CLASSROOM SEATING: APPLYING JOHNSON'S DECISION MAKING

INVENTORY

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INVENTORY

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CLASSROOM SEATING: APPLYING JOHNSON'S DECISION MAKING

MODEL

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ABSTRACT

Over a period of three weeks students in an introductory Parks and Recreation course were studied to determine their decision making styles, seating choice and movement. Data were collected on the first day of class to determine student decision making styles using Johnson, Coscarelli and Johnson's (2007) Decision Making Inventory (n=145). Over the next eight class periods student seat choice was also collected (n=129). Evidence was provided that decision making styles are not significantly correlated with seat choice when compared on the first day of class, but did correlate three weeks later on the last day of data collection. Gender and DMI styles do not correlate but significant differences are present between males and females with regard to style. That was evidenced by interactions that occur between gender and style categories. Decision making styles were predominately systematic/internal for males and systematic/external for females. Movement data suggested over a three week period students stabilize their seat choice. Overall by the eighth data collection period student movement diminished, gender became relevant to style and seat choice became consistently characterized by females in the forward rows and males in rear of the classroom.

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CHAPTER I

INTRODUCTION TO THE STUDY

In his 1959 book entitled *The Sociological Imagination*, C. Wright Mills writes about the importance of intellectual craftsmanship. More specifically he describes the influences that drive researchers to want to know more. According to Mills, one of those influences is the desire to understand what the researcher has observed; the likelihood of engaging in that research increases if the investigator is intimately tied to the unknown. For Mills, the researcher's life work is nothing more than observing and interpreting. This study is exemplary of what Mills described: gaining through a process of observing and interpreting, a better understanding of classroom seating, movement and the decision process college students go through in choosing those seats.

The design of college classrooms has not changed significantly since Harvard University was established in 1636. Students still sit in rows and columns while the teacher faces that arrangement as the focal point of interaction, particularly in large lecture halls (Koneya, 1976).   Seats and their location, while designed to provide line of sight between the instructor and the student, take on a life of their own as symbols of student achievement potential. Over almost 400 years of classroom design, no one has been able to overcome the proximetrics of front, back, central and side seating availability within the landscape of higher education classrooms. It is unlikely, except within the virtual reality of cyber classrooms that classroom configuration will ever change beyond rooms that are larger and provide greater seating density. Because of limited designs, there is a need to better understand how student seating choices and the

associated decision making process influences a student's opportunities for success in a college classroom.

Classroom Proximetrics and Seating Choice

In almost any large classroom there is a system of order. Seats are arranged in rows and columns exemplifying the higher education seating process instituted several hundred years ago. Unlike smaller classrooms with moveable chairs and tables, the large classroom is typically constructed with fixed unmovable seating. Because of that typical order, some students sit in the front of the room, others toward the middle and the rest in the rear of the room. For the most part, little has changed from the historical underpinnings of lecture-type classroom design to today's modern and contemporary designs with one exception: size. The interaction between the student and the teacher "all to one and one-to-all" (Griffith, 1921 p. 36) typifies the classroom regardless of size. Classrooms have gotten bigger but the layout has not changed. Given that the room does not change, some (Becker, Sommer, Bee, & Oxley, 1973; Daly & Suite, 1981; Guyot, Byrd, & Caudle, 1980; Holliman & Anderson, 1986; Koneya, 1976; Pedersen, 1994; Rebeta, Brooks, O'Brien, & Hunter, 1993; Sommer, 1967; Totusek & Staton-Spicer, 1982) have ventured toward knowing more about the psychological traits of students that occupy those seats in classrooms throughout academe.

Griffith's (1921) work can be considered the foundational study of all classroom seating inquiry. His study showed students sitting in the front of the room performed at a higher level than those in the back of the room. As a theme, performance, seat location, and the associated improvement in scoring that occurs near or in the front of the room is substantiated (Benedict & Hoag, 2004; Daly & Suite, 1981; Griffith, 1921; Levine,

O'Neal, & McDonald, 1980; Mercincavage & Brooks, 1990; Stires, 1980) through a variety of testing techniques. Regardless of the research method, two elements in association with performance have been brought forth. First, students choosing seats near the front and in the middle of the room consistently perform at higher levels than those along the outer edges and near the back of the room; and second, it is the student sitting in those seats by choice rather than assignment that provide the element of increased performance, not the seat itself. Stated in different terms, if students are assigned seats (for example alphabetically) little or no variance in performance exists between students, regardless of their seating location. These studies suggest that students self-selecting forward seating may have some inclination or precondition to higher levels of performance from those choosing to sit in the back of the room. Further, it appears that those students sitting near the front reap the benefits of being closer to the instructor and gain the associated attention, interest and interaction. Holliman and Anderson (1986) showed an inverse relationship between performance and rearward seating location. Those sitting near the front performed at higher levels and as the row number increased performance diminished. Brooks and Rebeta (1991) found that women sit in the front rows more than men and performed in those seats at a level higher than men.

An associated area of study is student participation. In either participation or verbalization, those students choosing to sit in the forward seats exhibit greater levels of participation (Becker et al., 1973; Daly & Suite, 1981; Koneya, 1976; Sommer, 1967; Wulf, 1977). Those students are also perceived by the teacher to be more interested in the course and show a desire to be recognized by the teacher as being more involved.

Several studies describe personality differences existing between those seated near the front of the room and those seated on the outside seats and in the back. Without exception, students sitting in the front rows differ in their personality traits from others in the classroom. Researchers have found that front row students show higher levels of aggression, are more practical and imaginative, exhibit less anxiety, have higher self-esteem and high achievement motivation (Armstrong, Hudon, Miller, & Davis, 1992; Hillmann & Brooks, 1991; Rebeta et al., 1993; Totusek & Staton-Spicer, 1982). Based upon these findings, two significant studies (Guyot et al., 1980; Pedersen, 1994) concentrated on the students sitting in other locations than the front rows. In these studies, territoriality and privacy were considered attributes of some students who chose a seat near the back and in the far corners for the purpose of avoiding eye contact and participation (Guyot et al., 1980; Pedersen, 1994). In addition to these reasons, some students chose the same seat repeatedly and in different classrooms indicating a sense of territoriality in seating choice.

Participation, Performance and Personality

According to research findings, front row seating appears clearly to be beneficial to student performance and participation when seats are chosen. What is also consistent across studies is the variance in performance between students in assigned seats and students in chosen seats. While some might argue forward seating is beneficial, it is only so when those choosing those seats exhibit motivation towards achievement, appropriate personality and the desire to participate. Many faculty are aware that student seating choice is not arbitrary or capricious; students choose seats and move from seat to seat for a variety of reasons (Benedict & Hoag, 2004; Wulf, 1977).

Conceptual and Theoretical Framework

Regardless of where a student sits in the classroom, some form of cognitive process has occurred prior to the selection of that seat. Students initiate a decision making process and, because of the collection of relevant cues available to them either prior to or at the time, they make a choice of seating location. Decision making and choice are two elements that make up the conceptual framework of this study. Both are included in the rational decision model, but more relevant, they can be explained with the decision making inventory (DMI), a more simplified approach that isolates data gathering into two distinct subscales and data analysis into two distinct subscales. The data gathering subscales are systematic representing a more detailed response to data gathering than the spontaneous scale which is more reactionary with less regard for details. The data analysis is divided between internalizers that share little of their decision making process with others and the externalizer that requires some form of verbal cooperation with others in order to make a decision (Johnson, 1978).

Rational Decision Model

The idea that certain decision making processes occur in some form may be best associated with Patton and Sawicki (1993) and their six-step circular approach to rational decision making (see Figure 1). At the root of the model is the concept that " whatever people do, their behavior is largely the result of conscious (or even unconscious) deliberate choice among alternatives" (Stone, 2002, p. 199). Also, the choice made for any problem should yield a decision that produces an optimal condition (Patton & Sawicki, 1993).

According to Stone (2002), the rational decision model is used in many decisions, even simple day-to-day ones. The process includes six steps that must be accomplished, even for student seating choice. Step one requires students to identify the problem. In this instance, the problem clearly is where to sit. This decision will be addressed either before or as they enter the room. Decisions may be dictated by availability of seats or by assumptions based upon previous experience. Step two requires the student to evaluate the criteria they will use in making the seating choice. Numerous criteria may be necessary to make the choice. For example, students may ask if location is important to see and hear or if location is important to be seen and heard. They may determine who they will sit next to or even more importantly, if location provides any benefit to the evaluation process. There may be several factors that influence their decision at this time. While not limited to the following, some students may also consider the availability of an aisle seat, a left handed seat, an open seat, visibility of the front of the room, or acoustics. In step three students will sort through the potential open seats and, in each case, return to step two to determine the consequence (cost) and benefit of each location. In step four, one potential seat will be elevated to their preferred choice and in step five, students will make their choice final. Step six allows the student to monitor and evaluate their choice for future consideration or more immediate action, such as changing seat location.

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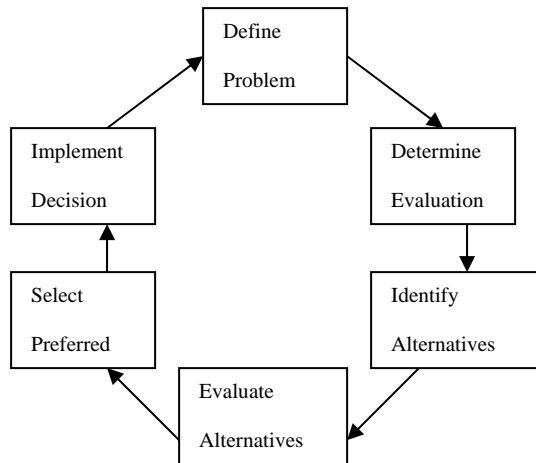
Figure 1. The classical rational problem solving process.

Note: From *Basic Methods of Policy Analysis and Planning* (p. 3), by C.V. Patton and D.S. Sawicki, 1993, Upper Saddle River, NJ: Prentice Hall.   Copyright 1993 by Prentice Hall. Reprinted with permission.

In most situations all decisions are bounded (Simon, 1976). There are limitations to knowing all the alternatives and having all information necessary to evaluate the alternatives. Time is a primary constraint in making the decision. While, according to Simon, "rationality is concerned with the selection of preferred behavior alternatives in terms of some system of values whereby the consequences of behavior can be evaluated" (p. 75), Stone (2002) describes Simons' bounded rationality by saying, "People consider only some alternatives, have limited information, and stop searching for a solution when they have found a satisfactory one, instead of holding out for the absolute best course of action" (p. 233). The rational model is applicable to student seating selection even though students are still applying the process in an almost instantaneous process that is bounded to some degree by the perceptions and information available to them at the time of the decision. It can be argued that students do not have enough time to thoroughly process the decision if they use the rational model.   This study was designed to use the DMI to dissect this process, focusing specifically on decision making styles consistent

with first gathering information necessary to make the decision, and then analyzing that information to make a decision that is best for each student.

Decision Making Inventory

This examination of decision making used the DMI developed by Richard Johnson in 1978. The DMI condenses the six steps of the rational model into two basic categories: 1) the process of gathering the data necessary to make the decision and, 2) the process of analyzing the data in order to make the decision. Each of these two basic categories of the DMI encompasses two subscales. The data gathering process has two subscales: spontaneous and systematic; and the data analysis also has two subscales: internal and external (Johnson, 1978).

Spontaneous style individuals tend to make quick decisions based on superficial information and typically move from one decision they believe to be correct to the next decision which they also believe to be correct. Systematic gatherers tend to collect all the information they can before making any decision. Once these individuals make the decision, they retain it. The data analysis subscales suggest the internal style is one in which the person does not talk about his/her decision and typically becomes agitated when forced to discuss his/her decision. Those who exhibit the external style, voice their decision at every opportunity, seeking support and consensus (Johnson, 1978).

Since 1978, the DMI has undergone 12 revisions. Primarily the result of Coscarelli's work (1983), the DMI has improved its reliability and validity through each redesign. The current version of the DMI, Form L consists of 36 questions. Further discussion of the reliability and validity are provided.

Purpose of Study

As evidenced by the number of studies focused on the college classroom, this environment poses numerous questions worthy of scholarly examination. Studies of classroom seating within college classrooms include personality (Armstrong et al., 1992; Rebeta et al., 1993; Totusek & Staton-Spicer, 1982), self-esteem (Hillmann & Brooks, 1991), privacy (Pedersen, 1994), ecology (Becker et al., 1973; Sommer, 1967), environment (Stires, 1980), teacher perceptions (Daly & Suite, 1981), and proximity (Holliman & Anderson, 1986) to name but a few. But even with the myriad of studies, gaps still exist especially with regard to classroom seating.

This study is not without direction from previous studies. Many of the studies presented in the literature review add to the rationale for more studies in the area of student seating. Becker, Sommer, Bee and Oxley (1973) state:

> Finally, there is the need for an ecological perspective where instead of looking at the classroom situation as an isolated event, it is seen in relation to events going on around it – in professors' offices, in cafeterias, sitting on the grass outside, in dormitory rooms, or in libraries. We need to reexamine the function the classroom can or should serve in a college education. (p. 525)

Daly and Suite (1981) provide:

> Anecdotal evidence, drawn from teachers who participated in this experiment suggest first that seating position quickly becomes an indicator of student participation, interest, achievement, and shyness. It also can affect teachers' interaction patterns with students, and to the extent that interaction patterns are affected, learning differences may accrue. (p. 68)

Kitagawa (1998) adds, "Most teachers are interested in students' seating behaviors in classrooms, but have stereotypes about relationship between seating positions and students' personal characteristics." To resolve the inconsistencies of stereotypes, a consensus about seating positions is needed (p. 46). Benedict and Hoag (2004), summarize the study of classroom seating and its purpose by stating,

> Given the results, what policies should we institute to encourage weaker students to move to the front or engage them more actively in the class? We wonder whether there are conditions under which a professor would be justified in using some method of seat assignment, either selecting seats for students or perhaps using a rotating seating chart. However, if seating location reflects an active choice on the part of students concerning how important the class is, perhaps active engagement should be left to individual students. (p. 227)

According to Sommer (1967), when students were a part of longitudinal studies on classroom seating they were observed choosing the same seats in different classrooms. Many times their seating choice on the first day of class was influenced by existing relationships and in some classrooms, because of poor acoustics, rear seating was often only filled by "latecomers" (p. 502). This study will investigate student seating choice within class rank, reasons for taking the course and influences for seat selection.

Koneya's (1976) study left unanswered whether student reaction to certain seating situations were a result of modifications or confirmations based on previous experiences or whether there were other influences that occurred in concert with their seating choice. These questions will be explored through this study.

This study was specifically designed to determine the decision making styles of students within the study group and to determine if that decision making style had any influence upon their seating choice. Furthermore, the study was intended to ascertain if class rank, student high school graduating class size, high school GPA, being previously enrolled in large lectures, gender, ethnicity, anticipated grade in the course, reasons for taking the course and the condition in which the actual seat selection was executed had any influence on seating choice.

The impetus for conducting research in the area of decision making and classroom seating has perhaps an even higher order of importance. As an example, Benedict and Hoag (2004) make a strong argument that the shape of the room may create more seats in the rear of the room than in the front. If the room does not accommodate equal access to interaction from all points, should the instructor relegate more time and attention to the rear of the room knowing those in the back of the room are more likely to perform at a lower level then those in the front? Kitagawa (1998) suggests that teachers stereotype the relative position of students in the classroom. In addition, Stires (1980) views student seating choice as a bigger social issue that promotes discrimination of certain students based on their seating choice and that seating choice may not be representative of choice but rather of availability.

From the opposite viewpoint, Gump (1987) suggests that seat selection may be more a reflection of the student's needs rather than the characteristics of the seat itself. If this is true, knowing the decision making styles and the influences that may impact their seating choice will contribute to a better understanding of both student and classroom characteristics.

In every research article, gaps were present; unexplainable outcomes presented the need for future research in classroom seating. Almost without exception, researchers alluded to the fact that considerably more needed to be done to better understand student seating choice and the resulting outcomes of those choices. The purpose of this study was to examine how student seating choices, movement and the associated decision making influence opportunities for success.

Research Questions

There are essentially three research questions associated with this study. The overarching purpose of this research was to determine the decision making style of students and to establish if a relationship exists between decision making styles and student seating choice. Additional research questions pertinent to decision making and seating choice were explored to determine if those decision making styles could be attributed to certain seating choice locations and if those seat locations vary with movement according to decision making style over time. Additional variables were provided to ascertain if seating choice and decision making style were related to class rank, the size of a student's high school graduating class, the number of large lectures with which a student had been previously associated with, ability, gender, ethnicity, desire for taking the course, relationships, physical attributes of the classroom, sight, hearing and availability.

RQ$_1$:   Are there preexisting variables that correlate with seating choice?

RQ$_2$:   Are there variables that correlate with DMI style?

RQ$_3$:   Can movement be predicted?

Research Design

This study was a single institution quantitative study conducted in an introductory Parks, Recreation and Tourism course offered each fall and winter semester at a large research extensive university in the Midwest. The typical enrollment is 175 students. Students represent freshman through seniors from almost every discipline. The course met the humanities or social science requirement across campus in many departments.

Students were administered the DMI on the first day of class. At that time students self reported their seating location by seat number, and provided their class rank, their high school graduating class size, and the number of courses they had been enrolled in that would classify as a large lecture, their high school GPA, gender, ethnicity, and their anticipated grade in the course. They also were asked to provide their rationale for taking the course and why they chose their seat on the first day.

During the next three weeks students were asked to provide their seating location. This occurred in every class period prior to the first exam. No other data was collected at that time.

Correlations were completed on all variables to determine any relationships. Chi square tests, regressions and T-tests were conducted with decision making styles as the independent variables and seating choice and movement as the dependent variables. Using multiple regression correlations, this research attempted to predict the influence decision making styles have on seating choice and movement. An analysis of variance (ANOVA) was also conducted between DMI styles and seat choice.

Significance of Study

The significance of this study was that it was the first study designed to determine decision making styles among students in association with classroom seating choice and movement. According to both Johnson (1978) and later Coscarelli (1983) the instrument is useful in determining the data collection or gathering style and analysis styles in the area of career decision making. In addition, the application of the DMI to classroom seating choice expands the applicability of a well validated and reliable instrument that has undergone extensive testing to other potential areas of research.

Limitations

This study was built with specific knowledge of the classroom and the students that typically enroll in this course. There were several limitations.

1.	Movement within the classroom between the initial data collection and subsequent data collection occurs over a three-week period.

2.	Student participation was voluntary and therefore certain seat choices may have been limited if occupied by those not participating.

3.	Surveying on the first day may have shown some limitations associated with a lack of identity regarding the instructor or test administrator. Because recruiting for the study was accomplished by graduate students as the first item of business and the actual testing was administered by the instructor secondarily, some confusion may have existed as to who was instructing the course.

4.	Self-reported data has inaccuracies. As an example, students may not have had a consistent view of what constitutes a large lecture. Even though 100 was the

threshold, students may not have recognized with any precision the exact number of students enrolled in those courses.

5.   Students may have reported the wrong seat location. This was a possibility and steps such as placing the seat number under the desktop were taken within the study methodology to reduce this possibility.

6.   Some students may not have been present the first day of class due to late registration, but may have been present on the next data collection. It was also possible a student was not in the class on the first day, dropped the course and was not available for the second data collection.

7.   Over enrolling a course is common practice. The assumption that due to absenteeism students will always have a seat is only a problem on exam days when attendance exceeds permanent seating capacity.

8.   The study classroom has four seats which are provided for handicapped access. These seats are typically vacant and were therefore eliminated.

9.   By design students were told little about the study except that the study is about student seating choice and decision making. After all the data were collected, students were provided their decision making style and informed of its meaning.

10.   This study was limited to a large lecture format course.

12.   Seating was limited to those arriving in the classroom late.

<p style="text-align:center">Summary</p>

This study is important in understanding student decision making styles with regard to seating choice.   It was built upon years of study using a variety of techniques. Those lines of inquiry range from student performance (Benedict & Hoag, 2004; Stires,

1980; Totusek & Staton-Spicer, 1982; Wulf, 1977) and seating to personality (Rebeta et al., 1993; Totusek & Staton-Spicer, 1982), to room friendliness (Douglas & Gifford, 2001). No studies, however, investigate the process that occurs through decision making for student seating choice.

The research questions were designed to determine preexisting variables that might correlate with seating choice, variable that correlate with DMI style and the predictability of movement.

Definition of Key Terms

Judgment is a part of the "larger decision-making process that are concerned with assessing, estimating, and inferring what events will occur and what the decision-makers evaluative reactions to those outcomes will be" (Hastie, 2001).

Choice according to William Glasser (1997) is nothing more than making decisions that feel good to us. That choice is also made based on information provided to us at the time of the decision.

Decision making is common to all human behavior. It is comprised of separating an individuals reasoning method into: their options, the consequences of those options, choosing a preferred options and then determining a choice (Brown, 2005).

Proximetrics as a term is a combination of proximity and the metrics or spacing that occurs between two objects. This term is not is Webster's New World Dictionary (Neufeldt & Guralink, 1988), but is commonly used to define distance and space. No author is known.

Action zones are defined in more than one way. Wulf (1977) identified students sitting in the front and center of the room as the action zone, while Koneya (1976) described the same area as the zone of centrality.

Large class sizes are defined anecdotally as any course with enrollment exceeding 50 students. That will not be the case for this study. Instead, this study will use a class size of 100 students.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

As teachers look across the classroom, a variety of passive and active student actions are occurring and sooner or later the question begs to be asked: Why have these students chosen those seats? There are many factors that influence a student's choice of where to sit and as many factors associated after choosing a particular seat. Gump (1987) helps to clarify the study of classroom seating by stating, "Because the attitudes of students choosing various positions in the row-column seating pattern differ, it can be argued that these positions-in themselves-are not coercive of behavior but merely collect their own special kinds of pupil psychologies " (p. 699).

Vincent Tinto's (1997) statement, "The college classroom lies at the center of the educational activity structure of institutions of higher education; the educational encounters that occur therein are a major feature of student educational experience" (p. 599), lends impetus to this study. This research is concerned with understanding decision making processes among students in a large lecture classroom. More specifically, the study will examine how differing decision making styles affect a student's choice of seat locations and how those styles may adjust that seating choice over a specified period.

This chapter focuses on two dimensions of classroom seating literature: the psychological aspects and the physical characteristics. Early studies are discussed to provide initial research into seating and seating choice outcomes and more current studies are included to illustrate the expanding variety of statistical and methodological inquiry into classroom seating.

Early Studies on Classroom Seating

Studies of Classroom Seating

Studies from as early as 1921, discuss participation, achievement, personality, and seating choice/assignment methodologies. Several studies provide an overview of notable foundational works that have been built upon in the area of classroom seating research for nearly 100 years.

Seating choice in introductory undergraduate psychology courses were the most commonly examined by researchers. Most early studies determined how students exhibited differing performance variables in particular seats. Almost exclusively, ANOVA was the preferred statistical method (Armstrong et al., 1992; Becker et al., 1973; Hillmann & Brooks, 1991; Levine et al., 1980; Mercincavage & Brooks, 1990; Rebeta et al., 1993; Sommer, 1967; Stires, 1980; Totusek & Staton-Spicer, 1982; Wulf, 1977). Data were collected and grouped usually in rows or zones. In a few cases correlations were conducted (Douglas & Gifford, 2001; Guyot et al., 1980; Holliman & Anderson, 1986), the same is true for Chi Square tests (Brooks & Rebeta, 1991; Koneya, 1976; Pedersen, 1994).

The earliest study (Griffith, 1921) attempted to make sense of disparities in course grades by association with row assignment. Griffith's study using assigned seating and descriptive statistics (by row) showed that the middle rows of students performed better than did the front, but the back row was representative of students with the lowest overall semester grade. The most interesting aspect of Griffith's study was the development of a topographic graph showing the highest overall course grades located in the center of the

room with lower grades falling off to the sides and back of the room. It is also important to note Griffith used assigned seating which was the typical method of the early 1900's.

Studies following Griffith's 1921 research began to look beyond only student performance and seat location to include eye contact, interest in the instructor, seat proximity to the instructor, verbalization, interaction, seating choice, evaluative perceptions and action zones in association with seating choice. Sommer (1967) found that students sitting opposite the instructor were more likely to participate in discussions because of greater eye contact with the instructor. According to Koneya (1976), Sommer's research "more than any other, was responsible for highlighting the 'person' versus location question in subsequent spatial studies" (p. 268). Becker, Sommer, Bee and Oxley, (1973) found classroom participation linked to students' perception of interest in the instructor. As different variables of classroom seating began to emerge, Levine, O'Neal, and McDonald (1980) interpreted exam scores in relation to seating proximity to the instructor, but found no significant effect between proximity and participation. Koneya's (1976) study built on previous participation studies, but identified participation in terms of verbalization. This is a commonly cited study and can be considered a seminal work within the field of classroom seating studies. Koneya found high verbalizers chose seats in what he referred to as the "triangle of centrality" (p.273) or seats in the center portion of the front row and angling toward the center of the middle of the room and referred to as the action seats. Adams and Biddle, (1970) discovered similar characteristics of interaction and centrality between students and instructors. Stires (1980) built upon Sommer (1967) by showing students sitting in the front of the room and those sitting in the center scored higher on tests when given a choice of seating over

those students without choice, thereby supporting choice over assigned seating in association with performance. By 1981 a study by Daly and Suite turned the variables around and looked at teachers' evaluative perceptions of students. Teachers evaluated seating position based on how they perceived that student in that location would participate, their potential academic performance, behavior, their ability to get along with others and overall potential. Overall, potential academic performance was the only variable that was significant. Generally, research isolated students based on their specific seat and row. New studies, however, were beginning to migrate away from purely seat and row methods and toward identifying special zones.

One such study was conducted by Wulf (1977) who examined overall achievement by both row and action zones and was interested in comparing assigned seating to randomly selected seating. Her hypotheses were that the environment would be the necessary element in determining student performance and that regardless of where high achieving students sat, they would perform well. The results were similar to Sommer (1967) in that the back row had the low mean responses, GPA and course grades. Assigned seating indicated no significant results for either rows or zones. Wulf's final inquiry asked those with assigned seats where they would rather sit; those students earning an "A" in the course (80%) would have sat in the front row if given the chance. This supports Wulf's hypothesis that in spite of the assigned seating location, high achieving students still did well.

These early studies are important because they explored a variety of variables associated with student seating and seating choice. A variety of works have occurred since those studies. Most are similar in their methodology and gradually develop

explanations of the observations. Early studies indicated that students sitting near the front of the room were likely to perform at a higher level (Griffith, 1921; Stires, 1980) and were followed by later studies that confirmed this relationship (Benedict & Hoag, 2004; Brooks & Rebeta, 1991; Guyot et al., 1980; Holliman & Anderson, 1986; Mercincavage & Brooks, 1990). Other studies show students have greater interest in the course (Becker et al., 1973) and are perceived by the teacher as more interested in the course through verbalizations (Adams & Biddle, 1970; Koneya, 1976; Wulf, 1977); are likely to pay more attention during lectures (Daly & Suite, 1981); participate more than others in the classroom (Sommer, 1967; Stires, 1980) and in later studies differ in personality traits and self esteem from their classroom peers (Armstrong et al., 1992; Hillmann & Brooks, 1991; Totusek & Staton-Spicer, 1982). Furthermore, studies revealed the evolvement of seat selection as a precursor to performance. When given the chance to self-select, high performing students tend to pick seats near the front of the room (Stires, 1980; Wulf, 1977).

Psychological Studies of Classroom Seating

Among the research on seating, the strand relating to psychological factors is the largest. Studies include the variables of motivation, personality, self-esteem, self-esteem and gender, territoriality, gender, privacy and success in the classroom.

Motivation for students choosing seats is one area of research. For example, Mercincavage and Brooks (1990) investigated freshmen and achievement motivation using the Prevailing Mode Questionnaire (PQM). Maintaining achievement scores as the row numbers increased was indicative of juniors only. The researchers found freshman

differing from sophomores and juniors. For freshmen, a significant decrease in achievement score was revealed as the row numbers moved further back.

Totusek and Staton-Spicer (1982) studied personality traits of students in relation to randomly chosen and assigned seating and found students randomly choosing seats and students in action seats (front and center) maintained significantly different personality traits from others in the classroom. Almost without exception students sitting in the forward rows either performed at a higher level or exhibited traits such as "assertive, rebellious, competitive and admiration demanding, more sensitive and in need of attention from others, and more imaginative and unconventional in attitudes (p. 162)", traits that were inconsistent with those of other students in the classroom.

In a follow-up to earlier studies, Rebeta, Brooks, O'Brien and Hunter (1993) decided to see if students' personality actually caused them to choose seats to better accommodate their personality traits. Students completed a survey two weeks prior to the beginning of classes. One hundred and two students using the same method and the same class as in experiment one (conducted three years apart) completed the survey. The results were similar to experiment one, with students who sat in the first two rows scoring high on achievement motivation and low on trait anxiety. Because of this outcome, the authors suggested students do chose seats based on achievement motivation.

In studies using trait, state and test anxiety measures, Rebeta, Brooks, O'Brien and Hunter (1993) identified personality as a function of seating position and achievement motivation. In one experiment, students (primarily freshman) were surveyed four weeks into the course and, in another experiment; students (freshmen) were surveyed prior to arrival in the classroom. Experiment One showed students sitting in the

front rows exhibited the greatest degree of personality differences. These differences were measurably different between the back row and the front where those sitting in the front row show higher self-esteem, achievement motivation and low trait anxiety. In this study, the state and test anxiety did not show any significance. Experiment Two was conducted to determine if freshmen students were predisposed with personality traits before entering the classroom and make the conscious decision to sit in the appropriate seat that best fits their personality trait. Experiment Two administered a PMQ prior to students beginning school. Students completed a seating chart and PMQ scores were matched. Results were the same as Experiment One with personality measures of self-esteem and achievement motivation being higher for those sitting in the front rows.

Self-esteem is the subject of several studies. In 1991, Hillmann and Brooks analyzed the row students chose using a multi-dimensional self-esteem survey. Their findings indicated that as row numbers increased, all of the scores associated with the 11 subscales for the inventory also decreased. Hillmann and Brooks noted both higher self-esteem and motivation associated with forward seats. In 1992, Armstrong, Hudon, Miller and Davis hypothesized the forward rows and especially the front row in a classroom allowed for greater possibilities for student-teacher interaction; therefore, a desire exists for students wanting greater student-teacher interaction choosing to sit in the front rows. Comparisons of men's and women's self-esteem scores revealed no significant difference. Therefore Armstrong et al. (1992) considered the two groups to be equal in self-esteem. A second two-way ANOVA conducted between men and women sitting in the front rows and those seated in the back rows used self-esteem as the dependent variable. Again, the result failed to show any significance between gender groups. The

study did show that women seated in the back rows and men seated in the front rows had higher self-esteem scores than did others seated in their respective rows. In effect, the study showed that self-esteem is a measure that is significant in men choosing their seats but not in women choosing their seats.

The idea that students choose seats and do so with some type of territoriality (Guyot et al., 1980) stimulated research based on observations that students sit repeatedly in the same seats day after day when given the freedom to chose. Using territoriality criteria described by Edney (1974) (security, sense of control and prediction, attachment, privacy, identity, stimulation, the maintenance of social order and social role), Guyot et al. found only security, sense of control and prediction, and identity ranked higher than other factors. Students reported sitting in the same general location 91% of the time and in the same seat 78% of the time. In the second part of the study, 321 students in unassigned seats reported sitting in the same seat 86% of the time and in the same location 92% of the time. From their study the authors concluded that consistent selection of the same seat may be an expression of human territoriality.

As the emergence of classroom seating inquiry increased during the early 1990's, Brooks (1991; 1993) coauthored several studies. Brooks and Rebeta (1991) realized a need to study gender and seating location. The study dealt specifically with how women differ from men in seating choice and location. Over a period of six years the authors studied nearly 600 students, 312 men and 283 women. Final analysis indicated that women preferred the front four rows over men, but by the middle of the room both men and women selected seats equally. Men preferred the last two rows seating more than women did. Overall, women scored higher course grades than did men. Men appeared to

show more randomness with grade distribution while women's high course grades decreased as the women moved toward the back of the classroom. The study showed that both men and women tended to have higher scores when seated in the first two rows.

There are two different groups of students that sit in classrooms: those who want to be an integral part of the class and those who do not. Pedersen's (Pedersen, 1994) study looked at privacy. According to Pedersen, "Privacy is not simply eliminating contact with others. It may involve maximizing, as well as, minimizing such contact" (p. 394). Results showed only *not neighboring/seclusion* (italics added for emphasis) as significant among several variables. Other variables included seat access or availability, the type of class, interest in the course, and what a student intends to gain by taking the course. In spite of potential correlating independent variables, the author described the data as indicative of a separating behavior between those seeking privacy and choosing the rearward seating and those wanting to be noticed or needing additional eye contact sitting in the front of the room.

Benedict and Hoag provide one of the more recent studies on classroom seating within the psychological arena. Their study was initiated to determine how seating influenced student success in the classroom. Focusing on the large classroom environment, they found students sitting in the back of the room had a 23% higher chance of receiving a "D or "F" than students sitting in the front row. They also found that students forced to sit further forward when preferred seating was available, improved their performance.

Psychological Summary

Almost without exception, researchers have shown that whoever sits in the front seats will either perform differently or exhibit differing characteristics from the rest of the class and those sitting on the sides or in the back perform at levels below those in centrally located and front row seats (Armstrong et al., 1992; 2004; Griffith, 1921; Rebeta et al., 1993; Totusek & Staton-Spicer, 1982). Additional studies illustrate that the seat is differentiated from the student (Stires, 1980; Totusek & Staton-Spicer, 1982; Wulf, 1977). Most researchers support the idea that assigned student seating creates little variance in performance in the classroom, while student selected seating increases variance (Levine et al., 1980). However, in both cases those sitting in the back and one side or the other of the classroom continue to perform below those seated in the front and center seats regardless of their predisposition to do well, but when forced to move forward, improve their performance (Benedict & Hoag, 2004).

Physical Space Studies

While a large number of studies examined psychological influences on student seating choice, other studies have dealt with physical space. Physical space is described as tangible factors that may influence a students' seating choice. These include distance from the instructor to the student (proximity), imaginary seating preferences (latent) and friendliness attributes of a classroom.

One such study is Holliman and Anderson's (1986) inquiry into student grades and proximity. In an attempt to better understand the physical aspects of a classroom and their influences on student seating, the authors investigated proximity, centrality, density and aisle seating in relation to course grades. Using correlation coefficients and

significance between groups (rows) and using variance measures for those students sitting in the front of the room the authors found an inverse relationship between distance and course grade. Centrality seating choice or aisle seating and performance showed no significance. Once again, this study supported previous studies showing those in the front rows performed better than any other rows when comparing grades to seating choice (Armstrong et al., 1992; Benedict & Hoag, 2004; Griffith, 1921; Totusek & Staton-Spicer, 1982).

Kitagawa (1998) took exception to the variety of methods employed for studying classroom seating. Specifically, Kitagawa argued that the selection of front/back and side/side or central area was not consistent and therefore not comparable. Using a latent structure technique, students were asked to choose seats based on an estimate of their seating choice preferences at the end of the semester. A latent structure technique allowed the students to make a selection of what seating they preferred rather than an actual recording of where they sat.

Wulf (1977) used a similar method with the exception students rated every seat in the grid rather than just choosing one they most preferred. Everyday, 151 students signed a seating chart when they arrived at class indicating their actual seating location. A seven-point instrument with two simple questions asking; "The place I never like to sit" and "The place I like to sit best" (Wulf, 1977, p.41) was administered at the end of the semester. Student preference pointed to the central seating area. The back and side of the room had lower mean scores with the back being the lowest. A factor analysis revealed only four of the seating areas (72.9% of variance) was necessary to describe student preferences in four latent zones (Wulf).

The implications of Wulf's study are that the latent four-zone structure provides a rationale for eliminating some of the seating locations when seating is studied. The recommendation is to not include side zones when studying rows from front to back and not include the rear zone when studying side to side zonal seating.

One unique study looked at classroom friendliness attributes using a lens approach (Douglas & Gifford, 2001). The authors suggested that physical characteristics of classrooms could be evaluated. Twenty professors and 51 students looked at photographs of 35 classrooms to determine the friendliness of the surroundings and their preference for each classroom. Students and professors completed 10-point Likert scale using criteria that included brightness, seat comfort, interior complexity, room size, view to outdoors, seating arrangement and steepness. The results showed overall student and professor responses were highly correlated: friendliness ($r = 0.90$, $p < 0.001$), and preference ($r = 0.88$, $p < 0.001$). In essence, students and professors had similar perceptions of classrooms using the criteria.

Seating Location vs. Seating Choice

Since 1921, only one meta-analysis of classroom seating research has been conducted. In 1988 Montello's meta-analysis contradicted previous studies by determining that seat location and performance are not causal. While Montello (1992) agreed in a later article that participation, attitudes toward the class and self-reported variables were related to seating location, he disagreed that this relationship had anything to do with performance.

To justify his argument, he used well known studies (Adams & Biddle, 1970; Sommer, 1967) that were conducted in college lecture-style environments with typical

row and column seating arrangements. In those studies, students were randomly assigned their seating location, allowed to self-select, or assigned seats in alphabetical order. In all the studies where students self-selected seats, student performance decreased as the row numbers increased. Montello (1988; 1992) took the greatest exception to studies that indicated randomly assigned seating and argued, because of the variety of seating arrangements and methodologies used, that any clear empirical proof of relationships of performance to seating was inconsistent.

Perhaps what is most important about Montello's (1988) analysis was he showed few, if any, previous researchers had provided controls for variables like, "content of the course, grading systems; the class style (e.g., lecture, seminar); room size and shape (e.g., sloping floors), presence of aisles, pillars and windows, seat arrangements and lighting, and the number of students and overall seating configuration (where do they sit in an unfilled classroom?)" (p. 154). Any of these could have a significant effect on how data are interpreted. Montello also noted exam method as an additional element that had not been addressed in any studies up until that time. He argued the use of multiple choice testing may contribute more to performance than does the seating location. If the exams are based on textbook material rather than classroom discussion, the causal relationship between exam scores and classroom seating may not be present. For these reasons he disagreed with the hypothesis that seating location is related to course performance.

According to Montello (1988), anything disassociated with interaction between the student and the teacher must be eliminated. Any future studies on classroom seating must consider how topical content is delivered. This delivery might include extra credit,

on-line quizzes, or even outside readings. Furthermore, exams must be written to coincide directly with content delivered in the classroom.

<div align="center">Theoretical Frameworks</div>

Associating theory with research is at the heart of any study. Someone once said sociology is useful in explaining most everything. For example one could have used Albert Bandura's (1986) social cognition theory and self-efficacy with the premise that seating choice may be influenced by perceived expectation and the student's ability to meet those expectations through performance (Sommer, 1967; Stires, 1980). But this research is not specifically about performance. Another possibility could have been educational theories such as Astin's (1977; 1993) and Tinto's (1993; 1997; 1994) theories of involvement and how that involvement is proportional to socialization, but this research is not about socialization. This study looks at the decision making styles of students in direct association with seating choice. A conceptual overview of the decision making process using rational choice theory is provided to explain the processes that likely occur among students.

Rational and Choice Theory

According to the rational choice theory, any study of student seating and decision making should include judgment and choice. The two words, however, are not synonymous. Judgment should be considered an assisting element to choice. Judgment involves the cognitive deliberation necessary to make a choice, while choice may, in and of itself, be made with or without judgment (Einhorn & Hogarth, 1981). Some refer to this process as decision making. According to Stone (2002), " In the realm of human experience, there are many ways to make decisions: by habit, social custom, impulse,

intuition, or procrastination; by consensus, delegation, bargaining, mediation, trial, voting, or flipping a coin" (p. 232). If one is to assume judgment includes some form of cognition and choice is the action taken through judgmental processes (decision making), many also argue some form of rationality occurs throughout the sequence of events. Rational decision making, therefore, requires that a person consider all the alternatives, evaluate each alternative and then make a specific decision.

Judgment seeks some form of optimality (Einhorn & Hogarth, 1981). By repeatedly making similar judgments, one eventually regresses toward the mean. More specifically, the more one makes the same judgment, the more likely those judgments become consistent and similar to others in the same situation. At some point a choice (decision) will be made based on judgment and that choice will more than likely, not result in any negative consequences nor will it involve any uncertainty (Hastie, 2001) because that choice has been made over and over. Hastie (2001) describes judgment as a component to decision making that is primarily concerned with, "assessing, estimating and inferring what events will occur" (p.657).

Choice theory, advanced in recent years by William Glasser (1997), attempts to change the normal stimulus-response behavior by teaching persons they are the only ones who can control their own behavior. He argues society has so long been forced to respond to a variety of stimuli, but people do so with little or no thought. According to Glasser (1997), choice theory offers only information as a resource for making decisions. Because no other sources of input exist, coercion as either reward or punishment is not in the choice theory equation. Choice theory encompasses four basic psychological needs and these needs are innate. Among the needs are belonging, power, freedom and fun.

Glasser's choice theory focuses on individuals figuring out ways to satisfy one or all of the elements. His theory differs from Maslow's hierarchy of needs in that Maslow's hierarchy requires completion or achievement of one level before moving to the next (Maslow, 1987). Glasser, however allows one or all of the elements to be achieved simultaneously. Choice theory provides some understanding of student decision making and seating choice if no perceived reward or consequence exists for their choice.

Human decision-making factors down to one single problem: How to make a decision that will allow individuals to achieve their prescribed goals (Stone, 2002). The rational model, in Figure 1, describes the typical processes theorized to occur in decision making.
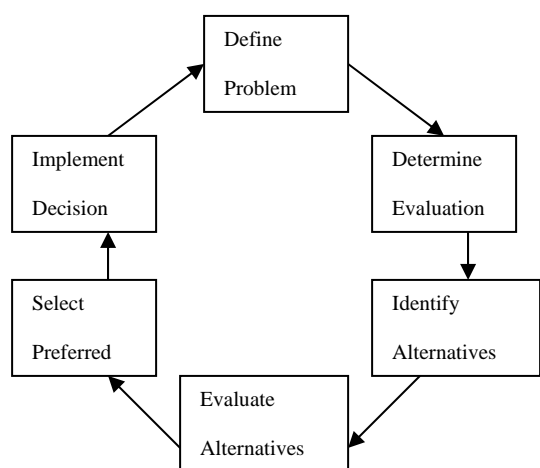
Figure 2. The classical rational problem solving process.
Note: From *Basic Methods of Policy Analysis and Planning* (p. 3), by C.V. Patton and D.S. Sawicki, 1993, Upper Saddle River, NJ: Prentice Hall.   Copyright 1993 by Prentice Hall. Reprinted with permission.

According to Stone (2002), "Rational choice holds that whatever people do, their behavior is largely the result of conscious (or even unconscious) deliberate choice among alternatives" (p. 199).

It is unlikely that students explicitly follow the classic model of rational decision making. Time is an element that is necessary to analyze any problem presented. The more time one has, the more detailed the analysis (Patton & Sawicki, 1993). But time also has other limitations. Too much time spent in analysis can create "analysis paralysis" (Stone, 2002, p. 233), another possible problem with seating choice.

Consequence and reward are other issues that are important in the rational decision model (Scott, 2000; Stone, 2002). To properly analyze all the alternatives, one must know not only the perceived consequences, but also the rewards. Studies have shown both benefits to sitting in the front and center of the room and consequences for sitting in the back or side of the room (Adams & Biddle, 1970; Armstrong et al., 1992; Benedict & Hoag, 2004; Griffith, 1921; Koneya, 1976; Rebeta et al., 1993; Totusek & Staton-Spicer, 1982). It is unclear if this information is available or within the analysis information as students chose a seating location.

To summarize, judgment assists choice and one of the methods used to make a choice or decision is diagramed in Figure 2. As one makes a choice, one is most concerned with how that choice will help them meet their goals. Using the model provided in Figure 2, the thought process that occurs (if it does) for students as they choose their seat can be minimized into a version of Figure 2 that is provided in Figure 3.

```
        ┌──────────┐
        │ Define   │
        │ Problem  │
        └──────────┘
┌──────────┐      ┌──────────┐
│ Implement│      │ Identify │
│ Decision │      │Alternatives│
└──────────┘      └──────────┘
        ┌──────────┐
        │ Select   │
        │ Preferred│
        └──────────┘
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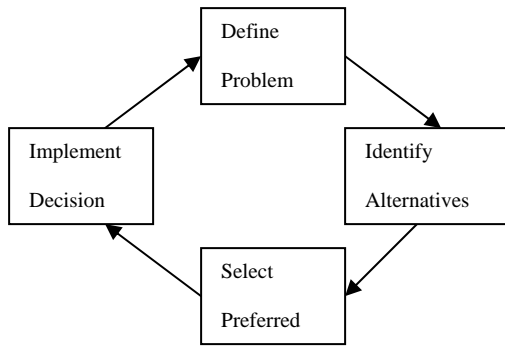
Figure 3. Basic analysis model.

Note: From *Basic Methods of Policy Analysis and Planning* (p. 3), by C.V. Patton and D.S. Sawicki, 1993, Upper Saddle River, NJ: Prentice Hall.   Copyright 1993 by Prentice Hall. Reprinted with permission.

Because time is a critical element, students may define seating location either systematically before they arrive in the room based on previous experience, or spontaneously as they enter the room. In either case, students may consciously develop a preferred location, or as they enter the room, process the possibilities within the room at that time. They will select a seat based on preference, availability or randomness, using one of four decision making styles.

The Decision Making Inventory

In 1978 Richard Johnson (1978) developed the DMI to assess the decision making process among college students regarding their career choices. The impetus behind his model was a diminishing job market in the 1970's, coupled with a changing societal perspective on personal relations that was creating incompatible working environments (e.g. dual income families). Johnson's research supports his hypothesis that if he knew the individual decision making styles based on how people gather and process information, he could then predict their choice.

Using observation as a first method in development of the DMI, Johnson (1978) followed clients as they made decisions in a variety of life choices. As a second step he then classified the data into groups that were making consistent decisions. In a third and final step, Johnson applied the survey model to those with identifiable characteristics for each group to validate the model over a period of several months with nearly 150 clients.

Similar to the rational model supported by Patton and Sawicki (1993) and Stone (2002), Johnson's (1978) DMI recognized the main processes typically engaged in with decision making. Those include the collecting of information necessary to make a decision and second, analyzing that information in order to make the decision. He further dissected the data collecting and data analysis into two categories.

According to Johnson (1978) the process of information gathering is divided into two distinct categories. The first is characterized as spontaneous and the second as systematic. Furthermore, these two characteristics could be clearly distinguished by three criteria; 1) individual reaction to events, 2) method of making commitments and 3) the individual's determination to achieve goals previously set.

Through his validation process Johnson (1978) determined the characteristics of spontaneous and systematic behaviors were not necessarily related to external and observable behaviors, but rather more to do with each individual's psychological internalized method of addressing decisions. This is best corroborated by how individuals easily adapt to external behaviors, but internally never have any change in their analytic style.

Spontaneous vs. Systematic Data Gathering

The spontaneous style described by Johnson (1978) has three main attributes. Of those individuals categorized as spontaneous their expression of all these characteristics is inconsistent. Some may have all of the characteristics and some may only have one and still be identified as spontaneous. Reaction to events is the first criteria. Spontaneous individuals tend to see the event in total rather than separating it in to individual pieces. According to Johnson, "They tend to either like something or dislike it" (1978, p. 531). They also tend to describe the events they are a part of in more holistic terms that may also include a generalization of their emotions. Finally, spontaneous individuals need more physical contact with the experience in order to determine their feelings.

The second attribute of spontaneous data gathering individuals is their quickness in committing to a decision. They tend to be more excited about the decision and because of the quickness of the decision they may include several decisions together. This for many spontaneous individuals creates opportunities to move between decisions and still be equally excited even though they have changed their commitment. The last characteristic is their ability to move between goals and exhibit degrees of flexibility between one goal or another. They are also capable of "chaining" (Johnson, 1978, p. 532) thoughts together. Because of this characteristic they can quickly gather information in a very loose format and then as quickly adapt to new conditions. Typically, they need variability in their academic endeavors and struggle with consistency in any one area or discipline.

With each of the three characteristics it is important to understand the expression of their characteristics of spontaneity occurs across a spectrum of responses. For

example, Johnson (1978) explained while a spontaneous individual may need hands-on experiences to make decisions s/he may be capable of fantasizing about the event to develop his or her reaction to the event. Spontaneous quick data gathering styles may also be very cautious and goal setting can be created in a very unstructured format, but spontaneous individuals may also be very structured in their goal establishment to the degree that moving between those goals is not perceivable through observation.

Coscarelli (in press) further clarifies the decision making process of spontaneous individuals differentiating more on how they think rather than how much they think. The spontaneous style also tends to use a backward form of reasoning to support their decision process. After a decision is made and new opportunities arise, any contradictions to the decision are replaced with newer more supportive elements. This thinking process tends to be viewed as backward reasoning.

Just as there are three characteristics of a spontaneous individual there are also three for those identified as systematic (Johnson, 1978). In opposition to spontaneous data gathering, the systematic individual views events as small segments. To assist with this, they tend to need detailed information about whatever they are analyzing and need that information before they can make a decision. As the collection of information increases, the individual becomes more comfortable with making a decision. The second element again in opposition to spontaneous gathering is caution in making commitments. Through thorough analysis of the data, systematic persons evaluate all the alternatives, but only personally detail the one they select. Another important element to commitment is that systematic individuals will not make a decision among the alternatives until they have thoroughly evaluated all the alternatives. The difference between the spontaneous

and the systematic is that while both may collect considerable information, the systematic individual will only make a decision when all the information is gathered. Spontaneous persons will make the decision and then continue to collect information. Finally, systematic individuals will not move across commitments. Once they make the decision they tend to stick with that decision.

Goal setting and orientation is the last element of a systematic gatherer. They tend to set long-range goals and move across goals in a deliberate fashion. Unlike spontaneous gatherers, systematic gatherers can multi-task (Johnson, 1978).

As with the spontaneous style, the systematic style of thinker as Coscarelli (in press) indicates is more likely to forward reason and solve the situational problem as they go along until a point with which they are willing to commit to a decision. Each thought process is enveloped with an ultimate outcome rather than as with the spontaneous style quickly making than decision and repeatedly making change to accommodate that decision.

Internal vs. External Data Analysis

Following the data gathering process Johnson's (1978) second decision making process is the data analysis phase. Here there were two types of analysis expressed: the external style and the internal style.

The external processor, as described by Johnson (1978), requires some form of thinking out loud. Because they have difficulty in the decision making process, external processors tend to express their decision process to others. They may weigh the potential outcomes, both negative and positive, for anyone to help them in the decision process, or in some cases when no one is present. Hearing their words out loud assists them with the

decision making process. They may also outwardly discuss one decision process and positive outcome that may be perceived with making the decision and then change in midstream and switch to an entirely different decision. This response to the decision process does not mean they do not think out the process, it merely means they are more comfortable externalizing the decision.

The internal style of the data analyzer reveals much more thinking about the decision before any form of discussion takes place. They may even delay the decision process until they have enough time to thoroughly process their thoughts. Their thoughts take on enough meaning and importance that they may have difficulty talking about their decision and may express that difficulty as frustration or anger if asked to discuss or make their decision before they are ready (Johnson, 1978). It is important to realize that after thoroughly thinking through the process, internal processors may be very similar to externalizers but talk only after they have thought through the process.

Furthermore, Coscarelli (in press) adds the importance of understanding how thinking through the process differs between internalizers and externalizers. Even though both may think through a situation with similar amounts of time invested, one makes the decision thinking backward (spontaneous) and the other makes the decision thinking forward.

Decision Making Model

Johnson's (1978) completed model included four dimensions. Two regarding the data collection process: Spontaneous and systematic and two regarding the data analysis process; Internal and external. The model is provided below.

DATA GATHERING

```
                    ┌─────────────────┐
                    │   Systematic    │
                    └─────────────────┘
                             │
 DATA         SY-I           │   SY-E
┌──────────────┐             │             ┌──────────────────┐
│   Internal   │─────────────┼─────────────│   External       │
└──────────────┘             │             └──────────────────┘
              SP-I           │    SP-E
                             │
                    ┌─────────────────┐
                    │  Spontaneous    │
                    └─────────────────┘
```
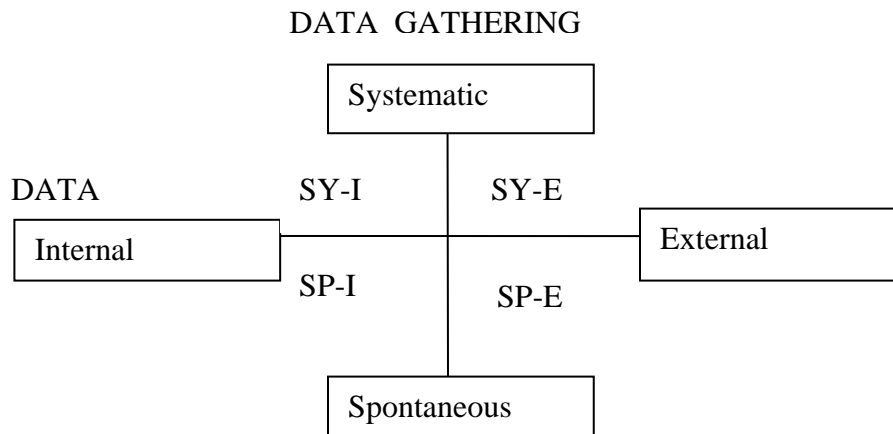
Figure 4. Decision making model.

The model represents two independent factors. It suggests the possibility of an

individual being in any one of the four quadrants by comparing two styles.

Adaptation

Johnson's (1978) DMI fits the study of classroom seating because, even though

data gathering and analysis tend to be consistent with little movement between those

categories, each of the styles have the ability to adapt. It is possible a spontaneous data

gatherer can cross over to a more systematic approach by spending more time thinking

through the options before making the decision. At the same time a systematic style data

collector might see a need to employ a quicker decision making process. The same is true

for data analysis styles. Here, an externalizer with a serious decision may not share their

thoughts with others and an internalizer may, when sensing a comfortable environment,

freely talk out their situation.

The DMI as originally designed by Johnson (1978) identified four different

decision making styles. Following Johnson's untimely death shortly after the DMI was

constructed, Coscarelli initiated improvements and continued the development of the

DMI out of respect for the original author (W. C. Coscarelli, personal communication

August 2, 2006). Over the last 25 years, the styles have remained unchanged but the

inventory has changed to improve reliability and validity.

Coscarelli's DMI

Coscarelli (1983), a colleague of Johnson, advanced the original DMI to the

newest version that includes two more attributes. The addition of choosing among

alternates and thought patterns had previously been embedded into three characteristics:

individual reaction to events, making commitments, and achieving goals.

Johnson's (1978) earliest version of the DMI consisted of 29 items in a forced

response format. This type of format does not allow the respondent to select a response

in the mid range of the Likert response or a non-response choice. Version one had 11

questions for measuring spontaneous-systematic styles, six for internal and external

analysis and 12 filler questions. Validity coefficients were .60 (internal-external) and .64

(spontaneous-systematic), with reliability estimates of .27 and .64 respectively. In an

unpublished dissertation by Piper (1978), factor analysis indicated the spontaneous-

systematic scale only accounted for 11.2% of the variance and the internal-external scale

only 6.5% of the variance.

The next version of the DMI included nine items to measure the internal-external

scales and 24 items for the spontaneous-systematic scales. Cronbach alpha's for

reliability improved into the range of .50 to .73, but the total variance using a factor

analysis still only accounted for about 13.3% (Coscarelli, 1983).   Subsequent versions

continued to reflect changes and each change improved the overall reliability and

variance. But each improvement only resulted in very minor improvements.

By 1980, the DMI had been through five versions with little significant improvement. In 1981, the next version (version six) was modified to only 20 questions. Seven were held over from previous inventories and four were removed completely. A pilot study was conducted by Coscarelli with 73 students. In this study, students were given the sixth version of the DMI and then each of the three groups were given variable minute length interpretations of the DMI. At the end of 10, 20 and 30 minute presentations, students were asked to self select what they believed their style to be regarding the DMI. Overall, the sixth version now had alpha coefficients ranging between .40 and .68, but validity across all four styles now closely approached .60 of the total variance. Agreement between actual and self evaluated scores was 21% for the first group, 41% for the second group and 79% for the third group and helped support the process of establishing validity. Furthermore, negative correlations were predictable across spontaneous-systematic and internal-external, and a high correlation was indicated between systematic and internal scales that was evident in previous studies (Coscarelli, 1983).

A second study by Coscarelli (1983) increased the numbers to 316 within ten different sections of a freshman orientation course. For this study, alpha's ranged from .36 to .60 and percent of variance across all scales was .54. As each version was tested, the pattern and ranking of decision making styles has remained consistent. Systematic-internalizers (46%) rank first with systematic-externalizers (34%) second, spontaneous-internalizers (11%) third and spontaneous-externalizers (9%) last. As studies continued, difficulty with consistency for the spontaneous scale remained even though factor

analysis showed little relationship with other scales. The low end of reported alphas was always associated with the spontaneous scale.

A third study by Coscarelli (1983) was conducted that year to verify the validity of the DMI. This test again used freshman in an orientation course, but was a test-retest method and continued to ask students to self-evaluate their DMI styles. In spite of only half of the first test respondents taking the retest, alpha's ranged from .41 to .71 and validity improved to 60.2% of the total variance. Agreement between the test and the self-evaluated DMI was 69%.

By 2004 the DMI was now in the eighth version. Hardin and Leong (2004) researched the effectiveness of the DMI as a tool in the assessment of career decisions. Over twenty five years after the development of the DMI by Johnson (1978), Hardin and Leong wanted to test the criticisms that the DMI "lacked a theoretical base" (p. 51). As a test group, 207 college students of which, 53% were female, 63% were freshman and the mean age was 19.49, participated in the forced-item DMI (Form H). As a study, their proposal was to compare how men and women responded to three different career scales. In addition to the DMI they also used the Self-Construal Scale and the Career Maturity Inventory Subscale. Once again the spontaneous scale had a low alpha coefficient for both men and women, but was comparable to the other scales. Correlations of the different scales were also conducted. Hardin and Leong (2004) found that "despite the poor reliabilities of the spontaneous scale, a confirmatory factor analysis provided a near perfect fit to the data, supporting the four-factor structure of the DMI" (p. 62). In addition, they also found, "The current research has provided initial support for the

relevance of Johnson's (1978) theory of decision making to career assessment and for the use of the DMI to measure Johnson's decision making styles" (p. 63).

Few uses of the DMI exist outside of the career choice arena. However, as Coscarelli's interpretation of the DMI has improved, new research has been conducted. One such study was conducted in 1989 by Coscarelli, Stepp and Lyerla (1989). In this study, they attempted to predict DMI styles based on blood type. In some parts of Asia, recruiting for some high level positions is based on an applicant's blood type. Specifically, Type A is the preferred blood type. In total 305 students participating in a blood drive completed the DMI and another 254 completed the Myers-Briggs Type Indicator (MBTI). For the DMI, Cronbach's alpha ranged from .41 to .64 with spontaneous decision making style having the lowest alpha. Overall the study revealed through chi-square tests that the MBTI had no relationship between personality type and blood type, but the DMI showed some relationships with Type O being the most significant. The importance of this study is the application of the DMI as a predictor of decision making type beyond career choice.

<div align="center">Summary</div>

To summarize, research has shown that relationships exist between psychological influences and traits and student seating choice, and between physical space and student seating choice. Studies show the student may have a greater influence on a variety of measures to a greater degree than does the actual seat location regardless of the measure (Stires, 1980; Totusek & Staton-Spicer, 1982; Wulf, 1977). Put another way, several studies have shown the student to be a greater predictor than the actual location of where the student sits. In early studies, classroom participation generally was the dependent

variable, while seat choice and location were chosen as independent variables (Griffith, 1921). Other research included personality (Totusek & Staton-Spicer, 1982), motivation and self esteem (Holliman & Anderson, 1986; Rebeta et al., 1993). In those studies findings indicated that students sitting in the front rows had significantly different traits then those sitting in the back rows. Gender was also investigated with women preferring the front of the room (Brooks & Rebeta, 1991). In almost every study, students were grouped by row, seat number or zones. Later works on physical space also supported student's choice in seating location as influential in affecting outcomes (Douglas & Gifford, 2001).

Rational and choice theory and the DMI present an explanation of the decision making process. Patton and Sawicki's (1993) authorship of the rational model is debatable, but it is obvious many of the factors associated with the DMI are integral to the rational model. While the rational model provides a step by step approach to decision making it is not testable in that form. The DMI, though, is very useable as an instrument to measure the decision making characteristics of students in the classroom in association with their seating choice.

The study of classroom seating choice should be considered the baseline for methods and techniques employed in the classroom to enhance a student's chance for learning. Arguably, teaching to students who do not want to learn is difficult. The study of seating choice is directly connected to understanding and, better yet, identifying those students by using their seating choice to understand their willingness to participate, verbalize, perform, and interact and their predisposition to self-esteem, territoriality, privacy and motivation. If, through continued studies of student seating choice, educators

can identify additional factors associated with seating choice, they can make adjustments to teaching methods and students can adjust their choice of seating position to better their chances for success. Furthermore, if a student's decision making style can be predicted based on their seat choice, or if the proportion of students within the classroom exhibit one or more decision making styles, it is possible to adjust teaching methods to better serve their needs. For example, if spontaneous-externalizing students are the norm, teaching methods that encourage greater verbalization could benefit those students. It is also possible they could be systematic-internalizers which might promote the use of technological learning advancements to allow them to participate in the classroom without verbalizing. Wireless rapid student response systems might be useful.

A final rationale is supported by Scott (2000). Anecdotal observation suggests student seating choice often conflicts with what is known about seating choice. While high performing students may perform at high levels regardless of where they sit (Wulf, 1977), those performing poorly could benefit from knowing their decision making style and move to gain that benefit (Benedict & Hoag, 2004).

This study focused on student seating choice and decision making. This is not a study of student performance. No known studies exist dealing with seating choice and decision making styles.

<div align="center">Hypotheses</div>

The hypotheses for this study were intended to determine student decision making styles and seating preferences, but also were designed to predict the decision making style in association with that preference.

Ho$_1$:   There is no significant relationship between GPA, anticipated grade in the course, number of large classes, high school class size and seat choice.

Ho$_2$:   There is no significant relationship between seat choice and DMI style.

Ho$_3$:   There is no significant relationship between seat choice (location) and gender.

Ho$_4$:   There is no significant relationship between seat choice and performance.

Ho$_5$:   There is no significant relationship between DMI style and seat movement.

Ho$_6$:   There is no significant difference between the DMI style and performance.

Ho$_7$:   There is no significant relationship between gender and movement

Research questions were intended to cover a large spectrum of variables. Many of those variables associated with research question one was to find correlations that might exist with preexisting variables and seat choice. Specifically, class rank based on number of hours completed was intended to ascertain if student seating correlated with class rank. Graduating class size as a variable sought to determine if students coming from small communities and thus typically from smaller schools and classrooms had seating preferences different from those from larger populations. The number of large lectures as a variable was designed to determine if those having greater numbers of large lecture courses had seating preferences over those with fewer large lectures. Variance between DMI styles, seat choice and seat movement were also be investigated.

CHAPTER III

METHODOLOGY

Introduction

There is no academic fascination with classroom seating. It is not a field of study that has intrigued generations of academic scholars. What is important to this study takes one back to Chapter I and C. Wright Mills and his statement on method, "Statements of method promise to guide us to better ways of studying something, often in fact of studying almost anything" (p. 122). While the study of seat selection may be benign in nature, it is the method employed that makes this study one of merit and deepens the breadth of knowledge available for future studies. It is a new approach, a new lens, and an attempt to not only determine seating choice, but to also explore the decision making style of those making those seat selections and the accompanying movement that exists between seats.

The use of the DMI is unique. It has never been used to determine the decision making style in association with seating choice. In fact, it has not been used outside of career decision making to any degree. What does make the use of the DMI applicable is the considerable effort invested in improving the reliability and validity specifically among college students.

As discussed in Chapter II, the rational model (see Figure 2) provides a depiction of the processes that take place during decision making, but there is no known method of testing the model. The DMI's design does an excellent job of associating the type of style present in decision making with how the decision most likely was made. It is

suggested in the literature that a spontaneous style data gatherer will make quick

decisions, while a systematic style will deliberate over the decision and collect as much

information as possible. Analyzing the decision for an externalizer will require some

form of discussion with others, while the internalizers will keep to themselves and make

sure they have all the information necessary before making the decision (Johnson, 1978).

Seat choice is representative of the decision making process.

Finally, how does gender influence both seat choice and seat movement? Gender

has typically not been an outcome of previous studies, but this research was designed to

consider gender as an independent variable.

In discussing the methods, this chapter includes research design, data source,

population, data collection, variables within the study and the analysis of data.

<div align="center">Statement of Problem</div>

Classroom seating and the decision making process that occurs before the seat

choice is made does have implications in the classroom. While generally argued that

those in the front and center areas of the room perform at higher levels (Benedict &

Hoag, 2004; Brooks & Rebeta, 1991; Griffith, 1921; Holliman & Anderson, 1986; Levine

et al., 1980; Mercincavage & Brooks, 1990; Totusek & Staton-Spicer, 1982), anomalies

exist throughout the classroom (Wulf, 1977). Clearly research suggests when students

are assigned seats there is no variance in performance, but when seating is self-selected

by the student, variance exists (Levine et al., 1980; Schwebel & Cherlin, 1972). Students

knowing their decision making style may never actually change that style, but they can

adapt (Coscarelli, 1983; Johnson, 1978). Students identified as spontaneous

externalizers, might be inclined to adapt their seating choice in a more systematic way to

gain the benefits of selecting the appropriate seat. This might be especially true for an externalizer sitting on the back row who would rather participate by sitting in the front row, but for some reason selects rearward seating.

Overall the problem that exists may be larger than the issue of decision making and classroom seating choice. The problem may be students do not know how they can achieve benefits because they do not know what researchers know (Scott, 2000). Some may know generally that front row seating is a benefit, but the front row is not for everyone. The use of the DMI will help to explain seating choice by decision making style.

Research Questions and Hypotheses

There are three research questions associated with this study. The questions sought to determine the correlation between high school graduating class size, academic ability, class rank, course offerings, previous experience with large classes, age, ethnicity, anticipated course grade, reason for taking the course, and reason for choosing their seat on the first day of class and seat choice. Research question two investigated DMI distribution across the class room, the relationship of seat choice to DMI style and research question three explored the possibility of predicting movement based on gender, performance, DMI style and seat choice.

RQ_1: Are there preexisting variables that correlate with seating choice?

This research question was designed to determine if several preexisting variables might correlate with seating choice. Included in the variables were large class size and class rank. Students enrolling in the course as freshman and that are from small enrollment high schools could be inclined to make a seat choice differently from those

associated with high enrollment high schools. According to Arias and Walker (2004),

students do not consider class size important when given a choice between a small

seminar format and a larger class format, but when using exam scores as the dependent

variable Arias and Walker (2004) found that small class size has an impact on

performance. It is also possible students coming from small class size high schools may

avoid large lecture formats.

It is generally accepted that high school GPA is an indicator of the potential for

success in higher education (Martin, Montgomery, & Saphian, 2006). It is also known

that many other factors may relate to the overall performance of students in college

including personality, social integration, motivation, and self-management (Robbins,

Allen, Casillas, Peterson, & Le, 2006). The purpose of this variable was to support the

idea that perhaps the higher a student's high school GPA the more likely students are to

exhibit differences in seating choice and the less likely they are to sit in areas that

previous research indicates do not contribute to student success.

Numerous studies have supported that seat choice may be associated with study

characteristics or academic performance. Rebeta, Brooks, O'Brien and Hunter (1993)

provide evidence that achievement motivation and performance is enhanced toward the

front of the room.

Class rank as another variable within research question one is included. As a

student matures within an institution of higher learning their seating choice may change

or adapt. There is an inherent expertise developed through decision making over time

(Simon, 1993). As described by Simon through each experience the person gains and

sorts knowledge into "chunks (p. 402)." These chunks are indexed so the individual can

recall information obtained from the last experience and use it to make the next decision. The more chunks of information, the easier it is to make the decision. This variable is based on the idea that as a student matures through an institution of higher learning s/he gains more and more information. This variable sought to determine if students at higher class ranks sit closer to the front or center of the room. According to Hillman and Brooks (1991) freshman sitting toward the front of the classroom exhibit higher degrees of self-esteem and performance, but Mercincavage and Brooks (1990) found little variation among sophomores and juniors. These findings might suggest class rank and the corresponding seat choice may take on less importance as class rank increases. If there is a correlation between high school class size and seating choice, it was also possible a correlation existed between the number of large lectures a student has taken and their seating choice.

Research Question One Analysis

Because the many variables in research question one are correlational in nature they will analyzed using correlation matrices produced with Pearson correlation coefficients. By using this method relationships can be determined between interval and ratio variables. All of the DMI inventory questions will undergo this procedure. Because few strong correlations were present and few multiple correlations were evident a stepwise regression was not used. In addition t tests and chi square test are also necessary to determine how the variables compare to campus populations.

Several questions and some data were collected in a nominal format. Those require chi square tests both for independence and goodness of fit.

RQ$_2$:   Are there variables that correlate with DMI style?

There are no studies with regard to seat choice and DMI styles. This question was included to ascertain if student DMI style could be correlated to student seat choice and would it accompany the variety of other attributes studies have shown to be associated with seating. Personality (Rebeta et al., 1993; Totusek & Staton-Spicer, 1982), self-esteem (Armstrong et al., 1992; Hillmann & Brooks, 1991), traits associated with privacy and territoriality (Edney, 1974; Pedersen, 1994) are examples of characteristics that have been identified with seat location.

Due to the paucity of gender studies using the DMI this research variable was included. No studies specifically target gender and DMI style, however, Hardin and Leong (2004) examined the differences between gender with regard to career assessment instruments including the DMI. Studies that examined gender and seating choice (Armstrong et al., 1992; Brooks & Rebeta, 1991) found females prefer the front rows. If gender is correlated to DMI style, it is possible DMI styles would cluster with women towards the front of the room.

Research Question Two Analysis

Again due to the correlational style of data analysis correlation matrices using Pearson correlation coefficients are required. Chi square and t tests are also used.

RQ$_3$:   Can movement be predicted?

With movement there are several potential factors that might explain the variable. How do gender and DMI style relate to movement and are there factors that allow seat choice to be predicted based on either DMI style, gender or performance. Finally does movement diminish and with that reduction in movement over time are variables more predictable then initial seating choices?

First one should realize seating choice may be marked by certain traits or characteristics. Edney (1974) describes human territoriality as, "an interesting variety of concepts: space (fixed or moving), defense, possession, identity, markers, personalization, control, and exclusiveness of use (p. 962). If territoriality is an effective way of distinguishing the outcomes of movement, it is likely establishing territory and "possession" (p.962) are established through either limited movement or no movement. As stated by Patton and Sawicki (1993), people tend to process their choice in order to achieve some form of optimal condition with no consequences, especially when they process the same alternatives over and over.

According to Coscarelli (1983), there are traits associated with each DMI style. The spontaneous style described by Johnson (1978) has three main attributes: reaction to events, quickness to react and the ability to move between goals. By designation, a spontaneous DMI style would be inclined to quickly react to situations and might be more likely to move often. A systematic DMI style individual views events as small segments, uses caution in making commitments and will not move across commitments. It is therefore possible a systematic DMI style does not move often.

Some student seating will be static. According to Guyot, Byrd and Caudle (1980), the tendency to stay in the same seat may be a form of territorial control or social order. But, movement does occur for many students. There in fact is most likely a constant movement within the classroom. The DMI suggests that a systematic data gatherer may make a decision and stick with it mainly because of the consideration that went into making that choice. If that is true, one might hypothesize that little or no

movement would be exhibited by systematic DMI types, but the opposite would be true for spontaneous types.

There is evidence as suggested by Mayo and Nicholas (1999) that women and minorities have low expectations towards success, However, research does suggest that females may perform at higher levels than men as evidenced in the National Educational Longitudinal Survey (Buchmann & DiPrete, 2006). Research with regard to student seating suggests women tend to sit towards the front of the room (Brooks & Rebeta, 1991). This question sought to determine if movement by gender is equal.

Johnson's (1978) theory of decision making was originally designed for determining career choice. The current version of the DMI developed by Coscarelli (Johnson et al., 2007) is not specific to career choice. Rather it measures a person decision making style independent of any situation or condition. It is possible that certain decision making styles present themselves within areas of the classroom. This study helps in understanding the makeup of a large classroom through the lens of the DMI. Are spontaneous individuals more likely to sit in the back of the room? Do systematic individuals select the best seating location for success? If these are true, instructors could redesign their lecture methods, for example teaching methods designed not from a global classroom perspective, but rather based on specific areas within the classroom. Instructional idea might include movement to encourage integration, media to enhance focus and attention, and in-class activities to engage internalizers.

Research Question Three Analysis

Due to the predictive nature of research question three several linear regressions will be conducted. Primarily these will be to determine the predictability of movement

by style and gender. Other measure will also be conducted including t test and a repeated measures ANOVA to determine if movement is significant over the study period.

Hypotheses

The hypotheses attempted to determine whether seating choice and DMI styles were related, the relationship between gender and seating choice, the relationship between seat choice and performance, and if any relationship existed between seat choice and overall movement within the classroom.

Hypotheses

This study proposes three research questions. The hypotheses, however, number seven. The following null hypotheses will be tested in this study:

Ho_1:   There is no significant relationship between GPA, anticipated grade in the course, number of large classes, high school class size and seat choice.

Ho_2:   There is no significant relationship between seat choice and DMI style.

Ho_3:   There is no significant relationship between seat choice (location) and gender.

Ho_4:   There is no significant relationship between seat choice and performance.

Ho_5:   There is no significant relationship between DMI style and seat movement.

Ho_6:   There is no significant difference between the DMI style and performance.

Ho_7:   There is no significant relationship between gender and movement

Data Source

This study is a single-institution study conducted at a Midwestern research extensive university. The study was conducted in a lecture hall environment consisting of nine rows divided by a center aisle with ten seats on each side of the aisle in the first row and 11 seats on each side for the remaining rows. Additional seating was provided

along the front of the room in the form of four tables provided for handicapped accessibility. Six additional seats were located behind these tables on each side of the room. The room is slightly curved, thus providing a small lecture area below all but the 12 seats and tables located in the front of the room. The room is also inclined from front to back with the front of the room being lower than the back of the room. No stage or speaker podium exists. Total capacity of the room is 180.

Population

The population was all the students enrolled in an introductory leisure services course. Based on previous studies by Vaught (2005) in the same classroom and course, the typical population of the classroom is 60% male and 40% female. The sample population did not deviate from this with 59.3% male and 40.7% female. The class rank makeup was predicted to be approximately 30% freshman, 28% sophomores, 32% juniors and 21% seniors. The sample population closely paralleled the predicted with 34% freshman, 30.3% sophomores, 13.8% juniors and 23.4% seniors. The mean age of the sample was 19.86 with the predominate age groups being 19 and 20 (28.3%, 26.2%). Student area of study concentration is typically varied, but reflects almost 95% of the students enrolled are outside the course designated major. Ethnicity was 91.5% White/Caucasian, 4.9% Black/African American, .07% Asian, 2.1% eastern Indian and no responses were provided for Native American.

Instrumentation

The DMI is currently in its twelfth iteration. Form L (Appendix A) was used in this study. The DMI was developed to determine decision making styles of college students, specifically regarding their professional career choice (Johnson et al., 2007).

The DMI is used with permission (see Appendix B). The DMI measures two separate components of decision making: the data gathering process and the analysis of that data. Decision making styles are then assigned as: 1) systematic/internalizers, 2) systematic/externalizers, 3) spontaneous/internalizers and 4) spontaneous/externalizers.

A manual to be released in 2007 and authored by Johnson, Coscarelli and Johnson (Johnson et al., 2007) provides the instructions for the administration of the DMI. A draft version has been provided for use with this study (see Appendix C). Form L has 36 questions with 12 questions on each page. Students were instructed to respond to the six forced responses ranging from "Never to Always". Numbering for the questions does not include the numeral "4" which would be a possible mid-point response. The forced-scale design requires the respondent to answer toward one end of the scale.

Scoring can be done by the respondent, but to ensure reliability and correctness the instrument was hand scored by the researcher. Each of the four DMI subscales is represented by three questions on each page. In total there were 12 possible responses for each subscale. A total for each subscale is determined and the highest score for data gathering (spontaneous-systematic) and for data processing (internal-external) are combined to determine the individual decision making style. In rare cases where two scores are the same within the category the systematic scale is reduced to "1" based on testing experience that suggests a systematic style will tend to center their responses due to the caution employed with making any decision. This makes the choice spontaneous. In the case of a tie in the analysis style a "1" is assigned to the external scale. This makes the choice internal. Again theory and experience suggest any type of exam or survey is

biased toward the internal style decision maker that does not need to think out loud (Coscarelli, 1983).

Reliability and validity for this instrument have been thoroughly documented. Both have been the impetus behind the generation of 12 versions since the DMI was introduced in 1978. Form L is representative of design changes through Form H. Forms between H and L have undergone changes, but reverted back to the current version of Form L. Reliability across all versions has alphas ranging as low as .5 and as high as .73. Overall validity accounted for nearly 60% of the variance through Form L.

<div align="center">Data Collection</div>

This study was presented to the Institutional Review Board (see Appendix D) for approval prior to administration. Students were provided informed consent forms that outline the background and purpose of the study, their voluntary participation rights, and discussion of the instrument completion process, benefits, risks and confidentiality.

Data collection occurred on the first day of class. The timing of the administration was important. According to Coscarelli(1983), "It is often useful to give the DMI before the client is aware of the theory" (p.159). There are several other reasons that also include high student attendance on the first day of class, an unbiased perception of the instructor, high level of student seat selection, and typical lack of need for management at the onset of course.

Students were administered the DMI on the first day of class. The DMI is designed as a self scoring inventory, but was hand scored by the researcher to maintain reliability and correctness. Form L (Appendix A) consisted of 36 questions using a forced response six-point Likert scale.

At that time students also provided their student number, seat location, class rank, number of large lectures they have been enrolled in prior to this course, high school graduating class size, high school GPA, gender, race, anticipated grade in the course, their reason for taking the course and their reason for selecting their current seat. The use of the student's ID provided anonymity and eliminated any bias that may be present with knowing the student by name. Gender and high school GPA were collected, but according to Coscarelli (personal communication, September 5, 2006) "Based on what I have seen, there should be no difference between gender or GPA, though I did find an instance of lower high school rank for the subscale spontaneous-internalizer [*sic*]." Ethnicity was collected even though the course enrollment is primarily White/Caucasian (93.4%). Students were also asked to provide their anticipated grade in the course to determine student ability. Two final questions asked for respondents to provide their reasoning for taking the course and their reasoning for the selection of their current seat.

Beginning with the second day of class, attendance was collected that included the seat location of each student. This occurred for eight class periods until the day before the first exam.

<div align="center">Variables in the Study</div>

This study did not include collegiate GPA as a variable. There are specific reasons for this approach. It has been argued that GPA is not a consistent standard for achievement (Lounsbury, Sundstrom, Loveland, & Gibson, 2003; Ridgell & Lounsbury, 2004). As an example, GPA reflects a cross-section of courses with little consistency. A student GPA may represent courses in the hard sciences that include a laboratory component, a writing intensive course and perhaps a communication course in public

speaking. Each of the three courses is distinctly different. Even greater variability exists between a literature course and math course. According to Bartels, Bommer and Rubin (2000), "GPA reflects many factors besides intelligence, including motivation, opportunity, interest and persistence" (p.198). The elimination of collegiate GPA limits the variables, thus enhancing this study. Montello provides "It appears that the available research does not support the hypothesis that seating location in college classrooms has any consistent effect on course achievement" (Montello, 1988, p. 154) and "I concluded that existing evidence indicates no consistent effect of seating on course grades, or if there is such an effect, it is so weak as to be of no theoretical or practical importance" (Montello, 1992, p. 307).

This study did not address SES. This was primarily due to the difficulty in differentiating levels of income for students who are independent of parental support and those still dependent upon family support.

By design the study was not meant to discriminate. Existing demographics suggest this classroom did not significantly represent minorities. The current United States population as reported by the United States Census Bureau (2000) provides a profile of Whites (75.1%), Blacks (12.3%), Hispanics (12.5%), Asian (3.6%) and American Indian (0.9%). It should be noted that after 1997, the United States Census Bureau began to allow individuals to select more than one ethnic background. For this reason, the total does not equal 100%. The Department of Education (2006c) indicates a student profile among degree granting institutions of Whites (66.1%), Blacks (12.5%), Hispanics (10.5 %), Asian (6.4%), American Indian (1.0%) and nonresident Alien (3.4%). These two demographic profiles are similar. But at the university where this

study occurred the population profile is not consistent with the profiles of the Unites

States Census Bureau's demographics or the Department of Education demographics. At

the study university in 2006, Whites represented 80%, Blacks (5.4%), Hispanics (1.8%),

Asian (2.7%), American Indian (0.6%), non-resident international (5.0%), and

unknown/not reported (4.5%). Therefore, a disproportionate sample was likely. Any

effort to stratify the sample to create a balance population reduced the sample population

significantly enough to compromise the data analysis. Ethnicity was collected, but

provided no useable data.

Variables that are important to this study were seating choice and location,

decision making style, self-reported class rank and hours completed in school, age, self-

reported high school graduating class size, and self reported number of large lecture

courses taken.

Additional variables that were controlled were limiting information regarding the

DMI theory, and seat location. For the latter, each seat was given a number that was

labeled under the desktop. Students, when asked to provide their seating location, looked

under their desktop for the seat number. Attendance was also taken everyday. This

ensured any student movement was not a result of inconsistent attendance. Sign-in sheets

were passed out each day. It was important the attendance did not influence student

desires to move to different seats. Taking attendance each day with a sign-in sheet

passed down the rows did not alert students to any need remain in the same seat.

Furthermore, no effort was made with regard to informing students of a need for a seating

chart or that there was any need to remain in the same seat.

Method of Statistical Analysis

The research design for this study was correlational.   This study of classroom

seating and decision making styles incorporated the DMI to measure the decision making

styles of students. The study also determined the relationship between student decision

making and seating choice. Additional design elements were incorporated to determine if

seat selection changes after the DMI was administered were related to decision making

styles, if increased enrollment in large lecture settings influences seat choice and if

graduating class size and thus high school size had any influence on a student's decision

making style. Further analysis compared seat location and gender. After the initial data

were collected, it was analyzed using a variety of statistical methods.

To begin the data analysis process, all the independent variables underwent a

multiple regression correlation. This method is generalizable and flexible and is capable

of providing the magnitude of effect of the independent variables upon each other. This

relationship testing method has the potential to examine the independent variables and

determine their strength in relation to the other independent variables (Cohen, Cohen,

West, & Aiken, 2003). The completed correlation matrices provided evidence of any

relationships that existed between seat location, decision making style, class rank, student

graduating class size and the number of large lectures in which the student previously

enrolled.

More specific to the ability to predict the influence of one variable upon another is

the use of linear regression. Each subscale of the DMI is an independent variable and the

seating choice (distance) was the dependent variable. Generally the function of multiple

regression is to determine the relationship between the variables and the strength of that relationship (Cohen et al., 2003).

Movement between seats is also a part of this study. The distance change for each student was determined within rows, between rows and as a total movement. Multiple regression and repeated measures were completed to determine if any significant change occurred with each of the four DMI subscales. Analysis of variance (ANOVA) was conducted to determine if any variance existed between balanced cells of the decision making styles and seat location.

Chi square goodness-of-fit, and independence along with t-tests were used extensively to determine the differences among the means and proportions of participants in many response categories.

Summary

This study administered the DMI to approximately 146 students. Additional data collection included the student's seat location, class rank, graduating high school class size and the number previously taken large lectures. Data analysis consisted of t-test, chi square, multiple regression correlations, linear regression and ANOVA.

CHAPTER IV

ANALYSIS OF DATA

The purpose and design of this study were developed to research student decision making styles, seating choice, movement and the relationships that may exist. The study also examined other variables and their relationship with decision making style including student high school size, high school GPA, current class rank, the number of courses they had previously taken that were over 100 students, gender, age, ethnicity, their anticipated grade in the course, reason for taking the course and their reason for selecting their seat on the first day of class.

Chapter II provided evidence of a variety of seating situations and the attributes of students choosing those seats. Early studies by Griffith (1921) determined that students sitting in rear seats had poorer academic performance than did those in forward seats. This finding has been consistency supported by later studies (Benedict & Hoag, 2004; Daly & Suite, 1981; Griffith, 1921; Holliman & Anderson, 1986; Levine et al., 1980; Mercincavage & Brooks, 1990; Stires, 1980).

Other studies indicate that increased participation and verbalization are demonstrated among forward seated students (Becker et al., 1973; Daly & Suite, 1981; Koneya, 1976; Sommer, 1967; Wulf, 1977). Research in the area of personality suggests that different personalities are represented by seat location. In all of these studies, a consistent difference occurred between those in the front rows and the rest of the classroom with regard to aggression, practicality and imagination, anxiety, self-esteem

and motivation (Armstrong et al., 1992; Hillmann & Brooks, 1991; Rebeta et al., 1993; Totusek & Staton-Spicer, 1982).

Chapter III presented the statement of problem, research questions, hypotheses, population to be studied, the DMI instrumentation, data collection, variables in the study and the methods for statistical analysis. This chapter provides statistical evidence regarding the frequencies of DMI styles, the relationship of seat location to DMI style and gender, movement and gender, course performance on Exam I and a factor analysis of the DMI.

Study Design

Research Questions

The following research questions were examined throughout this study.

RQ_1: Are there preexisting variables that correlate with seating choice?

RQ_2: Are there variables that correlate with DMI style?

RQ_3: Can movement be predicted?

Null Hypotheses

The following null hypotheses were tested in this study:

Ho_1: There is no significant relationship between GPA, anticipated grade in the course, number of large classes, high school class size and seat choice.

Ho_2: There is no significant relationship between seat choice and DMI style.

Ho_3: There is no significant relationship between seat choice (location) and gender.

Ho_4: There is no significant relationship between seat choice and performance.

Ho_5: There is no significant relationship between DMI style and seat movement.

Ho_6: There is no significant difference between the DMI style and performance.

Ho$_7$:   There is no significant relationship between gender and movement

Population Sample

The student profile of those completing the initial survey included 59.3% males and 40.7% females (n=145). This differs from the campus population of 47.1% males and 52.8% females (N.A., 2006b). A chi-square goodness of fit was calculated to compare the frequency of the study population to campus (Campus mean = 52.8% Male, 47.1% female). A significant deviation from the campus population was found ($x^2(1) =$ 2.326, $p < .05$). Age categories were 16.6% age 18, 28.3% were age 19, 26.2% were age 20, 15.9% were age 21, 9.7% were age 22, 2.1% were age 23 and 1.4% were age 25 (n-145). The mean age of the population sample was 19.86 years. Class rank provided 32.4% freshman, 30.3% sophomore, 13.8% junior and 23.4 percent senior (n=145). A chi-square goodness of fit test was calculated to compare the class rank of the sample population to the class rank statistics of campus. A significant deviation for the campus demographics (N.A., 2006a) was found ($x^2(3) = 11.18$, $p < .05$).

The overall grade point average among the study group was 3.5 (n=144), with the ethnic makeup at 91.5% (84% = Campus) White/Caucasian, 4.9% (6%) Black/African American, 0.7% (2%) Asian, 0.7% (1%) Eastern Indian, 2.1% (1.7%) Hispanic and no responses indicated for Native American/American Indian (n=142).

The Classroom

The classroom had 180 seats available. Those seats were divided among nine rows with an aisle dividing the room. The mean distance for seats from the front of the room is 22.95 feet. Among the 145 participants in the study the mean distance from the front was 23.44 feet. A one sample *t test* comparing the mean seating location of the

sample population to the actual room mean of 22.95 feet was conducted. The difference was not significant (t (143) = .703, $p >$ 05).

Instrumentation

The DMI Form L (see Appendix A) was administered after graduate students conducted the recruiting for the study (see Appendix E) and after students completed the written consent form (see Appendix F). Instructions for the DMI were provided to the students and the instructions were also printed as an introduction to the survey.

Based on Johnson, Coscarelli and Johnson's (2007) most current text for administering the DMI, students were asked to complete the survey based on their personal life and not their behavior as it related to work of school. The survey was 36 questions with 12 questions on each of three pages. Each page had three questions for each of the DMI styles including systematic, external, internal and external. The DMI used a Likert scale forced response scale with six possible responses. Responses ranged from "Never" to "Always" but did not provide any value that was indicative of a mid point or that allowed the respondent to indicate the question was "Not Applicable".

The survey also solicited, along with demographic information, a response from each student with regard to their seat location, graduating high school class size, high school GPA, class rank, number of courses taken that were larger than 100 students, why they took the course, their anticipated grade in the course and why they chose the seat they sat in on the first day of class (see Appendix G). The survey required approximately 20 minutes to complete.

Data Collection

The initial survey was conducted within an introductory course in Parks, Recreation and Tourism on the first day of class. The classroom has a capacity of 180 students. On that day there were 146 (81% of total enrollment) students and all provided consent to participate in the study. After the data were reviewed it was found one student who participated in the DMI portion later dropped the course. That data was retained for the DMI portion of the study for the class profile. One student also provided unusable data for the DMI portion of the survey and they were eliminated from further DMI analysis (n=145). Using the most current data available through the registrar's office the total enrollment on the second day of class was 168 students which placed the course at full enrollment. Therefore, approximately twenty-two students did not attend the first day of class.

Following the initial survey conducted on the first day of class, attendance (seat location) was collected for the next eight class periods. That sample (n=166) is more representative of the class and includes students who were not in attendance on the first day of class; however, a portion of this population did not complete the survey and were eliminated from the DMI study. Only the students in attendance on the first day of class and who completed the survey are used in the DMI portion of the study (n=145).

Missing Values for the DMI Survey

Statistical analysis was conducted using SPSS 13.0, SPSS 15.0 and Microsoft Excel 2003. Data were entered into Excel and missing data were either adjusted according to directions provided in the DMI manual or removed based on parameters established for the study. For the DMI portion of the study, there were eight students

who failed to completely enter all the necessary DMI values. Based on the criteria prescribed in the DMI manual, seven of those students were retained because replacing the missing value with the highest possible value (7) did not change his/her overall DMI style (n=146). The one student removed from the DMI portion was due to replacing their missing value with the highest possible value changed their DMI style (n=145). As described in Chapter III the highest value for systematic/spontaneous is selected as the primary value and the highest value between internal/external is selected as the secondary value. Adding a value of seven points to any one missing value could change that primary or secondary value and therefore misrepresent the respondent's style. Other values that were either missing or provided in a format unrelated to the survey guidelines were changed to missing values or remained as missing values.

After all DMI data were corrected to meet the study criteria, the date were migrated into SPSS for analysis. SPSS was then used to process data first by frequencies, descriptives, crosstabulations, and non parametric tests, then by correlations, analysis of variance and linear regression. Data were also analyzed using a factor analysis.

General Questionnaire Analysis

In addition to the demographics of the study group, several questions were asked to ascertain whether a student's previous experience with large enrollment high schools had any effect on their seat selection and whether the number of large lectures previously taken influenced their seating choice. Of those responding, 14.1% (n=142) indicated they had been in four courses over 100 students and 12% indicated they had been in five and ten courses over 100 students. Overall, one half of the students had been in at least 6.5 courses that were larger than 100 students with a mean of 7.7 courses.

Students were asked to provide their high school graduating class size; the predominant size among the group was a graduating class of greater than 250 (52.4%, n = 145). Classes of 151 to 250 were 20.7%, 76-150 were 16.6%, 16-75 were 10.3% and no students indicated they came from a high school graduating class of less than 15.

A Pearson correlation coefficient was conducted between the number of large classes students had taken prior to this study, the size of their high school graduating class and their seat location and distance from the front of the room. No significance was evident using Pearson's correlation except between seat location and distance which is to be expected.

Table 1

Intercorrelations Between Number of Large Lectures, High School Class Size, Seat Choice and Distance from the Front of the Room(n=142)

	Large Classes	High School	Seat	Distance
Number of Large Classes	1			
High School Class Size	.643	1		
Seat Location	.344	.414	1	
Distance	-.083	.045	0.958**	1

**$p < .01$.

Pearson's correlation coefficients were also run to determine interactions between seat locations, high school GPA, anticipated grade in the course and their Exam I score. Due to skewed responses for anticipated grade in the course, Exam I score was also provided as an indicator of performance. Ninety three percent of the students indicated they would receive an "A" while 9.7% indicated a "B" (n=144). Anticipated grade had a weak negative correlation with GPA (r (144) = -.164, $p < .05$) while Exam I provided a negative weak correlation with seat location (r (145) = -.173, $p < .05$) and distance to the front of the room (r (145) = -.194, $p < .05$), but showed a positive weak correlation between GPA and Exam I (r (144) = .192, $p < .05$). Because Montello (1988; 1992) indicted that the type of exam could have an influence on performance, a brief description of the exam given is provided. Exam I was primarily multiple choice (26 questions), true/false (11 questions) and matching (13 questions). There were no essay questions with a total of fifty questions.

Table 2

Intercorrelations Between Questionnaire Variables (n=145)

	Seat Number	Distance from Front	High School GPA	Anticipated Grade	Exam I
Seat Number	1				
Distance from Front of Room	0.958**	1			
High School GPA	-.141	-.145	1		
Anticipated Grade	-.093	-.064	-.161	1	
Exam I	-0.173*	-.195*	0.192*	-.101	1

*$p < .05$, **$p < .01$.

Scatter plots are provided to show students sitting in the rearward seats had lower high school GPA scores and lower exam scores which support the negative correlations.

Figure 5 shows as distance from the front of the room increases, high school GPA as indicated decreases. Figure 6 shows the distance from the front of the room and Exam I score. Clearly a negative relationship exists between these variables. As students move further from the front of the room students' exam scores decrease.
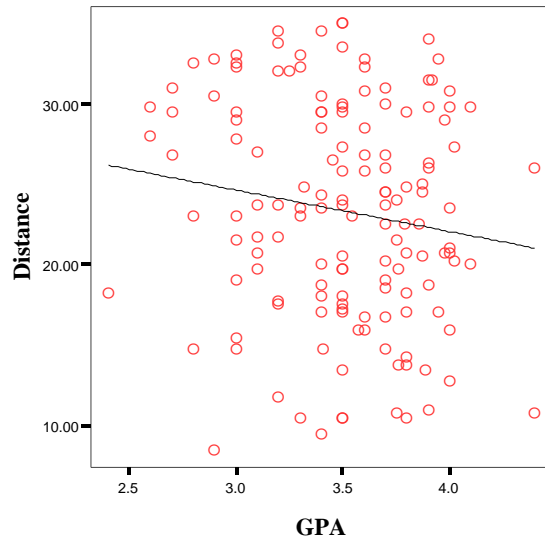
Figure 5. Distance from the front of the room and high school GPA provide evidence that as distance from the front of the room increases, high school GPA decreases.
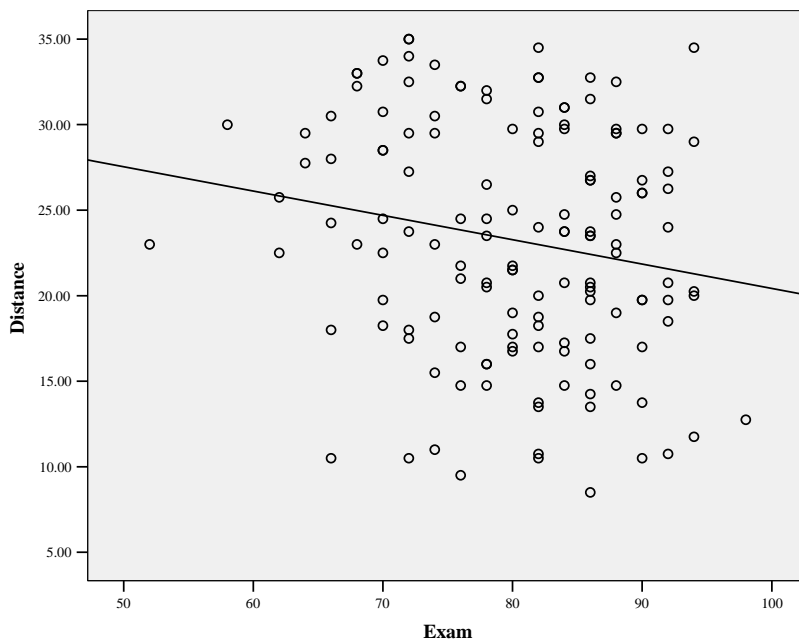
Figure 6. Distance from the front of the room and exam scores provide evidence that as distance from the front of the room increases exam scores decrease.

Correlations were conducted between seat, distance and class rank but no correlations were present. A comparison of the means of distance from the front of the classroom and class rank provided that freshman tend to sit further from the front of the room than do seniors.

Table 3

Comparison of Rank and Distance

Distance

Rank	Mean	N	Std. Deviation
Freshman	24.4149	47	6.27761
Sophomore	23.0795	44	6.41985
Junior	21.8375	20	8.06971
Senior	22.9632	34	7.26530
Total	23.3138	145	6.80653

Students were asked to respond to two questions related to their reason for taking the course and their reason for selecting a seat on the first day of class. The percentage of students taking the class for the following reasons were: 7.6% because it was a required course in their major, 24.1% because it met one of their general education requirements, 24.8% because it met a humanities credit and 43.4 percent because they just wanted to take the course (n=145). When asked why they chose the seat on that day of class, 42.1% indicated they chose their seat to sit next to someone they knew, 35% provided they wanted an empty seat next to them so they selected an aisle seat, 4.3% indicated they had a hard time seeing the blackboard or images in the front of the room, 0.7% indicated that they had a hard time hearing instructors, 2.1% made the selection based on being left handed, and 15.7% indicated it was the only seat in the room when they arrived.

Chi square nonparametric tests were conducted to determine if the responses met expected values and therefore normal distribution. Both, reason for selection of the seat (x^2 (3) = 37.37, $p < .05$) and choice of seat (x^2 (3) = 134.8, $p < .05$) differed significantly from the hypothesized values.

Table 4

Reason for Taking the Class

	Frequency	Percent
Required in Major	11	7.6
Meets Gen Ed Requirement	35	24.1
Meets Humanities Requirment	36	24.8
Just Wanted to Take the Course	63	43.4
Total	145	100.0

Table 5

Reason for Choosing Seat on First Day of Class

	Frequency	Valid Percent
Sit next to a friend	59	42.1
Wanted an empty seat next to me	49	35.0
To better see the front of the room	6	4.3
To better hear	1	.7
Left handed	3	2.1
Only available seat	22	15.7
Total	140	100.0

Table 6

Chi Square Values

	Why	Choice
Chi-Square	37.372	134.800
df	3	5
Asymp. Sig.	.000	.000

DMI Styles

According to Coscarelli and Johnson (2007), systematic-internalizers (46%) typically rank first with systematic-externalizers (34%) second, spontaneous-internalizers (11%) third and spontaneous-externalizers (9%) last. This study is inconsistent with those data. Among those studied (see Figure 7) systematic-internalizers were 24.5%, systematic-externalizers were 30.1%, spontaneous-internalizers were 19.6% and spontaneous-externalizers were 25.9% (n=143). Because of the difference in the mean responses, a chi square goodness of fit test was conducted to determine if significant differences exist between the means of the study group and the means as presented by Johnson and Coscarelli (1983). A significant deviation from the values provided as

typical for the DMI was found (x^2 (3) = 69.87, p < .05). However with normally

distributed expected values there was no deviation among the sample population (x^2 (3) =

3.21, p > .05).

Bar chart with values: Systematic/Internalizer 24.5, Systematic/Externalizer 30.1, Spontaneous/Internalizer 19.6, Spontaneous/Externalizer 25.9.
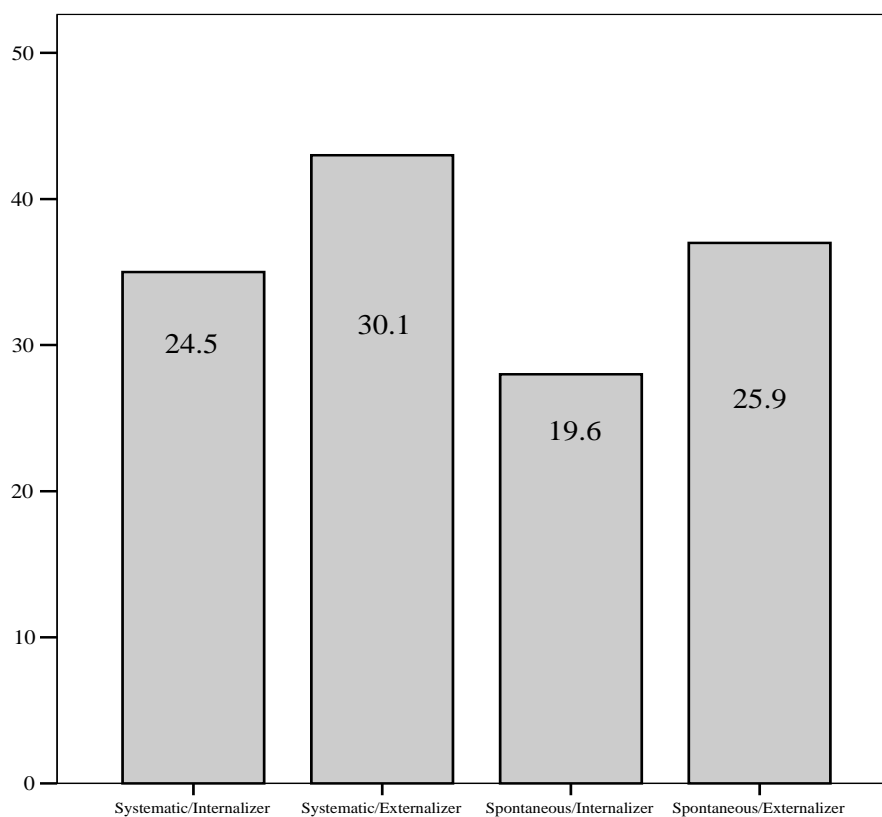
Figure 7. The DMI styles of the study group are depicted (n=145)

It is important to note the differences in observations that occur between style

descriptions. Based on the DMI manual, the assignment of values for styles is made

according to the highest score in either the systematic/spontaneous category or in the

internal/external category. Ultimately, the style is assigned a number between one and

four. Numbered style (1,2,3,4) takes into consideration those respondents that do not

meet the criteria when there is a tie between the categories. If raw numbers were

adjusted according to the DMI manual, a raw score would be reduced in the systematic and internal categories to "1". Instead these raw numbers remain unchanged and those with an assigned style change are removed. Therefore the assigned style values include 143 participants, but the raw values for each respondent include the number before the assignment of a value even if there are ties (n=145).

Table 7

Style

	Observed N	Expected N	Residual
Systematic/ Internal	35	35.8	-.8
Systematic/ External	43	35.8	7.3
Spontaneous/ Internal	28	35.8	-7.8
Spontaneous/ External	37	35.8	1.3
Total	143		

Seating Location and DMI Style

Seat location has been identified as being negatively correlated with Exam I and high school GPA. A Pearson correlation coefficient matrix was prepared to determine if any relationships existed between seat location and DMI style. No correlation was present.

Table 8

Intercorrelation Between Seat and Style

	Seat Location	Spontaneous	Systematic	Internal	External
Seat Location	1				
Spontaneous	.071	1			
Systematic	.051	-0.188*	1		
Internal	-.083	0.206*	.132	1	
External	-.004	-.027	0.166*	-.306**	1

$*p < .05.$ $**p < .01.$

Data provided little evidence that seating and DMI style categories were related but do show a negative moderate relationship between internal and external styles (r (145) = -.306, $p < .01$), a positive weak relationship between spontaneous and internal (r (145) = .206, $p < .05$), a negative weak relationship between spontaneous and systematic (r (145) = -.188, $p < .05$) and a weak positive relationship between systematic and external (r (145) = .166, $p < .05$).

Gender

Correlations were conducted between DMI style categories and gender. Initial correlations provided only a weak positive relationship between gender and external style (r (145) = .222, $p < .01$).

Table 9

Intercorrelations Between Gender and DMI Style (n=145)

	Gender	Spontaneous	Systematic	Internal	External
Gender	1				
Spontaneous	-.059	1			
Systematic	.065	-0.188*	1		
Internal	-.161	0.206*	.132	1	
External	0.222**	-.027	0.166*	-.306**	1

$*p < .05.$ $**p < .01.$

Gender means were compared to DMI style categories using a factorial analysis of variance (ANOVA). A 2 (gender) x 4 (DMI style) was conducted for between-subjects interaction. A main effect for gender was found ($F(3,143) = 3.778$, $p < .05$). A cross tabulation determined gender and seat location could be related. The cross tabulation (Table 10) revealed males tend to exhibit a higher mean distance from the front of the room than do females.

Table 10

Matrix of Gender and Distance from Front of Room

Gender	N	Mean Distance	Std. Deviation
Male	86	24.9448	6.86192
Female	58	21.0948	5.95447

Gender was further analyzed by each of the four style categories. A cross tabulation (Table 11) of gender and style provides a matrix for each style. Among the males, the predominate style was systematic/internal, while the females exhibit a systematic/external style.

Table 11

Gender and DMI Style Crosstabulation

		Style				Total
		Systematic/ Internal	Systematic/ External	Spontaneous/ Internal	Spontaneous/ External	
Male	Count	25	18	18	18	79
	Expected Count	20.8	23.3	14.7	20.2	79.0
Female	Count	9	20	6	15	50
	Expected Count	13.2	14.7	9.3	12.8	50.0
Total	Count	34	38	24	33	129
	Expected Count	34.0	38.0	24.0	33.0	129.0

Note. DMI styles are arbitrary numbers assigned to style categories having the highest value.

A Pearson chi square test of independence for gender and DMI style indicated a significant difference between gender and style ($x^2(3) = 10.78$, $p < .05$). This significance suggests that there are differences between styles and gender as clearly shown in Table 11. The differences between males and females, shown in Table 11, within the systematic/internal style and the spontaneous/internal style are dramatic.

A chi square goodness of fit showed a significant difference among gender groups ($x^2(3) = 5.80$, $p < .05$) but no significance between DMI styles ($x^2(3) = 3.20$, $p > .05$). Males tend to be represented within all styles with a greater number demonstrating a systematic/internal style. Females, however, are in direct opposition to males with the fewest number of spontaneous/internalizers and the greatest number of systematic/externalizers.

Further analysis of gender indicated differences among the means of each DMI style. This was most evident for the external DMI style where females indicate a 42.16% mean response and males indicate 37.20%. Internal style also indicates a difference, with males at 39.41% and females at 37.03%. Only subtle differences were present between

the other styles.   A Pearson chi square test of independence between gender and each of the style categories shows no significance. For each chi square, the following results are provided: Gender and spontaneous ($x^2(29) = 25.47$, $p > .05$), gender and systematic ($x^2(31) = 39.06$, $p > .05$), gender and internal ($x^2(32) = 41.05$, $p > .05$), and gender and external ($x^2(38) = 46.45$, $p > .05$). Table 12 shows the differences between gender groups and style categories by their means.

Table 12

T Test Between Gender and Style Groups (n=145)

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Spontaneous	Male	87	38.45	6.384	.684
	Female	58	37.64	7.218	.948
Systematic	Male	87	37.47	11.637	1.248
	Female	58	38.93	9.913	1.302
Internal	Male	87	39.41	6.794	.728
	Female	58	37.03	7.744	1.017
External	Male	87	37.20	10.747	1.152
	Female	58	42.16	10.768	1.414

Note. All respondents provide input into each category

To better portray a balanced mean of styles and gender, a marginal mean was calculated that includes both the mean of males and the mean of females. Table 13 is graphed in Figure 8.

Table 13

Marginal Means of DMI Styles for both Males and Females

DMI Style	Mean
Spontaneous	38.126
Systematic	38.054
Internal	38.458
External	39.184

Figure 8 clearly shows the means of each style category and the variance that exists between styles. The scale has been expanded to show that interactions occur between the means but not to the extreme that they create significance. The marginal means are depicted between the gender groups.
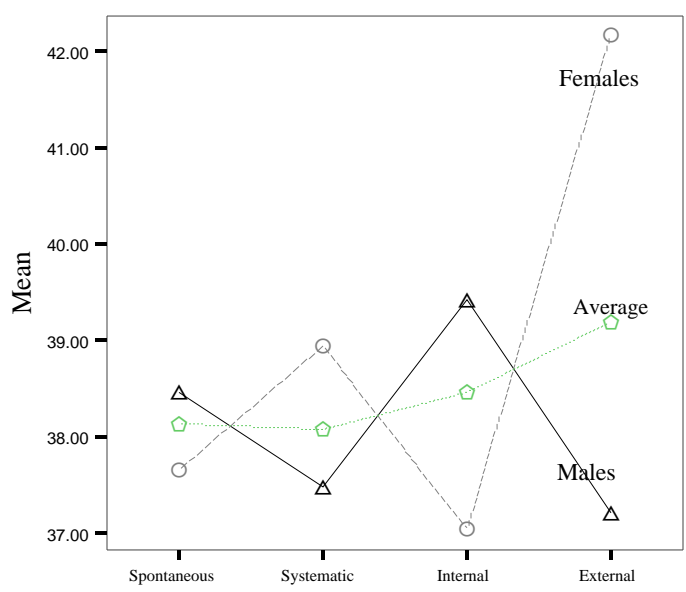
Figure 8 The graph shows the means of males and females and the interacting marginal mean between both genders.

Table 14

Independent Samples Test Between Gender and Style Category

| | t-test for Equality of Means | | | | |
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Spontaneous	.710	143	.479	.810	1.141
		111.812	.490	.810	1.169
Systematic	-.784	143	.434	-1.460	1.862
		134.561	.420	-1.460	1.803
Internal	1.953	143	.053	2.379	1.218
		111.113	.060	2.379	1.251
External	-2.720	143	.007	-4.960	1.823
		122.141	.007	-4.960	1.824

An independent-sample t test comparing the mean scores of the DMI style categories and gender found a significant difference between the means of the external DMI style between males and females. (t (143) = -2.72, p< .05). The mean of females for external style was significantly higher (m = 42.16, sd = 10.768) within the external style. No significance was evident between gender and internal, spontaneous or systematic scales.

Table 15

Analysis of Variance Between Gender and Style Categories

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	2.593	5	.519	2.228	.055
1	Residual	31.883	137	.233		
	Total	34.476	142			

An ANOVA does not support a linear relationship between gender and DMI style categories (F (5,137) = 2.23, p > .05).

Data were also filtered and Pearson correlation coefficients were conducted among men and women. There was a weak positive relationship among men between spontaneous and internal styles (r (85) = .285, p < .01) and a moderate positive relationship among women with systematic and external styles (r (58) = .333, p < .01).

Table 16

Intercorrelations Among Males (n=87)

	Spontaneous	Systematic	Internal	External
Spontaneous	1			
Systematic	-.183	1		
Internal	0.285**	.097	1	
External	.025	.132	-.192	1

**p < .01.

Table 17

Intercorrelations Among Females (n=58)

	Spontaneous	Systematic	Internal	External
Spontaneous	1			
Systematic	-.193	1		
Internal	.098	.223	1	
External	-.066	.199	-0.400**	1

**$p < .01$.

Gender analysis with relation to DMI style provided some weak significant relationships and interactions. Most were within the internal and external DMI style categories, but differed between gender groups. There was no significance across all styles. This may be due to a disproportionate number of males to females, but also suggests style is random within the study population and while gender may be linked to the external style, and spontaneous style, it is not conclusive enough to predict style based on gender. It does, however, suggest the instrument may have gender biases that are shown by the interactions in Figure 8.

Movement

After the initial data collection, attendance was collected each day by seat number for a period of eight class periods. At no time during the study was there any mention of required seating or the need of a seating chart to better identify the students. The purpose for this was to measure the amount of movement that was present and compare that movement with selected variables in this study. In total, attendance seating for eight days were collected over a period of three weeks. All data were collected prior to the first exam. Each attendance day was then used to develop a difference between the previous

day's seat location and the following day. Some respondents were not in attendance on every class period.

Missing Values for Movement

Movement values presented a different method for the determination of missing values and to determine the cut-off for attendance days. As described, each day a student was in attendance his/her seat location was recorded. Each subsequent day that seat location was compared to the previous seat location and two values were determined. The first determined the movement horizontally or within the rows and the second determined the movement vertically or between rows. A total movement was also determined adding the movement within the rows with movement between rows.

Attendance was determined to be a key element to determining how to address missing values. If a student was in attendance for all eight days the resulting number of seat locations was eight with seven deviations possible. But if a student was only in attendance, for example, four class periods the resulting deviation would only be three and therefore a student would have missed four possibilities. A student meeting this profile would, therefore, have a higher potential average movement then one in attendance all eight days.

The mean attendance rate for the class on the eight days attendance was monitored and was 6.98 (n=165) yet the range for attendance during that period was between two and eight; 25% of the class was present five or fewer class periods. Based on statistical evidence that 75% of the class was present six of more class periods, all records with less than six days of attendance were removed from further consideration.

The remaining respondents (n=147) represent approximately 75% of the students enrolled in the class and more closely relates to the number of students completing the survey on the first day of class. Furthermore, of the 25% of students in attendance for less than six days, some students present on the first day of class for the DMI survey were also eliminated. The final number of students considered in the analysis of DMI style and movement was 129. Seventeen percent of those remaining were present six class periods, 28.6% were in attendance seven times and 54.4% were in class all eight days.

A review of movement data including within rows, between rows and the total movement clearly shows movement diminished through the study period. Data show each time a student comes to class his/her seat selection tends to stabilize. The greatest amount of movement is during the early class periods. This was most evident within the rows where movement was greatest in the second and third days and diminished toward the eighth day. Between rows showed less movement, but it was not unusual to see a student seek a seat in the same row location, but either one row forward or one row back of the previous seat location.
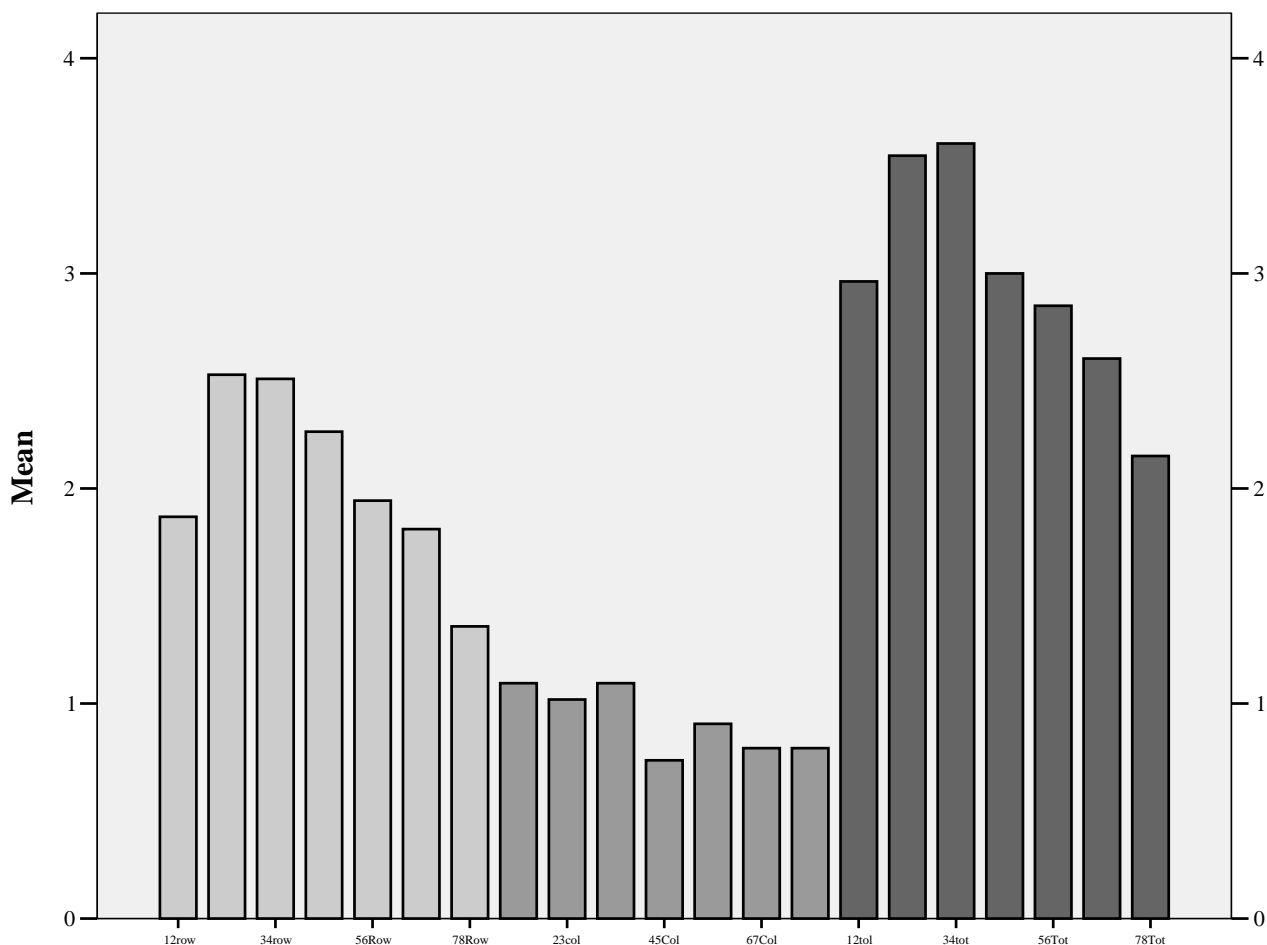
Figure 9. Mean movement within rows, between rows and total movement over a period of eight class periods. Columns 1-7 are within rows, 8-14 are between rows and 15-21 are total movement. Mean movement for each category is also provided. N=129

Table 18 sums the movement within rows, between rows and provides the total

movement over the eight days movement data were collected. From this table one can

see the greatest movement is within the rows. The descriptives for within rows, between

rows and the total are provided followed by the mean movement for each category.

Table 19 is provided to show the descriptives for all movement within rows, between

rows and in total for each day of the study.

Table 18

Mean Movement for Within Rows, Between Rows and Total Movement

	N	Minimum	Maximum	Mean	Std. Deviation
Within Rows	129	.00	50.00	12.2558	10.80674
Between Rows	129	.00	20.00	5.5504	4.76308
Total Movement	129	.00	59.00	17.8062	13.98776
Valid N (listwise)	129				

Table 19

Descriptives for Movement

	N	Maximum	Mean	Std. Deviation
1/2 Within	110	11	1.96	2.354
2/3 Within	120	15	2.27	3.113
3/4 Within	120	18	2.43	3.819
4/5 Within	121	15	1.93	3.091
5/6 Within	121	14	1.72	2.374
6/7 Within	111	11	1.66	2.270
7/8 Within	115	11	1.54	2.023
1/2 Between	110	7	1.10	1.354
2/3 Between	120	7	1.13	1.363
3/4 Between	120	6	1.00	1.296
4/5 Between	121	6	.78	1.294
5/6 Between	121	6	.79	1.392
6/7 Between	110	7	.75	1.274
7/8 Between	87	5	.79	1.058
1/2 Total	129	13	2.61	2.948
2/3 Total	129	15	3.16	3.701
3/4 Total	129	19	3.19	4.426
4/5 Total	129	19	2.53	3.698
5/6 Total	129	14	2.35	2.816
6/7 Total	129	14	2.06	2.822
7/8 Total	129	16	1.91	2.445
Valid N (listwise)	53			

Because movement was evident within the rows and between the rows over a period of eight class periods and because that movement diminished over the eight class periods a paired-samples t test was conducted between the third and fourth class period total movement (highest movement) and the last class period movement between the seventh and eighth days and significance was present (t (128) = 3.18, $p < .05$) for total movement.

Table 20

Paired Samples t test Between Within Row Movement for Day 3/4 and Day 7/8

	Mean	N	Std. Deviation	Std. Error Mean
Day 3/4	3.19	129	4.426	.390
Day 7/8	1.91	129	2.445	.215

Given that movement diminishes over time, it is critical to this study that movement is significant between the highest period of movement and the least movement. This established that students seek a seat location over time that they are comfortable with and tend to remain in that location.

A repeated measures ANOVA was conducted between each of the daily movement totals and the total movement to determine any interactions. Table 24 demonstrates significance in almost all comparisons between daily movement and total movement.

Table 21

Contrasts Between Daily Movement and Total Movement

Measure: MEASURE_1

Source	Movement	Type III Sum of Squares	df	Mean Square	F	Sig.
Movement	Day 1 vs. Day 2	190.990	1	190.990	15.887	.000
	Day 2 vs. Day 3	11.097	1	11.097	.790	.377
	Day 3 vs. Day 4	173.091	1	173.091	16.179	.000
	Day 4 vs. Day 5	8.858	1	8.858	1.074	.303
	Day 5 vs. Day 6	43.263	1	43.263	5.507	.021
	Day 6 vs. Day 7	4.904	1	4.904	.702	.404
Movement*Total Movement	Day 1 vs. Day 2	1448.175	45	32.182	2.677	.000
	Day 2 vs. Day 3	954.495	45	21.211	1.511	.052
	Day 3 vs. Day 4	869.305	45	19.318	1.806	.010
	Day 4 vs. Day 5	800.737	45	17.794	2.157	.001
	Day 5 vs. Day 6	640.380	45	14.231	1.812	.010
	Day 6 vs. Day 7	477.335	45	10.607	1.519	.050
Error(movement)	Day 1 vs. Day 2	997.840	83	12.022		
	Day 2 vs. Day 3	1165.381	83	14.041		
	Day 3 vs. Day 4	887.998	83	10.699		
	Day 4 vs. Day 5	684.798	83	8.251		
	Day 5 vs. Day 6	652.007	83	7.856		
	Day 6 vs. Day 7	579.564	83	6.983		

Movement and DMI Style

An analysis of DMI and movement creates a reduction in the sample population

due to the elimination of those students missing more than five days (n=129).

Table 22

Style Frequency for Movement

	Frequency	Percent	Valid Percent	Cumulative Percent
Systematic/ Internalizer	34	26.4	26.4	26.4
Systematic/ Externalizer	38	29.5	29.5	55.8
Spontaneous/ Internalizer	24	18.6	18.6	74.4
Spontaneous/ Externalizer	33	25.6	25.6	100.0
Total	129	100.0	100.0	

The movement population differs from the original population as evidenced in the above table. In the large sample (n=143) systematic-internalizers were 24.5%, systematic-externalizers were 30.1%, spontaneous-internalizers were 19.6% and spontaneous-externalizers were 25.9% (n=143). Among those in the movement study the systematic/internalizers were 26.4%, the systematic/externalizers were 29.5%, spontaneous/internalizers were 18.6% and spontaneous/externalizers were 25.6%. A Chi square test was conducted using Coscarelli's (1983) expected values and again a significant deviation from the Coacarelli's values occur $(x^2 (3) = 57.79, p < .05)$, but using hypothesized expected values the Chi Square indicates no deviation $(x^2 (3) = 3.25, p < .05)$,

Movement is indicated within all DMI styles. Among the four DMI styles, the greatest amount of movement is among the spontaneous/internalizers for within rows (m=13.5) and again among spontaneous/internalizers for between rows (m=6.54). The least amount of movement among the styles is the systematic/internalizer.

Table 23
  DMI Means for Within Rows, Between Rows and Total Movement

	Within Rows	Between Rows	Total Movement
	Mean	Mean	Mean
Systematic/Internal	11.47	5.47	16.94
Systematic/External	12.37	5.08	17.45
Spontaneous/Internal	13.50	6.54	20.04
Spontaneous/External	12.03	5.45	17.48

A simple linear regression was calculated predicting the subject's style by their total movement. The regression equation was not significant (F (1, 127) = .108, p > .05). Movement can not be used to predict style.

Table 24

Style and Total Movement

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.140	1	.140	.108	.743
1	Residual	165.550	127	1.304		
	Total	165.690	128			

Further regression analysis using movement data from the third and forth days when total movement is at it greatest agrees with the total movement data but, also does not show significance (F (4, 124) = .271, p > .05).

Table 25

Analysis of Variance for DMI Styles and Day 3/4 Movement

	Sum of Squares	df	Mean Square	F	Sig.
Regression	21.747	4	5.437	.271	.896
Residual	2485.788	124	20.047		
Total	2507.535	128			

Significance is however evident when using the total movement between the seventh and eighth days ($F(4, 124) = 2.67$, $p < .05$). This suggests that style and movement begin to stabilize over time and that style may be more predictable after several class periods than early in the course.

Table 26

Analysis of Variance for DMI Styles and Day 7/8 Movement

	Sum of Squares	df	Mean Square	F	Sig.
Regression	60.707	4	15.177	2.673	.035
Residual	704.177	124	5.679		
Total	764.884	128			

Gender and Movement

Gender and movement indicated that males tended to have a greater degree of movement then did women in all categories.

Table 27

Gender and Movement

	Within Rows	Between Rows	Total Movement
	Mean	Mean	Mean
Males	12.85	5.70	18.54
Females	11.32	5.32	16.64

The mean movement for participants provided through an independent-sample t test compared gender to movement within rows ($t(127) = .781$, $p > .05$), between rows ($t(127) = .436$, $p > .05$) and in total ($t(142) = .752$, $p > .05$) and found no significance. The mean of males ($m = 12.85$, $sd = 10.74$) was not significantly different from the mean of females ($m = 11.32$, $sd = 10.94$) for within rows, and the mean of males between rows

(m = 5.70, sd = 4.91) did not differ from females (m = 5.32, sd = 4.55). The same was

true for total movement where males (m = 18.54, sd = 13.97) and females (m = 16.64, sd

= 14.07) also did not differ across the means.

Table 28

Independent Samples Test Between Gender and Movement

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Within Rows	.163	.687	.781	127	.436
Between Rows	1.063	.304	.436	127	.664
Total Movement	.154	.696	.752	127	.453

Table 29

Means for Movement by Gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Within Rows	Males	79	12.8481	10.74779	1.20922
	Female	50	11.3200	10.94222	1.54746
Between Rows	Males	79	5.6962	4.91297	.55275
	Female	50	5.3200	4.55551	.64425
Total Movement	Males	79	18.5443	13.97323	1.57211
	Female	50	16.6400	14.07235	1.99013

A simple linear regression was calculated predicting the subject's movement on

their gender. The regression equation was not significant (F (1, 127) = .190, p > .05).

Movement can not be predicted by gender when using total movement as the dependent

variable.

Table 30

Analysis of Variance for Gender and Movement

Model		Sum of Squares	df	Mean Square	F	Sig.
Gender and Movement	Regression	.046	1	.046	.190	.664
	Residual	30.574	127	.241		
	Total	30.620	128			

Gender and Style

Gender and style were analyzed and do not vary from the original data even though the sample population has been limited. Males still exhibit the systematic/internalizer style, but also are evident in the spontaneous/internal and spontaneous/external categories, while females are predominately systematic/externalizers.

Table 31

Gender and Style Crosstabulation

Count

		Style				Total
		1	2	3	4	
	Male	25	18	18	18	79
	Female	9	20	6	15	50
Total		34	38	24	33	129

A Pearson chi square was calculated to determine if the observed cell values differed significantly from the expected values. There was no significance, however the cell values closely approached the .05 level (x^2 (3) = 7.78, $p > .05$).

Table 32

Intercorrelations Between Style Categories, Total Movement and Gender (n=129)

	Spontaneous	Systematic	Internal	External	Total Movement	Gender
Spontaneous	1					
Systematic	-.165	1				
Internal	0.183*	.133	1			
External	.011	.153	-.308**	1		
Total Movement	.021	-.064	.049	-.090	1	
Gender	-.028	.099	-.143	0.225*	-.067	1

* $p < .05$

In Table 32 gender and external are related (r (129) = .225, $p < .05$). This leads to the argument presented throughout this study that gender and style are related in at least a weak manner with the greatest relationship occurring between gender and external. In this study females are primarily systematic/external.

Performance and Gender

One of the variables collected on the first day of class was the student's anticipated grade in the course. This was to determine if relationships existed between DMI and performance. Students responded overwhelming that they would receive and "A" in the course. As mentioned previously, 90.3% of the students indicated they would receive an "A" while 9.7% indicated a "B" (n=144). Additionally, the mean high school GPA among the respondents was a 3.5. Anticipated grade had a weak negative correlation with GPA (r (144) = -.164, $p < .05$) while Exam I provided a negative weak correlation with seat location (r (145) = -.173, $p < .05$) and distance to the front of the

room (r (145) = -.194, $p < .05$), but showed a positive weak correlation between GPA and

Exam I (r (144) = .0192, $p < .05$).

An independent sample t-test was conducted between the means of gender and

exam scores and no significant difference was found. (t(127) = -.504, $p > .05$)

Table 33

Intercorrelations Between Movement, Exam I Score and DMI Style (n= 129)

	Within Rows	Between Rows	Total Movement	DMI Style	Exam I
Within Rows	1				
Between Rows	0.545**	1			
Total Movement	0.958**	0.762**	1		
DMI Style	.026	.029	.030	1	
Exam I	.048	-.019	.031	-.090	1

**$p < .01$.

A Pearson correlation coefficient was calculated (Table 34) for the relationship

between subject's Exam I score, DMI style and movement and no correlations were

found between movement and style or movement and exam.

Gender, Style and Movement

An additional element that was studied was the relationship between gender and

style categories with regard to total movement. A correlation matrix (Table 35) indicates

there was no correlation between style and movement. An additional correlation matrix

(Table 36) was run with the same variables, but adding gender and removing Exam I.

Table 34

Intercorrelations Between DMI Style Categories and Total Movement (n=129)

	Spontaneous	Systematic	Internal	External	Total Movement
Spontaneous	1				
Systematic	-.165	1			
Internal	.183*	.133	1		
External	.011	.153	-.308**	1	
Total Movement	.021	-.064	.049	-.090	1

*p < .05. **p < .01.

In Table 32 gender and external are related (*r* (129) = .225, *p* < .05).

Style, Gender and Row

Style, gender and row were analyzed to further determine if correlations existed between gender and their row seat location. By recoding the data into rows a correlation matrix provides more evidence that difference occur between males and females with regard to seat choice.

Table 35

Intercorrelations Between Style Category, Gender and Row (n=145)

	Spontaneous	Systematic	Internal	External	Gender	Seat by Row
Spontaneous	1					
Systematic	-.188*	1				
Internal	0.206*	.132	1			
External	-.027	0.166*	-.306**	1		
Gender	-.059	.065	-.161	0.222**	1	
Seat by Row	.085	.052	-.073	-.002	-.314**	1

*p < .05. **p < .01.

Table 35 shows a moderate negative relationship between gender and row (r (145) = -.314, $p < .05$). This provides more evidence that gender and seat location are related.

A cross tabulation between gender and row shows the values by gender and row.

Table 36

Gender and Row

Count

		Row								Total
		1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	
	Male	8	9	7	8	11	12	17	15	87
	Female	10	9	9	11	9	4	4	2	58
Total		18	18	16	19	20	16	21	17	145

Table 36 supports the negative correlation that is present in Table 35 between gender and row by indicating the disproportionate number of females sitting in rows five through eight (males = 55, females = 19).

Factor Analysis of DMI Inventory

Questions from the DMI inventory were analyzed using Cronbach's alpha to determine internal consistency. Each of the four scales were analyzed to assess whether each of scales measures the construct as intended (Cronk, 2006). Previous studies using Form L of the DMI indicated Cronbach's alpha's between .41 and .64 across all scales (Coscarelli et al., 1989).

Table 37
Reliability Statistics for Coscarelli's DMI

Style	Cronbach's Alpha	N of Items
Systematic	.621	3
Spontaneous	.530	3
Internalizer	.568	3
Externalizer	.716	3

Note. Items were summed for each page or three questions in each style.

Chronbach's alphas for this study are low. Numbers are best when approaching 1. The levels provided in the study did not approach this level.

Summary

A summary of the data analysis is divided into four categories. The first provides a summary of the user data that is not in conjunction with the DMI. The second is specific to seating choice and the DMI instrument. A third category is provided for gender and the associated relationships between gender, and seating choice. A final category is provided for movement and the associated relationships with gender and style.

User Demographics and Survey Reponses

Data for this study consisted of a higher proportion of males (59.3%), a mean age of 19.86, a high school GPA of 3.5, 32.4% freshman, and 91.5% White/Caucasian. Data collection occurred on the first day of class. Approximately 81% of those enrolled were present ($n = 146$). The data set for this portion of the study is representative of high participation with few missing values. Student participation did not appear to show a high number of outliers or anomalies that would confound the data analysis. A second

set of data collected over eight class periods increased the number of participants (n = 166), but only those missing less than three class periods remained in the movement sample (n=129). Response to a nominal format question provided one of the more positive results with 43.4% indicating they wanted to take the course over needing it as a required course. Correlations did not occur between questionnaire items with regard to the number of large classes, high school class size, or seat location.

Performance as provided in the questionnaire proved of little use and instead student exam scores were inserted to determine if any relationships existed between seat choice, high school GPA, anticipated grade and exam I score. Of those variables only Exam I scores showed weak negative correlations with the seat number (r (145) = -.173, $p < .05$), distance from the front of the room (r (145) = -.195, $p < .05$), and a weak positive correlation with high school GPA (r (145) = .192, $p < .05$). This provided the first evidence that seat choice and performance were at least mildly related.

Seating Choice and DMI

Seating choice and DMI style were an overarching element of this study. When asked to respond to their reason for choosing their seat on that first day of class, 42.1% indicated they wanted to sit next to someone they knew. As to their choice of seats, most indicated they just wanted to sit next to a friend.

Data revealed little correlation between seating choice and DMI style, but did provide that freshman tend to sit the furthest from the front of the room. Other variables including high school graduating class size, high school GPA, and anticipated course grade provided little evidence that relationships exist. Distance from the front of the

room to their seat location did not provide any correlation with DMI style. Correlations

between seat location and style provided no correlations.

The study group was predominately classified as systematic/externalizers (30.1%)

and that group was mostly represented by females (n = 23). Males presented an opposite

decision making style to females, the majority of males were systematic/internalizers (n =

26). Several tests continued to support the characterization of males being

systematic/internalizers and females being systematic/externalizers. A t test provided

that the means of males and females for internal and external differed, but no significance

existed between spontaneous and systematic scales. Pearson correlation coefficients

were conducted among males and females and only weak correlations were present for

externalizers.

Gender

Gender proved to be one of the most influencing variants. There were

correlations between gender and the external style category (r (145) = .222, $p < .01$). The

data clearly suggests males sit further from the front of the room than do females. When

Pearson chi square tests were conducted there was significance between gender and DMI

style (x^2 (3) = 10.78, $p < .05$) and chi square goodness of fit tests indicated significant

difference between gender (x^2 (3) = 5.80, $p < .05$), but no difference between styles (x^2

(3) = 3.20, $p < .05$).

Gender was further analyzed with more detail to determine the significance of the

interactions (Figure 8). Even though interactions were present across gender and style

categories, t tests were only able to determine significance between internal and external

styles for both gender groups. Chi square tests further supported that significance exists between gender groups, but not between styles.

Correlations were run between gender and style. Those tests within the gender groups show males correlate with the spontaneous category (r (87) = .285, $p < .01$) in spite of there being more males in the systematic category; and, females correlate (r (58) = -.400, $p < .01$) with the internal category, which the study supports. It should be noted the negative correlation is due to females being coded "2" in the study. Reversing the numbers and giving females a code of "1" will reverse the sign.

Movement

The greatest amount of movement occurred in the first class periods among those present (n=129). Over the period of the study, movement diminished in each study category. The most movement was within the rows. Based on the data there were obvious points at which movement was greatest and, on the last day data were collected it was at it lowest. Paired t tests showed significance between the highest total movement and the lowest total movement.

A repeated measures general linear model was conducted to determine if significance was present for each daily total movement. Movement across all days provided the most significant levels between the third and forth days, but overall significance was present each day except the second and third day when comparing daily total movement to total movement.

Overall, those in the spontaneous/internalizer DMI style had the greatest amount of movement. This finding differed from previous tests by Coscarelli (1983).   A t test was conducted to determine if the means differed significantly between gender and

movement and no significance was evident (n=129). Statistical measures to determine if DMI style could be predicted by movement were not tenable. Additional linear regressions were conducted to determine if movement could be predicted by gender. This also was not tenable. An exception to this occurred when linear regressions were conducted between style and movement on the last day of total movement. This is a point at which movement is the least. On that day significance was present. This may provide evidence that by the third week of class, style is more predictable than it is in the first week of class.

Gender and movement did show that males tend to move more than do females, but t tests did not support any level of significance regardless of movement within row, between rows or total movement. Regression analysis did not present any evidence that movement can be predicted by gender.

To offset an exaggerated response to students anticipated grade in the course, performance on Exam I was analyzed with gender and movement. No significance was evident using t tests for gender and exam scores. A Pearson correlation coefficient was calculated for the relationship between exam score, DMI style and movement, no correlations were present.

A data analysis was conducted to determine the effect of gender upon style and the effect of movement on style. Movement was not correlated with any style; however, gender was related to the external style.

To better determine if seat choice could be predicted, seat location was recoded into rows. While no correlations were present between the style categories and the row, there was a negative moderate correlation between row and gender (r (145) = -.314, $p <$

.01). Based on the data, males tend to occupy the back rows with greater proportion then do women.

The factor analysis of the DMI was consistent with previous studies using Form L Internal reliability for all scales was low based on Cronbach's alpha.

CHAPTER V

DISCUSSION

This chapter will underscore the results of Chapter IV by providing the context in which the results belong. It will blend numerous statistical measures with findings and relate those findings to previous literature. To begin, each hypothesis and the associated research questions will be discussed with reference to their viability or limitations. Results will be compared and contrasted to previous works with deference to their immense variety of variables.   This chapter will also provide the study's limits and issues to better understand the implications of the study and to prepare for future studies with regard to student decision making, seating choice and movement.

Analysis of Hypotheses

Hypothesis I stated there is no significance between GPA, anticipated grade in the course, number of large classes, high school graduating class size and seat choice. Research questions one asked if there were preexisting variables that correlate with seating choice.

The lack of correlation between the other variables and seat choice suggests that students sit randomly within the classroom with regard to the size of high school they attended, their academic ability, class rank, and experience from other large classroom environments.

Two of the variables: reason for taking the class and seat selection were nominal in nature. Even though it was determined 44.1% of the students indicated they wanted to take the course and 41.6% indicated they chose their seat to sit next to someone they knew, the usefulness of that data in the correlation matrix was limited by the nominal format.

Based on the analysis of data hypothesis one is retained. At best weak correlations were present which may result from the Likert scale response. No evidence was found to suggest a relationship exists.

Hypothesis two asked if a relationship existed between seat choice and DMI style. Research question two asked are there variables that correlate with DMI style.

The logic behind this hypothesis centered on the assumption that it was not the seat that created the characteristic of the student, but rather the student brought that characteristic with them to the seat (Stires, 1980; Totusek & Staton-Spicer, 1982; Wulf, 1977). The studies suggest that other tendencies would be transported to the seat location, therefore, if one knew those tendencies, student's seat location or choice of seat could be predicted. With some reservations, this hypothesis was retained stating there is no relationship between seating location and DMI style. The findings of this study suggest that over a period time, students settle in their seat choice. Once that occurs, it may be possible to determine a style based on seat location based on less student movement. This observation is supported by Patton and Sawicki's (1993) research that suggests people tend to seek an optimal situation and by making repeated decisions arrive at some form of stability.

Decision making and the associated style was considered to be similar to other dimensions that have been studied if decision making style is characterized as a trait of the student. Motivation and self esteem (Holliman & Anderson, 1986; Rebeta et al., 1993) as examples are characteristics and traits that can be measured. In those motivation and self-esteem studies, students sitting in the front rows had significantly different traits than did those sitting in the back of the room. This study also suggests

differing styles between the front and back of the room, but diverges from earlier studies by monitoring movement over a three week period. While seat choice can not be predicted by DMI style initially, it may be possible to predict it later in a course. Studies that did not take place over a period of time or re-test subjects at a later date may be subject to a Type I error in causing rejection of the null hypothesis when they should have been accepted. Early characterizations of students might be subject to change over a period of time with respect to seat location.

Hypothesis three studied the relationship between gender and seat location. Clearly there were differences between gender groups. Males tended to exhibit a systematic/internal style, while women were systematic/externalizers. Differences among gender were also confirmed by Chi square tests (x^2 (1) = 5.80, $p < .05$).   There were also differences in seating location and choice. Males tended to sit further from the front than did women.

Only one study was found that discussed women with regard to DMI styles. In that study (Hardin & Leong, 2004), gender differences were not determined within style with the exception of the external category. In that case and with a similarity to this study, women had higher mean scores on the external scale than did men. In addition, Hardin and Leong's research also found, as did this study, no significant difference between men and women with regard to DMI categories.

Gender and DMI style were further analyzed using a 2 X 4 ANOVA and a significant main effect was evident (F (3, 143) = 3.778, $p < .05$). To further support this finding, t tests between the means of males and females for DMI styles were significant (t (143) = -2.72, $p < .05$), chi square goodness of fit tests (x^2(3) = 5.80, $p < .05$) were

significant across gender, and interaction between gender and styles, while not significant, were evident (Figure 9). Furthermore, correlation coefficients between males and females when tested within those groups provided a weak positive correlation between spontaneous/internal styles for men (r (87) = .285, p < .05) and among females between internal and external styles a correlation of (r (58) = -.400, p < .05).

Data suggest hypothesis three must be rejected for this study.

Hypothesis four looked at the relationship between seat choice and performance. Performance as a variable was initially provided by asking students to give their anticipated grade in the course. Students' responses clearly indicated they held high grade expectations. There was, however, a weak correlation between student reporting high school GPA and their Exam I grade (r (144) = .192), p < .05).

Seat choice was not correlated with high school GPA or anticipated grade. Evidence was present to support previous studies that seat choice and performance are related (Benedict & Hoag, 2004; Brooks & Rebeta, 1991; Griffith, 1921; Holliman & Anderson, 1986; Mercincavage & Brooks, 1990; Stires, 1980; Totusek & Staton-Spicer, 1982). Due to an overwhelmingly high response to anticipated grade, scores from the first exam were included to substantiate performance. Ninety three percent of respondents indicated they would receive an "A". Even though no correlation was present with seat choice and high school GPA, plotting the relationship between these distances and high school GPA (Figure 5) does show as distance from the front of the room increases, student reported high school GPA also decreases. This relationship may suggest that students with lower high school GPA's are inclined to sit further towards the back of the room and may sense the front of the room as a space of intimidation or discomfort.

Following this distance and high school GPA relationship, a plot of exam score with distance from the front of the room shows that as students move toward the back of the room, their level of academic performance diminishes (Figure 6). This is similar to the findings of Benedict and Hoag (2004).

A review of the mean distance by class rank may provide some support that students, particularly freshman, (m=24.41 feet) are intimidated by forward seating while juniors (m=21.84) and seniors (m=22.96) are less intimidated.

Based on the data, hypothesis four must be rejected. This study is in agreement with other studies, but recognizes that measurement techniques for performance may be inconsistent with other studies.

Hypothesis five states there is no significant difference between the DMI style and movement. Research questions three was associated with this hypothesis.

There is strong evidence to support that movement does diminish over time. Figure 9 clearly shows, for each movement category, movement diminishes over time. Through general linear model repeated measures and with paired-samples t tests, movement was shown to not only diminish, but to significantly diminish over a period of time. Without question, females tend to sit further forward, and to exhibit a systematic/external style. Males sit further back, exhibiting a systematic/internal style. Over a period of three weeks, evidence shows that females stabilize towards the front and males towards the back. It is therefore likely systematic/externalizers characterized as females are more likely to move toward the front of the room over time and male systematic/externalizers are more likely to move to the back of the room.

Movement is an expression of the consequence of choosing a seat. While Johnson (1978) and Coscarelli (1983) have determined those exhibiting the spontaneous style can easily move from one decision to another, this study differed from their research by showing the greatest amount of movement among systematic styles (56%) and the lesser movement within spontaneous styles (44%).

As a primary hypothesis, the determination that movement and style have some relationship is most closely aligned with DMI characterizations. According to previous studies (Coscarelli, 1983; Johnson, 1978; Johnson et al., 2007) there are distinct differences between DMI styles. The spontaneous style is characterized as reactionary. Those meeting that criteria are more likely to make quick decisions and more likely to let their first impressions dictate their decisions. A second element of being spontaneous is the ability to make quick decisions and, at times, make more than one decision at a time. This style can quickly assess the situation and react. Because the quickness of decisions and the ability to move from one to another, spontaneous individuals need to make a lot of decisions and thus require variety in those decision opportunities. Based on these criteria one could argue a spontaneous style would likely be less settled and require more movement within the classroom.

A systematic style will likely need detailed information to make a choice and will analyze each choice they make with a great amount of concern for making the correct choice. Because of the time needed to make these decisions they may be more likely to make fewer decisions, but the ones they do make are made with a degree of comfort. That is due to analyzing the alternatives and not making a decision until they are ready. In the end, a decision made by a systematic individual will be one that is maintained with

little variance. To process the decision, Johnson's DMI partitions the styles into two

categories. The externalizer needs to share their choices with others while the internalizer

does not.

Within the study movement population, the primary style was a

systematic/externalizer, followed by the systematic/internalizer which was inconsistent

with Coscarelli's model. Chi square test showed the observed sample differed from

Coscarelli's model, yet when compared to the hypothesized value there was no

significance.

Movement was analyzed using a method of movement within the rows, between

and a total movement values was the combination of both movement types. For

movement within the rows the spontaneous/externalizer had the greatest movement

followed by the systematic/externalizer. For movement between rows the

spontaneous/internalizer had the most movement followed by the systematic/internalizer.

Overall movement was greatest for the spontaneous/internalizer.

Given movement and styles the spontaneous style tends to have the greatest

degree of movement as might be expected. A linear relationship though is not apparent

($F(1,127) = .108, p > .05$), but if given more time it is possible one would exist. Initially

hypothesis five must be retained, but caution is initiated with the possibility of a Type II

error when we retain the hypothesis but should reject. It appears this hypothesis would

be rejected overtime with no possibility of a Type I error.

Hypothesis six suggests there is no relationship between DMI style and

performance. Correlations showed no relationship between either the raw DMI style

category or DMI style and exam I. Additional correlations with a reduced population as

used for movement, total movement, movement on the third and fourth day and movement on the seventh and eighth day also did not show any relationships. Based on the data of this study group, hypothesis six is retained.

The final hypothesis states there is no significant relationship between gender and movement. Research question three was associated with this hypothesis. Based on the data collected, men move more than women, but the movement was not significant within rows, between rows or in total movement when analyzed using an independent samples t test. In all movement categories, men move more than women with the greatest movement within the rows. A regression analysis (F (1, 127) = .190, P >.05) indicates a linear relationship does not exist between gender and movement. Again, as with hypothesis five, a Type II error may be possible when this hypothesis it is retained but should be rejected. Over time this hypothesis has the potential to be rejected with the possibility of a Type I error.

Summary of findings

Based upon the data, high school graduating class size, high school GPA, anticipated grade in the class, class rank, experience with large lectures, reasons for choosing the course and reasons for seat selection on the first day of class are not correlated with seat location or distance from the front of the room.

Making a prediction of DMI styles based on seat choice was not considered tenable in the early stages of the course. Another view is that student seating is random, with no characteristic clustered within any area of the classroom on the early days of the course. There was evidence that males sit towards the back of the room and exhibit a

systematic/internalizer style and that freshman sit towards the back of the room, but no significance was present.

Location was also an important element in determining performance. Based upon students' first exam score, it was clear those towards the front of the room performed better than did those in the back of the room. This negative relationship has been demonstrated by several studies (Benedict & Hoag, 2004; Brooks & Rebeta, 1991; Griffith, 1921; Holliman & Anderson, 1986; Mercincavage & Brooks, 1990; Stires, 1980; Totusek & Staton-Spicer, 1982). Seat location also differed between males and females. Given that males tend to sit near the back of the room and scored lower on exam one might surmise performance between males and females is influenced by seat location.

Gender was analyzed for relationships with DMI style and movement and even though differences were present between males and females they were not significantly different. Table 40 and Table 41 are provided as a quick reference to the outcomes of the hypotheses and the research questions.

Table 38

Hypotheses Table of Results	Outcome
Ho_1: There is no significant relationship between GPA, anticipated grade in the course, number of large classes, high school class size and seat choice.	Retain
Ho_2: There is no significant relationship between seat choice and DMI style.	Retain
Ho_3: There is no significant relationship between seat choice (location) and gender.	Reject
Ho_4: There is no significant relationship between seat choice and performance.	Reject
Ho_5: There is no significant relationship between DMI style and seat movement.	Retain

Ho$_6$:   There is no significant difference between the DMI style and   Retain
performance.

Ho$_7$:   There is no significant relationship between gender and movement   Retain

Table 39

Research Questions	Outcome
RQ$_1$: Are there preexisting variables that correlate with seating choice?	Yes
RQ$_2$: Are there variables that correlate with DMI style?	Yes
RQ$_3$: Can movement be predicted?	Yes

Note: * Indicates value changes over time and therefore in each case after a period of three weeks this response would be different

Ethnicity and Socioeconomic Status

This study included ethnicity, but did not include socioeconomic status (SES). Even though ethnicity was included it had a limited influence on the data. During the review of literature on classroom seating no studies were found that assigned race, ethnicity or SES as the dependent variable. One explanation for this omission is a possible homogenous population of subjects within the research population that excludes racial minorities, ethnic group members and multiple SES categories. According to Bogue and Aper (2000), the early classroom profile was predominately white, male and of European descent. That did not change until the mid twentieth century with the Servicemen's Readjustment Act of 1944 better known as the G.I Bill (Lucas, 1994), Brown v. Board of Education in 1954 (Roebuck & Murty, 1997), the lunching of Sputnik in 1957, the Civil Right Act of 1964, and the Higher Education Act of 1965 (Lucas, 1994; Roebuck & Murty, 1997).   It is likely, even though no student profile exists, that

Griffith's (1921) early study typified the profile described by Bogue and Aper. Altbach, Lomotey and Kyle (1999) state,

> During the 1970's, the numbers of underrepresented students in the undergraduate student population increased significantly. By the 1980's, however, the growth rate for most groups had slowed: in 1985, 87.3 percent of the student population was white, 8.1 percent was African American, 1.6 percent was Hispanic and 2.1 percent was Asian America… Members of underrepresented groups are still just that in higher education – underrepresented. (p. 451)

Additional evidence indicates that during the 1980's, SES paralleled race and ethnicity (Bogue & Aper, 2000). Today in all ethnic categories equalization has remained slow which indeed influences opportunities for balanced research emphasizing race, ethnicity or SES within classroom settings (Altbach et al., 1999).

The inclusion of race provides no insight into seating choice among different ethnicities. Further studies in more diverse settings may be necessary to better determine any relationship between seating choice and DMI styles. For this study the usefulness of race was limited due to the lack of representation within the campus population and the greater disproportionate representation of other races.

<center>Recommendations</center>

Environment plays a huge role in studies of this nature. In this study the classroom was only nine rows deep and 22 seats wide. A larger classroom with a less intimate setting could perhaps improve the variance. Classroom size among many other variables supports the problematic nature of classroom seating studies that was suggested by Montello (1988; 1992). Each classroom is different.

A first recommendation would be to study DMI style, movement and gender within a larger lecture hall that exceeds 22 rows. In fact, the larger the room the better chances for finding variance among the DMI styles and categories. It is likely even in that environment student movement would stabilize.

The DMI instrument is constantly being revised. Much of the revision is with regard to the low Chronbach alpha coefficients and validity issues. Form L is a direct outcome of revision since Form H, but after numerous revisions From L is a really a mirror of Form H. Little or no improvement in alphas or validity has been achieved through those revisions. But to discount the DMI because of these low values may not be valid. In this study, even though the DMI was administered outside of the normal career decision making usage, it still had similar alpha coefficients. Therefore, some stability seems to be present and continuing to apply the DMI to a variety of situations could improve the coefficients.

As mentioned previously, one of the reasons the DMI exhibits low alpha coefficients may be due to the nature of the spontaneous scale. It may seem ironic to implement the DMI with the spontaneous scale in light of the fact that the rational model is far removed from spontaneity. It does, however, address that even in the most rational of decision making situations and within a population of both rational and irrational possibilities, the rational model does not allow for irrational or spontaneous decisions. Because of the nature of spontaneity, establishing high alphas may never be realized.

Another possibility that could be tested is replacing the forced scale Likert response scale. The use of the forced scale Likert, while eliminating the centered response, avoids a central tendency response but encourages responses at the extremes.

Further uses of the DMI and corresponding internal consistency studies need to be conducted. Because this study differed from previous studies in some areas like gender and DMI style associations and general DMI categorical group sizes, additional studies within the same population might improve the consistency of the instrument for student decision making.

Gender, with regard to decision making, movement, performance, and seat location should continue as a line of inquiry. Without argument, this area shows promise that differences do occur between males and females with regard to DMI styles. In *Women's Ways of Knowing* (Belenky, Clinchy, Goldberger, & Tarule, 1986) the authors unravel the importance of intuition among women and the importance of using "firsthand experience" (p. 191) as a basic tool in forming decisions. That experience as Goldberger (1997) further explains is amplified in areas that to a degree may eventually help with understanding gender differences with regard to classroom seating. *Silence* may explain why females need to sit further forward to show engagement without verbalizing. Goldberger explains women may prefer to remain silent to protect their sense of self. As well *received knowing* may also lend support to forward seating by explaining that women do not place in high regard their processes of knowing and would rather conform to the norms of their gender. This may also help to explain forward seating among females. If they see others towards the front they may express their conformity by also choosing seat toward the front of the room. It would be a useful experiment to study a homogeneous population of females and as well one that is entirely comprised of males to compare with this study.

The usefulness of nominal data is also related to continual replication of the studies. This study can be improved and that improvement would center on the nominal categories. In addition, questions like anticipated grade tend to be answered with a positive outlook for success. After the first exam, asking this question again might create a greater range of responses.

A disappointing element of this study was the lack of diversity. In all previous studies the issue of heterogeneity is present. Most are in university settings where historically a homogeneous population exists. Another line of inquiry would employ a seating study at a more culturally diverse institution and perhaps one that is predominately African-American, which is in contrast to the present study population.

Looking at student seating with an emphasis on exactly why students sit where they sit and why they self-select in a sociometric approach might also be useful. As an example, further research into better knowing the relationships that exist either before a student enters the room or ones that evolve after they choose their seats might provide more information about student interactions. Questions that better explain student performance might include determining study habits of students in close proximity with regard to seat location, relationships that benefit student performance, interaction outside the classroom or living arrangement such as learning communities where groups of students live, attend classes and study together. In a similar line of inquiry, study needs to be conducted to better understand the intentions of students as they choose their seat. Are students aware that increased performance may be associated with forward seating? In a general sense, what do students know about a room and the benefits they may derive from seat choice?

Room architecture is another recommendation for study. As classrooms are being built, how should they be designed to better accommodate what researchers suggest are outcomes of seat choice? Many classrooms are symmetrical with the same number of seats in each row in the front as in the back. The marginalization of students as they sit further back might be decreased by designing classroom that get smaller with less seats toward the back and larger with more seats toward the front. Another interesting element of design that may have an effect of seat choice are the door locations. With rear doors movement is essentially unrestricted and students can come in late and leave early without any interruption to the lecture. However, in rooms with only forward doors movement is limited and seating could be influenced by where the lecture is presented. Students may self-select seats near doors so they can easily get in and out of the room rather than for the benefits those seats may provide in classroom performance.

One last line of inquiry that was noted in this study and worth continuing is movement within the classroom. If evidence is available to students that rearward seating is a detriment to their education, would that encourage them to move? Can an instructor, through repeated presentation of information regarding seating, create a sustained environment that is balanced for all students? As an example, from this study females tend to sit further forward than do males. It is also apparent that clusters of females extend beyond the first row to include several forward rows. If a margin of opportunity is present for females, is there room for an infiltration of males from the back of the room toward the front and would that movement influence females more than males? In that same line, could continual information about classroom seating as an experiment within the classroom, actually cause students to move?

Conclusion

It is ironic that studies of classroom seating and decision making styles are related to time. This study shows that over time student movement stabilizes to a point where style is almost predictable. There is a similar analogy that decision making, if given enough time, will also stabilize (Patton & Sawicki, 1993). Because of this study, there may be reason to allow students to settle over a period time prior to making any decisions with regard to seating charts, differentiation of in-class assignments and the time frame for examination.

There is also something that is provided from this study about teaching method. The all-to-one and one-to-all (Griffith, 1921) method does not have to be the standard method of delivery within a large classroom. Movement by the instructor might diminish the topography of a room by spending some of the class period within or toward the back of the room. In addition, efforts can be made to encourage participation from the back of the room, by merely knowing student's names and calling on them to engage in discussion.

By understanding what the researcher has observed, the likelihood of engaging in that research increases if the investigator is intimately tied to the unknown . This study does not answer all the questions about classroom seating, decision making and movement, but it does advance the potential for wanting to know more, not only by this researcher, but perhaps by others. It does build on previous studies even though that was never the intention. Knowing that seating choice is different among males and females, that decision making styles are not predictable initially, and that movement stabilizes over time are important findings.

This study opens a new line of research that can once again be built upon to better understand student seating choice. Gradually, it is possible that through this type of research one may be able to construct classroom content, participation, exams and seating arrangements in ways to enhance student learning.

This study adds to the discourse and presents one more piece of information that builds on existing knowledge.

References

Adams, R. S., & Biddle, B. J. (1970). *Realities of teaching: Explorations with video tape*. New York: Holt, Rinehart and Winston, Inc.

Altbach, P. G., Lomotey, K., & Kyle, S. R. (1999). Race in higher education: The continuing crisis. In P. G. Altbach, R. O. Berdahl & P. J. Gumport (Eds.), *American higher education in the twenty-first century*. Baltimore: Johns Hopkins University Press.

Arias, J. J., & Walker, D. M. (2004). Additional evidence on the relationship between class size and student performance. *The Journal of Economic Education, 35*(4), 311-329.

Armstrong, S., Hudon, C., Miller, H., & Davis, S. (1992). *Classroom seating preference and level of self-esteem*. Paper presented at the Southwestern Psychological Association Convention, Austin TX. (ERIC Document Reproduction Service No. ED346785).

Astin, A. W. (1977). *Four critical years*. San Francisco: Jossey-Bass.

Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco: Jossey-Bass.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs: Prentice-Hall.

Bartels, L. K., Bommer, W. H., & Rubin, R. S. (2000). Student performance: Assessment centers versus traditional classroom evaluation techniques. *Journal of Education for Business, 75*(4), 198-201.

Becker, F. D., Sommer, R., Bee, J., & Oxley, B. (1973). College classroom ecology. *Sociometry, 36*(4), 514-525.

Belenky, M. F., Clinchy, B. M., Goldberger, N. R., & Tarule, J. M. (1986). *Women's ways of knowing: The development of self, voice, and mind*. New York: Basic Books.

Benedict, M. E., & Hoag, J. (2004). Seating location in large lectures: Are seating preferences or location related to course performance. *The Journal of Economic Education, 35*(3), 215-231.

Bogue, E. G., & Aper, J. (2000). *Exploring the heritage of American higher education: The evolution of philosophy and policy*. Phoenix, AZ: The Oryx Press.

Brooks, C. I., & Rebeta, J. L. (1991). College classroom ecology: The relation of sex and student classroom performance and seating preference. *Environment and Behavior, 23*(3), 305-313.

Brown, R. (2005). *Rational choice and judgment*. Hoboken, NJ: John Wiley and Sons.

Buchmann, C., & DiPrete, T. A. (2006). The growing female advantage in college completion: The role of family background and academic achievement. *American Sociological Review, 71*(4), 515-542.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah: Lawrence Erlbaum Associates.

Coscarelli, W. C. (1983). Development of a decision-making inventory to assess Johnson's decision-making styles. *Measurement and Evaluation in Guidance, 16*(3), 149-160.

Coscarelli, W. C. (in press). *The decision-making style inventory: Facilitator guide*. San

    Francisco, CA: Pfeiffer.

Coscarelli, W. C., Stepp, S. L., & Lyeral, R. (1989). Relationship of blood type with

    decision-making style and personality type. *The Mankind Quarterly, 29*(4), 307-

    327.

Cronk, B. C. (2006). *How to use SPSS: A step-by-step guide to analysis and*

    interpretation (4th ed.). Glendale, CA: Pyrczak Publishing.

Daly, J. A., & Suite, A. (1981). Classroom seating choice and teacher perceptions of

    students. *Journal of Experimental Education, 50*(2), 64-69.

Douglas, D., & Gifford, R. (2001). Evaluation of the physical classroom by students and

    professors: a lens model approach. *Educational Research, 43*(3), 295-309.

Edney, J. J. (1974). Human territoriality. *Psychiatric Bulletin, 81*, 959-975.

Einhorn, H. J., & Hogarth, R. M. (1981). Behavior decision theory: Processes of

    judgment and choice. *Annual Review of Psychology, 32*, 53-88.

Glasser, W. (1997, November). Choice theory and student success. *The Education*

    Digest, 63, 16-21.

Goldberger, N. R. (1997). Ways of knowing: Does gender matter. In M. R. Roth (Ed.),

    Women, men & gender: Ongoing debates

 New Haven: Yale University Press.

Griffith, C. R. (1921). A comment upon the psychology of the audience. *Psychological*

    Monographs, 30, 36-47.

Gump, P. V. (1987). School and classroom environments. In D. Stokols & I. Altman

    (Eds.), *Handbook of environmental psychology* (pp. 698-701). New York: Wiley.

Guyot, G., Byrd, G. R., & Caudle, R. (1980). Classroom seating: An expression of situational territoriality in humans. *Small Group Behavior, 11,* 120-127.

Hardin, E. E., & Leong, F. T. L. (2004). Decision-making theories and career assessment: A psychometric evaluation of the decision making inventory. *Journal of Career Assessment, 12*(1), 51-64.

Hastie, R. (2001). Problems for judgment and decision making. *Annual Review of Psychology, 52*, 653-683.

Hillmann, R. B., & Brooks, C. I. (1991). Differences in self-esteem of college freshmen as a function of classroom seating-row preference. *Psychological Record, 41*(3), 315.

Holliman, W. B., & Anderson, H. N. (1986). Proximity and student density as ecological variables in a college classroom. *Teaching of Psychology, 13*(4), 200-203.

Johnson, R. H. (1978). Individual styles of decision making: A theoretical model for counseling. *The Personnel Guidance Journal, 56*, 530-536.

Johnson, R. H., Coscarelli, W. C., & Johnson, J. (2007). *Learning from work experience: The decision-making model*: Jossey-Bass: Pfeiffer.

Kitagawa, T. (1998). The latent four-zone structure in classroom seating space. *Japanese Psychological Research, 40*(1), 40.

Koneya, M. (1976). Location and interaction in row-and-column seating arrangement. *Environment and Behavior, 8,* 265-282.

Levine, D. W., O'Neal, E. C., & McDonald, P. J. (1980). Classroom ecology: The effects of seating position on grades and participation. *Personality and Social Psychology Bulletin, 6*(3), 409-412.

Lounsbury, J. W., Sundstrom, E., Loveland, J. M., & Gibson, L. W. (2003). Intelligence, "Big Five" personality traits, and work drive as predictors of course grades. *Personality and Individual Differences, 35*, 1231-1239.

Lucas, C. J. (1994). *American higher education: A history*. New York: St Martin's Griffin.

Martin, J. H., Montgomery, R. L., & Saphian, D. (2006). Personality, achievement test scores, and high school percentile as predictors of academic performance across four years of coursework. *Journal of Research in Personality, 40*, 424-431.

Maslow, A. (1987). *Motivation and personality* (3rd ed.). New York: Harper and Row, Inc.

Mayo, M., & Nicholas, C. (1999). Gender, race, and performance expectations of college students. *Journal of Multicultural Counseling & Development, 27*(2), 93-105.

Mercincavage, J. E., & Brooks, C. I. (1990). Differences in achievement motivation of college business majors as a function of year in college and classroom seating position. *Psychological Reports*(66), 632-634.

Mills, C. W. (1959). *The sociological imagination*. New York: Oxford Press.

Montello, D. R. (1988). Classroom seating location and its effect on course achievement, participation, and attitudes. *Journal of Environmental Psychology, 8*, 149-157.

Montello, D. R. (1992). An effect of seating location on course achievement?: Comment on Brooks and Rebeta. *Environment and Behavior, 24*(3), 396-399.

N.A. (2000). Profile of general demographic characteristics: 2000. Retrieved October 24, 2006, 2006, from http://www.census.gov/prod/cen2000/dp1/2kh00.pdf

N.A. (2006a). Comparison of total fall enrollments by student level. Retrieved February 14, 2007, from http://registrar.missouri.edu/Statistics-Student_Information_and_Reporting/Fall_2006/Fall_2006_Enrollment_Summary.htm

N.A. (2006b). MU Enrollment Demographics. Retrieved February 20, 2006, from http://ir.missouri.edu/enrollment/e1-a.xls

N.A. (2006c). Percentage distribution of students enrolled in degree-granting institutions, by race/ethnicity: Selected years, fall 1976 through fall 2004. Retrieved October 24, 2006, 2006, from http://nces.ed.gov/fastfacts/display.asp?id=98

Neufeldt, V., & Guralink, D. B. (Eds.). (1988). *Webster's new world dictionary* (3rd ed.). New York, NY: Simon and Schuster.

Patton, C., & Sawicki, D. S. (1993). *Basic methods of policy analysis and planning* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Pedersen, D. M. (1994). Privacy preferences and classroom seat selection. *Social Behavior & Personality: An International Journal, 22*(4), 393-398.

Piper, R. (1978). *A comparative, factor-analytic study of the Jungian type survey and Johnson's decision making inventory.* Unpublished Doctoral Dissertation, Southern Illinois University, Carbondale, .

Rebeta, J. L., Brooks, C. I., O'Brien, J. P., & Hunter, G. A. (1993). Variations in trait-anxiety and achievement motivation of college students as a function of classroom seating. *Journal of Experimental Education, 61*(3), 257-267.

Ridgell, S. D., & Lounsbury, J. W. (2004). Predicting academic success: General intelligence, "Big Five" personality traits, and work drive. *College Student Journal, 38*(4), 607-618.

Robbins, S. B., Allen, J., Casillas, A., Peterson, C. H., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of Educational Psychology, 98*(3), 598-628.

Roebuck, J. B., & Murty, K. S. (1997). Historically black colleges and universities: Their place in American higher education. In L. F. Goodchild & H. S. Wechsler (Eds.), *The history of higher education* (2nd ed.). Boston, MA: Pearson.

Schwebel, A. I., & Cherlin, D. L. (1972). Physical and social distancing in teacher-pupil relationships. *Journal of Educational Psychology, 63*(6), 543-550.

Scott, J. (2000). Rational Choice Theory. In G. Browning, A. Halcli & F. Webster (Eds.), *Understanding contemporary society: Theories of the present* (pp. 126-138). Thousand Oaks: Sage.

Simon, H. A. (1976). *Administrative Behavior* (3rd ed.). New York: The Free Press.

Simon, H. A. (1993). Decision making: Rational, nonrational and irrational. *Educational Administration Quarterly, 29*(3), 392-411.

Sommer, R. (1967). Classroom ecology. *The Journal of Applied Behavioral Science, 3*(4), 489-503.

Stires, L. (1980). Classroom seating location, student grades, and attitudes. *Environment and Behavior, 12*(2), 241-254.

Stone, D. (2002). *Policy paradox: The art of political decision making*. New York: W. W. Norton & Company, Inc.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: University of Chicago Press.

Tinto, V. (1997). Classrooms as communities: Exploring the educational character of student persistence. *Journal of Higher Education, 68*(6), 599-623.

Tinto, V., & Goodsell, A. (1994). Freshman interest groups and the first year experience: Constructing student communities in a large university. *Journal of Freshman Year Experience, 6*, 7-28.

Totusek, P. F., & Staton-Spicer, A. Q. (1982). Classroom seating preference as a function of student personality. *Journal of Experimental Education, 50*(3), 159-163.

Vaught, D. R. (2005). On-line quizzes: Putting technology to work to aid student performance. *Schole: A Journal of Leisure Studies & Recreation Education, 20*, 18-28.

Wulf, K. M. (1977). Relationship of assigned classroom seating to variables. *Educational Research Quarterly, 2*(2), 56-62.

Appendices

        A – Form L

        B – Permission to use DMI

        C – DMI Instruction manual

        D – Institutional Review Board approval

        C – Recruiting form

D – Written Consent