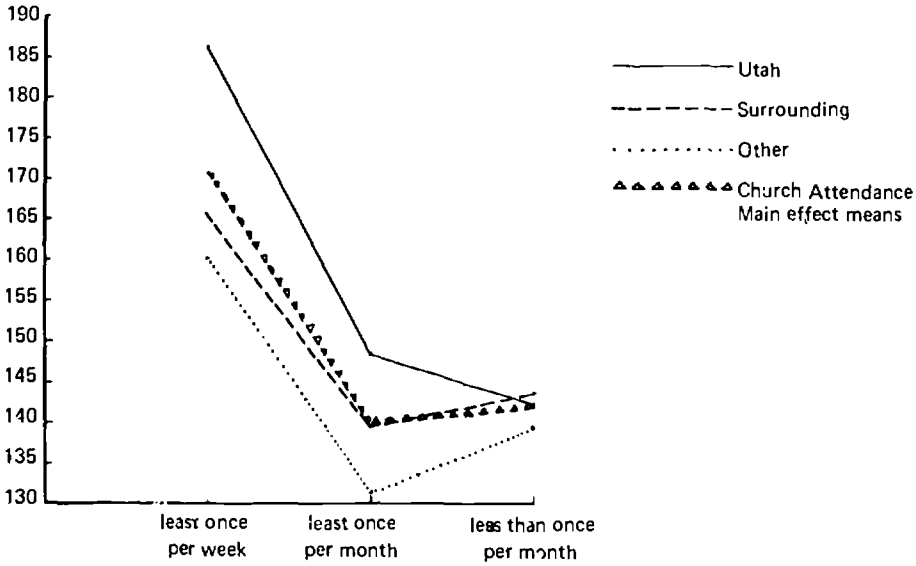

Figure 14. Church attendance by state of childhood residency for the adjusted mean D Scale scores for 1027 Utah State University subjects (data taken from Table 46).

1. The difference between the mean D Scale scores of subjects from Utah attending church once a week and once a month will be equal to the difference between the means of subjects from surrounding states attending church once a week and once a month. The hypothesis may be stated:

   $(\bar{X}$ Utah 1/wk - $\bar{X}$ Utah 1/mo) = ($\bar{X}$ Surr. 1/wk - $\bar{X}$ Surr. 1/mo)

2. ($\bar{X}$ Utah 1/wk - $\bar{X}$ Utah <1/mo) = ($\bar{X}$ Surr. 1/wk - $\bar{X}$ Surr. <1/mo)

3. ($\bar{X}$ Utah 1/wk - $\bar{X}$ Utah 1/mo) = ($\bar{X}$ Other 1/wk - $\bar{X}$ Other 1/mo)

4. ($\bar{X}$ Utah 1/wk - $\bar{X}$ Utah <1/mo) = ($\bar{X}$ Other 1/wk - $\bar{X}$ Other <1/mo)

5. ($\bar{X}$ Surr. 1/wk - $\bar{X}$ Surr. 1/mo) = ($\bar{X}$ Other 1/wk - $\bar{X}$ Other 1/mo)

6. ($\bar{X}$ Surr. 1/wk - $\bar{X}$ Surr. <1/mo) = ($\bar{X}$ Other 1/wk - $\bar{X}$ Other <1/mo)

It will be recalled that an overall significant interaction was obtained for only the D Scale (Table 41), so the above null hypotheses are of interest only for the D Scale. Of the six null hypotheses, Hypotheses 2 and 4 were rejected (Tables 49 and 50). The differences between pairs of means for the rejected null hypotheses presented in Tables 49 and 50

TABLE 49

Mean D Scale Score Difference[1] on Church Attendance and State of Childhood Residency for Rejected Interaction Null Hypothesis for Utah State University Subjects

Church Attendance	State Utah	State Surrounding	F-Ratio	P
1/wk	186.65	165.60		
<1/mo	142.28	143.94		
Difference	44.37	21.66		
Difference	22.71		6.78	<.01

[1]Interaction means obtained from Table 46.

TABLE 50

Mean D Scale Score Difference[1] on Church Attendance and State of Childhood Residency for Rejected Interaction Null Hypothesis for Utah State University Subjects

Church Attendance	State Utah	State Other	F-Ratio	P
1/wk.	186.65	160.06		
<1/mo.	142.28	139.63		
Differences	44.37	20.43		
Difference	23.94		6.11	<.05

[1]Interaction means taken from Table 46.

are graphically represented in Figures 15 and 16. The difference between the mean D Scale scores of subjects from Utah attending church once a week and less than once a month was not equal to the differences between the means for subjects from surrounding states ($p<.01$) or from "other" states ($p<.05$).

Religion by State Interaction. Religion by state did not interact significantly (Table 41) to affect D or F Scale scores. Should the reader be interested in the within cell means for religion by state, they are presented in Table 51. The main effects of both these factors have been discussed previously.

Weber State College

The three-way classification analyses, using the factors of religion, church attendance, and state of childhood residency, for Weber State College included 792 of the 837 subjects (Table 52). The significant covariates were different from those for the Utah State University analyses (Table 41). Major was significant only on the F Scale at Weber State and city size was not significant for either scale. Sex was a significant ($p<.01$) covariate for the D Scale (Table 52).

Religion. The main effect of religion was not significant ($p<.05$), with F-Ratios for the D and F Scales of .78 and .88, respectively (Table 52). Although the differences among them were not significant, the means are presented in Table 53.

The interaction of religion by church attendance or religion by state was not significant for either scale (Table 52).

Church Attendance. The main effect of church attendance (Table 52) was significant beyond the .01 level for the D Scale score, but only approached significance ($p<.10>.05$) for the F Scale. The F-Ratios were considerably smaller than the corresponding values reported for the USU sample (Table 41).

The D and F Scale means bore a linear relationship to church attendance for the Weber State College subjects (Table 53), with subjects attending once a week (155.12, 108.55, respectively) scoring higher than those subjects attending less than once a month (140.60, 95.58). The reader will recall that there was a curvilinear relationship between F and D Scale means and church attendance for the USU data, with those subjects attending at least once a month having the lowest scores on both scales (Table 42).

In the post hoc comparisons of all possible pairs of mean D Scale scores (Table 54), those WSC subjects who said they attended once a week

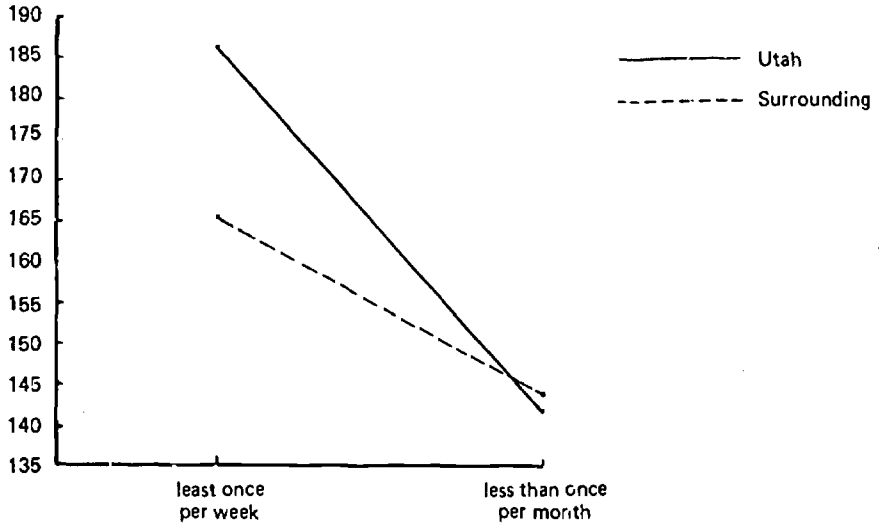

Figure 15. Means for rejected interaction null hypothesis for mean D Scale difference of church attendance (least once per week and less than once per month) by Utah and surrounding States for Utah State University subjects (data taken from Table 49).

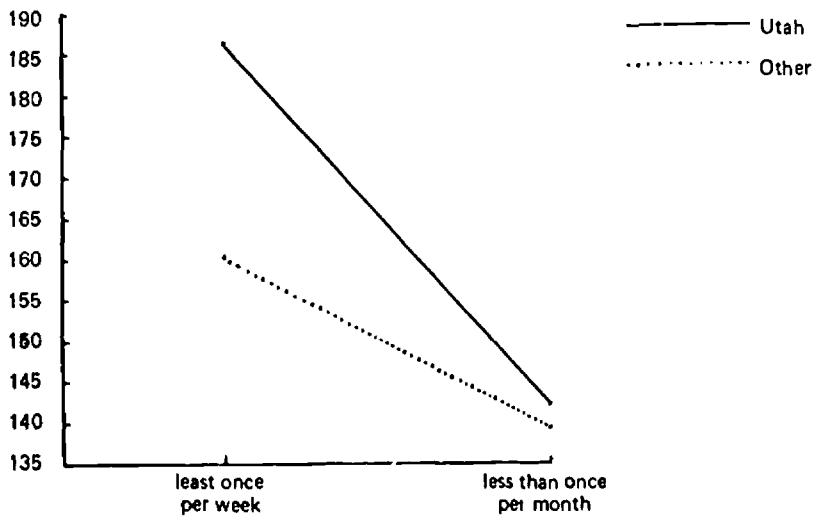

Figure 16. Means for rejected interaction null hypothesis for mean D Scale score differences of church attendance (least once per week and less than once per month) by Utah and Surrounding States for Utah State University subjects (data taken from Table 50).

TABLE 51

The D and F Scale Adjusted Means[1] for 1027 Utah State University Subjects Grouped by Religion and State[2]

Scale	Religion	State			Main Effect Means[3]
		Utah	Surrounding	Other	
D	Other	169.01	168.94	158.58	165.51
	LDS	165.68	149.06	139.48	151.38
	Protestant	155.34	154.01	144.73	151.36
	Agnostic	161.76	133.07	146.68	147.17
	Catholic	144.06	143.72	129.31	139.03
	Main Effect Means	159.17	149.76	143.74	150.89
F	Other	124.28	105.98	102.42	110.89
	Protestant	112.19	105.59	92.63	103.47
	Agnostic	120.03	99.16	86.65	101.95
	LDS	95.83	104.10	100.86	100.27
	Catholic	111.75	85.52	86.15	94.47
	Main Effect Means	112.81	100.07	93.75	102.21

[1]Means adjusted for unequal Ns, major, sex, teaching plans, and city size.

[2]Means taken from the analysis reported in Table 41.

were significantly ($p<.05$) more dogmatic than those subjects who said they attended at least once a month, and had significantly ($p<.001$) lower scores than the subjects who said they attended church less than c[illegible]onth.

TABLE 52

Analyses of Covariance for D and F Scale Mean Scores of 792 Weber State College Subjects Grouped by Religion, Church Attendance, and State

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Religion	D	4	1885.69	471.42	.78	>.05
	F	4	4121.75	1030.43	.88	>.05
Church Attendance	D	2	7814.19	3907.09	6.47	<.01
	F	2	5873.08	2936.54	2.51	>.05
State	D	2	673.97	336.98	.56	>.05
	F	2	2738.63	1369.31	1.17	>.05
Religion x Church Attendance	D	8	3362.17	420.27	.70	>.05
	F	8	8556.61	1069.58	.94	>.05
Religion x State	D	8	4270.75	533.84	.88	>.05
	F	8	3359.00	419.87	.36	>.05
Church Attendance X State	D	4	2733.51	683.38	1.13	>.05
	F	4	2737.11	684.28	.49	>.05
Covariates:						
Major	D	7	8073.73	1153.39	1.91	>.05
	F	7	18322.55	2617.51	2.24	<.05
Sex	D	1	12878.57	12878.57	21.34	<.01
	F	1	2419.09	4219.09	2.07	>.05
Teaching Plans	D	3	3108.13	1036.04	1.72	>.05
	F	3	3380.58	1126.86	.96	>.05
City Size	D	3	2377.10	792.37	1.31	>.05
	F	3	1130.79	376.93	.32	>.05
Linear Comparisons	D	1				
	F	1				
Error	D	749	451974.90	603.44		
	F	749	876329.90	1170.00		
Total	D	792	17577880.00			
	F	792	8159201.00			

TABLE 53

D and F Scale Adjusted Means[1] of 792 Weber State College Subjects Grouped by Religion and Church Attendance[2]

Scale	Religion	1/wk	1/mo	<1/mo.	Main Effect Mean
D	LDS	169.29	151.97	139.21	153.47
	Protestant	150.42	162.75	147.93	152.12
	Other	153.37	152.33	141.54	149.08
	Catholic	152.77	147.55	137.29	145.87
	Agnostic-Blk.	149.81	141.44	137.03	142.76
	Main Effect Means	155.12	150.23	140.60	148.65
F	LDS	114.49	109.62	100.62	108.28
	Protestant	100.99	107.62	100.23	102.95
	Other	97.60	108.17	101.06	102.27
	Agnostic-Blk.	115.27	87.78	85.68	96.24
	Catholic	114.32	79.72	90.33	94.79
	Main Effect Means	108.55	98.58	95.58	100.91

[1]Means adjusted for unequal N, major, sex, teaching plans, and city size.

[2]Obtained from the analysis of covariance reported in Table 52.

Church attendance and religious affiliation did not interact significantly to affect D or F Scale scores at Weber State College (Table 52).

TABLE 54

Mean D Scale Differences[1] for 792
Weber State College Subjects Grouped by Church Attendance

Church Attendance	1	2	3
Once a week	1	4.89*	14.52**
Less than once a month	2		9.63**
Less than once a month	3		

*Significant at the <.05 level.

**Significant at the <.001 level.

[1]Differences obtained from church attendance main effect means in Table 53.

State of Childhood Residency. The factor of state of childhood residency, as with religion, yielded non-significant F-Ratios((Table 52). A consistent curvilinear relationship was present between state and the main effect means of both scales. The WSC subjects from surrounding states had the highest scores for both scales and subjects from Utah had the lowest scores (Table 55). However, at Utah State University the relationship was linear, with those subjects who grew up in Utah having the highest mean D and F Scale scores and those coming from "Other" states having the lowest means.

Table 56 was constructed to provide a convenient comparison of the state of childhood residency main effect mean for both institutions. It is interesting to note that those subjects from Utah attending USU had higher D and F Scale scores (159.17, 112.28) than their counterparts at Weber (146.82, 96.06). These differences were significant at the .01 level. Out of state students attending USU were less dogmatic and authoritarian while their counterparts at WSC were more dogmatic and authoritarian (Table 56); however, this difference was not significant (p>.05).

TABLE 55

The D and F Scale Adjusted Means[1] for 792 Weber State College Subjects Grouped by Attendance and State[2]

Scale	Church Attendance	State: Utah	Surrounding	Other	Main Effect Means
D	1/wk	155.50	152.20	157.66	155.12
	1/mo	148.17	158.96	143.56	150.23
	<1/mo.	136.79	145.20	139.81	140.60
	Main Effect Means	146.82	152.12	147.01	148.65
F	1/wk	101.70	118.88	105.08	108.55
	1/mo	91.13	102.49	102.14	98.58
	<1/mo.	95.35	98.27	93.13	95.59
	Main Effect Means	96.06	106.55	100.12	100.91

[1]Means adjusted for unequal N major, sex, teaching plans, and city size.

[2]Means obtained from analys s presented in Table 52.

Interaction of Church Attendance and State. The interaction of church attendance by state (Table 55) and religion by state (Table 57) were not significant for either scale (Table 52).

TABLE 56

Comparison of D and F Scale Adjusted Mean Scores for 1027 Utah State University Subjects and 792 Weber State College Subjects Grouped by State of Childhood Residency[1]

Scale	Institution	N	Utah	N	Surrounding	N	Other
D	USU	601	159.17*	175	149.76	251	143.74
	WSC	578	146.82	69	152.12	145	147.01
F	USU	601	112.28*	175	100.07	251	93.75
	WSC	578	96.06	69	106.55	145	100.12

[1]Data taken from Tables 51 and 55. Analyses of covariance yielded significant differences among the USU D ($p<.05$) and F ($p<.01$) scale means (Table 41). Differences among the WSC means were not significant (Table 52).

*The t-tests for the USU and WSC D and F Scale mean differences were significant beyond the .01 level.

Summary

Subjects who declined to declare their church attendance or state of childhood residency were excluded from the analyses. At Utah State University, the analyses included 1027 subjects; for Weber, 792 subjects were included.

Major and city size were significant covariates (both scales) for the USU analyses, while at WSC sex was significant as a covariate for both scales and major was significant for the F Scale.

Religion as a factor was not significant at either institution and Hypothesis 12 was not rejected.

Differences among levels of church attendance were significant for both the D and F Scale scores at USU. For the Weber State subjects, church attendance was a significant factor for the D Scale, but only approached significance for the F Scale. For both scales and for both institutions, those subjects who attended church at least once a week had the highest mean scores (not significant for the F Scale at WSC) of the three categories of church attendance. Hypothesis 13, concerning church attendance, was rejected for the D Scale at both institutions and for the F Scale at USU.

TABLE 57

The D and F Scale Adjusted Mean Scores[1] of 792 Weber State College Subjects Grouped by Religion x State[2]

Scale	Religion	State Utah	State Surrounding	State Other	Main Effect Means[3]
D	LDS	150.88	159.20	150.33	153.47
	Protestant	149.43	153.41	153.37	152.07
	Other	138.04	158.60	150.60	149.08
	Catholic	156.84	146.92	133.85	145.87
	Agnostic-Blank	138.91	142.27	135.34	142.76
	Main Effect Means	146.82	152.11	147.01	148.65
F	LDS	100.01	119.11	105.73	108.25
	Protestant	102.94	103.57	102.32	102.95
	Other	97.20	108.64	100.98	102.27
	Agnostic-Blank	87.29	107.93	93.55	96.24
	Catholic	92.91	93.48	97.99	94.79
	Main Effect Means	96.06	106.55	100.11	100.91

[1]Means adjusted for unequal Ns,major, sex, teaching plans, and city size.

[2]Means obtained from analysis in Table 52.

Consistent results were not obtained for the factor of state of childhood residency. At Utah State University, the state of childhood residency was significantly associated with both D and F Scale means and Hypothesis 14 was rejected. Subjects from Utah attending USU had the highest adjusted mean scores of the three levels of state residency.

In contrast, at Weber State College in-state subjects had the lowest mean D and F Scale scores. However, significance was not obtained and Hypothesis 14 was not rejected.

None of the two-way interactions was significant for the WSC analyses and Hypotheses 15, 16 and 17 were not rejected.

For the USU sample, significant interactions were obtained between religion and church attendance for both the D and F Scales, and Hypothesis 15 was not accepted. The curvilinear pattern of the main effect means did not hold up for the within cell means for all five levels of religion. The means for Catholics and "Others" had a linear pattern.

The religion by state interaction was not significant for either scale at USU and Hypothesis 16 was not rejected.

The interaction of church attendance and state of childhood residency was significant for the D Scale for USU subjects, but no significant interaction was obtained for the F Scale. Hypothesis 17 concerning the interaction of state and church attendance, therefore, was rejected for the D Scale at USU, but not for the F Scale. Post hoc linear comparisons were computed to pin point the significant interaction between pairs of within cell means for subjects from Utah (attending church once a week versus less than once a month) and subjects from surrounding states (attending once per week versus once a month) was significant. The difference between pairs of within cell means was also significant for Utah subjects and subjects from "other" states who said they attended church once a week or less than once a month. None of the other differences between pairs of within cell means which were tested were significant.

Academic Fields of Secondary Education

Hypotheses 1 and 2 were directed toward determining whether subjects majoring in education were any more open or closed minded than those majoring in other college fields. For Hypothesis 1, the analyses included 1016 subjects from Utah State University and 793 subjects from Weber State College. All subjects planning to receive teaching certificates were classified as education majors. For Hypothesis 2, 751 USU and 597 WSC subjects were included in the analyses, elementary teaching majors excluded. The students were classified according to whether or not they planned on obtaining secondary teaching certificates.

For the present analyses the question was raised, If only subjects planning to receive a secondary teaching certificate were used, would there be a significant difference among the mean D or F Scale scores of the various secondary education academic fields? The numbers of subjects used for the analyses were greatly reduced from those used for testing Hypothesis 2—a Utah State University sample of 317 and a Weber State sample of 200 subjects.

Because of the small number (less than nine subjects) planning to receive secondary teaching certificates from the academic areas of natural resources and engineering, they were excluded from the analyses. Eliminating these two majors from the USU analysis made the analyses for the two institutions more comparable in that at WSC natural resources did not exist as a major and only four subjects majoring in engineering were planning to teach. However, two majors, family life and agriculture, were included in the USU analyses but not in the WSC ones.

The hypothesis to be tested, using only subjects planning to receive a secondary teaching certificate, was:

(18) There is no significant difference among the mean D or F Scale scores of the various secondary education academic fields.

Each analysis of covariance (Table 58) was a one-way classification model with eight majors for the USU analysis and six for WSC. All means were adjusted for unequal cell sizes and for the covariates of religion, sex, church attendance, and state and city size.

Utah State University

The significant covariates for the Utah State University analyses (Table 58) were religion, sex, and church attendance ($p<.01$) for both the D and F Scales, and city size only for the F Scale ($p<.05$). The covariates of city size failed to reach significance for the D Scale, as did state of childhood residency for both scales.

The difference among the secondary academic fields was significant for both the D ($p<.05$) and the F ($p<.01$) Scales. For the D Scale, the adjusted means for business education (161.30), family life (155.48), art-music (152.77), and physical education (152.74) students ranked highest of the eight secondary academic majors. The majors of agriculture (138.58), social science (143.70), and English (144.36) had the lowest adjusted D Scale means for the USU sample (Table 59).

On the F Scale, the results were somewhat similar (Table 59). Business majors (109.50) again had the highest mean, followed by physical education (108.12), and family life (102.19). Agriculture (93.99), social science (95.02), and science and math (95.95), students had the lowest F Scale mean scores.

The significant differences between the pairs of means for secondary academic fields are presented in Tables 60 and 61. The business secondary education majors were significantly ($p<.01$) more closed minded (D Scale) than majors in English, social science and agriculture. Business

TABLE 58

Analyses of Covariance for D Scale and F Scale means of 317 Utah State University Secondary Education Subjects Grouped by Academic Fields

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Secondary Academic Fields	D	7	10476.43	1496.63	2.37	<.05
	F	7	8477.98	1211.11	2.88	<.01
Covariates:						
Religion	D	4	9508.26	2377.06	3.77	<.01
	F	4	8852.44	2213.11	5.26	<.01
Sex	D	1	9593.37	9593.37	15.22	<.01
	F	1	4364.88	4364.88	10.38	<.01
Church Attendance	D	2	7020.08	3510.04	5.57	<.01
	F	2	5441.40	2720.70	6.47	<.01
State	D	2	68.44	34.22	.05	>.05
	F	2	994.17	49.71	.12	>.05
City	D	4	3238.22	809.55	1.28	>.05
	F	4	4625.04	1156.26	2.75	<.05
Linear Comparisons	D	1				
	F	1				
Error	D	296	186565.50	630.29		
	F	296	124527.80	420.70		
Total	D	317	7324059.00			
	F	317	3324063.00			

majors also scored higher ($p<.05$) than science and math students (Table 60). Secondary students majoring in family life scored significantly ($p<.05$) higher on the D Scale than did majors in English, social science, and agriculture.

Eight pairs of the F Scale mean differences (Table 60) were significant. Even though the difference between business and agriculture

TABLE 59

D and F Scale Means of 317 Utah State University Secondary Education Students Grouped by Academic Major[1]

Scale	Secondary Academic Field	N	Mean[2]
D	Business	28	161.30
	Family Life	40	155.48
	Art-Music	40	152.77
	Physical Education	38	152.74
	Science-Math	27	146.85
	English	66	144.36
	Social Science	71	143.70
	Agriculture	7	138.58
	Total	317	
F	Business	28	109.50
	Physical Education	38	108.12
	Family Life	40	102.15
	Art-Music	40	96.70
	English	66	96.28
	Science-Math	27	95.95
	Social Science	71	95.03
	Agriculture	7	93.99
	Total	317	

[1]Means taken from analyses reported in Table 58.

[2]Means adjusted for church attendance, religion, sex, state, city, and unequal N s.

TABLE 60

Mean Differences[1] on the D Scale for 317 USU Secondary Students Grouped by Academic Major

Secondary Academic Major	1	2	3	4	5	6	7	8
Business	1	5.82	8.53	8.56	14.45*	16.94**	17.60**	22.72**
Family Life	2		2.71	2.74	8.63	11.12*	11.78*	16.90*
Art-Music	3			.03	5.92	8.41	9.07	14.18
Physical Ed.	4				5.89	8.38	9.04	14.16
Science-Math	5					2.49	3.15	8.27
English	6						.66	5.78
Social Science	7							5.12
Agriculture	8							

*Significant at the <.05 level.

**Significant at the <.01 level.

[1]Differences between means obtained from Table 59.

means was greatest in magnitude, it was not significant. This may be attributed to the small number of students majoring in agriculture. Business majors, however, were significantly more authoritarian than students majoring in art-music ($p<.01$), English ($p<.01$), science-math ($p<.05$), and social science ($p<.01$). Physical education majors scored higher on the F Scale (Table 61) than did the students in art-music ($p<.05$), English ($p<.01$), science-math ($p<.05$), and social science ($p<.05$).

TABLE 61

Mean Differences[1] on the F Scale for 317 USU Secondary Students Grouped by Academic Major

Secondary Academic Major	1	2	3	4	5	6	7	8
Business	1	1.38	7.31	12.80**	13.22**	13.55*	14.47**	15.51
Physical Ed.	2		5.93	11.42*	11.84**	12.17*	13.09*	14.13
Family Life	3			5.49	5.91	6.24	7.16	8.20
Art-Music	4				.42	.75	1.67	2.71
English	5					.33	1.25	2.29
Science-Math	6						.92	1.96
Social Studies	7							1.04
Agriculture	8							

*Significant at the <.05 level.

**Significant at the <.01 level.

[1]Differences between means obtained from Table 59.

Weber State College

The analyses of covariance for the Weber State College secondary education data yielded considerably different results than those obtained for the Utah State University sample. As covariates (Table 62), sex and church attendance were significant ($p<.01$) for both the D and F Scale analyses. None of the other covariates—religion, state, or city size—was significant.

TABLE 62

Analyses of Covariance for D and F Scale Adjusted Mean Scores of 200 Weber State College Secondary Education Subjects Grouped by Academic Fields

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Secondary Academic Fields	D	5	2326.94	465.39	.79	>.05
	F	5	2639.50	527.90	1.17	>.05
Covariates:						
Religion	D	4	1981.02	495.26	.84	>.05
	F	4	3436.86	859.21	1.91	>.05
Sex	D	1	5432.95	5432.95	9.19	<.01
	F	1	2020.69	2020.69	4.48	<.01
Church Attendance	D	2	8158.15	4079.07	6.90	<.01
	F	2	4174.42	2087.21	4.63	<.01
State	D	2	1085.95	542.98	.92	>.05
	F	2	1600.31	800.16	1.78	>.05
City	D	4	685.49	171.37	.29	>.05
	F	4	1689.08	422.27	.93	>.05
Linear Comparisons	D	1				
	F	1				
Error	D	181	107054.30	591.46		
	F	181	81557.07	450.59		
Total	D	200	4409278.00			
	F	200	2043838.00			

The difference among the means of the secondary academic fields was not significant for the D or F Scale (Table 62). The means are presented in Table 63. It is interesting to note that WSC students majoring in English and social studies received lower F or D Scale scores than most other majors as did the students majoring in those academic fields at USU.

TABLE 63

D and F Scale Adjusted Mean Scores of 200 Weber State College Secondary Education Students Grouped by Academic Fields[1]

Scale	Secondary Academic Field	N	Mean[2]
D	Physical Education	43	152.28
	Science-Math	29	147.91
	Art-Music	27	147.18
	Social Science	46	146.53
	Business	9	140.93
	English	46	136.46
	Total	200	
F	Physical Education	43	103.35
	Business	9	102.47
	Science-Math	27	98.05
	Art-Music	29	99.66
	Social Science	46	93.90
	English	46	93.78
	Total	200	

[1]Means taken from the analyses reported in Table 62.

[2]Means adjusted for church attendance, religion, sex, state, city, and unequal N.

Summary

Null Hypothesis 18--that there is no significant difference among D or F Scale scores of secondary education students--was rejected for

both scales for the USU sample, but not for either scale for the WSC analyses. At USU, business majors had the highest D Scale scores and they were significantly more dogmatic than majors in science-mathematics, English, social studies, and agriculture. Family life majors scored significantly higher on the D Scale than English, social science, or agriculture majors. On the F Scale, again, business majors had the highest mean score and were significantly different than those majors in art-music, English, science-math, and social science. Physical education majors also had significantly higher scores than majors in art-music, English, science-mathematics, and social science.

Institutional Differences

Throughout the study, all analyses were run separately for each institution. This was done to provide replication of the analyses, as well as to avoid the problem of differing majors at the two institutions. For the final analyses, 1845 subjects were used to test differences between the two institutions. The hypothesis was:

(19) There is no significant difference between the mean D or F Scale scores of subjects from Weber State College and Utah State University.

In addition to testing Hypothesis 19, we were interested in sex differences between the two institutions. In some analyses (e.g., Hypotheses 3 and 8), particularly with the D Scale, sex differences yielded higher F-Ratios at Weber State College than at Utah State University. For that reason, we wanted to make cross-institution comparisons.

For computational convenience in calculating linear comparisons to get at cross-institution sex differences, the two factors of sex and institution were combined as four treatments in a one-way analysis of covariance. This was in place of a two-way classification using sex and institution as factors, and yielded the same results statistically. The four treatments were: USU males, USU females, WSC males, and WSC females. The reader will note that these four means would have been the within cell means if a two-way analysis of covariance had been used. The main effect means for sex and institution were calculated by averaging the "within cell" treatment means.

The Covariates. The covariates for the analyses were major, religion, teaching plans, church attendance, state and city size.

Some characteristics of the subjects from the two institutions were described in Chapter III. The primary differences between the two institutions were: (1) The number of out-of-state students (USU had 41.5 percent out of state students and WSC had 28.3 percent);

(2) the academic fields (USU, but not WSC, had such majors as agriculture, natural resources, family life[5], and civil and electrical engineering[6]); (3) the cities in which the subjects grew up (the greatest percentage--40.9--of USU subjects grew up in cities of less than 2,500, while at Weber State College only 24.7 percent were in that category; at WSC 31.6 percent of the subjects came from cities of 50,000 or more, while at USU only 16.5 percent were in that category); (4) state of childhood residency (58.5 percent of the USU students came from Utah, while 71.7 percent of the WSC subjects came from within the state); (5) age (the USU subjects were slightly younger, with 83.3 percent of them being under 25 years of age and 74.4 percent of the WSC subjects coming from that age group); (6) teaching plans (more of the USU subjects were planning to teach--53.2 percent--than was true at WSC--43.4 percent); and, (7) percentages of males and females (USU had 56.2 percent males and WSC had 64.2 percent).

Five of the seven characteristics listed above, all except age and sex, were used as covariates in adjusting the four treatment means (sex by institutions). Age was not significantly related to D and F Scale scores in preliminary analyses and was not used as a covariate; sex was one of the factors used in making up the four treatments for the analyses.

The covariates (Table 64) significant for both the D and F analyses were major ($p<.01$), religion ($p<.01$), church attendance ($p<.01$) and city size ($p<.05$). State emerged as significant ($p<.05$) as a covariate for the F Scale. The covariate of teaching plan was not significant for either scale and state was not for the D Scale (Table 64).

The Results. The analysis of covariance (Table 64) yielded a significant difference ($p<.01$) among the four treatments of combined institution and sex for the D Scale. However, for the F Scale a significant difference ($p>.05$) among the means was not obtained.

When the "main effects" of institution and sex were considered for the D Scale (Table 66), subjects from Weber State College (146.19) scored significantly ($p<.001$) lower than the subjects from Utah State University (153.60). The "main effect" of sex only approached significance ($p<.10>.05$) for the pooled data.

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[5]Family life major exists at WSC; however, because of the small numbers existing in that major, the students were not included in the analyses, when conducted separately for USU and WSC. However, for the institutional analyses (Hypothesis 19), they were included.

[6]Engineering is more manufacturing and industrial at WSC rather than civil and electrical as for the USU sample.

TABLE 64

Analyses of Covariance for D Scale and F Scale Mean Scores of 1845 Subjects Grouped by Four Treatments of Sex and Institution

Source of Variance	Scale	d.f.	SS	MS	F-Ratio	P
Institution and Sex[1]	D	3	19538.11	6529.37	6.28	<.01
	F	3	2930.77	976.92	.71	>.05
Covariates:						
Major	D	11	41413.38	3764.90	3.62	<.01
	F	11	67712.11	6155.65	4.46	<.01
Religion	D	4	15971.15	3992.79	3.84	<.01
	F	4	14971.85	3742.96	2.71	<.01
Teaching Plans	D	3	3535.61	1178.54	1.13	>.05
	F	3	4674.01	1558.00	1.13	>.05
Church Attendance	D	3	56240.64	18746.88	18.04	<.01
	F	3	39934.56	13311.52	9.64	<.01
State	D	2	5775.51	2887.75	2.78	>.05
	F	2	11227.00	5611.35	4.06	<.05
City Size	D	4	10189.75	2547.44	2.45	<.05
	F	4	12958.24	3239.56	2.35	<.05
Linear Comparisons	D	1				
	F	1				
Error	D	1814	1885306.00	1039.31		
	F	1814	2504656.00	1380.74		
Total	D	1845	43543260.00			
	F	1845	21755400.00			

[1] Institution and sex considered as four treatment levels.

The differences between the sex or the institution "main effect" means were not significant (p>.05) for the F Scale.

TABLE 65

The D and F Adjusted Means[1] of 1845 Subjects Grouped by Institution and Sex

Sex and Institution	Scale	Mean
Utah State University	D	153.60
	F	103.23
Weber State College	D	146.19
	F	100.15
Male	D	151.50
	F	101.83
Female	D	148.29
	F	101.55
Utah State University Female	D	153.78
	F	103.55
Utah State University Male	D	153.42
	F	102.91
Weber State College Male	D	149.58
	F	100.76
Weber State College Female	D	142.81
	F	99.55

[1]Covariates are major, religion, teaching plans, church attendance, state and city size. Means were also adjusted for unequal Ns.

On the D Scale (Table 66), WSC males (149.58, Table 65) scored significantly ($p<.01$) higher than WSC females (142.81) and significantly lower than the USU females (153.78, $p<.05$). In addition, WSC females scored significantly ($p<.01$) lower than USU females and USU males (153.42).

TABLE 66

Linear Comparisons for Differences of D and F Scale Adjusted Mean Scores[1] for 1845 College Subjects Grouped by Institution and Sex

Scale	Hypothesis	$\bar{X}$ Diff	MS	F-Ratio	P
D	Error Term		1039.31		
F	Error Term		1380.74		
D	USU vs WSC	7.41	13982.71	13.45	<.01
F	USU vs WSC	3.08	2640.09	1.91	>.05
D	Males vs Females	3.21	3586.70	3.45	>.05
F	Males vs Females	.28	66.28	.04	>.05
D	USU Male vs USU Female	.36	28.08	.03	>.05
F	USU Male vs USU Female	.64	89.39	.06	>.05
D	WSC Male vs WSC Female	6.77	7247.01	6.97	<.01
F	WSC Male vs WSC Female	1.21	361.13	.26	>.05
D	USU Male vs WSC Male	3.84	2475.27	1.79	>.05
F	USU Male vs WSC Male	2.15	769.77	.56	>.05
D	USU Female vs WSC Female	10.97	17071.24	16.43	<.01
F	USU Female vs WSC Female	4.00	2615.05	1.89	>.05
D	USU Male vs WSC Female	10.61	15022.45	10.88	<.01
F	USU Male vs WSC Female	3.66	2568.18	1.86	>.05
D	WSC Male vs USU Female	4.20	4261.17	4.10	<.05
F	WSC Male vs USU Female	3.08	3382.28	2.45	>.05

[1]Covariates are major, religion, teaching plans, church attendance, state and city size of childhood residency. Means obtained from the analysis presented in Table 65.

It is interesting to note that the significant differences between Utah State University males and females found in earlier analyses disappeared with the adjustments for these analyses. The differences between adjusted means here were only .36 for the D Scale and .64 for the F Scale (Table 66). In fact, for these analyses, USU females had slightly higher adjusted means (153.78, 103.55) than did USU males (153.42, 102.91; Table 65), contrary to the results for Hypothesis 3. This appears to be due to the differing adjustments from the five covariates when data for subjects from both institutions were used.

Hypothesis 19--there is no significant difference between the mean D or F Scale scores of subjects from Utah State University and Weber State College--was rejected for the D Scale, but not for the F Scale.

CHAPTER V

DISCUSSION OF RESULTS AND RECOMMENDATIONS

Discussion of Results

Individuals vary in the extent to which their belief systems are open to new beliefs and, in that sense, varying degrees of openness to change are built into our psychological makeups. Harvey (1969) concluded that individuals whose belief systems may be characterized as being less authoritarian and/or dogmatic are more likely to have the prerequisites for innovation than are persons whose belief systems are more authoritarian and/or dogmatic. Teachers, then, are more likely to be able to cope adequately with change in a dynamic society if they have open belief systems.

In addition, there is reason to conjecture that authoritarian and/or dogmatic teachers are not likely to have a positive influence upon their pupils--in the sense of building warm relationships or promoting more effective thinking.

Given the need for innovation and the apparent desirability of having open minded teachers in the classroom, the thrust of this research was to answer the question, "How do college students preparing to enter the teaching profession compare with college students in other academic fields regarding open-closed mindedness--authoritarianism and dogmatism?"

Academic Major

Deapite the common assumption (see e.g., Soderberg, 1964) that the teaching profession attracts people who are more authoritarian and dogmatic, prior to this study no reports could be found of studies comparing education majors with students in other fields within the same college or university. To look at the relationship of open-closed mindedness to being a teacher education major, we obtained samples of 1016 students from Utah State University and 893 from Weber State College. For the initial analyses, all students who were planning to receive a teaching certificate (elementary or secondary) were pooled as education majors.

At USU, differences among the means of the various academic majors--including education as a major--were not significant for the D or F Scales,

nor was the difference among the majors significant ($p<.10>.05$) for the D Scale means for Weber State College subjects. On the F Scale at WSC, however, the difference among means was significant. Comparisons of differences between pairs of means indicated that the mean of the education students, which was fourth highest of the seven in the analysis, was significantly higher only than that of social science majors (all non-teachers). Even though the null hypothesis was rejected for the F Scale at WSC, then, education majors were not significantly different from five of the six other majors--engineering, business, science-mathematics, art-music, and English. The assumption that education majors are more closed minded and authoritarian than other college students received little support from our initial analyses.

Academic Majors and Secondary Education

To explore further the relative open-closed mindedness of students preparing to teach, we asked whether teaching majors were more authoritarian and/or dogmatic than non-teaching majors in the same subject fields. This question could be answered only at the secondary level because prospective elementary teachers do not major in an academic field at either USU or WSC. Thus, elementary education students were excluded and 751 subjects from USU and 597 subjects from WSC were included in these analyses.

At USU, none of the differences between the D or F Scale means of teachers and non-teachers in the various academic majors was significant. Only two mean differences even approached significance ($p<.10>.05$); they were for business and family life with the non-teaching majors scoring lower on the D Scale.

At WSC, non-teaching engineers scored significantly ($p<.05$) lower than did engineers who planned to obtain teaching certificates, while English non-teachers scored significantly ($p<.05$) higher on the D Scale than their teaching counterparts. The difference between business teaching and non-teaching majors at WSC ($p<.10>.05$) was in the opposite direction from that obtained at USU (non-teachers had the higher mean at WSC).

These findings, then, also indicate that generally secondary education college students are not more authoritarian or dogmatic than their non-teaching counterparts.

Vocational Choice and Open-Closed Mindedness

It was noted in the Review of Related Research that Max Weber (1958) proposed that the choice of a vocation involves the intersection of a person's personality and his social setting. Specialized occupations are, according to Weber, likely to attract persons who resemble each other in personality. Conversely, one would expect personality differences among those who choose different vocations.

There is some support from past research for the proposition of "among vocation" differences. Greenberg and Fare (1959) found that liberal arts students had significantly lower mean F Scale scores than did other majors. They reported that the mean for their business majors was significantly lower than those for engineering and agriculture students, but the latter two majors were not significantly different from one another.

In addition, Stern (1962) reported that authoritarian undergraduates at the University of Chicago did poorly in social science and the humanities and disliked both areas, with their occupational choice being law, business, or engineering. Stern reported that these last subject areas had the highest D and F Scale scores while social science and humanity majors had the lowest D and F Scale scores. Similar findings--that liberal arts majors were more democratic, flexible, and tolerant than students majoring in engineering--have been reported by Davidson and Kruglov (1953) and Fox (1965). In addition, Davidson and Kruglov reported that rigid, conforming, and authoritarian students tended to select majors which were "technological and impersonal" as contrasted to careers characterized as "social and personal".

Our data do not bear directly on Weber's propositions because we were concerned with academic majors and these may encompass different vocational choices (political science majors, for example, may be preparing to be lawyers, government workers, or university professors, as well as secondary school teachers). Yet, they do have some relevance, and they bear on earlier research.

The analysis for Hypothesis 1, for instance, did not lend confirming data to the proposition of "among vocation" differences. Subjects who selected education (elementary and secondary as one level) as a vocational choice were found not to differ significantly from students who made other vocational choices. In fact, there generally were no differences among the means for different majors, except at Weber State College where a significant F-Ratio for the F Scale was obtained. Here a significantly lower mean for majors in social science (non-teachers) was obtained.

The results for Hypothesis 2 also failed to reveal "among vocation" differences. Prospective secondary teachers were compared with their non-teaching counterparts in the same academic majors and generally did not differ from them.

When secondary teachers were included with the other students (non-teachers) in college majors--the main effect of the analyses for testing Hypothesis 2--or when students planning to receive secondary teaching certificates were considered as a separate sample--Hypothesis 18--support for Weber's proposition was obtained. For Hypothesis 2, on the F Scale, 15 of the 35 differencea between pairs of academic F Scale means were significant for the USU sample (Table 17), while eight of 15 differences were significant for WSC (Table 18).

These findings support those of other researchers (Davidson & Kruglov, 1953; Stern, 1962; Fox, 1963) in that students in academic areas generally considered to be humanistically oriented tended to be less authoritarian. Greenberg and Fare's conclusion that there was a relationship between the areas of major interest in college and authoritarianism was also given support.

Secondary Education Majors

Although Hypothesis 18, concerned with secondary majors, was next to the last one to be discussed in Chapter IV, we will mention it here because of its relationship to the major hypotheses. Further analyses of differences among majors were conducted using only subjects (317, USU; 200 WSC) planning to receive a secondary teaching certificate. The question was raised:

> If only subjects planning to receive a secondary teaching certificate were included in the analyses, would there be a significant difference among the mean D or F Scale scores of students in the various academic fields?

The reader will recall that the null hypothesis was rejected for the USU sample, but not for the sample from WSC. It may further be recalled that Shaver and Richards' (1968, pp. 122-123) study at USU compared 253 students by secondary education majors. They obtained significant F-Ratios ($p<.05$) for both the F and D Scales (see Table 67 for the means for the academic areas for the two studies). They reported post hoc comparisons of the D Scale mean differences which yielded significant differences between social studies and four other majors (physical education, science, business education and vocational education). In addition, vocational education majors were significantly different from English majors. On the F Scale, home economics students were significantly lower than students in vocational education, music, sciences, business education, mathematics, and languages. In addition, English majors were lower than the majors of vocational education; and science, and social science majors were lower than science majors (Table 67).

The findings with the USU data for the present study were considerably different from the findings reported by Shaver and Richards. For the D Scale, business majors in the present study had significantly higher means than did majors in science-mathematics, English, social science, and agriculture; and home economics majors scored higher than students in English and social science. For the F Scale, business majors and physical education majors were significantly more authoritarian than music-art, science-mathematics, English, and social studies majors.

TABLE 67

D and F Scale Means for the Present Study of 317 USU Secondary Majors and the Shaver & Richards (1968) Study of 253 USU Secondary Majors

Secondary Academic Major	N	USU (1968) study[1] D Scale $\bar{X}$	F Scale $\bar{X}$	N	USU-one Covariate[2] D Scale $\bar{X}$	F Scale $\bar{X}$	N	USU all covariates[3] D Scale $\bar{X}$	F Scale $\bar{X}$
Vocational Ed.-Agr.	7	160.57	110.71	7	145.96	99.56	7	138.58	93.99
Music	6	157.33	101.17	40	154.60	97.21	40	152.77	96.70
Science	30	154.20	99.77	27	146.19	95.67	27	146.85	95.95
Art	18	152.11	93.28	40	154.60	97.21	40	152.77	96.70
Business Ed.	29	150.72	101.90	28	159.82	108.52	28	161.30	109.50
Mathematics	17	150.17	99.59	27	146.19	95.67	27	146.85	95.95
Languages	12	149.08	100.75	66	141.53	93.28	66	144.36	96.28
Physical Ed.	40	145.35	98.58	38	153.11	109.97	38	152.74	108.12
Speech	15	144.27	94.40	66	141.53	93.28	66	144.36	96.28
Social Studies	37	141.59	88.35	71	142.53	92.84	71	143.70	95.03
English	46	139.04	91.56	66	141.53	93.28	66	144.36	96.28
Home Economics	8	127.00	89.12	40	150.51	98.50	40	155.48	102.19
Totals	253			317			317		
F-Ratios		2.16	1.89		2.51	3.66		2.37	2.88

[1]Unadjusted scores for the Shaver-Richards' study, (1968, pp. 122-123)

[2]For the present study, scores adjusted only for unequal Ns and the covariate of church attendance.

[3]For the present study, scores adjusted for unequal Ns and for the covariates of religion, sex, church attendance, state and city size.

These differences in findings between the two studies could have occurred for one or more reasons: (1) chance sampling fluctuations; (2) changes in the dogmatism or authoritarianism of USU students in the time from one study to the next; and/or (3) the type of analysis used. The latter is an apparent and reasonable explanation. Analysis of variance was made on the Shaver and Richards' data, while for this study adjustments were made for the variables of church attendance, religion, sex and state, and city size, as well as unequal numbers of observations, using a general least squares solution for the analysis of covariance.

Although not mentioned in Chapter IV, the first analysis for the present study comparing the means of different secondary majors was run

using only one covariate--church attendance (See Table 67 for the USU means for this analysis). For the WSC analyses[1], the F-Ratios obtained for the 200 subjects were significant for both the D and F Scales. When the analyses were run a second time using the same WSC subjects and all five covariates, the F-Ratios for the covariates of sex and church attendance both emerged as significant. The F-Ratios for the main effect of secondary academic majors were reduced sufficiently to be non-significant (D Scale--.79, $p>.05$; F Scale--1.17, $p>.05$).

The second computer run for the USU analyses also produced smaller F-Ratios for the main effect of major (although significance was still obtained) with the covariates of religion, sex, and church attendance being significant.

It was also interesting that in several instances the additional covariates (second computer run) had considerable impact on the adjusted mean scores (Table 67). For example, for the USU data, the agriculture D and F Scale means for the first run (145.96, 99.56, using one covariate--church attendance) were adjusted in the second run (using all covariates) to 138.58, 93.99. The adjusted D and F Scale means for family life majors increased approximately five points. If the additional covariates had not been used, the higher F-Ratios from the first computer run would have led to the conclusion that major was a significant factor when the differences among the D and F Scale means could actually be attributed to other variables.

The foregoing discussion indicates the possible pitfalls in attempts to compare one D or F Scale study with another. For example, Capelluzzo and Brine (1969) compared their unadjusted D Scale grand mean of 143.3 for education students at the University of Massachusetts with Rabkin's (1966) unadjusted grand mean of 132.2 for his University of Washington teacher sample and found that they were significantly different. They further concluded that the means for their future teachers were not significantly different from the means reported by Rokeach(1960, p. 90) for five Ohio State University groups. Capelluzzo and Brine's conclusion that future teachers are significantly more dogmatic than experienced teachers (Rabkin's sample) needs to be treated with skepticism, particularly when one considers the type of sample used by Rabkin. His teacher group was made up largely of female Protestants who were attending summer school. Without controlling for such factors, are the significant differences that Capelluzzo and Brine found between their subjects and those of Rabkin and their comparisons with Rokeach's data interpretable.[2]

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[1]The WSC analyses are not reported in Table 67: D Scale, $F = 2.75$, $p<.025$; F Scale, $F = 2.37$, $p<.05$.

[2]Capelluzzo and Brine declared that their subjects were significantly more dogmatic than Rabkin's group and were also dogmatic according to Rokeach's criterion. "The combination of the evidence gathered to data leads to state that prospective teachers, like university students in general, more dogmatic than experienced teachers" (Cappelluzzo & Brine, 1969, 52-153).

Sex

The variables, in addition to academic major and secondary teaching plans, used as covariates in some analyses were also used as factors in other analyses. Those results will be discussed next in light of the findings presented in Chapter IV and the previous research available in the literature.

The main factor of sex (see the analyses reported in Tables 23 and 28) was significant beyond the .01 level for both scales when the data were analyzed separately for USU and WSC. Males scored higher than females at both institutions. This was also the case for studies reported by Alter and White (1966), Nidorf and Agrabite (1968), Vacchiano (1967), Plant, (1965), Plant, Telford, and Thomas (1965), and Lehmann (1962a, 1962b). Our results, however, did not support those reported by Rokeach (1960) and Anderson (1962) who found no significant differences between male and female dogmatism scores, nor those by McGee (1954) and Wilcox (1957) that female teachers were more authoritarian than male teachers.

However, when only subjects planning to receive elementary and secondary teaching certificates were used for the analyses (Tables 31 and 34), different results were obtained. At WSC, males still scored significantly higher on the D Scale than did female subjects. In addition, secondary males were significantly higher than secondary females and male elementary subjects scored higher ($p<.10>.05$) than female elementary subjects. At USU, however, male education students did not differ significantly from female education students on the D or the F Scale. Shaver and Richards (1968) using 254 secondary subjects at USU also found males not to be significantly different from females. For their "nationwide" sample using 1403 education students, Shaver and Richards also reported a nonsignificant difference between the sexes even though males had the higher mean.

In still another set of analyses (Tables 37 and 39) we looked at differences between males and females within specific majors. For those analyses, majors which contained few numbers of either sex were excluded--agriculture, engineering, natural resources, and family life. Physical education majors were also excluded because less than five were not planning to teach and teaching-nonteaching was a factor for the analyses. The analyses included 778 subjects from USU and 683 from WSC. Comparisons of differences between male and female D and F Scale means within the various majors (elementary education, secondary education, business, English, etc.) yielded nonsignificant F-Ratios for the F Scale at either institution, nor for the D Scale at USU. However, on the D Scale at WSC, males in social science and secondary education had significantly higher means than did their female counterparts.

It appears that much of the differences in male and female mean scores for the overall comparisons reported in Tables 23 and 28 may lie in majors dominated by one sex or the other, such as agriculture, engineering, natural resources, and family life. The male-female differences disappeared when these majors were excluded from the analyses (Tables 37 and 39).

These findings strongly suggest that the factor of sex should be controlled in research designs, either by drawing samples stratified by sex or by using covariance to hold sex constant.

City Size

The main effect of city size of childhood residency was significant for the USU subjects on the D and F Scales. At Weber State College, the difference among the means for the various city sizes was not significant for either scale. The USU subjects coming from cities of less than 2,500 and from 2,500 to 9,999 scored significantly higher on the D and F Scales than did those subjects coming from cities of 10,000 or more in population. This same trend, although not significant, was evident in the results for WSC.

That significant differences among the means for city size of childhood residency were found for USU but not for WSC may be due to differences in cultural exposure depending upon the location of the small town in which one is raised. The degree of "ruralism" or "urbanism" of small communities may depend heavily upon their proximity to large cities. For example, students living in the Greater Ogden Valley Area (WSC), yet coming from small towns (15.8 percent, Figure 5), lived close to Ogden and Salt Lake City and were exposed to a variety of subcultures in attending large junior and senior high schools. In addition, their teachers were likely to be from urban areas and their parents were likely to work, shop, and seek recreation in the cities. Also, the Greater Ogden Area (WSC) subjects who grew up in small towns were themselves more likely to be exposed to different people, races, and religions. This commonality of experience may account for the non-significant differences at WSC between subjects from small and large cities.

In contrast to the above, the USU subjects (29.3 percent, Figure 4) coming from communities with less than 1,500 people may have been more apt to be from communities isolated from subcultural variety. Their parents and school teachers were more likely to live and work in the same rural setting. The chances of having only one church in isolated communities in Utah and surrounding states is fairly high, and the exposure in early childhood to broad socio-economic and subcultural differences is likely to be limited.

In Rhode's (1960) report, authoritarianism was negatively correlated with urban residence (he had used subjects from urban and rural areas). Lehmann (1962b), however, reported that the most dogmatic males lived the

major portion of their lives on farms while their female counterparts came from cities with populations of 25,000 to 100,000. Yet, in our study females, as well as males, who came from cities greater than 50,000, had the lowest rather than the highest D and F Scale scores. Whether the size of community is related to D and F Scale scores may well be dependent upon the degree of "ruralism" or "urbanism" of the surrounding environment as this affects (Alter & White, 1966) the subcultural differences to which one is exposed, as well as dependent upon the variables controlled in an analysis of covariance.

Religion

Generally, dogmatism and authoritarianism have been found to be related to religious affiliation (see Review of Related Research). According to Kirscht and Dillehay's (1967) review, some religions are more congenial to authoritarian personality patterns than are others.

For the present study, considerable information was lost by the regrouping of the 22 different religious affiliations into five categories--agnostic-blank, Catholics, Latter-Day Saints (Mormons), Other, and Protestants--to have sufficient within cell observations for three-way analyses of covariance. It can be noted by checking Table 71 in Appendix C that there was a greater difference among the religions classified as "Protestants"--Baptists, Lutheran, Methodists, and Presbyterians--or "Other"--16 classifications--than there was among the resulting five classifications used in the analyses. Two of the classifications--Mormons and Catholics--contained only one religious group. Yet considerable variability in D and F Scale scores may exist from one Mormon ward (church) to another or from one Catholic parish to another depending, for example, upon such factors as the size of the community or its geographical location.

For the present study, one set of analyses included the factors of religion, church attendance, and state of childhood residency, as well as the covariates of major, sex, city size, and teaching plans. Under these analytic conditions and with our five categories of religion, the factor of religion was not significant ($p<.10>.05$) for either scale at either institution. These findings did not support Shaver and Richards' (1968) results for their "nationwide sample". Their Mormons were significantly more closed minded and authoritarian than the four other religious classifications--Protestants, Catholics, Jews, and agnostic-left-blank. Also, Protestants, Catholics and Jews scored significantly higher than their agnostic-left blank group. Rhodes (1960) also reported that subjects who belonged to fundamentalist faiths were more authoritarian and dogmatic. Lehmann (1962a) reported that students at a Congregational institution scored significantly higher on the D Scale than did subjects from a Presbyterian college, and subjects from both schools were significantly higher than students from a state university.

Inasmuch as these studies (Lehmann, 1962a; Rhodes, 1960; Shaver & Richards, 1968) did not control for such variables as church attendance, sex, city size and state of childhood residency, it is most difficult to compare the results. However, the trends for both scales at WSC (even though nonsignificant) do support the other findings.

Since the main effect of religion approached significance for the USU sample and the interaction of religion by church attendance was significant, religion should not be ignored in studies involving the D and F Scales.

Church Attendance

It was noted in the Review of Related Research (Chapter II) that a clear relationship between church attendance and open-closed mindedness has not emerged. Frymier (1959b) and Brickman (1967) concluded that church attendance was unrelated to open-closed mindedness. Yet, Jones and Gaier (1953), Jones (1958), Nalder, et al. (1959), Harvey, et al. (1968), Meredith (1968), Rokeach (1970), Allport (1964), and Stark, et al. (1970) found church attendance to be related to scores on the D and/or F Scales. The present sutdy also found church attendance to be a highly significant ($p<.001$) factor at USU for both scales and at WSC for the D Scale ($p<.01$), with the F Scale approaching significance ($p<.10>.05$). At both institutions, subjects attending church most frequently were more apt to have higher D and F Scale scores.

This was also the case for Rokeach's study (1970). Stark and his associates (1970), however, reported opposing findings regarding church attendance. In their study, subjects who attended church irregularly were the most bigoted and prejudiced.

The within cell means of our analyses (Table 53) are interesting in that inspection of the data for the WSC Protestant group for both scales and the WSC "Other" group for the F Scale supports the findings of Stark and his associates. In those cases, irregular attenders scored highest on the scales. However, the pattern cannot be given much credence because the difference among the F Scale means was not deemed to be significant.

For the USU sample (but not for the WSC one), the interaction of church attendance and religion was significant for both scales. The difference between agnostic-blank subjects attending church once a week and less than once a month was significantly greater than the difference between the pooled means for Catholics, Protestants, and Mormons attending church once a week and less than once a month. However, caution must be exercised in interpreting the agnostic-blank classification. The means for agnostic-blanks who said they attended church once a week were high for the D and F Scales (183.57, 144.74, respectively). This group may have contained extreme right wing authoritarians who refused to indicate the church they were attending.

It does seem clear that church attendance is a factor to be taken into account in making within or among group religious comparisons. Not only does church attendance appear related to open-closed mindedness, but the relationship is different for different religious groups--as our significant interactions indicate.

State of Childhood Residency

Data bearing on the childhood residency of students attending the two institutions yielded some interesting findings. At Utah State University, students who lived out of state as children scored significantly lower on both the D and F Scales than did in state (Utah) students. However, as with religion and city size, this relationship did not emerge for the WSC sample. In state students attending USU had a mean D Scale score of 159.17 and a mean F Scale score of 112.28, while their counterparts at Weber State College had mean D and F Scale scores of 146.82 and 96.06. The differences between the USU and WSC D Scale means were significant ($p<.01$).

For the D Scale results for USU subjects, a significant interaction ($p<.05$) between state of residence and church attendance calls for caution in interpreting the difference among the D Scale main effect means. The relationship between church attendance and the D Scale was curvilinear for the main effect means, but for subjects from Utah the profile was linear (Tables 49 and 50).

Institutional Differences

Comparisons are frequently made between the D and F Scale scores for samples drawn from universities in different geographical areas with little consideration given to the possible effects of variations in other variables. Alter and White (1966) compared 27 different populations from six different studies and concluded that the lack of consistency might be due to the lack of reliability of the D Scale or because the scale is sensitive to subcultural differences. Our findings suggest the feasibility of the latter conclusion.

The populations of the two institutions--USU and WSC--have been defined in Chapter III and briefly summarized in Chapter IV and the descriptions will not be repeated here.

From the two institutions, 1845 subjects were included in the analyses. It may be recalled that sex and institution were considered as one treatment with four levels and one-way analyses of covariance were computed for the D and F Scales. Four of the five covariates--major, religion, church attendance, and city size--made significant contributions to the adjustment of the treatment means. In addition, state of childhood residence was a significant covariate for the F Scale. None of the other analyses carried out for this study had this number of covariates emerge as significant.

Subjects from Utah State University had a significantly higher mean D Scale score than did the subjects from Weber State College. However, the F Scale means for the two institutions were not significantly different.

It will be recalled that we were interested in sex differences across institutions. Weber State College females scored significantly lower on the D Scale than did WSC males, USU males and females. In addition, the adjusted D Scale mean score for WSC males was significantly lower than that of USU females.

The significant covariates and the significance of the treatment variable of sex and institutions indicate that to make meaningful comparisons from one institution to another, a researcher should adjust for unequal numbers of subjects in the factor or treatment levels and employ at least the covariates identified in this study. Otherwise, comparisons of studies conducted at separate institutions or from different geographical areas will be difficult, if not impossible, to interpret.

Disposition of the Hypotheses

The objectives and purposes of this study were converted into 19 null hypotheses as the basis for the statistical analyses. The hypotheses have been stated at the beginning of each analysis subsection of Chapter IV. Although awareness of the design for each analysis is essential to interpreting the results[3], a summary of the fate of the 19 null hypotheses is presented in Table 68.

Recommendations

Our major concern in this project was with whether education majors as a group differed significantly in dogmatism or authoritarianism from other college majors. We concluded that, for our samples, they did not. Moreover, our students planning to receive secondary teaching certificates were generally no more closed minded or authoritarian than their non-teaching counterparts in the same academic major.

It must be recalled, however, that our samples were dominated by one religious group--Mormons. Our results need to be substantiated in other subcultures. Replication of the findings (Shaver & Larkins, in press; Sidman, 1960) is needed before conclusions about the relative open-closed mindedness of teacher education students can be safely drawn.

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[3]The various analyses of covariance involved different numbers of subjects, factors, and covariates.

Table 68

Disposition of the Null Hypotheses for the Analyses Conducted f
Utah State University and Weber State College Subjects

No.	Abbreviated Null Hypotheses[1]	Disposition of Hypotheses[2] USU	USC
1	There is no significant difference among the mean Dogmatism Scale or F Scale scores of the students in education and students majoring in other fields.	not rejected	D Scale-not rejected ($p<.10>.05$) F Scale-Rejected ($p<.05$)
2	. . .students preparing to teach in secondary education and college students in the same academic fields not preparing to teach.	not rejected	D Scale-rejected ($p<.05$) F Scale-not rejected
3	. . .male and female students	rejected ($p<.001$)	rejected ($p<.001$)
4	. . .subjects who grew up in different sized cities	rejected ($p<.05$)	not rejected
5	. . .interaction effect of sex and city size	not rejected	not rejected
6	. . .students not planning to teach, majoring in elementary education, and majoring in secondary education.	not rejected	not rejected
7	. . .elementary teacher education students and secondary teacher education students.	not rejected	not rejected
8	. . .female and male teacher education students	not rejected	D Scale-rejected ($p<.01$) F Scale-not rejected
9	. . .female elementary teacher education students and female secondary teacher education students	not rejected	D Scale-rejected F Scale-not rejected
10	. . .male elementary teacher education students and male secondary teacher education students.	not rejected	D Scale-rejected ($p<.01$) F Scale-not rejected
11	. . .males and females in each academic major.	not rejected	D Scale-rejected ($p<.01$) F Scale-not rejected
12	. . .different religious affiliations	D Scale not rejected ($p<.10>.05$) F Scale not rejected	not rejected
13	. . .levels of church attendance	rejected ($p<.01$)	D Scale-rejected ($p<.01$) F Scale-not rejected ($P<.10>.05$)
14	. . .Utah, six surrounding states, and other states	D Scale-rejected ($p<.05$) F Scale-rejected ($p<.01$)	not rejected
15	. . . interaction of religion and frequency of church attendance.	rejected ($p<.05$)	not rejected
16	. . .interaction of religion and state of childhood residency.	not rejected	not rejected
17	. . .interaction of state of childhood residency and church attendance.	D Scale-rejected ($p<.05$) F Scale-not rejected $10>.05$)	not rejected
18	. . .various secondary education academic fields	D Scale-rejected ($p<.05$) F Scale-rejected ($p<.01$)	not rejected
19	. . . Utah State University and Weber State College	D Scale - rejected ($p<.01$) F Scale - not rejected	

[1]The first null hypothesis is worded in its entirety, and Hypotheses 2 through 19 are abbreviated.

[2]Unless otherwise indicated, the disposition of the hypothesis applies for both D and F Scales. If the hypothesis was not rejected, the F-Ratio did not reach the value needed for a .05 level of significance.

The findings for the two major hypotheses of our study indicate that in general students entering teaching are no more closed minded than other college students. The findings, however, do not speak to questions about the relative open-closed mindedness of teachers in the classroom. It may well be that the demands of teaching in our public education system, often branded as authoritarian, are such that teachers become more closed minded in order to "survive", or that teachers who stay in the profession are comparatively more closed minded. Studies of teachers, not college students, are needed before conclusions can be drawn about the practicing profession.

One of the assumptions underlying the present study was that closed mindedness on the part of teachers was a deterrent to helping students reach their maximum potential. Further studies (e.g., McGee, 1954) are needed of the relationships between teachers' open-closed mindedness and the classroom environment in which pupils are "educated". Questions such as, "What relationship does the open-closed mindedness of teachers have to teacher behavior and to pupil interest, achievement, creativity, and tendency to stay in school?" still remain for the most part unanswered.

In addition to the foregoing recommended research studies, there are analyses beyond the scope of our project proposal which merit being carried out to use the wealth of data from our 1886 subjects. The research on sex as a variable related to D and F Scale scores still has not established whether differences found between males and females are attributable to actual sex differences (Vacchiano, et al., 1967; Alter & White, 1966) or to the nature of a few items on the scale (Nidorf & Agrabite, 1968). Using our data to replicate Vacchiano, Schiffman, and Strauss' (1967) use of three independent factor analyses of the items on the Dogmatism Scale for three groups of data (87 males, 89 females, and a combined male and female group) would add to the knowledge concerning theoretical difficulties or potential misinterpretations of the scales for the sexes. In addition, the use of factor analyses to establish the validity (i.e., the factorial discriminability) of the F and D Scales, as done by Kerlinger and Rokeach (1966) and Warr, Lee, and Joreskog (1969) could be profitably repeated on the present data in an attempt to verify their findings with subjects from a different subculture.

Another analysis merited with the present data would be a closer look at the factors of religion and church attendance. Because of the grossness of our religious classifications for the three-way analyses of covariance, considerable information was lost. Additional analyses regarding the 22 different religions and church attendance might add considerably to an understanding of the relationship of fundamentalism, authoritarianism, and dogmatism.

One of the enigmas for researchers using the D and F Scales has been the number of inconsistent findings reported in the literature. It is difficult to ascertain whether these differences are due to inadequacies in research design or whether they are attributable to actual differences among the samples. The results of our study suggest that more careful consideration must be given to the research design and statistical analyses if comparisons between studies are to be interpretable. The present study has shown that the D and F Scale scores are not independent of such variables as sex, major, religion, church attendance, geographical location of childhood residency--city size and state--and even the institution of higher education attended. When these variables are to be used as factors, sampling should be stratified according to proportions in the population. If these variables are not controlled in sampling, then it is essential that statistical adjustments be made. The factorial analysis of covariance using a general least squares solution seems particularly appropriate because it provides for adjusting means for various covariates as well as for unequal frequencies.

In conclusion, then, there are caveats about research techniques that must be taken into account in carrying out our major recommendations. The replication of our findings with regard to the relative open-closed mindedness of prospective teachers is needed. The extension of our research--to determine if the ongoing educative or selective processes of the public school setting lead to a different picture when experienced, rather than prospective, teachers are studied--should be of major concern to educational researchers.

Regardless of the thrust of future research using the D and F Scales, our results suggest that to obtain consistent and accumulative knowledge, three general types of variables must be considered in research design and/or statistical analysis: (1) personal characteristics (e.g., sex, religion, church attendance), (2) demographic background in terms of city size and state of childhood residency, and (3) educational characteristics (e.g., college major, institution attended). When these variables are adequately considered in research and statistical designs, then, and probably only then, will researchers eliminate inconsistent, uninterpretable findings and build a cumulative body of knowledge about open-closed mindedness and teachers.

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Appendix A

Directions for test administrators (graduate assistants) provided in addition to those listed in Chapter III under "instructions" were:

1. Check with the professor a day in advance of the scheduled date to remind him of the test and reaffirm the exact time and place for the test to be given. The last 30 minutes of class is considered best because students may leave the room upon completion of the opinionnaire.

2. Do not permit students to discuss the questions until they have left the room or until all the answer sheets have been collected.

3. Be straightforward, businesslike, sincere, accurate, and prompt.

4. Be properly dressed with a tie and coat.

5. Some of the questions on the opinionnaire will be or appear to be ambiguous. Questions raised by respondents should be handled as "Whatever you think" or "Just put down how you feel--do you agree or disagree".

6. Remain in the room at all times during the testing period.

7. Thank the professor for his cooperation.

8. Results of the study will be made available to each college or school dean.

APPENDIX B

INSTRUCTIONS

THE COMPUTER WILL BE USED TO RECORD THIS DATA. PLEASE FOLLOW CLOSELY THE DIRECTIONS GIVEN FOR MARKING THE DATA AND ANSWER SHEET. THERE ARE LARGE NUMBERS OF STUDENTS PARTICIPATING IN THIS RESEARCH AND THERE WILL BE NO ATTEMPT TO IDENTIFY YOU AS AN INDIVIDUAL. FURTHER INSTRUCTIONS WILL BE GIVEN ON THE OPINION QUESTIONNAIRE.

PLEASE FILL IN THE APPROPRIATE BLANKS AT THE TOP OF THE DATA AND ANSWER SHEET IN RESPONDING TO ITEMS A THROUGH J, AND THEN PROCEED IMMEDIATELY TO THE OPINION QUESTIONNAIRE:

A. Select your major and record. Example: If your major is History (20) (you will find the appropriate two numerals under Social Science)

0 1 2 3 4 5 6 7 8 9

A. [2] = = = = = = = = = =
[0] = = = = = = = = = =

AGRICULTURE:
- 00 Agriculture: all areas

BUSINESS:
- 01 Business: all areas

EDUCATION
- 02 Elementary education
- 03 Physical education
- 04 Psychology
- Secondary education: math your academic major

ENGINEERING:
- 05 Civil, Electric, Manufacturing
- 06 Industrial Tech. and Educ.

NATURAL RESOURCES:
- 07 Forestry, Range, Wildlife

FAMILY LIFE:
- 08 Family life: all areas

HUMANITIES & ARTS:
- 09 Audiology, Speech, Th. Arts
- 10 English, Journalism
- 11 Landscape Arch., Env. Plan.
- 12 Foreign Language
- 13 Art
- 14 Music

SCIENCE:
- 15 Math, Statistics, Comp. Sci.
- 16 Botany, Bact., Plant Phy., etc.
- 17 Chemistry, Physics, Geology
- 18 Zoology, Pre-med, Med. Tech.
- 19 Science Composite

SOCIAL SCIENCE:
- 20 History
- 21 Political Sci., Pre-Law
- 22 Sociology, Social Work
- 23 Social Science Composite

GENERAL:
- 24 No specific major

OTHER:
- 25 If you cannot find an appropriate area, specify your major in the blank marked "Major" at the bottom of the page.

B. Select and record your religious affiliation: (use the same procedure as stated for A.)

- 00 Agnostic
- 01 Baptist
- 02 Buddist
- 03 Catholic
- 04 Christian Scientist
- 05 Christian
- 06 Church of Christ
- 07 Congregationalist
- 08 Episcopalian
- 09 First Christ
- 10 Jehovah Witnesses
- 11 Jewish
- 12 Lutheran
- 13 L.D.S. (Mormon)
- 14 Methodist
- 15 Moslem
- 16 Nazarene
- 17 Presbyterian
- 18 Protestant
- 19 Seventh Day Adventist
- 20 Unitarian
- 21 United Christ
- 22 Other: Please specify in the blank for religious affiliation at bottom of answer sheet

C. Sex:
- 0 Male
- 1 Female

D. Age:
- 0 Under 24
- 1 25-29
- 2 30-34
- 3 Over 35

E. Class rank:
- 0 Sophomore
- 1 Junior
- 2 Senior
- 3 Graduate

F. Institution:
- 0 Utah State University
- 1 Weber State College

G. Teacher certification plans:
- 0 I do not plan to certify
- 1 Elementary
- 2 Secondary
- 3 Special Education

H. Typically I attend church:
- 0 At least once a week
- 1 At least once a month
- 2 At least once every six months
- 3 At least once a year
- 4 Less than once a year
- 5 Never

I. I spent most of most of my growing up years in the state of:
- 0 Arizona
- 1 California
- 2 Colorado
- 3 Idaho
- 4 Montana
- 5 Nevada
- 6 Oregon
- 7 Utah
- 8 Several states
- 9 Other: Please specify at bottom of answer sheet under state

J. I spent most of my growing up years in a city of:
- 0 Less than 1,500
- 1 1,500-2,499
- 2 2,500 - 9,999
- 3 10,000-50,000
- 4 Over 50,000

OPINION QUESTIONNAIRE

The following is a study of what the general public thinks and feels about a number of important social and personal questions. The best answer in each statement below is your personal opinion. We have tried to cover many different and opposing points of view; you may find yourself agreeing strongly with some of the statements, disagreeing just as strongly with others, and perhaps uncertain about others. Whether you agree or disagree with any statement, you can be sure that many people feel the same as you do.

On the answer sheet, fill in the space provided for each answer according to how much you agree or disagree with it. Please fill in the space for each question. Mark in +1, +2, +3, or -1, -2, -3 depending upon how you feel.

+1. I AGREE A LITTLE	-1. I DISAGREE A LITTLE
+2. I AGREE ON THE WHOLE	-2. I DISAGREE ON THE WHOLE
+3. I AGREE VERY MUCH	-3. I DISAGREE VERY MUCH

* *

1. The United States and Russia have just about nothing in common.

2. The highest form of government is a democracy and the highest form of democracy is a government run by those who are most intelligent.

3. Even though freedom of speech for all groups is a worthwhile goal, it is unfortunately necessary to restrict the freedom of certain political groups.

4. Obedience and respect for authority are the most important virtues children should learn.

5. A person who has bad manners, habits and breeding can hardly expect to get along with decent people.

6. It is only natural that a person would have a much better acquaintance with ideas he believes in than with ideas he opposes.

7. Man on his own is a helpless and miserable creature.

8. Fundamentally, the world we live in is a pretty lonesome place.

9. If people would talk less and work more, everybody would be better off.

10. The businessman and the manufacturer are much more important to society than the artist and the professor.

11. Most people just don't give a "damn" for others.

12. I'd like it if I could find someone who would tell me how to solve my personal problems.

13. It is only natural for a person to be rather fearful of the future.

14. Science has its place, but there are many important things that can never possibly be understood by the human mind.

15. Young people sometimes get rebellious ideas, but as they grow up they ought to get over them and settle down.

+1. I AGREE A LITTLE	-1. I DISAGREE A LITTLE
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16. There is so much to be done and so little time to do it in.

17. Once I get wound up in a heated discussion I just can't stop.

18. In a discussion I often find it necessary to repeat myself several times to make sure I am being understood.

19. What this country needs most, more than laws and political programs, is a few courageous, tireless, devoted leaders in whom the people can put their faith.

20. No sane, normal, decent person could ever think of hurting a close friend or relative.

21. In a heated discussion I generally become so absorbed in what I am going to say that I forget to listen to what the others are saying.

22. It is better to be a dead hero than to be a live coward.

23. While I don't like to admit this even to myself, my secret ambition is to become a great man, like Einstein, or Beethoven, or Shakespeare.

24. Nobody ever learned anything really important except through suffering.

25. What the youth needs is strict discipline, rugged determination, and the will to work and fight for family and country.

26. The main thing in life is for a person to want to do something important.

27. If given the chance I would do something of great benefit to the world.

28. In the history of mankind there have probably been just a handful of really great thinkers.

29. An insult to our honor should always be punished.

30. Sex crimes, such as rape and attacks on children, deserve more than mere imprisonment; such criminals ought to be publicly whipped, or worse.

31. There are a number of people I have come to hate because of the things they stand for.

32. A man who does not believe in some great cause has not really lived.

33. It is only when a person devotes himself to an ideal or cause that life becomes meaningful.

34. There is hardly anything lower than a person who does not feel a great love, gratitude, and respect for his parents.

35. Most of our social problems would be solved if we could somehow get rid of the immoral, crooked, and feebleminded people.

36. Of all the different philosophies which exist in this world there is probably only one which is correct.

+1. I AGREE A LITTLE	-1. I DISAGREE A LITTLE
+2. I AGREE ON THE WHOLE	-2. I DISAGREE ON THE WHOLE
+3. I AGREE VERY MUCH	-3. I DISAGREE VERY MUCH

37. A person who gets enthusiastic about too many causes is likely to be a pretty "wishy-washy" sort of person.

38. To compromise with our political opponents is dangerous b cause it usually leads to the betrayal of our own side.

39. Homosexuals are hardly better than criminals and ought to be severely punished.

40. When a person has a problem or worry, it is best for him not to think about it, but to keep busy with more cheerful things.

41. When it comes to differences of opinion in religion we must be careful not to compromise with those who believe differently from the way we do.

42. People can be divided into two distinct classes: The weak and the strong.

43. The worst crime a person could commit is to attack publicly the people who believe in the same thing he does.

44. Every person should have complete faith in some supernatural power whose decisions he obeys without question.

45. Some people are born with an urge to jump from high places.

46. In times like these it is often necessary to be more on guard against ideas put out by people or groups in one's own camp than by those in the opposing camp.

47. A group which tolerates too much differences of opinion among its own members cannot exist for long.

48. There are two kinds of people in this world: Those who are for the truth and those who are against the truth.

49. In times like these, a person must be pretty selfish if he considers primarily his own happiness.

50. Some day it will probably be shown that astrology can explain a lot of things.

51. My blood boils whenever a person stubbornly refuses to admit he's wrong.

52. A person who thinks primarily of his own happiness is beneath contempt.

53. Most of the ideas which get printed nowadays aren't worth the paper they are printed on.

54. Wars and social troubles may someday be ended by an earthquake or flood that will destroy the whole world.

55. No weakness or difficulty can hold us back if we have enough will power.

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56. In this complicated world of ours the only way we can know what's going on is to rely on leaders or experts who can be trusted.

57. It is often desirable to reserve judgment about what's going on until one has had a chance to hear the opinions of those one respects.

58. In the long run the best way to live is to pick friends and associates whose tastes and beliefs are the same as one's own.

59. Most people don't realize how much our lives are controlled by plots hatched in secret places.

60. Human nature being what it is, there will always be war and conflict.

61. Nowadays more and more people are prying into matters that should remain personal and private.

62. If a man is to accomplish his mission in life it is sometimes necessary to gamble "all or nothing at all."

63. Unfortunately, a good many people with whom I have discussed important social and moral problems don't really understand what's going on.

64. Familiarity breeds contempt.

65. Nowadays when so many different kinds of people move around and mix together so much, a person has to protect himself especially carefully against catching an infection or disease from them.

66. Most people just don't know what's good for them.

67. The present is all too often full of unhappiness. It is only the future that counts.

68. The wild sex life of the old Greeks and Romans was tame compared to some of the goings-on in this country, even in places where people might least expect it.

APPENDIX C

TABLE 69

Mean and Standard Deviations on the D and F Scale Scores for Utah State University Subjects Grouped by Major

Major	Scale	Rank[1]	N	Unadjusted Mean[2]	S.D.
Music	D	1	22	161.36	23.09
	F	6	22	105.55	23.35
Agriculture	D	2	59	159.53	21.56
	F	1	59	111.64	19.00
Civil Engin.	D	3	55	156.18	25.44
	F	3	55	107.80	18.79
Business	D	4	97	155.59	21.25
	F	4	97	107.17	19.48
Physical Ed.	D	5	42	155.78	26.52
	F	2	42	109.79	19.91
Chemistry	D	6	39	153.82	27.14
	F	12	39	100.26	20.49
Industrial Eng.	D	7	36	153.03	23.73
	F	10	36	102.03	20.76
Elementary Ed.	D	8	197	153.02	24.41
	F	5	197	104.55	19.75
Botany	D	9	5	150.80	19.30
	F	7	5	104.20	11.73
Family Life	D	10	60	150.63	24.79
	F	13	60	100.76	17.93
Landscape Arch.	D	11	18	148.72	24.49
	F	8	18	103.11	13.91
Math	D	12	29	147.31	30.40
	F	15	29	95.69	19.16
Zoology	D	13	13	146.00	31.46
	F	9	13	101.38	25.67
Psychology	D	14	21	145.48	28.49
	F	17	21	93.05	23.98
Art	D	15	40	145.50	28.61
	F	18	40	91.20	23.19
Natural Res.	D	16	102	144.11	23.21
	F	12	102	99.03	18.77
Speath	D	17	38	144.00	18.56
	F	14	38	97.45	22.82
History	D	18	45	142.93	27.62
	F	16	45	95.33	23.33
English	D	19	37	137.57	28.84
	F	19	37	90.62	24.40
Political Sci.	D	19	29	135.31	30.41
	F	21	29	82.31	26.04
Foreign Lang.	D	21	9	134.30	37.35
	F	22	9	80.50	17.17
Sociology	D	22	38	133.63	26.80
	F	20	38	86.76	27.06

[1]Rank ordered according to the D Scale means of students at USU

[2]The reader is cautioned that when certain variables (e.g., sex, major, church attendance, etc.) are found to be significantly related to the authoritarianism or dogmatism of subjects, comparison of unadjusted means and adjusted means may be of little value. For example, if sex was a significant covariate with males scoring higher than females (as with our data) then an unadjusted analysis including, for instance, the major of English (which may contain a high percentage of females) would be greatly affected. Without an adjustment for sex, English majors--just because they include a higher percentage of females--would have a lower mean score. Such unadjusted scores would be unreliable for making comparisons between majors or for comparisons of different studies in different institutions because the percentage of males and females might not be consistent. When the covariates are significant, the interpretation of unadjusted means becomes tenuous.

TABLE 70

Unadjusted Means and Standard Deviations on the D and F Scale Scores for Weber State College Subjects Grouped by Major

Major	Scale	Rank[1]	N	Adjusted Mean[2]	S.D.
Botany	D	1	22	157.18	27.16
	F	5	22	104.41	16.28
Civil Eng.	D	2	84	155.79	22.04
	F	3	84	107.79	18.89
Industrial Eng.	D	2	27	155.55	25.07
	F	1	27	109.44	20.89
Music	D	4	17	154.53	13.11
	F	1	17	109.65	18.41
Business	D	5	95	153.03	27.58
	F	6	95	104.38	21.94
Foreign Lang.	D	6	13	152.23	24.79
	F	10	13	101.62	16.84
Physical Education	D	7	46	150.20	23.51
	F	7	46	102.39	21.53
Zoology	D	8	61	150.15	26.58
	F	8	61	102.39	20.13
Psychology	D	9	25	149.52	30.58
	F	15	25	91.44	26.20
Art	D	10	36	149.25	25.17
	F	11	36	99.08	22.36
Math	D	11	23	148.35	20.45
	F	12	23	98.43	19.44
Chemistry	D	12	27	147.44	26.78
	F	9	27	102.15	21.36
Elementary Education	D	13	130	146.65	22.52
	F	4	130	105.97	29.47
History	D	14	43	142.88	28.97
	F	14	43	92.09	26.68
Political Science	D	16	38	142.53	21.92
	F	18	38	89.26	20.54
Sociology	D	16	42	140.82	24.94
	F	17	42	89.50	21.61
Family Life	D	17	10	140.40	28.64
	F	13	10	95.70	24.21
English	D	18	61	139.41	34.18
	F	15	61	90.93	26.08

[1]Ranked according to the D Scale unadjusted means.

[2]The reader is cautioned that when certain variables (e.g., sex, major, church attendance, etc.) are found to be significantly related to the authoritarianism or dogmatism of subjects, comparison of unadjusted means and adjusted means may be of little value. For example, if sex was a significant covariate with males scoring higher than females (as with our data) then an unadjusted analysis including, for instance, the major of English (which may contain a high percentage of females) would be greatly affected. Without an adjustment for sex, English majors--just because they include a higher percentage of females--would have a lower mean score. Such unadjusted scores would be unreliable for making comparisons between majors or for comparisons of different studies in different institutions because the percentage of males and females might not be consistent. When the covariates are significant, the interpretation of unadjusted means becomes tenuous.

TABLE 31

Unadjusted Means and Standard Deviations on the Mean D and F Scale Scores for Subjects Grouped by Institution and Original Categories of Religion

Religion[1]	Scale	Utah State University Rank	N	Mean	S.D.	Scale	Weber State College Rank	N	Mean	S.D.
Protestant	D	8	33	154.54	22.54	D	11	12	139.00	25.27
	F	2	33	104.77	22.17	F	10	12	96.08	23.86
Latter-Day Saint	D	2	712	154.01	23.18	D	3	571	150.61	25.06
	F	3	712	104.58	19.78	F	4	571	103.09	18.06
Others[2]	D	3	41	153.76	34.48	D	7	30	143.60	30.60
	F	4	41	102.15	29.35	F	7	30	97.53	1..10
Baptist	D	4	18	153.00	17.43	D	4	23	150.48	22.38
	F	1	18	105.78	18.08	F	8	23	97.52	19.18
Jewish	D	5	5	152.80	49.34	D	1	5	159.00	37.97
	F	6	5	98.00	34.15	F	1	5	114.40	17.40
Lutheran	D	6	26	147.69	21.86	D	5	15	150.13	22.56
	F	7	26	97.62	18.68	F	6	15	98.07	16.59
	F									
Christian	D	7	10	147.10	33.09	D	---	--	------	------
	F	9	10	93.40	15.61	F	---	--	------	------
Catholic	D	8	62	140.87	26.33	D	9	49	144.53	23.36
	F	5	62	98.27	22.15	F	9	49	97.27	24.27
Methodist	D	9	30	138.53	20.40	D	6	22	148.95	27.05
	F		30	93.57	18.99	F	3	22	104.42	17.70
Ag. Bierks	D	10	65	134.06	27.43	D	12	46	130.26	29.89
	F	12	65	79.09	28.63	F	12	46	79.91	21.99
Presbyterian	D	11	40	131.48	22.88	D	8	13	146.15	24.14
	F	10	40	90.52	16.47	F	5	13	98.38	19.67
Episcopalian	D	12	10	123.10	20.58	D	2	10	136.00	26.56
	F	11	10	79.10	15.08	F	2	10	107.60	20.74
Congregationalist	D	--	---	------	-----	D	10	5	119.60	26.17
	F	--	---	------	-----	F	11	5	90.60	26.41

[1]The reader is cautioned that when certain variables (e.g., sex, major, church attendance, etc.) are found to be significantly related to the authoritarianism or dogmatism of subjects, comparison of unadjusted means and adjusted means may be of little value. For example, if sex was a significant covariate with males scoring higher than females (as with our data) then an unadjusted analysis including, for instance, the major of English (which may contain a high percentage of females) would be greatly affected. Without an adjustment for sex, English majors--just because they include a higher percentage of females--would have a lower mean score. Such unadjusted scores would be unreliable for making comparisons between majors or for comparison of different studies in different institutions because the percentages of males and females might not be consistent. When the covariates are significant, the interpretation of unadjusted means becomes tenuous.

[2]Any religious classification containing fewer than five Ss.