Maps of routes to destinations and their utility for direction giving

by

Clifford James Gentry

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Program of Study Committee:
Paul Bruski, Major Professor
Sunghyun Kang
Frederic Malven

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ABSTRACT

How does one indicate objects in a drawn map while they are traveling to a specific destination? How are these notations, which are frequently anecdotal in nature, understood by those who are not familiar with the environment? This two-phase study examines qualities of hand-drawn maps drawn by subjects while en-route towards a specific destination. Next, another participant (who is unfamiliar with the geographic area drawn on the map) tests the accuracy of the map and its notations as the participant navigates the route drawn on the map. Using categorical coding and content analysis of the items noted on the map, statistical analysis is used to find correlations of activities and landmarks along one's path in a Midwestern university campus and community.

The first step towards getting somewhere

is to decide that you are not going to stay where you are.

– Dora the Explorer

CHAPTER 1. OVERVIEW

The information in this thesis can be divided into three areas: First, the literature review establishes a foundation of perceptual theory, environmental cognition, cognitive mapping, semiotics, and cartographic codification. Next, the researcher introduces the procedures to be used in the two phases of this study. Data collection included the collection of maps drawn by participants as they venture towards and assigned destination point and return to their point of origin. Data from the notation on these maps were coded and interpreted. Finally, these maps were given to participants who were not familiar with the area, where they were asked to follow the route indicated on the map, while being observed by the researcher.

Statement of the Problem

Determining the exact location of an unknown, yet specific point, such as a destination, one could use a variety of approaches to discover how to get there. Electronic devices, such as those using data from global positioning satellites (GPS) are found in mobile phones, vehicles, as well as a device itself. Computer programs and applications, such as Google Earth and Mapquest, will provide point-to-point directions from a specific origin to destination, often noting points of interest along the way. However, everyone has experienced when these directions are incorrect and guide one towards a dead end along a country road. Some people may utilize the digital technology to provide an accurate time of arrival, but then refer to a physical (cartographic) maps for guidance. What happens when you have someone else provide a map – one that they drew

themselves – for you to use for navigational purposes? How does one interpret the notation on this map? What if some of the elements drawn and indicated on the map are not understood by the the person using the map for navigation? How does one take the information from this map and extrapolate the information provided by someone into practical information used to navigate? What are some of expected differences between imagined maps and those used for navigation?

The purpose of this study are twofold: First, the study will collect the drawn maps of subjects while on a round trip to a specific, assigned destination point. At this point, the maps will be evaluated and coded for content and meaning. Secondly, test the maps by observing how they were interpreted and responded to by other participants taking the same route. Given the complexities and various layers that can be embedded both in the map and by the individual using the map, this study is given the rare opportunity to observe the multiple facets of the mapping process.

Objectives

The objectives of this study include the following:

1. Identify the differences between maps used for navigational purposes and mental maps.
2. Identify whether the notations on the maps are understood when used for navigational purposes.

3. Identify whether students who are applying for a professional design program have specific drawing styles that those students who are applying for a different design program.

Research Questions

The central aim of this study focused on the elements indicated on drawn maps and how they are understood when used for navigation. The following research questions were addressed in this study:

1. What are the different categories of drawn cognitive maps? How can these maps be categorized?

2. How does one interpret/translate the drawn cognitive map of another person (through symbology, cartography, directions)?

3. When a drawn cognitive map is used for navigational purposes, how does one interpret the inconsistencies and confusing notations?

Scope

This study consists of two phases. The first phase focuses on the drawn map of subjects while en-route to an assigned destination. The second phase utilized participants who where unfamiliar with the Ames, IA environment, and took the drawn maps from Phase 1 and tested the accuracy, comprehension, and coherence of the hand-drawn maps.

The subjects for Phase 1 of this study were enrolled in DSN S 183, Spring Semester 2012 at Iowa State University in Ames, IA. This course, Design Cultures, is part of the preprofessional Core Design Program for the College of Design. All incoming

freshmen and transfer students must complete the Core Design Program prior to application for the professional degree programs within the College of Design (2011). Additionally, the College of Liberal Arts and Sciences lists DSN S 183 as a Liberal Arts and Sciences General Education Area for the 2011–2012 academic year (CollegeOfLiberalArtsSciences, 2011).

This course is a three-hour lecture course, (3 cr.) for the Spring 2012 term, and meets on Tuesdays and Thursdays, from 12:40pm-2:00pm, and is taught by Associate Professor Michael Martin, from Landscape Architecture. Professor Martin is supported by five graduate teaching assistants, one of whom was the author/researcher of this thesis. This course requires subjects to attend lecture twice weekly, complete three out-of-class projects, and three in-class exams and a final exam.

This project is created by the researcher as the third out-of-class project. The researcher designed and developed the project for the undergraduate students with dual intentions: first, it covers a subject matter that is part of the curricula for this course [which is the introduction of the environmental principles of Kevin Lynch from his seminal work, *The Image of the City* (1960)], and introduces the students to the foundations of cognitive mapping. Secondly, the project provides the foundation for this graduate thesis project. The researcher met with Professor Martin on several occasions to obtain input and constructive criticism in developing the project and confirming and assuring that the project scope and objectives fall within the parameters and course objectives. Additionally, the researcher met with his thesis advisor, Associate Professor

Paul Bruski, Graphic Design, for guidance, support, and supervision of the design of the course project for a graduate research project.

The enrollment for DSN S 183 for Spring 2012 is 334 undergraduate students, all enrolled at Iowa State University. All of the subjects are required to complete the project as it stated assignment in the course syllabus, and is distributed to the students on the first meeting day of the semester. Subjects are all undergraduate level and have either little to no design skill sets. The gender of the subjects, as naturally occurring among subjects, is either male or female. The subjects' age range is 17-55, and the majority of the subjects intending to apply for a professional degree program within the College of Design; the remainder of the subjects are fulfilling a General Education requirement for the College of Liberal Arts and Sciences.

Prior to presenting the project, the researcher was asked to be a guest lecturer for DSN S 183. The lecture consisted of an introduction of Lynch's concepts in *The Image of the City* (1960), and to provided introductory foundations of cognitive mapping. After an hour of lecture, the researcher presented the project to the subjects. Subjects were introduced to this project in-class on Thursday, April 12, 2012; the project was to be submitted complete, in class on Tuesday, April 24, 2012 at 12:40pm.

The participants for Phase 2 of the study are individuals who live within the Des Moines, IA metropolitan area and indicate they are not familiar with the campus of Iowa State University and the Campustown neighborhood.

CHAPTER 2. REVIEW OF LITERATURE

Introduction

The first part of this thesis discusses the foundations and backgrounds of philosophical origins of mental maps, environmental perception and cognition, spatial navigation, semiotics, and cartography as a form of graphic communication. It demonstrates how all of these elements facilitate the drawing of a map and how one understands and interprets the embedded meanings within the drawn map.

Philosophical Origins

In addition to being known as a theoretical philosopher, Kant is also known as an enthusiastic geographer, influencing the frameworks of both philosophy and geographic space and their relationship towards the world (Richards, 1974). Kant argues that geographic space serves as a framework for the coordination and collaboration of individual experiences of the world. These concepts, as further noted by geographers, lead to the notion of cognitive or mental maps – a psychological learning theory. Several of Kant's writings provide an introduction to the relationship between the individual, space, geographical space, and spatial orientation and mental maps (Richards, 1974). Kant further states geographical data are meaningless unless the individual can coordinate them in his mind, and only if these constructs are coordinated as part of a spatial framework with an *a priori* construct:

> One says of a person who has travelled much, that he has seen the world. But there is more to the knowledge of the world than just seeing it. Whoever wants to profit from his journey must draw up a plan beforehand and must not just regard the world as an object of the outer senses. (Richards, 1974)

Early Perceptual Theory

Kant (1781) argues that there is no way for humans to comprehend the nature of "reality" except as an interpretation of their encounters with the world. Thus, Kant finds it impossible to separate completely the acts of knowing from the contents of knowledge. Knowledge can never exactly represent what is real: what we take to be real is a product of the act of knowing.

A mid-twentieth century philosopher, Cassirer (1944, 1955), identifies three levels of spatial knowledge: active, perceptual, and symbolic space. One could construe this as an argument that spatial knowledge exists at three orders of temporal integration. At the first level, quick temporal co-occurrences make possible the manipulation of objects and hand-eye coordination. Secondly, less close-packed sensory encounters allow the assembly of the routes and maps of spatial representations. Finally, the development of symbol systems allow a construction of fantasy arrangements of line and space mapped out in angstroms or light-years. At the symbolic level, perceptual space is "re-modeled" in a way that permits coordination, communication, calculation, and extrapolation.

This concept of "a plan beforehand" has similar qualities to present-day mental or cognitive maps. Trowbridge (1913) first publishes a paper addressing the issue of geographic orientation, and addresses the significance of his terminology of "imaginary

maps". Thirty-five years after that publication, Tolman introduces the notion of the cognitive map into his field of behavioral psychology (1948). Tolman utilizes the processes of mental (or cognitive) maps of rats within a maze, using food to lure the rat to complete the maze. Tolman increase the complexity and skill level of the maze, each level becoming increasingly more complex. The rat, having similar brain processes a human, recalls and responds to the cues and routes, builds upon its cognitive map, which is based on prior route knowledge.

Environmental Perception

Ittelson (1973), an environmental psychologist states that individuals appear to organize perceptual responses to the environment around five identifiable and interrelated levels of analysis: affect, orientation, categorization, systematization, and manipulation.

If perception, considered as experience, is complex, so is it complex when viewed as directive action. Understanding the total environment network within which perceiving takes place, both as information sources and arena for action, is the essential first step in unraveling this complexity. Ittleson states:

> One characteristic, which the evolutionary and the psychological question had in common, was the relational focus between perception and the external environment. In very general terms, one fundamental feature of perceiving was that it was of appropriate relevance to a situation in which it occurred… differences emerged as soon as attempts were made to specify relevancy or appropriateness. (1973, p. 6)

Most experimental studies of perception use the traditional criterion for assessing relevance to the situation: the comparison of a psychological response with a physical measure.

Three very general conclusions are offered on the nature of perception. First, perceiving is relatively free from direct control by the stimulus. Second, that it is inseparably linked to, and indeed indistinguishable from, other aspects of psychological functioning. Third, and perhaps paradoxically, that perceiving is relevant and appropriate to the environmental context in which it occurs.

The object-environment distinction is crucial. Objects require a subjects-object duality, or consider the object as a "thing". In contrast, one can only be a participant – not the subject – of an environment, or a non-self. The very distinction between self and non-self breaks down: environments surround, enfold, engulf, and nothing and no one can isolate and identify as standing outside or apart from it.

Ittleson continues to provide four characteristics of environments: first, environments surround. The quality of the surroundings force the observer to become a participant. One cannot passively observe the environment: one actively explores the multi-modal aspects. Secondly, environments are peripheral, and provide central information, which was always present, as well as central, peripheral information. Third, environments always provide a surplus of information that could possibly be processed.

Later Ittleson states additional perceptual stimulus properties can be identified: the role of action and purpose; the presence of meanings and motivational messages; and the concept of ambiance (1973). There is little reference to Ittleson and his work in

graphic design; whatever their relevance to the field. First, graphic design is absorbed perceptually, specifically through the visual senses: the physical nature stimulates a person's senses, where they may begin to interpret the function of type of space one is in. For example, if sensory factors such as olfaction (smell) and audition (hearing) are present, a person attempts to assume they are in an environment which normally provide these sensations, such as restaurant; if a person visually recognizes directional cues, such as wayfinding or signage, a person might be in an environment where the circulation path is restricted or controlled, such as a train station or airport. Ittleson's four characteristics of environments also contribute information to assist with the interpretation of the specific interior environment a person is experiencing.

Cognition of the Environment

Urban planner Kevin Lynch developed the seminal work on environmental cognition entitled, *The Image of the City* (1960). In this work, Lynch identifies multiple cues and methods one uses to structure and identify an environment. These sensory cues provide an orientation within a space in addition to maintaining a consistent orientation. Information from the external environment, if recognized, is read as visual related symbols or recognized patterns, which are later grouped together to create an experience. Lynch states:

> To become completely lost is perhaps a rather rare experience for most people in the modern city. We are supported by the presence of others and by special wayfinding devices… But let the mishap of disorientation once

> occur, and the sense of anxiety and even terror that accompanies it reveals to us how closely it is linked to our sense of balance and well-being. The very word "lost" in our language means much more than simple geographical uncertainty; it carries overtones of utter terror. (1960, p. 4)

This concept leads to the development of a process called wayfinding, which Lynch states:

> The strategic link is the environmental image, the generalized mental picture of the exterior physical work that is held by an individual. This image is the product both of immediate sensation and of memory of past experience, and it is used to interpret information and to guide action. (1960, p. 4)

Lynch (1960) identifies five environmental elements which utilize the creation of a familiarity and spatial connection. These elements – paths, edges, districts, nodes, and landmarks – allow a user to create reference points based upon mental models within the spatial environment. These five elements, Lynch states, have the ability to fluctuate from one state to another, as the user circulates through the space.

The environmental image can act as a spatial organizer and provides the ability to create distinct patterns within specific environments, which dictate the order of knowledge of the identical or similar spaces. The symbolic organization of environments and landscapes potentially create a decrease in emotional fear between the user's relationship with the complete environment.

Defining "Place" versus "Space"

Norberg-Schulz (1971) proposes a difference between the concept of place and space. "Place" has a specific, concrete presence – natural or man-made – or could be experienced as environments that have particular characteristics or qualities. "Spaces" has three-dimensional organizational elements that occupy place. Frequently, the layperson interchanges the terminology of "place" and "space." Norberg-Schulz provides examples which help distinguish this terminology based upon the principles introduced by Lynch (1960). Although a person may understand there *is* a distinction between "place" and "space", Norberg-Schulz addresses major differences between the two concepts of "place" and "space" is driven by the functionality and location of the environment: whereas Lynch focuses on more geographic, outdoor environments through paths, edges, districts, nodes, and landmarks.

Norberg-Schulz (1971) divides places into three elemental components: center, path, and domain. Centers are places of action where particular activities are carried out and areas of social interaction. Centers are also identified as points of departure for orientation and allowed one to "take possession of the environment." Norberg-Schulz believes that the concept is best suited for the interior environment since domains, in his opinion, don't carry the large area connotations of districts (i.e.: they are smaller in scale). Despite the difference in scale, the concept is nearly interchangeable with Lynch's "districts."

Paths are identified by Norberg-Schulz as places situated within larger contexts and cannot be understood in isolation. Paths are described by their continuity and

proximity to defining elements. Paths are a linear direction, which require users to follow specific goals, and are only indicated as an intended direction. Paths divide environments into areas that are more or less well known.

Domains are located within paths: they are defined by closure or by proximity, and obtain certain unifying functions in existential space that "fill out" the image and allow it to become more coherent. Domains additionally function as potential places for people's activities, and are influenced by physical, functional, social, and cultural factors.

The View From the Road

Urban planners Appleyard, Lynch and Myer (1964) analyze landscapes from the perspective of a driver who sequentially drives along a highway. Appleyard states that the sensation of driving (or moving through any particular space) is primarily based upon motion and space, and provides continual sequences. These sequences consist of numerous elements, grouped into progressive visual processes and perceptions. Furthermore, these visual perceptions are grouped into identifiable objects, using specific sensory experiences such as color, texture, and motion. Appleyard believes these elements are perceived over extended periods of time, and their meanings and perceptions are organized at a higher level as complex sequences, rather than simple and specific forms.

Appleyard states that perception processes are not sub-dividable: interrelated events can occur either sequentially or simultaneously. Appleyard believes that observed experiences are reversible and sequential. These observed events guide how a person goes from one event to the next event; they can be further recognized in the reverse order

if the same return route is taken. These sequences create an experience consisting of numerous elements and are grouped according to their perceived progression.

Actual locomotion in space appears to be an essential condition for the construction of spatial representations (Carr & Schissler, 1969; Lee, 1968; Kevin Lynch, 1960). Appleyard (1970) finds the degree of direct contact with an environment (e.g.: driving a car as opposed to being driven in a bus, or the length of residence) is directly related to the quality of the produced spatial representation. By actively observing and perceiving an environment (such as when a person is driving and scanning the landscape), one efficiently comprehends the environment than if one were a passive member and not responsible for receiving location and environmental cues. Hence, a person walking through an environment would better comprehend a space better than one driving through the same environment; however, one driving through a space would better understand a space better than the passive passenger in the same mode of transportation.

Knowledge can be directly related to previous experience through the same space or by comparing the experience to other similar environments. For example, the procedure one uses to circulate through a retail environment is generally consistent from store to store, such as comparing one grocery store chain to another grocery store chain. However, when comparing cross-genres, such as a retail environment/grocery store to an institutional environment, such as an elementary school, would not facilitate understanding of the spatial circulation.

Therefore, the "filmstrip" concept previously discussed is in constant perceptual adjustment, based upon the relationship between reality and its appearance as the result of individual interpretation. The designer eventually becomes responsible for the organizational transitions, either direct or ambiguous, and the points of entry, either static or dramatic. Bloomer and Moore creatively identify "the choreography of arrival at the house (the *path* to it) can send out messages and induce experiences which heighten its importance as a place" (1978, p. 78).

Combining Heft and Wohlhill's (1987) concept of "retinal snapshots" with theories of Hillier and Hanson (1988), which are based upon the nature of human interaction with the built environment, the view of structured space becomes very different. Hillier and Hanson identify buildings as transformations of space through objects; the ordering of space in buildings is actually concerned with the ordering of relations between people.

Route-Learning Mechanisms

Psychologists Siegel and White (1975) identify mechanisms used to foster and facilitate the learning of predetermined routes. "Recognition-in-Context-Memory" is the prominent role of landmarks in early spatial representation and appears to require a special kind of figurative memory. A person must understand something significant about that landmark: what it implies, what it is next to, when it last occurred, and what its connection is with other landmarks.

Route-learning can be learned through one's conventional sensorimotor system. Although the Siegel and White are not in the position of providing a formal analysis of

what this specific system is, it is likely possible to identify elements or characteristics of what the system must contain: a route must involve a sequence of decisions – generally, changes in direction; and knowledge of a route conceivably exists through a type of serial learning – a memorized series of decisions as established through repetition of the route.

Learning between landmarks is, to some extent, incidental and irrelevant except to the extent that intermediary landmarks serve as course-maintaining devices (where landmarks associated with no change in heading). Pattern-learning involves locating oneself along a number of routes by a system of landmarks. These routes with termini become interrelated into a network-like assembly as a function of repeated experience, temporal integration, and sustained meaningfulness (Siegel & White, 1975).

A distinction should be made between the relationship between route and survey knowledge. Route knowledge is a set of procedures to describe how to get from here to there: survey knowledge is a picture-like image of spatial layout (Sholl, 1987). Thorndyke and Hayes-Roth (1982) provide evidence that direct experience produces route knowledge; map learning, on the contrary, produces survey knowledge of environmental layouts.

Ecological Cognition

Starting with Gould (1966), geographers began to show an interest in the mental map. Gibson (1979) suggests an ecological approach to cognition, which contrasts greatly to that of mainstream definitions and views. Gibson states that perception is direct, immediate, and does not need internal informational processing. Essentially, this approach is an external process of interaction between an organism and its external

environment. Gibson's approaches and implications (1979), as defined by Heft (1996), restate Gibson's ecological approach and discuss its implication to the construction of cognitive maps in general and specifically to the issue of wayfinding. Heft continues to state that main stream cognitive sciences are essentially Cartesian in nature and have not as yet internalized the implications of Darwin's evolution (1996). The approach, as envisioned by Gibson, attempts to do this directly. Heft introduces the basic terminology of Gibson's ecological approach and relates it to various notions, specifically *optic flow, nested hierarchy* and *affordances*, which are linked to navigation and the way routes and places within the environment are learned (1979).

Cognitive/Mental Mapping

What are Cognitive Maps?

Psychologists Downs and Stea (1973) identify a cognitive map as a process composed of a series of psychological transformations by which an individual acquires, stores, recalls, and decodes information about the relative locations and attributes of the phenomena in his daily environment. Cognitive maps, in the most general definition stated by Kaplan (1973), are mental constructs which are used to understand and know the environment. They assume that people store information about their environment, then use cognitive maps to make spatial decisions.

The term cognitive map refers to the knowledge a person has about environmental and spatial relationships through the process of coding and retrieving information within a person's mind (Kitchin & Blades, 2002). The terminology "cognitive map" is a

conceptual umbrella to which more specific taxonomy is developed to refine the genre of a specific discipline. Some of the different terminology that describes specific applications of cognitive maps include: cognitive representations (Downs & Stea, 1973), environmental images (Kevin Lynch, 1960), mental images (Pocock, 1973), and mental maps (Gould & White, 1986). The terminology "map" does not imply that one has a physical map stored in their head, but represents an encoded representation of the environment (Kuipers, 1982). However, Kitchin and Blades (2002) state, the terminology of "map" is used to emphasize the distinct representations of spatial relations. Tversky (1992) further claims a cognitive map is the underlying cognitive apparatus that changes behavior.

The formation of cognitive maps begins as information about relative locations of spatial landmarks is picked up as a person circulates through the environment. Because these landmarks have a spatial separation, the information received is often sequential (Sholl, 1987). Cognitive maps also reflect information about the hierarchical arrangement of points within space, with respect to size, and their relationship to the geographic environment (G. W. Evans & Pezdek, 1980; Stea, 1969).

Downs and Stea (1973) further state that cognitive maps are "convenient shorthand symbols that we all subscribe to, recognize and employ." These maps do not have to be performed consciously, but can be if necessary; they are in effect a mental representation of the spatial environment knowledge.

Stea and Blaut (1973) state that the perceived environment of the viewer and believed a cognitive map acted as a construct that enables a person to predict an

environment which is too large to be perceived at once. These smaller environmental experiences can be integrated into a matrix, a collection of new experiences. Downing argues that cognitive maps can transcend past and future experiences. Cognitive maps:

> Suspend impressions, thoughts, feelings and ideas until, for some reason, consciously or unconsciously, the mind solicits, changes, and often distorts or manipulates its contents for some immediate purpose. In this way cognitive maps (images) allow us to bridge time, by using past experiences to understand present and future situations. (Downing, 1992)

Wood and Beck (1990) explain that cognitive maps are not just a set of spatial mental structures denoting relative position: they contain attributive values and meanings. The cognitive map is not independent of meaning, role, function, need, end, or purpose. According to Kaplan, cognitive maps include knowledge about places as well as knowledge of spatial relationships. Kaplan further identifies cognitive maps that are in effect "representations of objects and their associations" involving motivational information (1973). Spencer and Blades (1986) examine the relationships between behavior and the environment, including the integration of "images, information and attributes about an environment."

While the implications extend beyond the boundaries of age, Spencer, Blades, and Morsley (1989) examine the cognitive maps of children. They state:

> Cognitive maps are not isolated and contextless entities: they are formed during purposive activity in the everyday world of the child, and, in as much as they encode the resources, valued friends, memories, and aspirations as well as

the factual information about geographical layout and routes, they should perhaps be described as cognitive/affective maps.

Cognitive maps, according to Golledge and Timmermans (1990), are in effect a series of knowledge structures which consist of different levels of detail and integration that develop with age and education, thus increasing the information held. Moore and Golledge (1976) argue that cognitive maps are not independent of time and space and that "since each environment exists in a time-space context, so will cognitions of those environments."

Cognitive Maps and Spatial Navigation

Lynch and Rivkin (1959) create an experiment asking subjects to perceive their landscape while taking a walk around the block. This is believed to be the first study of urban perception where responses have been recorded while circulating through the city itself. Subjects were interviewed either following the walk or several days later to describe their recall through verbal interview and photographic recognition. Both "native" subjects, those familiar with the specific space, and "newcomer" subjects, those not familiar with the specific space, were used and compared to determine the significant differences between experiences.

Lynch and Rivkin conclude that both the native and the newcomer identify *what* is worth noting; however, significant differences appear in their organizational methods. The more familiar subjects create connections and do not break the space into isolated parts: whereas novice subjects tend to break the experience into separate parts, such as individual sides of a block, an alley, and a garden space. Lynch and Rivkin conclude that

a person must perceive their environment as an ordered pattern and constantly interject order into it, so that all relevant perceptions are cohesive. Subsequent applications and uses of the environment reinforce the perceptive cohesion. For the "native" user, Lynch and Rivkin acknowledge that the space at one time had been unfamiliar, but through habitual use and perception allow the subject to unify the subject's perceptions of the environment.

Accuracy increases with the amount of previous experience (Gary W. Evans, Marrero, & Butler, 1981; Gärling, Böök, & Engezen, 1982); there are possibly also qualitative changes in cognitive maps as a function of previous experience.

A person's navigation using cognitive mapping requires several things. First, it should be recognized that general movements in an environment are goal-directed and thus preplanned. The cognitive map should assist a person to plan their movement ahead. In order for this to be accomplished, the cognitive map must be keyed to the environment: features of the environment represented in the cognitive map must be recognized and the cognitive map translated into the environment. Second, when a person moves about, they need to mentally record their movements. This task of maintaining orientation in the environment may be accomplished by recognizing places or landmarks, but should also involve the ability to keep track of location relative to points or systems of reference (Gärling, Böök, & Lindberg, 1984).

The key questions are answered by Palmer (1978) about the mental representation of large and medium-scale environments: (a) what properties of – and components in – the environments are represented, and (b) how are these properties and components

represented. Research demonstrates that places have psychological attributes such as pleasantness, aesthetic quality, and complexity (Canter, 1977; Gärling, 1976a, 1976b; Lowenthal & Reil, 1972; Ward & Russell, 1981) and such checklists may be stored in a cognitive map of an environment (Lowenthal & Reil, 1972; Merrill & Baird, 1980). These attributes are multidimensional but are nevertheless referred to as a single property.

Semiotics

What is Semiotics?

Semiotics is the study of symbols and how they convey meaning. Having roots in the United States through Peirce (1985), and later developed in Europe by the French philosopher and linguist de Saussure (1986), philosophy establishes semiotics as a formation constructs based upon the formal experiment. In his masterwork, *Semiotics of Graphics,* Bertin (1983) attempts to classify all graphic marks in terms of how they hold the potential to express data. For the most part, the work of Bertin is strictly based upon his own personal judgement, although it is a highly trained and sensitive judgement. To date, there are few references to theories of perception or scientific studies.

It is often claimed that visual languages are easy to learn and use, but the question that arises from this statement is what does one mean by the term *visual language?* Ware provides three examples of contrasting examples of visual language: an example of visual language based on a cave painting, schematic diagram (showing the interaction between a person and a computer in a virtual

environment) with the brain simplified, but still understood as part of the anatomy; arrows show data flows and are arbitrary conventions, such as printed words. The third example is an expression of a mathematical equation that is utterly obscure to all but the initiated. These examples clearly show that some visual languages are easier to "read" than others (2012, pp. 30-31).

Saussure creates a threat to the idea that there can be a scientific basis for visualization design. Saussure defines a principle of arbitrariness applied to the relationship between the symbol and the thing that is signified. Saussure and his colleagues insist that truth is relative to its social context: meaning in one culture may be a completely different concept in another (Saussure, 1986).

Additional thinkers, such as Lévi-Strauss (1976) and Barthes (1973, 1982) develop theories that all meaning is relative to the culture: ones meaning is created by society. The overall concept of this theory is three-fold: first, no one representation is "better" than another, second, all representations have value, and third, all representations are meaningful to those who understand them and agree to their meanings (Ware, 2012).

Information Visualization

Hutchins (1995) states that thinking is not something that goes on entirely, or even mostly, inside people's heads. Very little intellectual work is accomplished when one decides to close their eyes and ears. Cognition is believed to be an interaction completed with cognitive tools: these tangible tools may include: paper, pencils, calculators, and information systems (Ware, 2012, pp. 25-26). Visualizations additionally play an increasing role as a part of the cognitive system. Visual displays provide the highest

bandwidth channel from the computer to the human. More information is acquired through the visual sense than through all the other sensory organs combined. Ware states that improving cognitive systems often means optimizing the search for data and making it easier to see important patterns (Ware, 2012).

Until 1972, the term *visualization* meant constructing a visual image in the mind (Shorter Oxford English Dictionary, 1972). A more contemporary definition comes to define it more like a graphical representation of data or concepts (Ware, 2012). Visualization becomes an external artifact used to support decision making: additionally, visualizations can function as cognitive tools.

Some advantages of utilizing visualization may include:

- Provides an ability to comprehend huge amounts of data
- Allows the perception of emergent properties that were not anticipated
- Enables problems with the data to become immediately apparent. A visualization commonly reveals things not only about the data itself but also about the way it is collected. With appropriate visualization, errors and artifacts in the data often jump out at you.
- Facilitates understandings of both large-scale and small-scale features of the data. It can be especially valuable in allowing the perception of patterns linking local features.
- Visualization facilitates hypothesis formation. (Ware, 2012)

A preprocessing stage designed to transform the data into something that is easier to manipulate. Usually there is some form of data reduction to reveal selected aspects. Data exploration is the process of changing the subset that is currently being viewed.

Ware states that:

> Visualization is about diagrams and how they can convey meaning. Diagrams are made up of symbols, and symbols are based on social interaction. The meaning of a symbol is normally understood to be created by convention, which is established in the course of person-to-person communication. Diagrams are arbitrary and are effective in much the same way as the written words on this page are effective—we must learn the conventions of the language, and the better we learn them the clearer that language will be. Thus, one diagram may ultimately be as good as another; it is just a matter of learning the code, and the laws of perception are largely irrelevant. (2012, pp. 29-30)

Cartographic Codes

Sign and Signifier

In *The Power of Maps* (1992), Wood states that there is nothing natural about a map: in addition to the map being a cultural artifact, revealing values and ideals about the individual who produced the map, it is loaded with intentions and purposes, and these elements and signs are mediated though the use of codes. Every single meaning and all significant meanings are derived from some sort of code. From a more technical standpoint, Wood defines *code* as:

A code can be said to be an assignment scheme (or rule) coupling or apportioning items or elements from a conveyed system (the signified) to a conveying system (the signifier). . . . The gestures, words, numbers, lines and lights are elements of the system conveying: *signifiers* (expression). The code (the rule) *assigns* the latter to the former, couples them. In so doing, it creates a *sign*. . . . The sign is *not* in the gestures or the lights, the words or the numbers: it is *not* the signifier. Nor is the sign in the intentions, promises or commands: it is *not* the signified. The sign exists solely, utterly and exclusively in its correlation [e.g.: established by the code, the rule, by custom, by the law]. (1992, pp. 108-109)

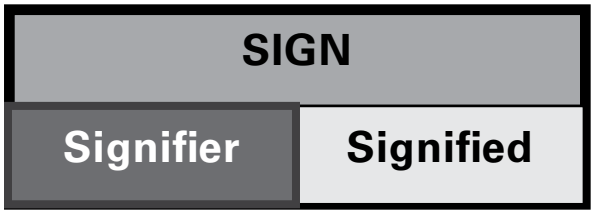

Figure 2.1. **Concept showing that the Signifier and the Signified are cojoined as the whole of the Sign. Adapted from The Power of Maps, D. Wood and J. Fels, Copyright 1992 by Guilford Press.**

Wood continues to explain that signs are:

> The creatures of codes with the loss of which they are rendered . . . into their constituent components, disembodied signifieds separated from insignificant signifiers. It is the codification in which the sign adheres, nothing else .(1992, p. 109)

Ten Cartographic Codes

One major foundations of Wood's analysis of maps lies in the establishment of Ten Cartographic Codes. Wood supports the foundation stating "No signs without codes", insisting that there are no self-explanatory signs; no signs that so resemble their referents as to self-evidently refer to them" (1992, p. 110). In response to this concept Wood develops, he elaborates upon his original statement and expands to creates Ten Cartographic Codes which allow the map to be *de*coded (or if a map is to be *en*coded).

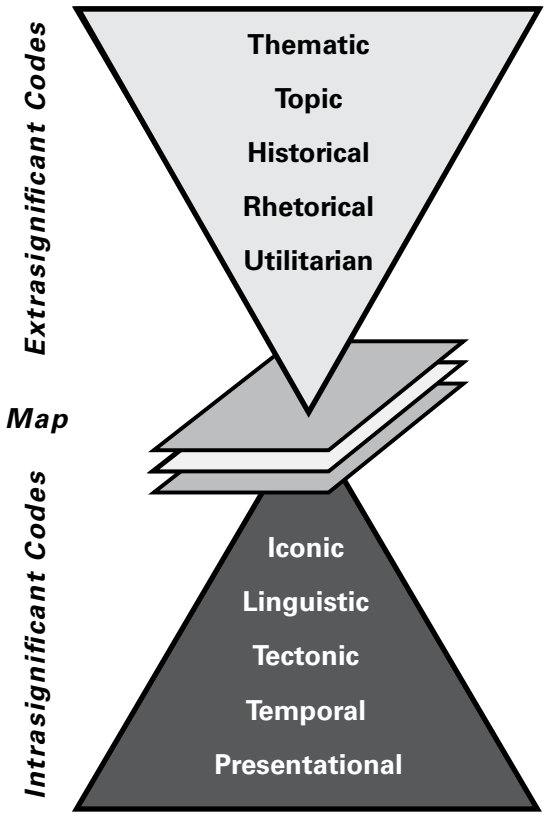

Figure 2.2. **Ten Cartographic Codes: Using the map as a focusing device. This image demonstrates how Intrasignificant Codes and Extrasignificant Codes provide layers to the map. Adapted from The Power of Mpas, by D. Wood, and J. Fels. Copyright 1992 by Guilford Press.**

Wood does not indicate that there are only ten of these codes (more of them can do exist), but these specific criteria which the map either exploits or is exploited. Although neither of the classes of codes work independent from the other, no map is inscribed with (at least) these ten codes.

Wood continues to classify these cartographic codes and breaks the concepts into two classifications: The codes which exploit the map, identified as *Codes of Intrasignification,* operate within the map, utilizing any level of language, and *Codes of Extrasignification*, are codes which exploit the map, operating externally and freely from the physical level of the map.

Codes of Intrasignification

The codes of intrasignification include: the *iconic* (the subject of things), the *linguistic* (the code of names and identification), the *tectonic* (providing relationships on the map in scalar and topological formats), the *temporal* (establishing duration and tense), and the *presentational* (showing how objects are presented: ordered, arranged, and organized).

Codes of Extrasignification

Layers of codification on top of the meaning of the map include: the *thematic* (establishing domain and discourse), the *topic* (gives the map the subject, topology; turns the map from space to place and gives it an existence), the *historical* (assigns the map an era, a name, a place in history), the *rhetorical* (sets the map and orients it in its culture, in its set of values: pointing to the fact that the

map is the very act of pointing somewhere else), and the *utilitarian* (the physicality that the map is mobile and can be carried off for any purpose it might further serve).

Cartography as Graphic Communication

MacEachren develops a depiction of cartography which consists of a process of information communication:

> The view of cartography as a communication process has been depicted graphically by many authors. While details of these depictions vary, all models share a basic structure with an information source tapped by a cartographer who determines what (and how) to depict, a map as the midpoint of the process, and a map user who 'reads' the map and develops some understanding of it by relating the map information to prior knowledge. (2004, p. 3)

Three perspectives are identified by MacEachren as taking toward scientific research on map symbolization and design stimulated by the communication paradigm: First, the scientific approach to cartography is impractical or irrelevant, either because cartography is an art rather than a science or because the rhetorical content of maps is more important than the *information* they contain. Second, there is the belief that the communication paradigm is the most promising approach to achieving cartography's ultimate goal of functional maps: However, those supporters of this paradigm believe that cartographic graphic communication consists of a combination of sloppy research, poor selection of initial problems to pursue, misdirected emphasis, wrong methods, and the

relative youthful approach leads to disappointing results thus far (Olson, 1983; Dobson, 1985; Medyckyj-Scott and Board, 1991). Thirdly, the perspective accepts cartography's function as creating interpretable graphic summaries of spatial information (i.e., representations) and the goal of producing more consistently functional maps, but judges the communication paradigm to be a much too constraining model for the discipline.

MacEachren continues to state:

> There is no single correct scientific, or nonscientific, approach to how maps work. . . . The map examined here, then, not as a communication vehicle, but as one of many potential representations of phenomena in space that a user may draw upon as a source of information or an aid to decision making and behavior in space. (2004, p. 12)

Howard presents a typology of three levels of representation of cartographic information (on the study of symbols): the *lexical*, the *functional*, and the *cognitive*. Howard assumes that the process in which humans represent information mentally determines how groups and societies can develop a consensus about letting symbols (in the broadest sense of the word) stand for objects, relationships, events, and the like, in the "real" world. (1980, p. 14).

Harley (1989), and Wood (1992), clearly establish that representation on a social level is also an important factor in map comprehension. It is not only the *map-user* who mentally represents map information nor is it only the *map-author* – the cartographer – who imbues a maps with meaning, which both explicit and implicit, it is society and culture within which map-author and map user coexist that provide meaning. Society

gives meaning (at multiple levels) to the symbols that the cartographer uses to assign meaning (also at multiple levels). How cartographers reach consensus about what should be represented and the meaning of particular symbol types (or even individual symbols), and about the ways in which the cartographer's social context influences these decisions, are issues relevant to a representational approach to cartography. Attention to these issues should complement, not compete with, attention to the visual and cognitive representations derived from the resulting maps (Howard, 1980, pp. 14-15).

CHAPTER 3. METHODS AND PROCEDURES

Overview

This study addressed two observations of the mapping process. The first phase of the project addressed the drawn maps of a group of subjects, evaluating their drawing styles, how key features are indicated and shown. The second phase took these drawn maps and distributed them to a group of participants who indicated they had not experienced or visited the site of the drawn maps. These participants followed the routes indicated on the map and the researcher observed how these maps were interpreted.

This study was based on the previous studies seminal works by Lynch (1960), Lynch and Rivkin (1959) and Appleyard, Lynch and Myer (1964). The study is based on explorations of mapping styles and how one signifies elements – such as landmarks, paths, or other activities and/or reactions – in communicating a travel path in a two-dimensional format.

This section begins with a brief description of each of the two phases of the study: The first phase collected and evaluated two subject maps with defined origin and destination points, while the second phase tested the maps in the field by participants who were not familiar with the area. The research questions and study objectives are presented next, which are followed by a description of the participants and the data that was collected and analyzed. The measurement instruments used in this study are discussed next. The section includes a description of the study procedures.

As stated earlier, the central aim of this study focused on the following questions:

1. What are the different categories of drawn cognitive maps? How can these maps be categorized?

2. How does one interpret/translate the drawn cognitive map of another person (through symbology, cartography, directions)?

3. When a drawn cognitive map is used for navigational purposes, how does one interpret the inconsistencies and confusing notations?

Statement of the Hypothesis

This study collected the drawn maps from the students enrolled in DSNS 183, Spring semester 2012, at Iowa State University in Ames, IA. Additionally, the drawn maps were "tested" by a group, who received these drawn maps and went into the physical environment to test if the routes indicated on the selected maps were understood.

Subjects

The study began with 334 subjects enrolled in DSNS 183. The researcher consulted with Nora Ladjahasan, statistician for the Institute for Design Research and Outreach (IDRO) in the College of Design, who recommended the researcher use a stratified random sampling of subjects, according to the indicated preference of professional program, rather than complete enumeration. This resulted in a stratified random sample population of 200 subjects, maintaining a 95% confidence level, ± 4% confidence interval (margin of error), from the original enumeration of 300 subjects (CreativeResearchSystems, 2012).

Study Procedures: Phases 1 and 2

Phase 1: Overall Procedures

The project presented to the subjects consisted of three components: the first component was a survey to collect demographic information (See Appendix B, Figure 7.2). The second component collected two maps: one indicating the path from the point of origin (College of Design) to the assigned destination point (either U.S. Post Office in Campustown [210 Welch Avenue, Ames, IA] or Capanna Coffee & Gelato [3329 West Lincoln Way, Ames, IA]). Detailed and specific instructions for the drawing of the maps can be found in Appendix B, Figure 7.1. The third component was an alternate route from the destination point to the origin point. On the handout of this project (Appendix B, Figure 7.1), the project cover sheet was either blue or white: determining students' final destination. All students started on-campus, from the College of Design, and if their sheet was blue, the destination was the U. S. Post Office in Campustown (210 Welch Avenue, Ames, IA, 50014-9996). If the sheet was white, the destination of the subjects was Capanna Coffee (3329 W. Lincoln Way, Ames, IA, 50014). Both locations were within 1.0 mile or less from the College of Design, due to course project limitations.

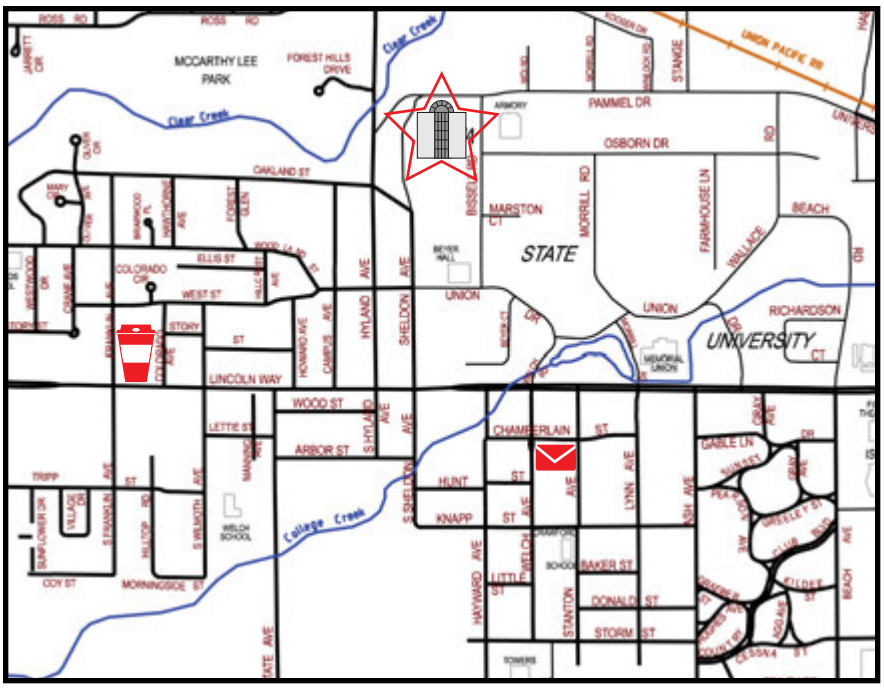

Figure 3.1. Map showing locations of College of Design at Iowa State University, US Postal Substation in Campustown (210 Welch Avenue), and Capanna Coffee & Gelato (3329 W. Lincoln Way). Base map courtesy of City of Ames, IA.

Phase 1: Materials and Procedures

The overall concept of the project was for the subjects to sketch their route/path as they complete a round trip to their assigned destination. It was stressed to the subjects that the use of assistive devices, such as Google Earth, Mapquest, or other mapping devices or applications was *strictly* forbidden. The subjects were to take two (2) 11” x 17” pieces of paper and a drawing instrument with them on their journey. On the back of the first page (which is indicated from this point forward as Map 1), subjects were to write their name, date, and time of day of their journey. Next, prior to their departure, the subjects were asked to take one (1) minute and sketch and annotate their surroundings at the point of origin, asking themselves the following questions:

- What do you see?

- What is important at this specific space?
- Why do you feel this space is significant?
- Does this specific space evoke or cause a specific emotion?

Subjects were reminded only to sketch for about a minute, and a complete and detailed landscape is not desired at this nor any point of their journey.

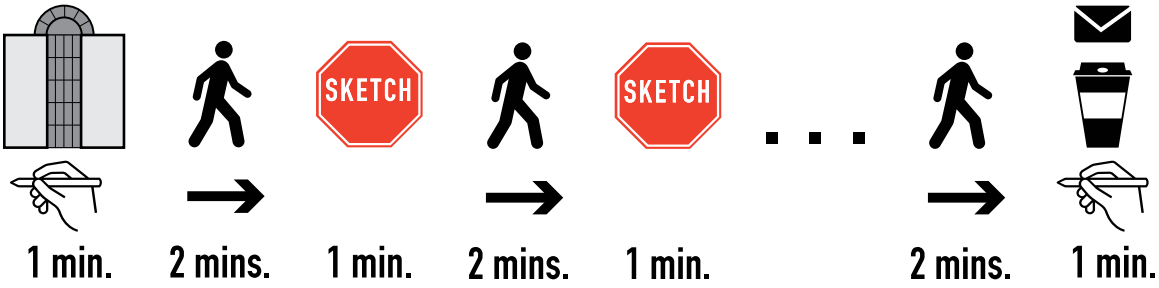

Figure 3.2. **Pictorial representation of the procedures for Phase 1 (Map 1).**

Next, subjects were asked to walk for approximately two (2) minutes toward their assigned destination point. At the end of the two minute walk, the subjects were asked to stop at a safe location (not the middle of an intersection), pull out Map 1 and take approximately one minute to draw their surroundings and their path to that specific point. At this point, subjects were asked the following questions:

- How did you get from the previous point to this point?
- What has changed about the quality of the place you are in?
- Were there obstacles that you encountered along your path?
- How did you know this was the right path to the destination?

Subjects were reminded they should only draw/sketch/write for about one minute.

Throughout this project, the subjects were reminded that *the project was <u>not</u> about the neatness or craft of their drawn map, but focused more on the specific route, observations, and significant elements along the way*.

Following a minute of sketching, subjects were asked to continue along their route to their assigned destination. After approximately two minutes of travel, subjects were asked to stop, sketch, and write for about a minute, keeping in mind the same questions that were asked at the first stopping point. At the conclusion of the minute of sketching, subjects were to continue the protocol of two minutes walking, one minute sketching/annotating until they reached their destination. Upon arrival at their destination, subjects were asked to make a final sketch of their surroundings of their destination point, keeping in mind the same questions asked at each stop.

Figure 3.3. **Pictorial representation of the procedures for Phase 2 (Map 2).**

The final component of Phase 1 consisted of drawing a map (from this point forward indicated as Map 2) from the assigned destination point to the point of origin: however this time, subjects were asked to take an alternative route. Subjects were asked to take out the second 11" x 17" paper and make the first sketch prior to leaving the destination point. The procedures for Map 2 were identical to those of Map 1: travel for two minutes, stop and sketch and write for one minute, noting how this route was

different and identifying significant elements at that specific point. This process was repeated until subjects returned to their point of origin. Upon their arrival at the point of origin (College of Design), subjects were asked to create a final sketch of their surroundings.

Subjects were reminded numerous times that this study was collecting sketches and notes of their routes, and participants were reminded not to recopy, redraw, digitally enhance or manipulate the sketch maps in any way. Additionally, the usage of any mediating devices, such as iPhones, mobile devices, GPS guidance systems or other electronic or non-electronic mapping systems were *strictly* forbidden. If subjects were not familiar with their assigned destination point, they could ask a colleague if they were familiar with the location of the destination point. Any referencing of any format of map – both hard-copy and/or digital – was *strictly* forbidden in this project. The researcher was interested in how subjects documented their routes, how objects (*e.g.*: obstacles, events, etc.) are indicated, and annotated.

If subjects had any question about the methodology being used in this project or regarding any of the specific details of this project, they could contact the researcher (primary investigator) directly at any time.

Content Analysis

Content analysis was used to analyze the text written on the hand-drawn maps of the subject's designated destination point and their return to the College of Design. The maps were collected and labeled with their assigned map number. Each subject was

assigned two maps: one from the College of Design to their destination point, and the second from the destination point to the College of Design, this time taking a different route than before. Subjects were asked to provide the date, time of day, and other significant elements (such as obstacles, experiences, emotions experienced, or weather conditions) on each of their maps.

Phase 2: Testing and Evaluation Procedures of Hand-drawn Maps

In order to further evaluate and test the maps from Phase 1, the researcher solicited participants for testing of the hand-drawn maps. Participants for this phase were recruited based upon their *un*familiarity with the Ames and Iowa State University campus environments. The researcher provided transportation to and from Ames, IA for the participants. For evaluation, the participants completed a brief survey (see Appendix B, Figure 7.3), collecting demographic information, and were given one map while at the point of origin (College of Design). The researcher explained to the participants their role in the project: this phase of the project was not a testing of the participants themselves, but wanted to show and reveal potential readings and misreadings of the maps.

Participants were asked to follow the map to their best abilities, while the researcher unobtrusively followed en route, noting the amount of time to reach the destination. Participants were encouraged to use a "think out loud" protocol, so the researcher could comprehend the participant's thought process. If the participant had major questions or deviated from the assigned map, the researcher provided support to return to the route on the map. Once the participant reached the destination, the researcher asked the participant if they discovered any major issues with the

comprehension of the map itself, or how the information on the map itself was presented (Appendix B, Figure 7.3).

The researcher provided the participant with a second map (to the College of Design), and reminded the participant to use the same protocols as before.

Criteria for Coding Data

Content Analysis

Definition

Content analysis is concerned with questions that can be posed in such a way that some form of quantification or pattern-matching can be assessed. Berelson states, "Content analysis is a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (1952, p. 2). The content analysis process is *systematic* in that every step of the data collection process must follow a set of explicit rules. *Objectivity* stipulates that each step of the research process must be carried out based on explicit rules and procedures and must not influence the interpretation of the data; and *quantitative* in nature, meaning that measurements should be exact. The excess information taken from the text, such as purely descriptive information about content, is of little value (Holsti, 1969).

Busch et al. (2005) states that information can be used to analyze the presence, meanings, and relationships of the words and concepts, and then establish inferences about the messages and experiences expressed within the text and writer. The text can be broadly defined and analyzed regarding conceptual meanings, specific notations, or

significant experiences at the time the text was written. While Busch et al. refer specifically to the written language, the principles can also be used to interpret visual content.

Background

Historically, the technique of content analysis evolved from journalism through the analysis of text. Although the initial studies in the early twentieth century examined texts for the frequency of occurrence of identified terms (word counts); by the mid-1950's researchers were already starting to consider a more sophisticated approach for the analysis of text, which were usually large in nature. Concepts, rather than simply words, and semantic relationships rather than just the presence of text were being analyzed (de Sola Pool, 1959). While the traditions of analytically recording word counts, concepts, and semantic relationships still occur today, content analysis is now utilized to explore mental models, and their linguistic, affective, cognitive, social, cultural, and historical significance by researchers within the social sciences and humanities (Busch, et al., 2005). For this particular study, the concepts, which are either drawn or indicated through text on the maps and overlays, will be relevant for statistical computation. Factors that might contribute to what one indicates could be based upon a person's social, cultural, and historical (based upon frequency of travel) significance.

Content analysis, for this specific study, was utilized to explore the drawn maps, significant spaces, frequencies, and conditions as participants traveled to an assigned off-campus destination point, and returning their on-campus point of origin, while taking a different and distinct route.

The investigator reviewed the contents of the maps and created potential categories in which to code and conduct content analysis. Two methods of analysis, conceptual analysis and relational analysis were considered to evaluate the text and concepts. The investigator adopted the relational analysis methodology to evaluate the data.

Conceptual analysis is traditionally selected for examination and analysis through the quantification and tallying of a concept, where the focus upon the occurrence of implicit and explicit terminology within a selected text. While explicit terms are simple to identify, coding for implicit terminology – and deciding upon the level of implication – demands a complex level of subjectivity. Relational analysis, like conceptual analysis, begins with the identification of present concepts within a given text. However, relational analysis goes beyond the presence of whether a concept is present or not: relational analysis explores the relationships between the concepts identified and looks for the presence of semantic, or meaningful relationships. Individual concepts, in and of themselves, are viewed as having no inherent meaning. Rather, meaning is a product of relationships among concepts within a text (Busch, et al., 2005).

First, the investigator tallied and created lists of conceptual categories from the text. The initial result created a large list of potential categories, which needed to be condensed into concept-related categories. The categories were divided into questions that could be answered with a yes or no, and by those which required additional information (such as a checklist of identified elements). These categories were coded for

frequency, relationship, and identification of the category concept. Finally, statistical analysis was performed on the data using SPSS Statistics 20.0 for Macintosh.

Treatments and Controls

This study focused on a hybrid of experimental and observational approaches was used to create the design of the study. The intention was to maintain control over as many aspects of the environment as possible (e.g.: select a specific origin and destination and timeframe for the event to be recorded). However, the nature of observational studies allowed the participants to control what information was indicated on the hand-drawn maps, and was therefore not controlled by the researcher.

Data Analysis

The data were analyzed using descriptive, correlative, and categorical statistics, and crosstabulation. The significance level used in this study was $p = .05$ (Hinkle, Wiersma, & Jurs, 2003).

Descriptive Statistics

Coefficient of Variance

Coefficient of variance is a measure of relative variability, which allows the possibility to compare variability across variables measured in different units.

Correlative Statistics

The purpose of the correlation coefficient is used to quantify the degree of association between two variables.

Correlation Coefficient

The correlation coefficient is used to quantify the degree of association between two variables. This correlation is frequently used during exploratory or observational stages of research to determine which variables at least have statistical relationships with one another. For this particular study, Pearson's correlation coefficient[1] (r) was computed as a qualitative measure to determine the strength and direction of the relationship between the two variables.

Crosstabulation

Crosstabulation classifies cases based on values for two or more categorical variables. The observed counts and percentages in a crosstabulation describe the relationship between the two variables tested. It shows the strength of the relationship between the variables. Further evaluation of chi-square tests determine that two categorical variables are independent. Summaries of the strength of the relationship between the variables are tested using measures of association (Norušis, 2009).

Coding Criteria

Coding Overview

In order to establish a coding protocol, the researcher coded using 59 different categories. The categories and how they were coded are explained below:

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[1] (Field, 2009, p. 178)

Table 3.1. Categories, Descriptions, and Responses for Coding Cartographic Elements

Category	Description	Response
Map Number	Number and letter of the map	###a or ###b (a = Map 1; b = Map 2)
Date	Date (if indicated) of map	Date selected by drop-down calendar
Destination	Final destination of map	Post Office Capanna College of Design
Page Orientation	Physical layout of the page	Portrait Landscape Rotational
Drawing Style	Style in which map was drawn (multiple selections could be indicated)	Plan Point of View Perspective Elevation Dimensional Other
Starting drawing point	Physical starting point on the page	1 2 3 4 5 6 7 8 9 On back Drawn as one Not indicated
Ending drawing point	Physical ending point on the page	1 2 3 4 5 6 7 8 9 On back Drawn as one Not indicated
Drawing Direction	Direction in which the map was drawn	Z S CW CCW Down/Up Up/Down Circular Perimeter Rows Columns Meandering Zig-Zag Down Up Right Left Map-Style Diagonal

Table 3.1 (continued)

Category	Description	Response
Starting/Ending point at CoD	Indicated which entrance of the College of Design was indicated	Front Entrance (east) Back Entrance (west) Side Entrance (south)
Number of Steps Drawn	How many steps were drawn, if indicated	Numerical value
Wayfinding Elements	Elements which assisted in wayfinding/circulation	List of specific elements
Lynchian Elements	Checklist of Lynch's Elements (multiple elements could be indicated)	Districts Paths Nodes Landmarks Edges
Narrative	Descriptive style of narration on the map (multiple elements could be indicated)	Directional Narrative Personal Descriptive
Emotions	List of emotions which subject indicated	List of specific emotions
Building Names (BN)	Did subject specifically identify off-campus buildings by name?	Yes/No
Campus Building Names (CBN)	Did subject specifically identify campus buildings by name?	Yes/No
Sensory Elements	List of senses indicated by subject (multiple elements could be indicated)	Haptic Visual Taste Olfactory Acoustic None Other
External References	Listing of any external references, such as ones from Pop Culture	List of external references
Weather	Weather conditions, if noted by subject	List of weather conditions
Miscellaneous/Other	General area for any notes regarding the map, or other attributes noted by researcher	List of notes, comments, unique details of this specific map by researcher

Table 3.2. Categories, Descriptions, and Responses for Coding Yes/No Questions

Category	Description	Response
Arrows	Did the map use arrows in the map to indicate direction or to call out specific locations?	Yes/No
Breadcrumbs	Were "breadcrumbs" or element included in the drawing, so one could retrace the exact route again?	Yes/No
Cardinal Directions	Were the directions North, South, East, West, or NE, NW, SE, or SW noted on the map or directions?	Yes/No
Left/Right/Forward Directions	Were the directions left, right, forward, behind noted on map or in the directions?	Yes/No
Compass Rose	Was a compass rose drawn to indicate cardinal direction?	Yes/No
Viewpoint	Did the map include a specific indicator showing how or where the subject was looking?	Yes/No
Enclosures	Were individual drawings in an enclosure, such as a circle or square?	Yes/No
Indicate Start	Did the subject indicate where the starting point was located on the map?	Yes/No
Indicate Finish	Did the subject indicated where the finishing point was on the map?	Yes/No
Street Names	Did the subject use or indicate street names in the map or written directions?	Yes/No
Paths	Were paths drawn on the map? Can include sidewalks, or other form of notation.	Yes/No
Building Numbers	Were the numbers of buildings indicated?	Yes/No
Indicate On Campus	Did subjects note when they were on campus?	Yes/No
Indicate Off Campus	Did subjects note when they were off campus?	Yes/No
Been There Before	Did the subjects indicate they had been there before or were familiar with that route?	Yes/No
Not Been There Before	Did the subjects indicate they had never been there before or were not familiar with that route?	Yes/No
Faster Route	Did the subjects indicate a certain route was faster than another?	Yes/No
Ask Assistance	Did the subjects have to stop and ask for assistance?	Yes/No

Table 3.2 (continued)

Category	Description	Response
Go Inside	Did the subjects indicate they went inside at the destination?	Yes/No
Legend	Was a legend included, describing the symbols or notations used?	Yes/No
Activities/Actions	Were there descriptions of activities that were also going on at the time subjects were drawing the map?	Yes/No
Human Form	Is there indication of a human form drawn within the map?	Yes/No
Number the stops	Are the stops numbered?	Yes/No
Overall Map	Is there an overall map route indicated?	Yes/No
Other Roads	Are other roads listed (besides the ones used for travel)?	Yes/No
Flags	Do they draw a flag at the post office or any other place on the map?	Yes/No
Branding/Logos	Are there logos or other forms of branding of businesses noted in the map?	Yes/No
Colors	Did they use color within the map?	Yes/No
Unique Map	Was the map unique? If so list how it was different than the other maps.	Yes/No

Summary

This study utilized quantitative results collected through content analysis, then statistically measured using descriptive, correlative statistics and crosstabulation; and qualitative approaches to evaluate hand-drawn maps to a designated off-campus destination. Finally, the maps were tested in the field for the map's comprehension and readability, by participants who indicated they were not familiar with the specific geographical area.

CHAPTER 4: RESULTS

Conditions for Phase 1

The subjects were introduced to this project on Thursday, April 12, 2012, within the lecture component DSNS 183. The researcher had also been asked to lecture in class. The researcher assigned two short readings prior to class, which were to provide a foundation for the given lecture by the researcher. The readings consisted of a short essay discussing the concepts of Lynch's environmental cognition (K. Lynch, 1996) and basic fundamentals of cognitive mapping (Jonsson, 2002). The lecture components consisted of going into more detail about the assigned readings, fielding questions from the audience, a short video, and then the introduction of the project.

The subjects (students) were given thirteen days (three class periods) to complete this project. During this time, it was not possible for the researcher to observe all of the subjects as they created their maps and traveled their assigned routes. Therefore, there were abnormalities and inconsistencies of the drawn maps, as to be expected. Additionally, outside events which are an accepted part of the university calendar occurred: VEISHEA, a university-wide tradition since 1922, celebrating the rites of spring,was held the from April 15–22, 2012. The activities of VEISHEA were held both on campus and in the Campustown area. Both sanctioned, sponsored events, as well as "unofficial" and impromptu gatherings were held this week. Several students noted this on their drawn maps, as the residual affects of the celebration and partying along the Welch Avenue businesses were indicated.

Within this window of a week and half, the subjects were asked to note the date and time of their journey on the backside of their maps. This might be used to as evidence if the student was conducting the map on the weekend of the spring celebration, or to indicate an anomalies which might appear in the map.

Demographic Information

The study used a stratified random sampling of subjects by major. The study began with 334 subjects enrolled in DSNS 183. A stratified random sampling of subjects, generated a random sample of 200 subjects. Out of the random stratified sample of 200 subjects, the breakdown of participants by gender and age are as stated:

Table 4.1 Demographic analysis of subjects by gender (*n* = 200).

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	105	26.4	52.5	52.5
	Male	95	23.9	47.5	100.0
	Total	200	50.3	100.0	
Missing	99	198	49.7		
Total		398	100.0		

As stated earlier, DSNS 183 is a requirement of the College of Design's Core Program, as well as an elective with the College of Liberal Arts. Therefore, this created a diverse age range within the subject pool.

Table 4.2 Demographic analysis of subjects by age (*n* = 200).

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17	1	.3	.5	.5
	18	38	9.5	19.1	19.6
	19	102	25.6	51.3	70.9
	20	29	7.3	14.6	85.4
	21	10	2.5	5.0	90.5
	22	10	2.5	5.0	95.5
	23	1	.3	.5	96.0
	24	1	.3	.5	96.5
	27	1	.3	.5	97.0
	31	2	.5	1.0	98.0
	36	1	.3	.5	98.5
	42	1	.3	.5	99.0
	43	1	.3	.5	99.5
	55	1	.3	.5	100.0
	Total	199	50.0	100.0	
Missing	99	199	50.0		
Total		398	100.0		

Information regarding the major of the participants was also gathered. The subjects indicated the first program of choice for admission into the professional degree programs in the College of Design. If the students were not applying for a professional program, they were asked to indicated their specific major.

Table 4.3 Listing of Academic Majors (*n* = 200).

Program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Other	35	8.8	17.5	17.5
	Arch	30	7.5	15.0	32.5
	BDSN_ISA_BPMI	20	5.0	10.0	42.5
	LA_CRP	30	7.5	15.0	57.5
	Graphic	30	7.5	15.0	72.5
	Industrial	30	7.5	15.0	87.5
	Interior	25	6.3	12.5	100.0
	Total	200	50.3	100.0	
Missing	99	198	49.7		
Total		398	100.0		

Seven categories were created for analysis, all with 30 subject (except Interior Design and Other majors), to create a subject pool of 200. In order to create equal categories, some of the similar majors were combined: Bachelor of Design, Integrated Studio Arts, and Biological/Pre-Medical Illustration were combined, as well as Landscape Architecture and Community and Regional Planning. These majors were combined not only because their populations were smaller, but also because within the College of Design, these major groups have historically been within the same department and share similar design philosophies.

This resulted in seven fairly evenly distributed categories. There were only 20 indications of Bachelor of Design/ISA/BPMI, as well as 25 students indicating interior design within the overall total population.

Of the students not intending to apply for a professional program, the majors and their frequencies are listed below:

Table 4.4. Non-Design Majors (*n* = 35).

Major	Frequency	Major	Frequency
Advertising	3	History/Education	1
Apparel, Merchandising, Design, & Production	2	Journalism/Mass Communication	3
Broadcast Journalism	1	Kinesiology	2
Business	2	Math	1
Child/Family Services	1	Mechanical Engineering	1
Civil Engineering	1	Microbiology	1
Elementary Education	2	Pre-Business/ Marketing	3
Engineering	1	Psychology	1
Event Management	1	Psychology/ Sociology	1
Global Resource Systems	1	Transferring/Not Returning	2

Additional Statistics

The analyses evaluated the differences between the specific categories of the drawn maps. Of the 200 subjects, a total of 398 maps were drawn (two subjects combined both maps on a single page).

Drawing Page Orientation

Table 4.5. Statistical breakdown of all subjects by Page Orientation (*n = 398).*

Page Orientation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rotational	20	5.0	5.0	5.0
	Portrait	190	47.7	47.7	52.8
	Landscape	188	47.2	47.2	100.0
	Total	398	100.0	100.0	

The values represented in Table 4.5 show the percentage of subjects who drew using a rotational page orientation (*e.g.:* The subjects started drawing the map with the page orientated in one direction [such as in portrait orientation, where the greater length of the page is in the vertical direction]), then rotate the page to a landscape orientation within the same drawing. Only 5% of the maps were drawn using a Rotational Orientation.

Portrait orientation is defined where the page is orientated with the greater length of the page runs from the top of the page to the bottom of the page (refer to Figure 4.2 for Portrait Orientation). Landscape Orientation indicates that the greater length of the page is oriented from the left edge to the right edge (refer to Figure 4.1 for Landscape Orientation). From a statistical perspective, those who drew using a Portrait Orientation were almost statistically equal (Portrait Orientation: 47.7%, Landscape Orientation: 47.2%). This result show that there was not a dominant preference for one page orientation over another.

Drawing Style

Table. 4.6. Statistical breakdown of all subjects by Drawing Style (*n = 398)*.

Drawing Style

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Misc	4	1.0	1.0	1.0
	Plan	58	14.6	14.6	15.6
	Point of View	121	30.4	30.4	46.0
	Perspective	49	12.3	12.3	58.3
	Elevation	115	28.9	28.9	87.2
	Plan/POV	14	3.5	3.5	90.7
	Plan/Elev	29	7.3	7.3	98.0
	Bird/Perspective	1	.3	.3	98.2
	Bird/POBV	1	.3	.3	98.5
	Plan/Elev/Persp	3	.8	.8	99.2
	Elev/POV	1	.3	.3	99.5
	Persp/Plan	2	.5	.5	100.0
	Total	398	100.0	100.0	

The results shown in Table 4.6 show that the greatest frequency of drawing style was using the Point of View (30.4%), closely followed by Elevation (28.9%), then Plan (14.6%), and Perspective (12.3%). One reasoning why the subjects may have drawn in a Point of View style was that it was drawn while en-route. Since the subjects only had a minute to sketch their surroundings, they may not have taken the time to draw accurate perspectives of their surroundings. This limited time constraint may contribute to the Elevation drawing style being second: the subjects attempted to gather as much information within the time constraints, and only indicated a flat drawing, as compared to a more detailed and complex perspective drawing style. This reason may also support the plan drawing style.

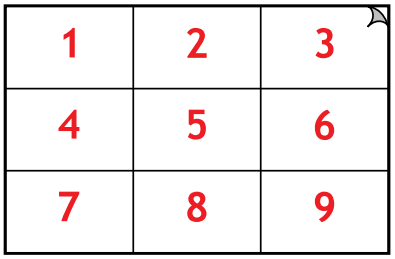
Destination

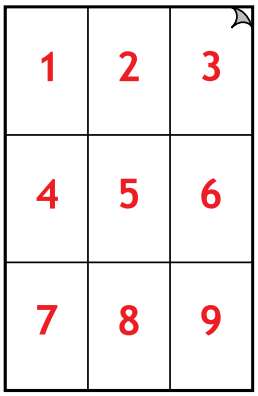
Table. 4.7. Statistical breakdown of all subjects by Destination (*n = 398)*.

Destination

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Post Office	126	31.7	31.7	31.7
	Capanna	77	19.3	19.3	51.0
	CoD	195	49.0	49.0	100.0
	Total	398	100.0	100.0	

Starting Drawing Points





Figures 4.1 (left) and 4.2 (right). Starting and ending points using landscape orientation (left) and portrait orientation (right).

To identify the starting and ending points of the drawing process. two charts were established to create a value within an approximate area of start and finish drawing points. Both the landscape and portrait orientations use the same configuration and notation; the only difference is the orientation of the physical page. These values can be seen in the table below in the left-hand column.

Table. 4.8. Statistical breakdown of all subjects by Drawing Starting Point (*n* = *398)*.

Start Draw Pt

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	255	64.1	64.2	64.2
	2	16	4.0	4.0	68.3
	3	28	7.0	7.1	75.3
	4	5	1.3	1.3	76.6
	6	5	1.3	1.3	77.8
	7	54	13.6	13.6	91.4
	8	8	2.0	2.0	93.5
	9	26	6.5	6.5	100.0
	Total	397	99.7	100.0	
Missing	99	1	.3		
Total		398	100.0		

The date from Table 4.8 shows that 64.1% of the subjects began in the upper left-hand corner of their page, regardless of the page orientation, followed by 13.6% starting their drawing in the lower left-hand corner (point 7, Figures 4.1 and 4.2) of the page. One explanation for such a greater number of the subjects starting in the upper left-hand corner could be contributed to the Western European/American reading style, which is one reads from left to right, top of the page to the bottom of the page. An explanation for the 13.6% beginning at starting point 7 could be attributed to the subject was considering they were going on a journey, and the map could originate at a corner, such as point 7, leaving the remainder of the page free to draw the map.

Ending Drawing Points

Table. 4.9. Statistical breakdown of all subjects (*n = 398)* by Drawing Ending Point.

End Draw Pt

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not indicated	9	2.3	2.3	2.3
	1	31	7.8	7.8	10.1
	2	10	2.5	2.5	12.6
	3	55	13.8	13.9	26.4
	4	18	4.5	4.5	31.0
	5	8	2.0	2.0	33.0
	6	35	8.8	8.8	41.8
	7	71	17.8	17.9	59.7
	8	56	14.1	14.1	73.8
	9	104	26.1	26.2	100.0
	Total	397	99.7	100.0	
Missing	99	1	.3		
Total		398	100.0		

Drawing Direction

Table. 4.10. Description and Explanation of Drawing Direction Used for Coding. and Analysis.

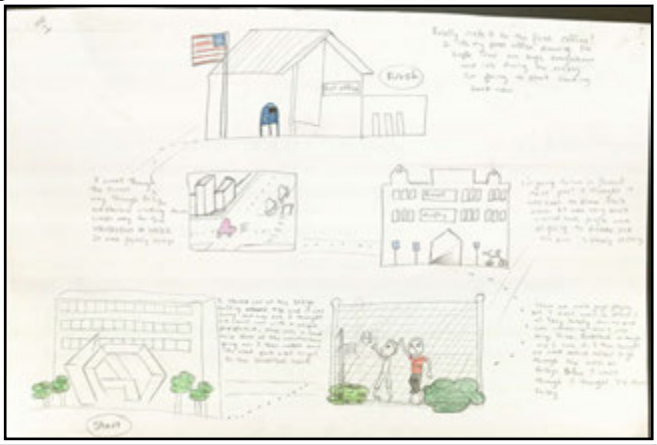
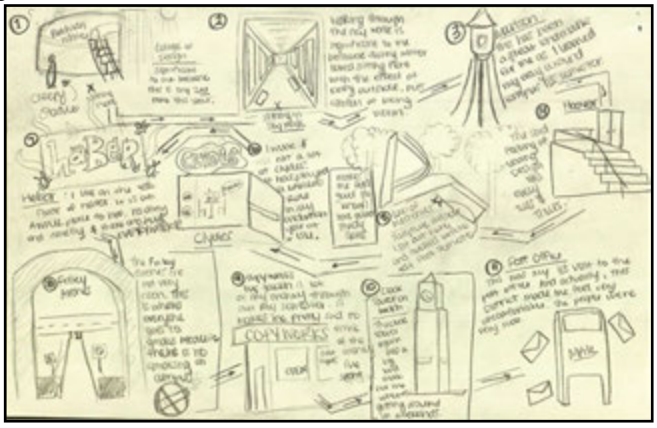
Direction Name & Image	Explanation	Map Example
S 	Start in upper-right hand corner, curving towards the left, through the center of the page, and then curving back towards the lower left-hand corner	Map 185a1 
Z 	Map drawn in a "Z" formation: go horizontal, diagonally down and to the left, then horizontal	Map 146a 

Table. 4.10 (continued)

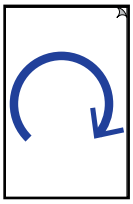
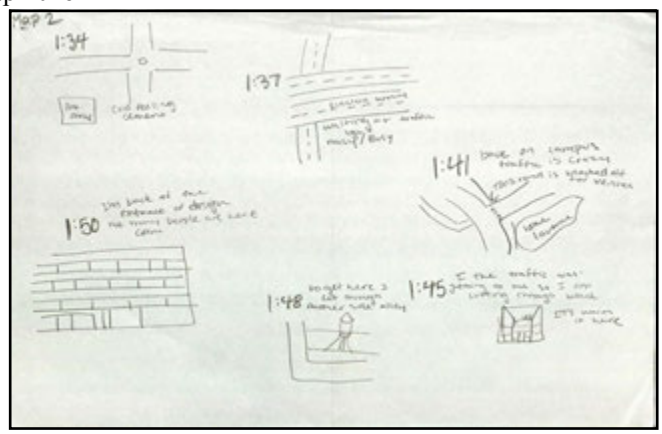
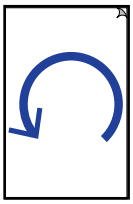
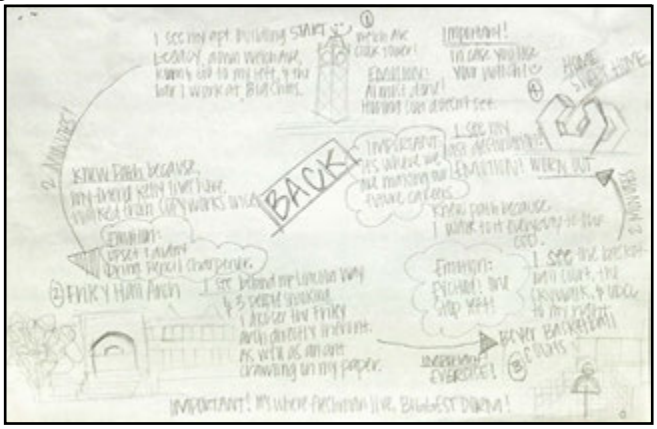
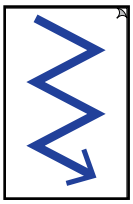
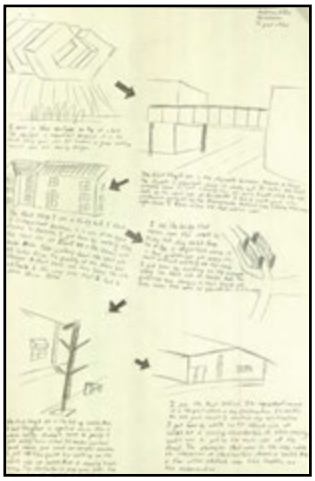
Direction Name & Image	Explanation	Map Example
CW (Clockwise) 	Map drawn in a manner similar to the movement of a clock	Map 101b 
CCW (Counter clockwise) 	Map drawn in a manner opposite to the movement of a clock	Map 29b 
Zig-Zag 	Moved from the left to the right, each time moving down the page	Map 83a 

Table. 4.10 (continued)

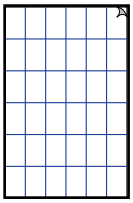
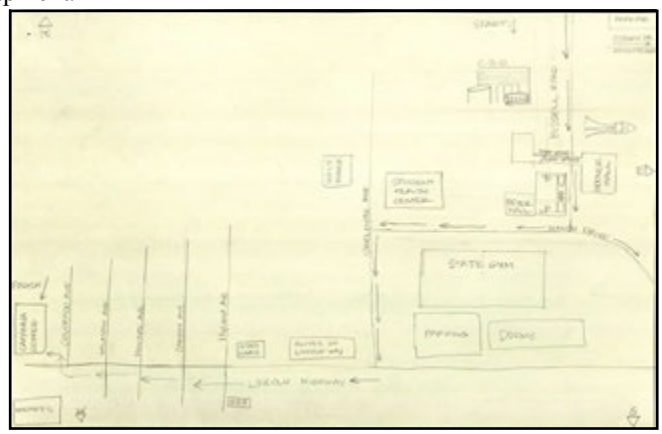
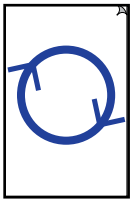
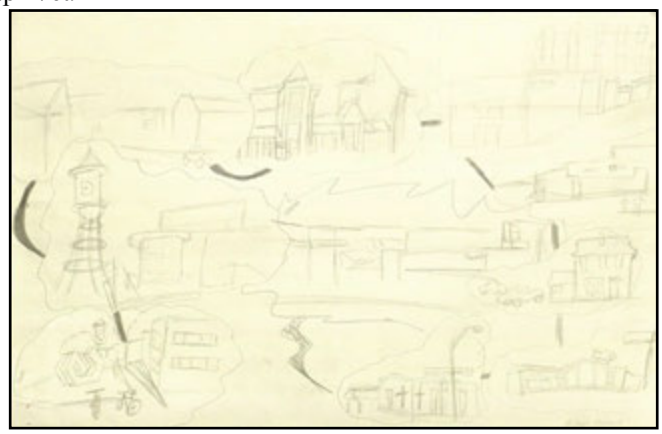
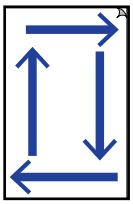
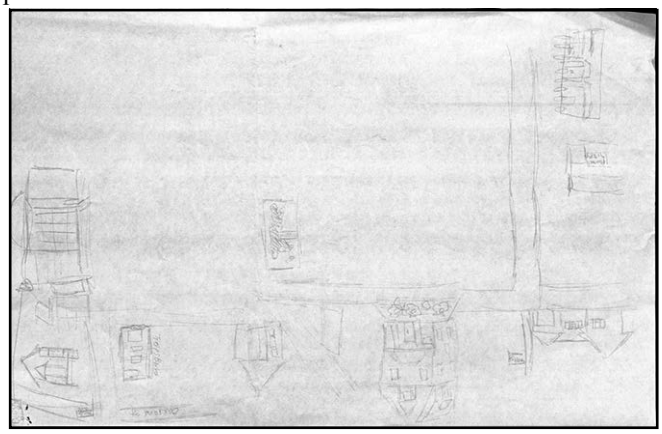
Direction Name & Image	Explanation	Map Example
Map 	Drawn how a map would look: usually showed overall route, and went in both length (longitudinal) and width (latitudinal) directions	Map 162a1 
Circular 	Created a circular form: no real obvious beginning; no obvious ending	Map 176a 
Perimeter 	Drew across the page, turned the page 90 degrees, then continued to draw across that edge, rotate 90 degrees and drawn, then rotate 90 degrees and draw	Map 46b 

Table. 4.10 (continued)

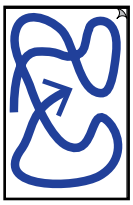
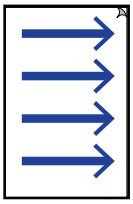
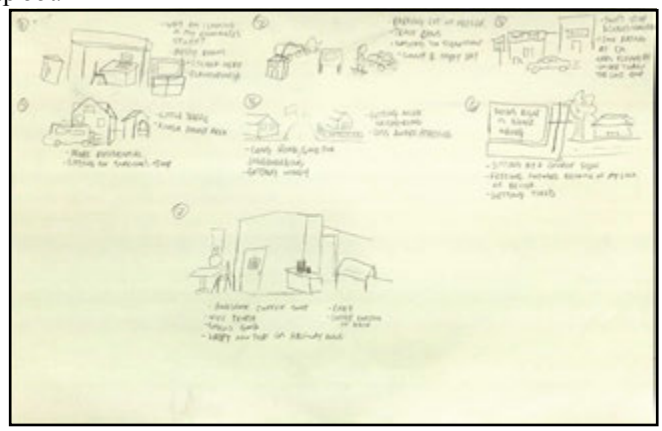
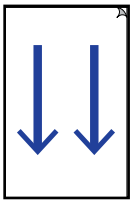
Direction Name & Image	Explanation	Map Example
Meandering 	No apparent grid format or structure. Just wandered haphazardly across the page.	Map 9b 
Rows 	Drew from left to the right; went down on page and continued to draw left to right. Formed visible rows.	Map 55a 
Columns 	Drew from the top of the page downwards towards the bottom. Moved back to top and continued drawing downwards again. Formed visible columns.	Map 214b 

Table. 4.10 (continued)

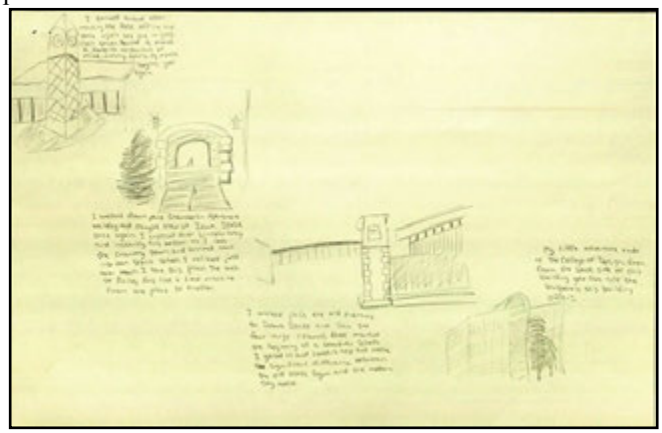
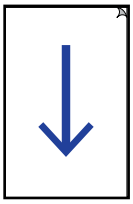
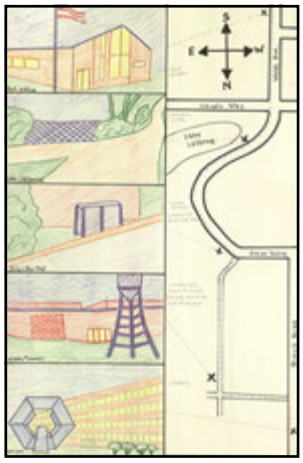
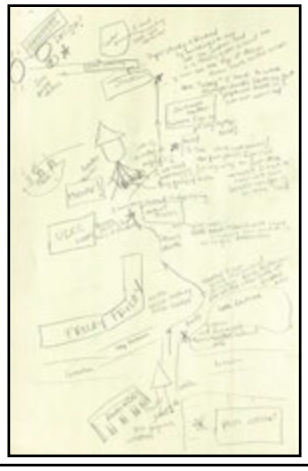
Direction Name & Image	Explanation	Map Example
Diagonals 	Started in one corner of the page and drew down to the opposite corner and the bottom of the page.	Map 69b 
Down 	Started at the top of the page and drew directly down; no deviation towards the left or right. Indicated a single column, rather than multiple columns.	Map 245b 
Up 	Started at the bottom of the page and drew directly upwards; no deviation towards the left or right. Indicated a single column, rather than multiple columns.	Map 80b 

Table. 4.10 (continued)

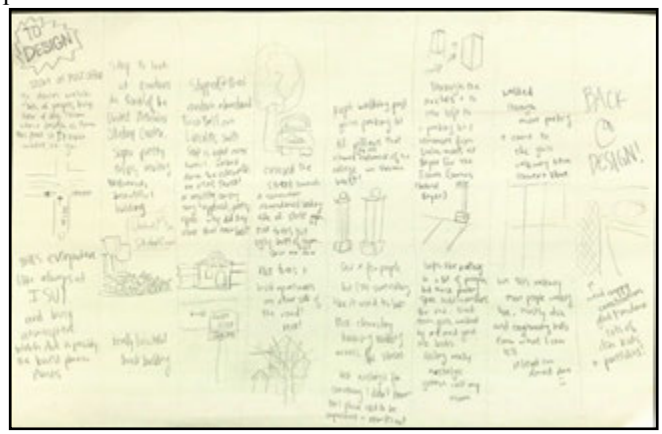
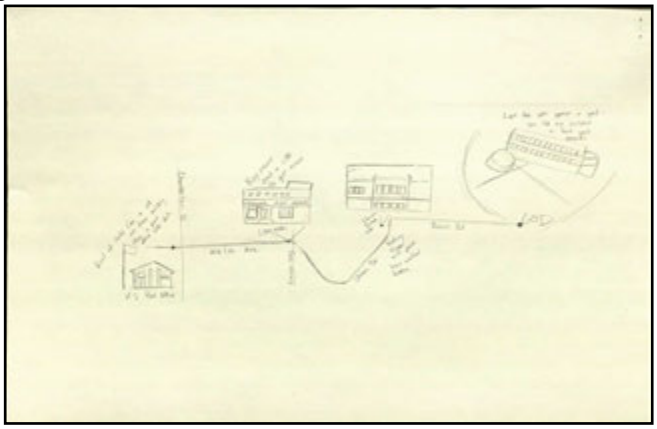
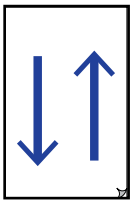
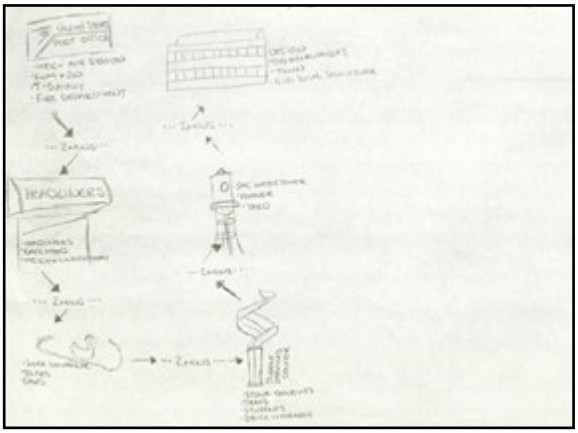
Direction Name & Image	Explanation	Map Example
Right 	Started at the left side of the page and drew to the right, in a single row. No deviation towards the top or bottom.	Map 260b 
Left 	Started at the right side of the page and drew to the left, in a single row. No deviation towards the top or bottom.	Map 139a 
Down-Up 	Started in the top left corner, drew toward the bottom, then shifted to the right and continued to draw towards the top of the page.	Map 14b 

Table. 4.10 (continued)

Direction Name & Image	Explanation	Map Example
None 	No drawing direction indicated; drew a single drawing, such as a vignette.	Map 244a 

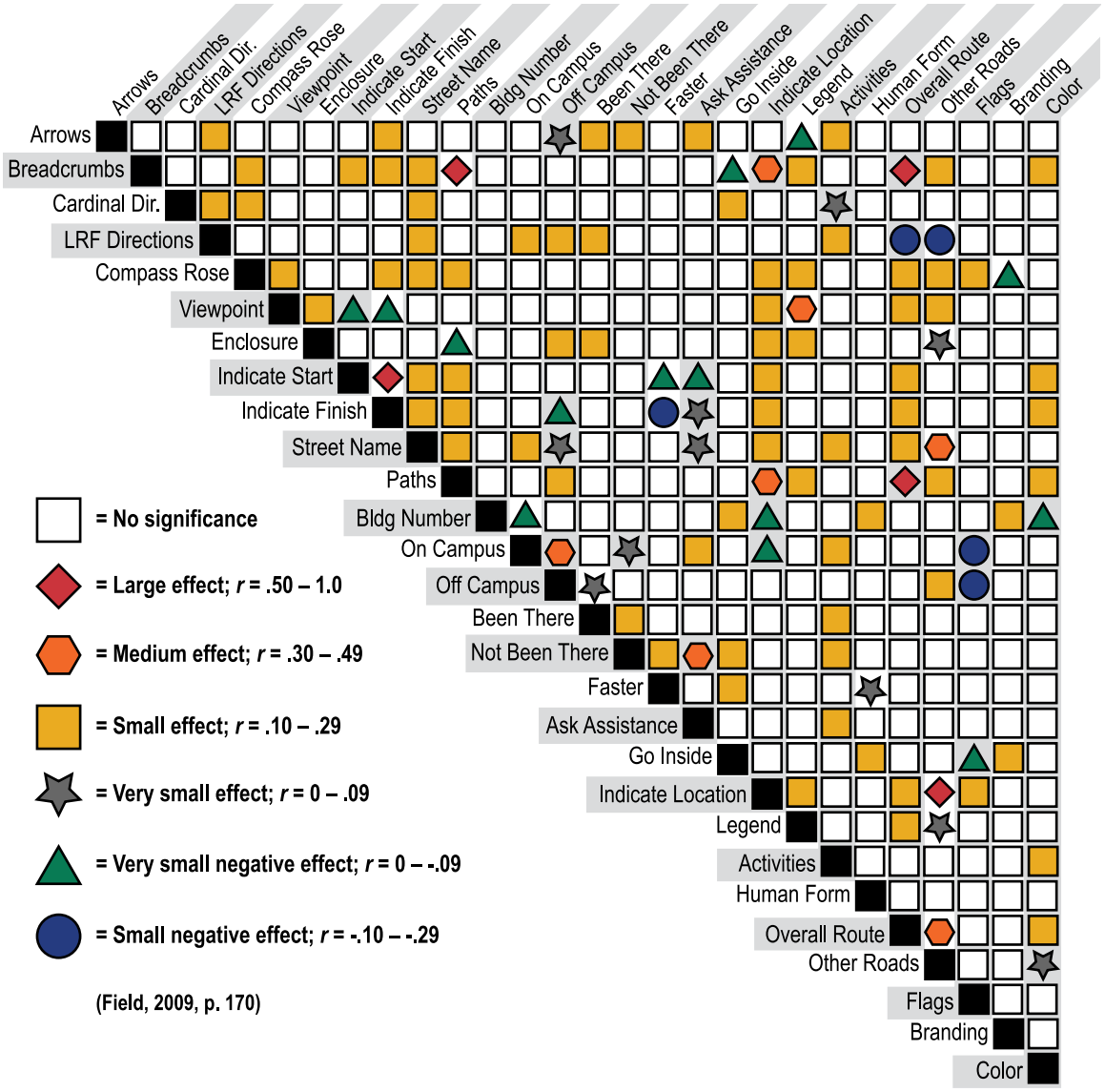
Table 4.11. Statistical breakdown of all subjects (*n = 398)* by Drawing Starting Direction. (Refer to Table 4.10 for explanation of Drawing Direction)

Drawing Direct

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Z	15	3.8	3.8	3.8
	S	2	.5	.5	4.3
	CW	30	7.5	7.6	11.9
	CCW	11	2.8	2.8	14.7
	ZigZag	35	8.8	8.9	23.6
	Map	71	17.8	18.0	41.6
	Circular	2	.5	.5	42.1
	Perimeter	7	1.8	1.8	43.9
	Meandering	63	15.8	16.0	59.9
	Rows	74	18.6	18.8	78.7
	Columns	13	3.3	3.3	82.0
	Diagonal	8	2.0	2.0	84.0
	Down	38	9.5	9.6	93.7
	Up	13	3.3	3.3	97.0
	Right	4	1.0	1.0	98.0
	Left	2	.5	.5	98.5
	DownUp	6	1.5	1.5	100.0
	Total	394	99.0	100.0	
Missing	99	4	1.0		
Total		398	100.0		

Correlational Statistics

Table. 4.12. Correlational Statistics of Categories (*n = 398).*



The best way to understand how two variables are associated is to look at whether they *covary.* A covariance is defined as a variable that has a relationship with, or has the potential to be related to, the *outcome variable* measured (Field, 2009). If one is interested in whether two variables are related, then one is interested in whether changes

in one variable are met with similar changes in the other variable. Therefore, as one variable deviates, either in a positive or negative manner, one would expect the other variable to deviate in a similar way.

The Pearson correlation coefficient (Miles & Banyard, 2007) is a standardized measure of the strength of relationship between the two variables: coefficients range from the value of -1 (as one value changes, the variable changes in the opposite direction by the same amount) , through 0 (as one variable changes, the other doesn't change at all), to +1 (as one variable changes, the other changes in the same direction by the same amount). Because the correlation coefficient is a standardized measure of an observed effect, it is a commonly used measure of the size of an effect and that values of ± .1 represent a small effect, ± .3 is a medium effect, and ± .5 is a large effect (Field, 2009, p. 170).

The correlation coefficient squared (known as the coefficient of determination, R2) is a measure of the amount of variability that is shared by the other. This value explains how much of the variability is shared between the two categories.

Correlations are often used during an exploratory or observational stage of research to determine which variables *at least* have a statistical relationship with each other (Boslaugh & Watters, 2008). In experimental designs, correlations are also used to determine the degree of association between independent and dependent (or response) variables. However, one should note, the finding of a correlation between two variables does not imply that a change in one variable causes a corresponding change in another—further experiments are still required to determine this specific change. Norušis (2009)

also warns that statistically significant correlations may not specifically tell about the cause-effect nature of the relationship between the variables. The usage of correlational statistics is useful for making initial assumptions about the relationships, especially in introductory research design: however, if more accurate data is desired, more through testing and evaluation is required.

Even though a pair of categories can produce a strong statistical relationship, there may be additional intermediate variables that actually causes the change in the variable's change. For example, in this study, the subjects only had one minute to stop and sketch while en route would produce different outcomes compared to if the subjects had an unlimited length of time to sketch at each stop. Additionally, since the subjects were not aware that their maps would be used in a later phase for navigation, it may be hypothesized that the maps might be drawn specifically focusing on navigational cues rather than anecdotal notations provided on some of the subject's maps.

Correlational Analysis: Large Effect

Table 4.13. Significant Correlations: Large Effect

Categories	Significance	Effect Size	Significance Level
Breadcrumbs: Paths	$r = .65$	$R^2 = 42.25$	p (one-tailed) < .01
Breadcrumbs: Overall Route	$r = .58$	$R^2 = 33.64$	p (one-tailed) < .05
Indicate Start: Indicate Finish	$r = .62$	$R^2 = 33.44$	p (one-tailed) < .01
Paths: Overall Route	$r = .63$	$R^2 = 39.69$	p (one-tailed) < .01
Indicate Location: Other Roads	$r = .50$	$R^2 = 25.0$	p (one-tailed) < .01

The paired categories indicating a large effect of significance are: Breadcrumbs: Paths, Breadcrumbs: Overall Route, Indicated Start: Indicate Finish, Paths: Overall Route, and Indicate Location: Other Roads.

Boslaugh and Watters (2008) do caution that observing strong statistical relationships may lead to over-interpreting correlations, since a surprisingly large number of variables are naturally correlated, but their relationship is not meaningful or causative.

All of the paired categories indicated as having a large effect of significance – with the exception of the pair Indicate Location: Other Roads – are similar in nature. Each category is paired with a category which is somewhat similar in nature by definition. The anomaly is the pair of Indicate Location: Other Roads. One explanation for this large effect significance may be that as one indicates their location on a map, they are searching out for landmarks or other visible cues for later confirmation that they have been at that specific place and are indeed on the correct route. It is assumed if the data was to be coded for other specific landmarks, such as “Indicate Stop Sign” or “Indicate Traffic Light”, these paired categories would also occur as large effect significant relationships when paired with indicating one’s location.

Correlational Analysis: Medium Effect

Table 4.14. Significant Correlations: Medium Effect

Categories	Significance	Effect Size	Significance Level
Breadcrumbs: Indicate Location	$r = .41$	$R^2 = 16.81$	p (one-tailed) < .01
Viewpoint: Legend	$r = .40$	$R^2 = 16.0$	p (one-tailed) < .01
Street Name: Other Roads	$r = .36$	$R^2 = 12.96$	p (one-tailed) < .05
Paths: Indicate Location	$r = .38$	$R^2 = 14.44$	p (one-tailed) < .01
On Campus: Off Campus	$r = .30$	$R^2 = 9.0$	p (one-tailed) < .01
Not Been There: Go Inside	$r = .32$	$R^2 = 10.24$	p (one-tailed) < .01
Overall Route: Other Roads	$r = .39$	$R^2 = 15.21$	p (one-tailed) < .01

The paired categories having a medium significant effect are listed in Table 4.14. The pairs, such as Breadcrumbs: Indicate Location, Street Name: Other Roads, Paths: Indicate Location, On Campus: Off Campus, and Overall Route: Other Roads are again similar categories by general definition, which explains their medium effect: they are similar activities or notations.

The unexpected pair of Viewpoint: Legend can be explained by the fact as one creates a legend on the map, one will indicate where, specifically, they are looking when the stop to sketch. This would provide additional, contextual clues for someone who might later take the map to know which direction the author the map was looking at that specific point in time.

The paring of Overall Route: Other Roads can be explained by the incorporation of additional contextual information, to provide confirmation for potential maps users in the future (similar to the large effect pairing of Indicate Locations: Other Roads). Instead

of including only the information of the specific route or path, the map author includes supplementary information for later users to provide visual and locational confirmation of one's specific point on the map, as well as their location within the journey.

Correlational Analysis: Small Effect

Table 4.15. Significant Correlations: Small Effect

Categories	Significance	Effect Size	Significance Level
Arrows: LRF Direction	$r = .21$	$R^2 = 4.41$	p (one-tailed) < .01
Arrows: Indicate Finish	$r = .15$	$R^2 = 2.25$	p (one-tailed) < .05
Arrows: Been There	$r = .15$	$R^2 = 2.25$	p (one-tailed) < .01
Arrows: Not Been There	$r = .12$	$R^2 = 1.44$	p (one-tailed) < .05
Arrows: Ask Assistance	$r = .13$	$R^2 = 1.69$	p (one-tailed) < .01
Arrows: Activities	$r = .12$	$R^2 = 1.44$	p (one-tailed) < .01
Breadcrumbs: Compass Rose	$r = .19$	$R^2 = 3.61$	p (one-tailed) < .05
Breadcrumbs: Indicate Start	$r = .25$	$R^2 = 6.25$	p (one-tailed) < .01
Breadcrumbs: Indicate Finish	$r = .28$	$R^2 = 7.84$	p (one-tailed) < .01
Breadcrumbs: Street Name	$r = .12$	$R^2 = 1.44$	p (one-tailed) < .01
Breadcrumbs: Legend	$r = .15$	$R^2 = 2.25$	p (one-tailed) < .05
Breadcrumbs: Other Roads	$r = .16$	$R^2 = 2.56$	p (one-tailed) < .05
Breadcrumbs: Color	$r = .16$	$R^2 = 2.56$	p (one-tailed) < .05
Cardinal Direction: LRF Direction	$r = .24$	$R^2 = 5.76$	p (one-tailed) < .01
Cardinal Direction: Compass Rose	$r = .21$	$R^2 = 4.41$	p (one-tailed) < .01
Cardinal Direction: Street Name	$r = .21$	$R^2 = 4.41$	p (one-tailed) < .01
Cardinal Direction: Go Inside	$r = .14$	$R^2 = 1.96$	p (one-tailed) < .01
LRF Directions: Street Name	$r = .11$	$R^2 = 1.21$	p (one-tailed) < .05
LRF Directions: On Campus	$r = .18$	$R^2 = 3.24$	p (one-tailed) < .01
LRF Directions: Off Campus	$r = .10$	$R^2 = 1.0$	p (one-tailed) < .05
LRF Directions: Been There	$r = .23$	$R^2 = 5.29$	p (one-tailed) < .01
LRF Directions: Activities	$r = .16$	$R^2 = 2.56$	p (one-tailed) < .01
Compass Rose: Viewpoint	$r = .14$	$R^2 = 1.96$	p (one-tailed) < .01
Compass Rose: Indicate Finish	$r = .13$	$R^2 = 1.69$	p (one-tailed) < .01
Compass Rose: Street Name	$r = .17$	$R^2 = 2.89$	p (one-tailed) < .01

Table 4.15 (continued)

Categories	Significance	Effect Size	Significance Level
Compass Rose : Paths	$r = .18$	$R^2 = 3.24$	p (one-tailed) < .01
Compass Rose: Indicate Location	$r = .13$	$R^2 = 1.69$	p (one-tailed) < .01
Compass Rose: Legend	$r = .14$	$R^2 = 1.96$	p (one-tailed) < .01
Compass Rose: Overall Route	$r = .27$	$R^2 = 7.29$	p (one-tailed) < .01
Compass Rose: Other Roads	$r = .27$	$R^2 = 7.29$	p (one-tailed) < .01
Compass Rose: Flags	$r = .12$	$R^2 = 1.44$	p (one-tailed) < .01
Viewpoint: Enclosure	$r = .21$	$R^2 = 4.41$	p (one-tailed) < .01
Viewpoint: Indicate Location	$r = .25$	$R^2 = 6.25$	p (one-tailed) < .01
Viewpoint: Overall Route	$r = .10$	$R^2 = 1.0$	p (one-tailed) < .05
Viewpoint: Other Roads	$r = .13$	$R^2 = 1.69$	p (one-tailed) < .01
Enclosures: Off Campus	$r = .10$	$R^2 = 1.0$	p (one-tailed) < .05
Enclosures: Been There	$r = .10$	$R^2 = 1.0$	p (one-tailed) < .05
Enclosures: Indicate Location	$r = .18$	$R^2 = 3.24$	p (one-tailed) < .01
Enclosures: Legend	$r = .16$	$R^2 = 2.56$	p (one-tailed) < .01
Indicate Start: Street Name	$r = .22$	$R^2 = 4.84$	p (one-tailed) < .01
Indicate Start: Paths	$r = .22$	$R^2 = 4.84$	p (one-tailed) < .01
Indicate Start: Indicate Location	$r = .16$	$R^2 = 2.56$	p (one-tailed) < .01
Indicate Start: Overall Route	$r = .23$	$R^2 = 5.29$	p (one-tailed) < .01
Indicate Start: Color	$r = .12$	$R^2 = 1.44$	p (one-tailed) < .05
Indicate Finish: Street Name	$r = .21$	$R^2 = 4.41$	p (one-tailed) < .01
Indicate Finish: Paths	$r = .22$	$R^2 = 4.84$	p (one-tailed) < .01
Indicate Finish: Indicate Location	$r = .17$	$R^2 = 2.89$	p (one-tailed) < .01
Indicate Finish: Overall Route	$r = .23$	$R^2 = 5.29$	p (one-tailed) < .05
Indicate Finish: Color	$r = .14$	$R^2 = 1.96$	p (one-tailed) < .05
Street Names: Paths	$r = .18$	$R^2 = 3.24$	p (one-tailed) < .01
Street Names: On Campus	$r = .14$	$R^2 = 1.96$	p (one-tailed) < .01
Street Names: Indicate Location	$r = .12$	$R^2 = 1.44$	p (one-tailed) < .01

Table 4.15 (continued)

Categories	Significance	Effect Size	Significance Level
Street Names: Activities	$r = .12$	$R^2 = 1.44$	p (one-tailed) < .01
Street Names: Overall Route	$r = .16$	$R^2 = 2.56$	p (one-tailed) < .01
Paths: Off Campus	$r = .10$	$R^2 = 1.0$	p (one-tailed) < .01
Paths: Legend	$r = .11$	$R^2 = 1.21$	p (one-tailed) < .01
Paths: Other Roads	$r = .28$	$R^2 = 7.84$	p (one-tailed) < .01
Paths: Color	$r = .17$	$R^2 = 2.89$	p (one-tailed) < .01
Building Number: Go Inside	$r = .23$	$R^2 = 5.29$	p (one-tailed) < .01
Building Number: Human Form	$r = .13$	$R^2 = 1.69$	p (one-tailed) < .05
Building Number : Branding	$r = .16$	$R^2 = 2.56$	p (one-tailed) < .01
On Campus: Ask Assistance	$r = .11$	$R^2 = 1.21$	p (one-tailed) < .05
On Campus: Activities	$r = .23$	$R^2 = 5.29$	p (one-tailed) < .01
Off Campus: Other Roads	$r = .10$	$R^2 = 1.0$	p (one-tailed) < .05
Been There: Not Been There	$r = .10$	$R^2 = 1.0$	p (one-tailed) < .05
Been There: Activities	$r = .24$	$R^2 = 5.76$	p (one-tailed) < .01
Not Been There: Faster	$r = .25$	$R^2 = 6.25$	p (one-tailed) < .01
Not Been There: Go Inside	$r = .22$	$R^2 = 4.84$	p (one-tailed) < .01
Not Been There: Activities	$r = .17$	$R^2 = 2.89$	p (one-tailed) < .01
Faster: Go Inside	$r = .11$	$R^2 = 1.21$	p (one-tailed) < .05
Ask Assistance: Activities	$r = .10$	$R^2 = 1.0$	p (one-tailed) < .05
Go Inside: Human Form	$r = .21$	$R^2 = 4.41$	p (one-tailed) < .01
Go Inside: Color	$r = .14$	$R^2 = 1.96$	p (one-tailed) < .01
Indicate Location: Legend	$r = .25$	$R^2 = 6.25$	p (one-tailed) < .01
Indicate Location: Other Roads	$r = .18$	$R^2 = 3.24$	p (one-tailed) < .01
Indicate Location: Flags	$r = .20$	$R^2 = 4.0$	p (one-tailed) < .01
Legend: Overall Route	$r = .15$	$R^2 = 2.25$	p (one-tailed) < .01
Activities: Color	$r = .11$	$R^2 = 1.21$	p (one-tailed) < .05
Overall Route: Color	$r = .24$	$R^2 = 5.76$	p (one-tailed) < .01

The paired categories having a small significant effect are listed in Table 4.15. It is essential to remember the effect size of the following correlational relationships may be purely consequential; the paired variables may not have a significant influence on the cause-and-effect relationship between the two categories.

Correlational Analysis: Very Small Effect

Table 4.16. Significant Correlations:Very Small Effect

Categories	Significance	Effect Size	Significance Level
Arrows: Off Campus	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05
Cardinal Directions: Activities	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05
Enclosure: Other Roads	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05
Indicate Finish: Ask Assistance	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .01
Street Name: Off Campus	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05
Street Name: Ask Assistance	$r = .08$	$R^2 = 0.64$	p (one-tailed) < .05
On Campus: Not Been There	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05
Off Campus: Been There	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05
Faster: Human Form	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05
Legend: Other Roads	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05
Other Roads: Color	$r = .09$	$R^2 = 0.81$	p (one-tailed) < .05

Correlational Analysis: Very Small Negative Effect

Table 4.17. Significant Correlations: Very Small Negative Effect

Categories	Significance	Effect Size	Significance Level
Arrows: Legend	r = -.10	R^2 = -1.0	p (one-tailed) < .05
Breadcrumbs: Go Inside	r = -.09	R^2 = -0.81	p (one-tailed) < .05
Compass Rose: Branding	r = -.09	R^2 = -0.81	p (one-tailed) < .05
Viewpoint: Indicate Start	r = -.09	R^2 = -0.81	p (one-tailed) < .05
Viewpoint: Indicate Finish	r = -.09	R^2 = -0.81	p (one-tailed) < .05
Enclosures: Paths	r = -.09	R^2 = -0.81	p (one-tailed) < .05
Indicate Start: Faster	r = -.10	R^2 = -1.0	p (one-tailed) < .05
Indicate Start: Ask Assistance	r = -.10	R^2 = -1.0	p (one-tailed) < .05
Indicate Finish: Off Campus	r = -.09	R^2 = -0.81	p (one-tailed) < .05
Building Number: On Campus	r = -.09	R^2 = -0.81	p (one-tailed) < .05
Building Number: Indicate Location	r = -.10	R^2 = -1.0	p (one-tailed) < .05
Building Number: Color	r = -.09	R^2 = -0.81	p (one-tailed) < .05
On Campus: Indicate Location	r = -.10	R^2 = -1.0	p (one-tailed) < .05
Go Inside: Flags	r = -.08	R^2 = -0.64	p (one-tailed) < .05

Correlational Analysis: Small Negative Effect

Table 4.18. Significant Correlations: Small Negative Effect

Categories	Significance	Effect Size	Significance Level
LRF Directions: Overall Route	r = -.19	R^2 = -3.61	p (one-tailed) < .01
LRF Directions: Other Roads	r = -.15	R^2 = -2.25	p (one-tailed) < .01
Indicate Finish: Faster	r = -.11	R^2 = -1.21	p (one-tailed) < .05
On Campus: Flags	r = -.12	R^2 = -1.44	p (one-tailed) < .01
Off Campus: Flags	r = -.11	R^2 = -1.21	p (one-tailed) < .05

Phase 2 Results

Participant ZK

Participant ZK tested maps 201a and 288b, which took them to Capanna Coffee. The participant was male and age 26, and works as a graphic designer.

ZK:Map 201a

The map was tested on July 12, 2012, from 3: 46pm to 4:06 pm. The participant stated in their notes that this map was not particularly difficult to understand. Once he had his bearings, he stated, it was quite easy to follow. The only issue that the participant noted was the realignment of the map, as the subject ran out of room when drawing the map: the subject noted this on the map, and stated to "re-orient" to the top. This caused a lot of rotation of the map by the participant, to figure out where to go next.

The subject indicated two main roads on the map, which the participant testing the map stated made it easy to understand and comprehend. When en route, the participant noted the landmarks in the distance, and knew they were on the correct route.

The only other issue the participant had was the orientation and notation of the buildings on campus. The subject was not clear in labeling each building, and when the participant tested the map, they were not abel to confirm if that building was correctly identified or not. The participant correctly identified Howe Hall when en route.

The subject asked the researcher which direction they were heading. Subject stated they were not confident using cardinal directions, which the researcher noted.

ZK: Map 288b

The return trip was on the same date, from 4:32pm to 5:03pm. The participant had some difficult at the beginning of the trip trying to discover where the participant began their map. Subject also had a difficult time using the detailed map drawn by the participant, which included a thumbnail of where the subject stopped; at some locations, the subject indicated which direction they looked when drawing; other times, they did not.

The subject also included thumbnail sketches of their stopping points. The participant used these to confirm they were on the correct path.

One major issue that the participant had was when they reached the intersection of N. Franklin Avenue and West Street. According to the map, the subject stopped here and drew/annotated, but there wasn't any indication of if they continued a north-based route or headed west along West Street. The map appeared to go in a easterly direction, so it was inferred they traveled along West Street. However, since the participant was matching up the thumbnail, the participant was not confident that they had made the correct choice in turning on West Street. The participant thought some of the thumbnails matched up, but was not 100 percent confident in finding them along the route.

The final thumbnail on this map showed a sign of an apartment complex. As the participant and researcher approached the College of Design, they didn't see this sign on the route they had taken. At this point, the researcher recalled the subject might have taken another path (not going along West Street, but rather continued along N. Franklin Avenue to Oakland Street). Once the participant and researcher reached Design, they

traced back their steps only to find that sign at the intersection of Hyland and Oakland, which indicated the subject indeed continued along N. Franklin to Oakland, and did not turn onto West Street, as they participant and researcher assumed.

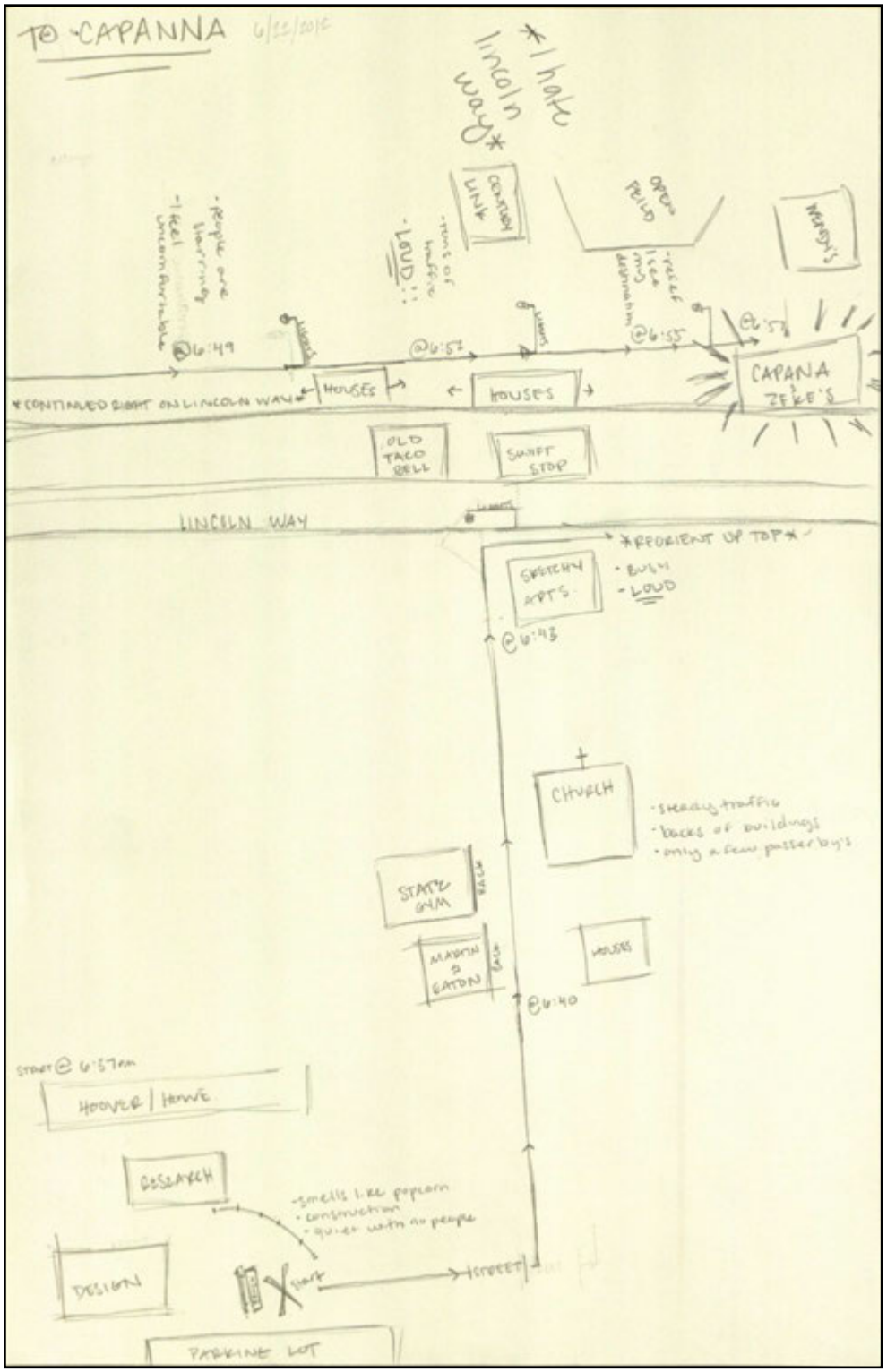


Figure 4.3. Map 201a used for Phase 2: ZK

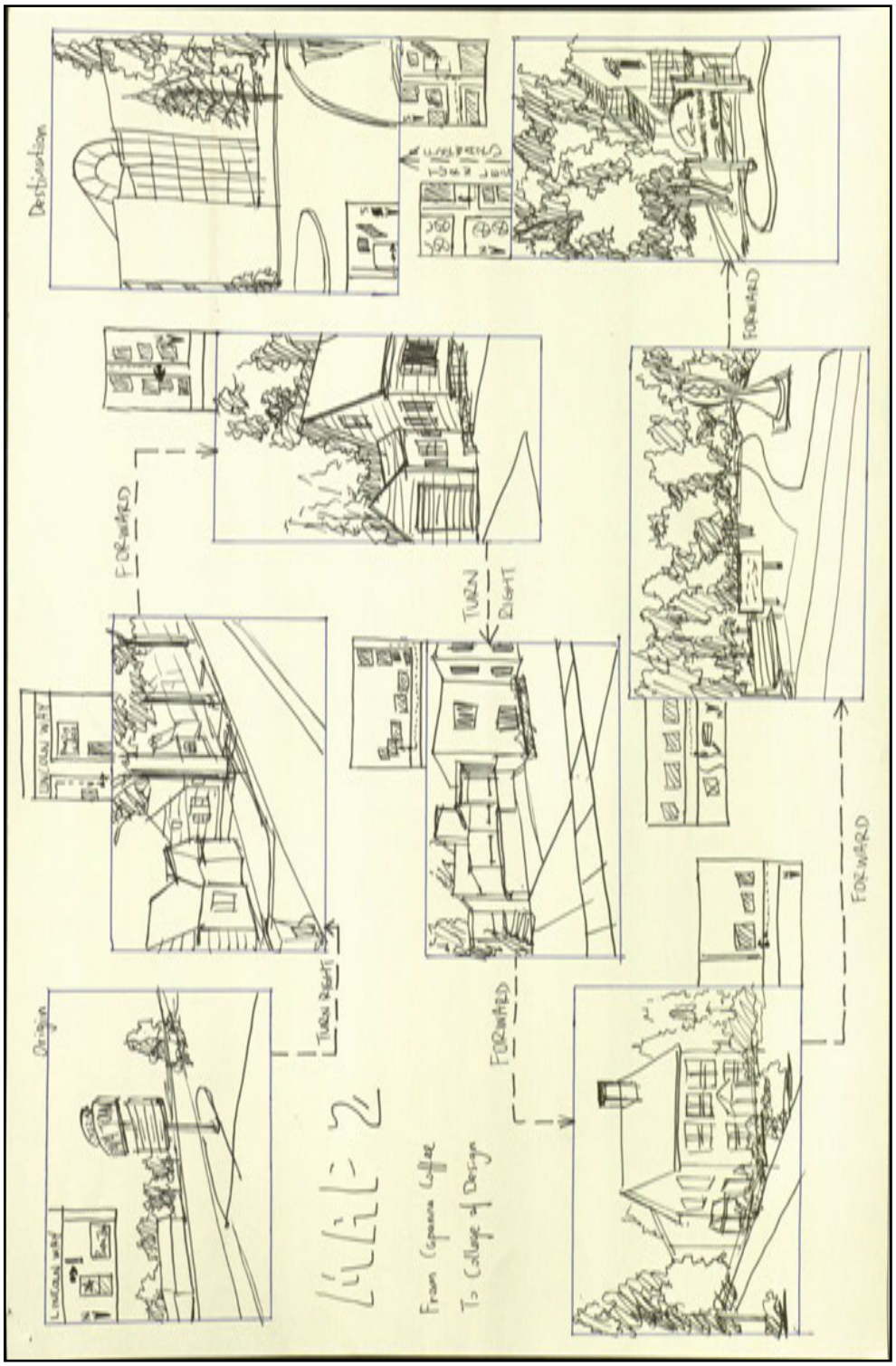


Figure 4.4. Map 288b used for Phase 2: ZK

Participant SS

Participant SS tested maps 164a and 207b, which took them to Capanna Coffee. The participant was female and age 26, and works in Human Services as a Job Developer.

SS: Map 164a

This map was tested on July15, 2012 from 4:15pm to 4: 39pm. The participant noted that the terminology on the map was difficult to understand (e.g.: "Martin" and "Zekes"), especially since the participant was not familiar with the area, street names, or building names. The participant noted that the map had indicated street names and signs included, which made it easier to understand.

While en route, the participant was a little confused. The comments on the evaluation form stated: [Did you get lost?] "A little due to the way the direction the maps was drawn and not being familiar with the buildings. Got back on track from street name mentioned and using sense of direction."

SS: Map 207b

The return route was conducted on the same date, from 4:44pm to 5:03 pm. While on the return route to Design, the participant stated there was nothing difficult about this specific map. "The map clearly showed the direction I should take and have street names and icons along the way to let me know I was on the right track."

The researcher noted that the participant actually put the map away after turning on West Street, just past Howard, and stated that they didn't require the map any more.

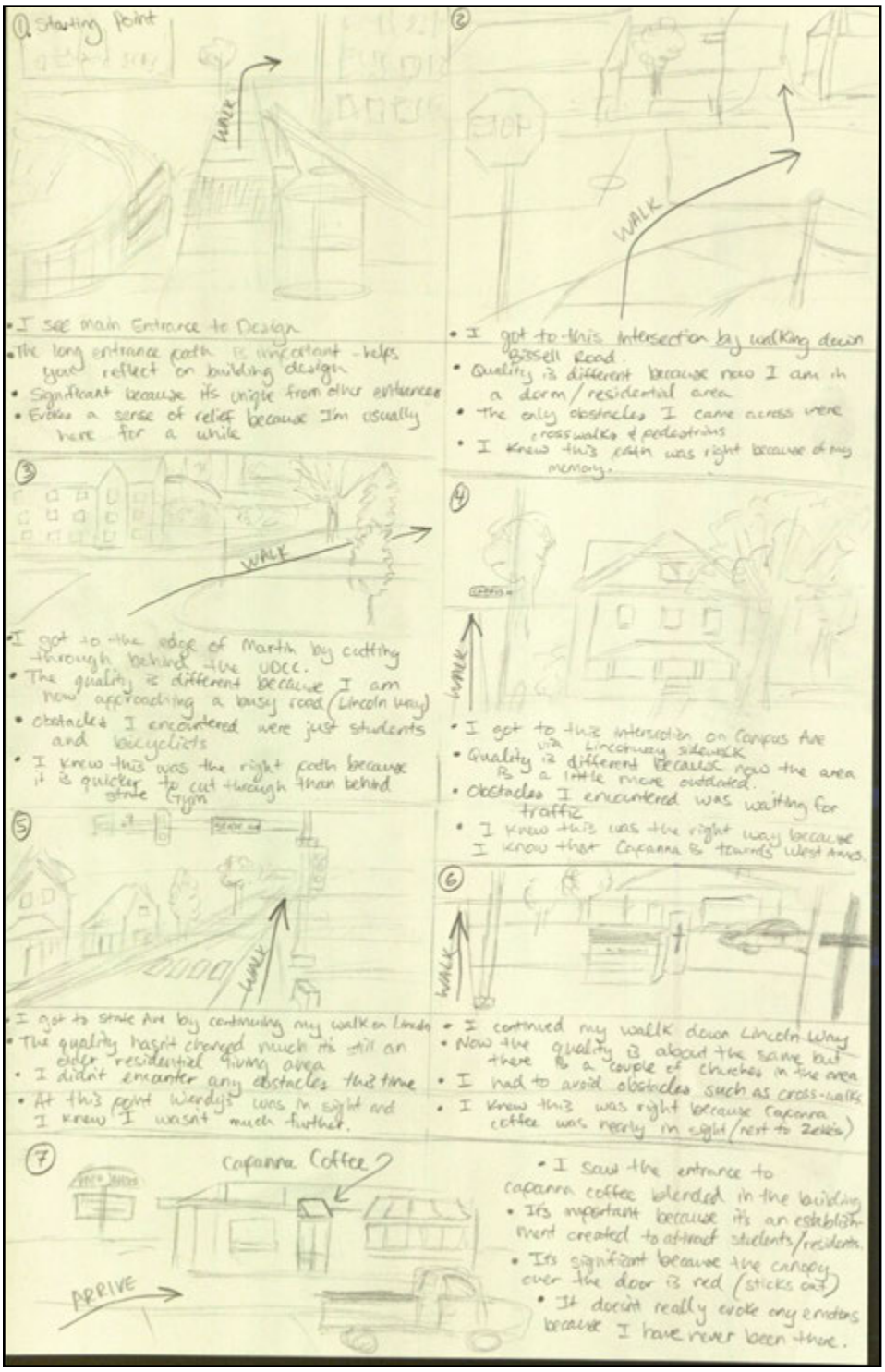


Figure 4.5. Map 164a used for Phase 2: SS

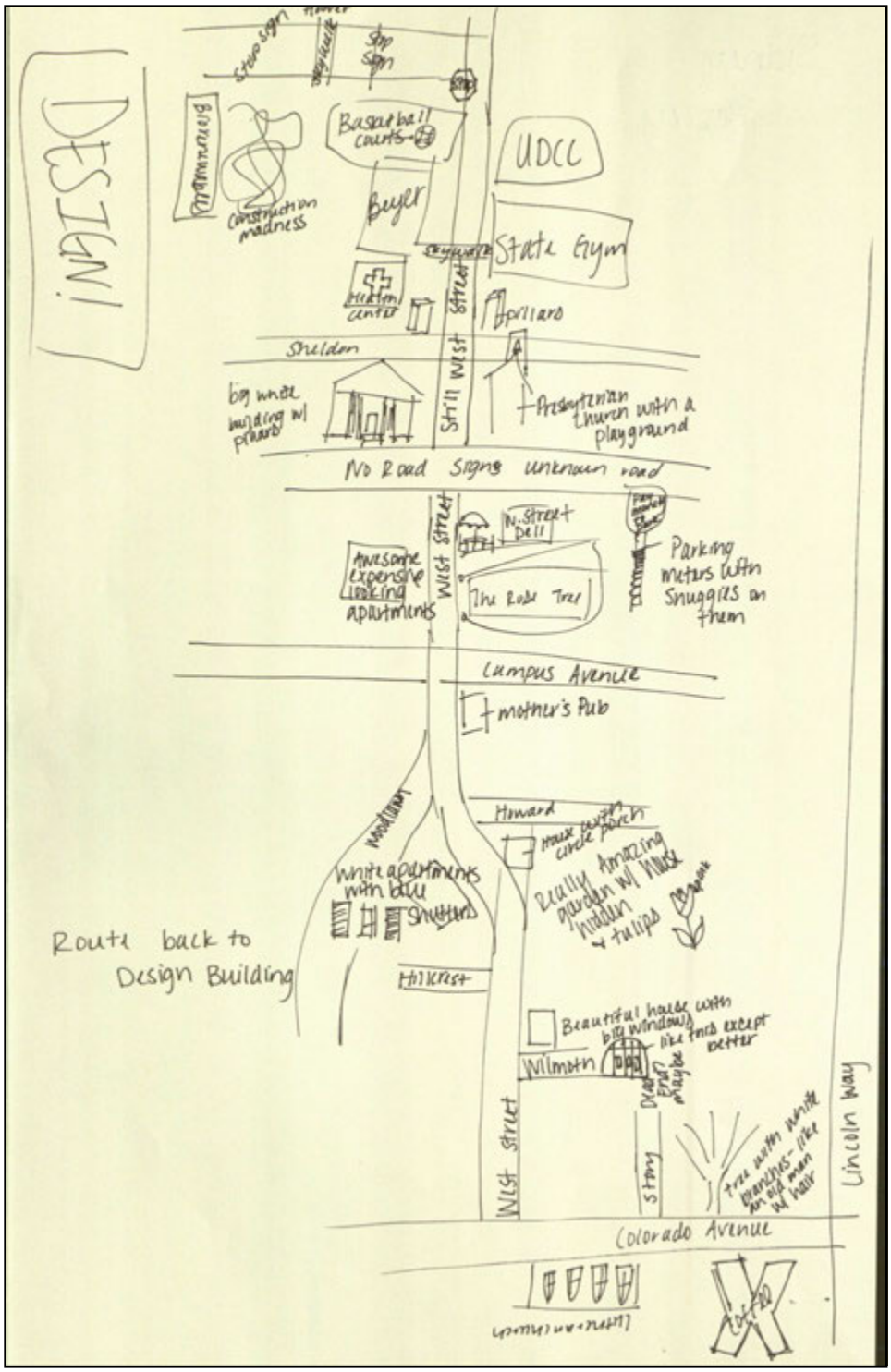


Figure 4.6. Map 207b used for Phase 2: SS

Participant EM

Participant EM tested maps 73a and 260b, which took them to the Post Office in Campustown. The participant was female, age 27, and is a laboratory analyst.

EM: Map 73a

This map was tested on July 15, 2012 from 5: 11pm to 5: 28pm. The participant initially stated that they needed to find a good point of origin, which they finally discovered the sculpture adjacent to the College of Design. From that point forward, participant identified and confirmed the major buildings indicated on the map. Participant also noted that the CyRide stops and drawn landmarks facilitated and confirmed they were on the correct path.

EM: Map 260b

The return route was conducted on the same date, from 5:30pm to 5:51pm. The participant noted that there were very little drawings or illustrations on this map. The content on here was mostly sentimental and anecdotal, which led to confusion and lack of comprehension by the participant.

Participant also noted that arrows were drawn on some intersections and buildings were selected as landmarks. The participant got lost a little bit at the intersection of Lincoln Way and Welch Avenue. Participant stated that no explicit left turn was mentioned in the commentary or illustration. Participant was looking for a church, and used their logic to deduce that it was towards the west, rather than the east, which led towards additional business establishments.

The only overall comment the participant noted was that the first map (Map 73a) was much more helpful than the second (Map 260b).

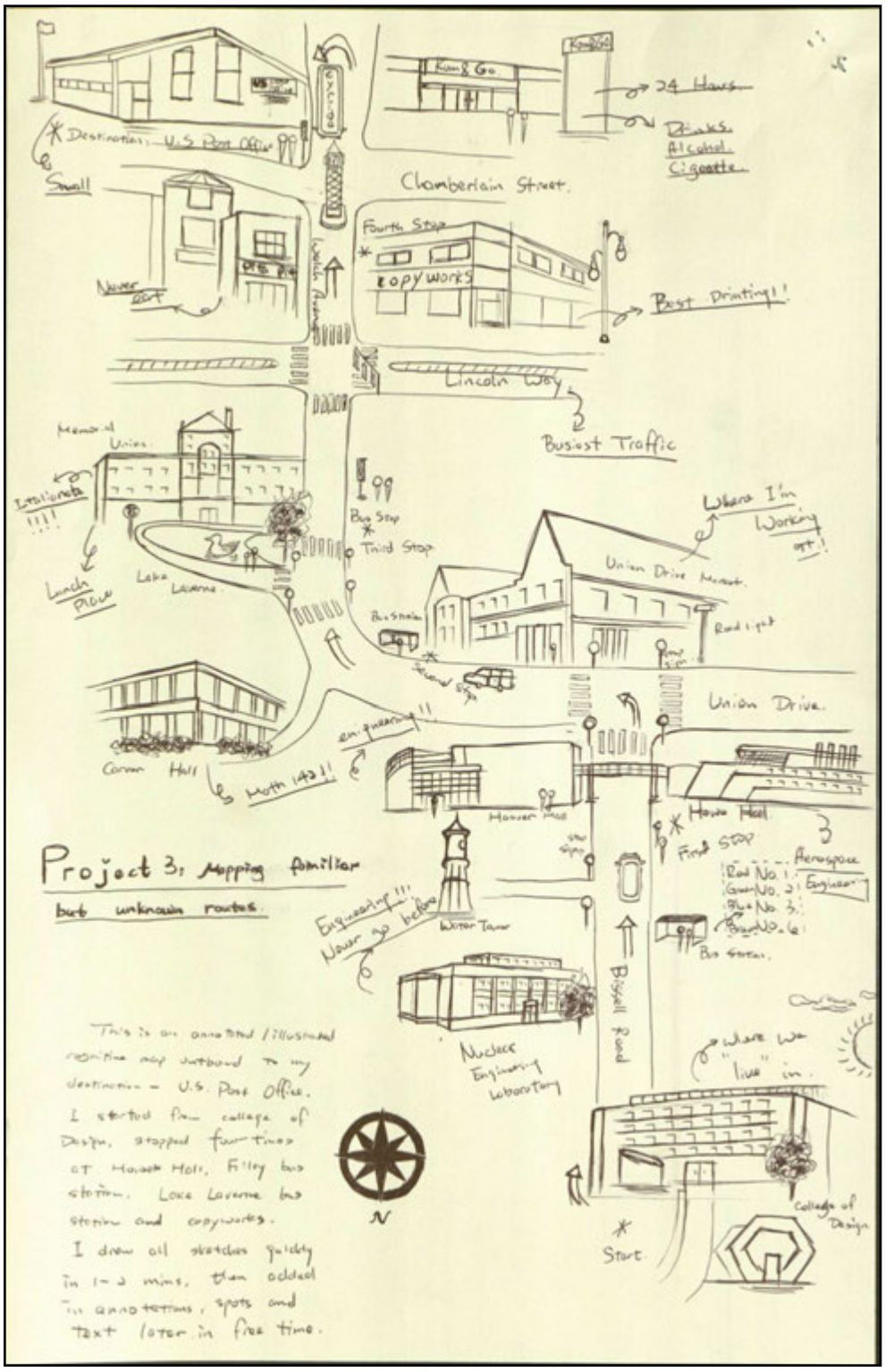


Figure 4.7. Map 73a used for Phase 2: EM

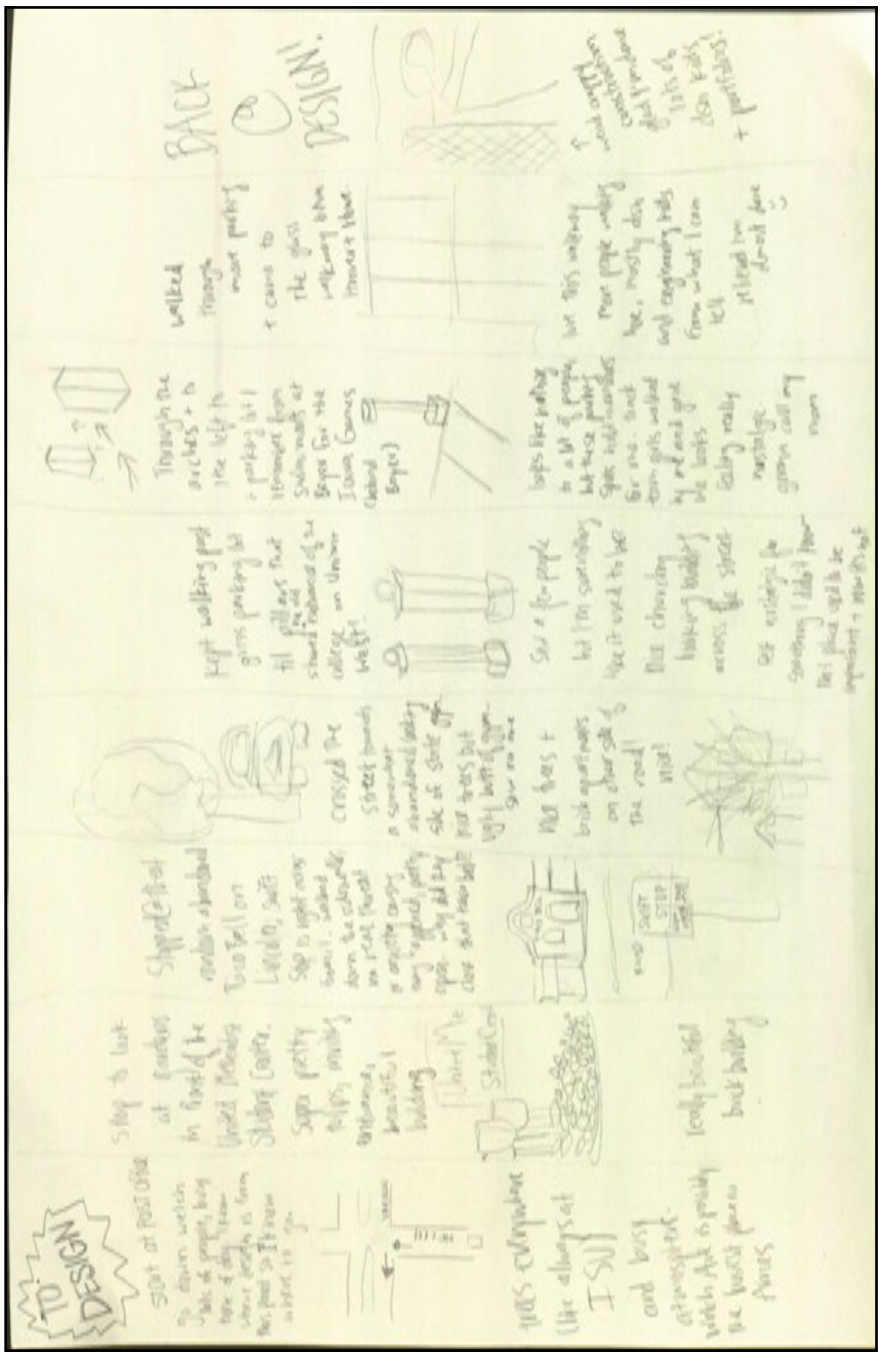


Figure 4.8. Map 260b used for Phase 2: EM

Participant SC

Participant tested maps 102a and 88b, which took them to the Post Office in Campustown. The participant was female, age 24, and works as a phelbotomist.

SC: Map 102a

The maps was tested on July 15, 2012 from 5: 57pm to 6:13pm. The participant stated that once they had the map facing North, it wasn't difficult to comprehend (participant's route was in a southerly direction towards the Post Office). The participant noted that the drawings were simple and the roads were named. They also stated that not too many words or paragraphs were used, and this increased the comprehension of the map. Participant did not deviate from the route, nor did they get lost.

SC: Map 88b

The return route was conducted on the same date, from 6:15pm to 6:31pm. The route took the participant through campus, and the notation on the map was more personal and anecdotal, from the subject's personal perspective. There was some indication of the names of buildings drawn on the map, but most were identified by the specific actions and interactions of the subject. The researcher had to assist the participant to identify place #3 drawn on the map: the subject noted on the map "I came here to drop a class once," which meant nothing to the participant. From this point forward, the participant had no issues with the map.

Participant stated they were not familiar with campus and didn't understand the references provided. However, the sketches at each stopping point were accurate and

right on. Participant was able to identify them while on the route, even without the labeling of the building on the map.

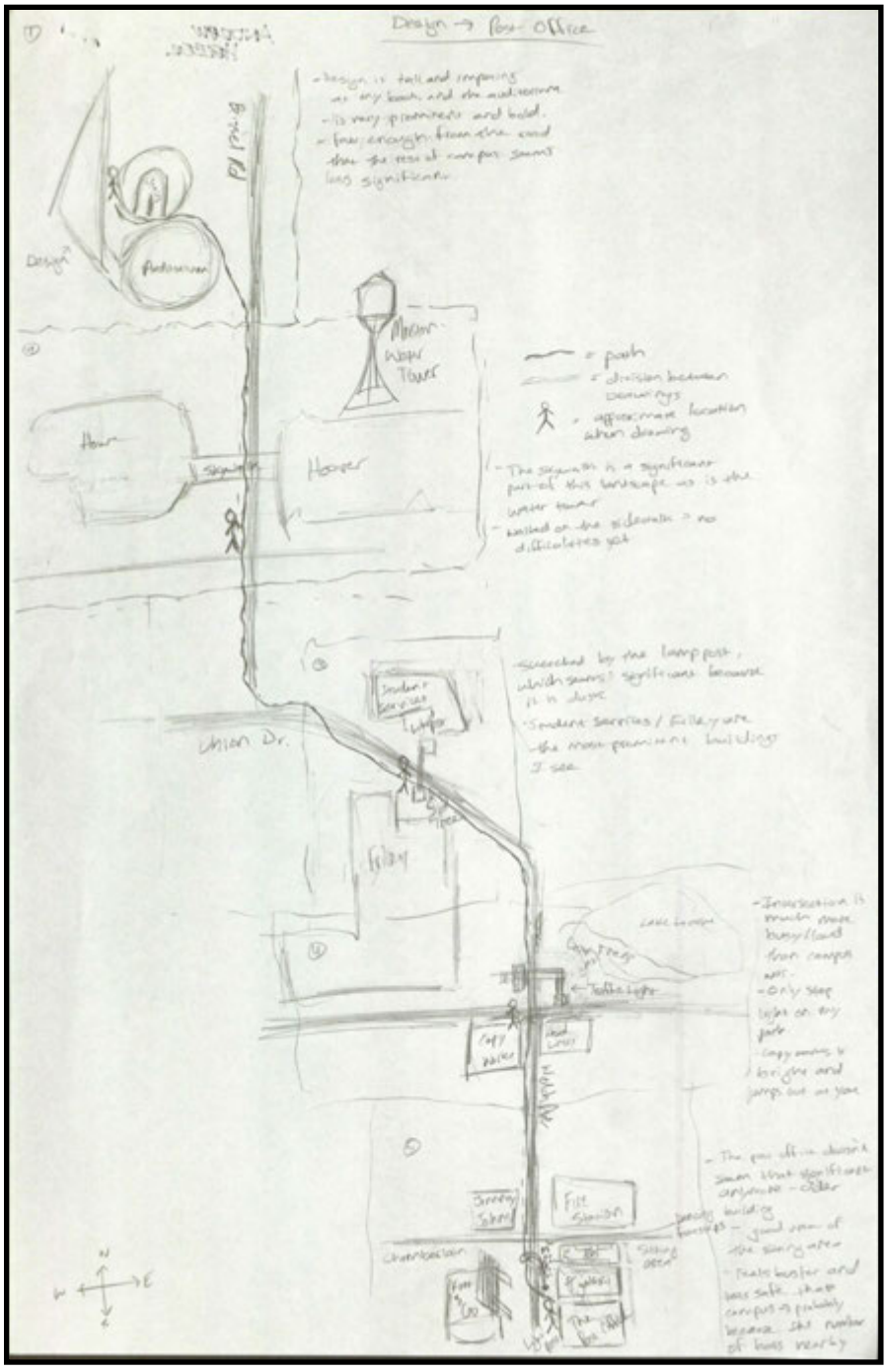


Figure 4.9. Map 102a used for Phase 2: SC

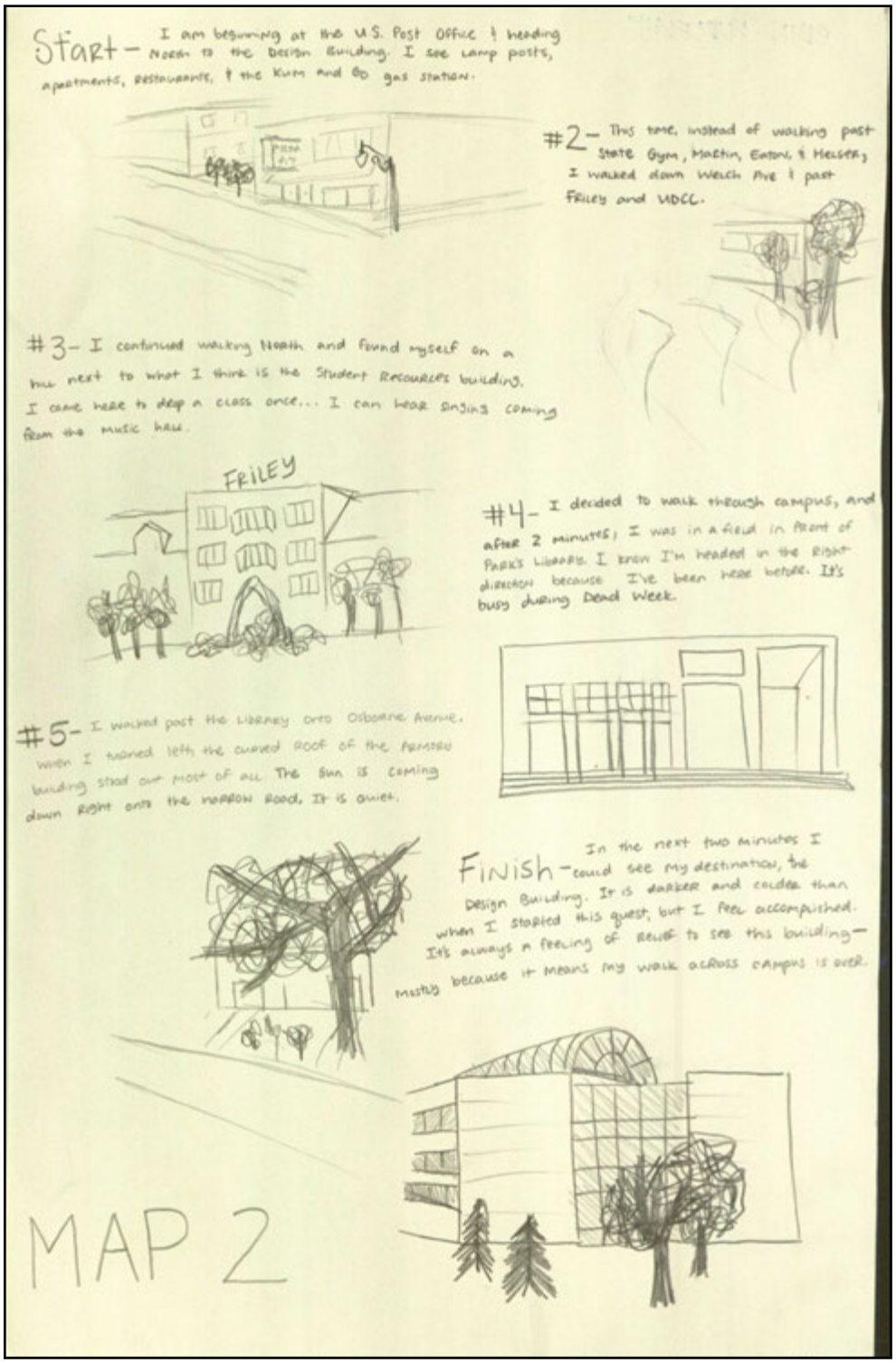


Figure 4.10. Map 88b used for Phase 2: SC

Participant CC

Participant CC tested maps 51a and 102b, which took them to the Post Office in Campustown. The participant was male, age 27, and works as a Coordinator in a Non-Profit organization.

CC: Map 51a

This map was tested on July 15, 2012, from 6:38pm to 6:53 pm. The participant noted some difficulty in reading the map: “Sometimes the drawings didn’t match the direction I was walking. Landmarks weren’t easily recognized.” The participant easily identified the street names and pointed out specific landmarks, such as the flag for the post office. This was the first participant who actually noted the flag prior to arriving at the post office.

Participant stated that they didn’t get lost. the route took them a way which made sense.

CC: Map 102b

The return route was conduced on the same date, from 6:57pm to 7:13pm. On this map, the participant noted that the intersections weren’t always labeled and some of the landmarks were obscured by trees. Participant noted the compass rose, and used it to provide initial orientation. One specific issue the participant had was at the beginning of the route: the subject drew that their route continued south-bound on Welch Avenue, towards the next intersection. The participant was a little confused as to why this occurred. After realizing the route was taking them towards the next intersection, then

continuing west, the participant understood why this was indicated by the subject (the Post Office is located in the middle of the block; not at an intersection).

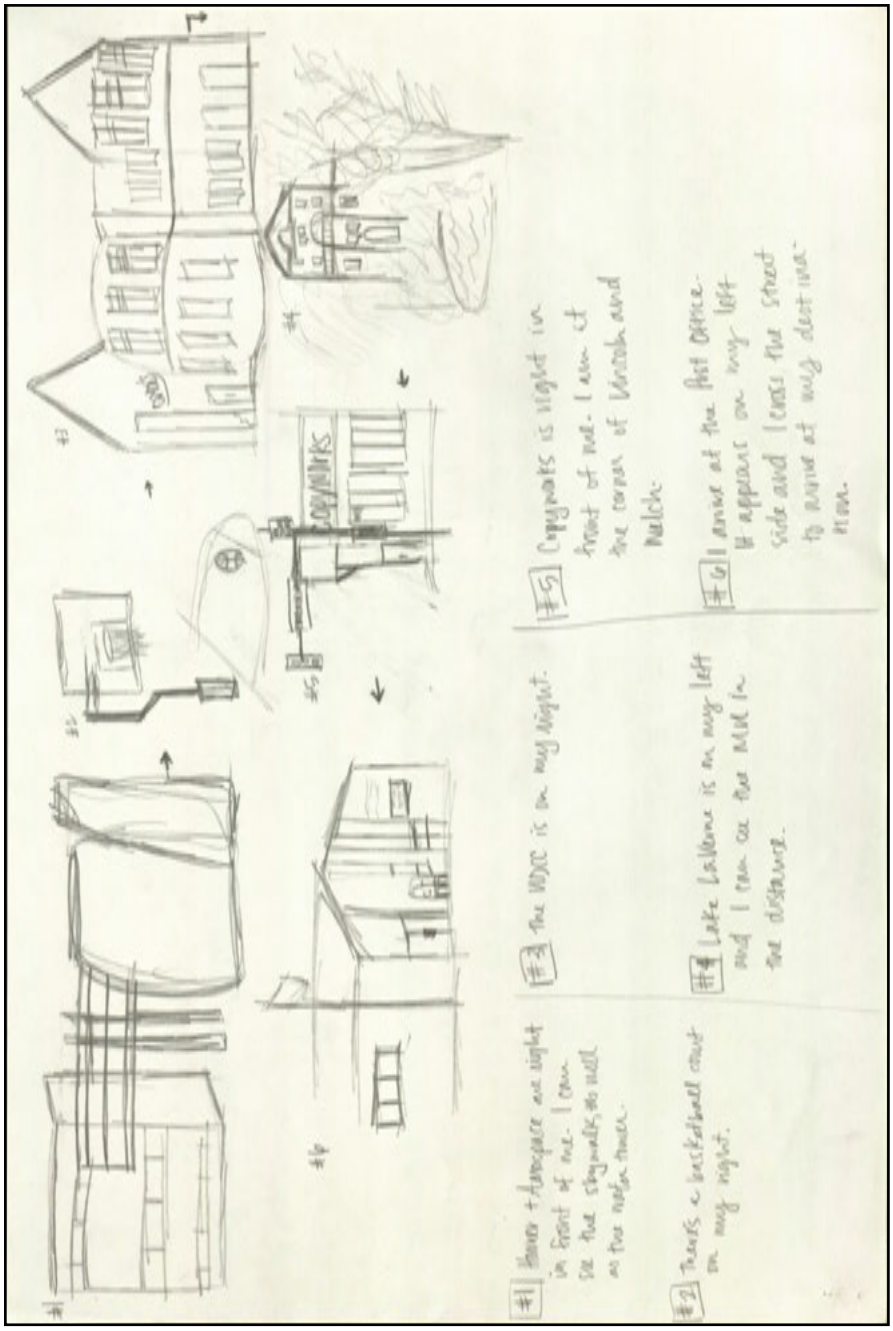


Figure 4.11. Map 51a used for Phase 2: CC

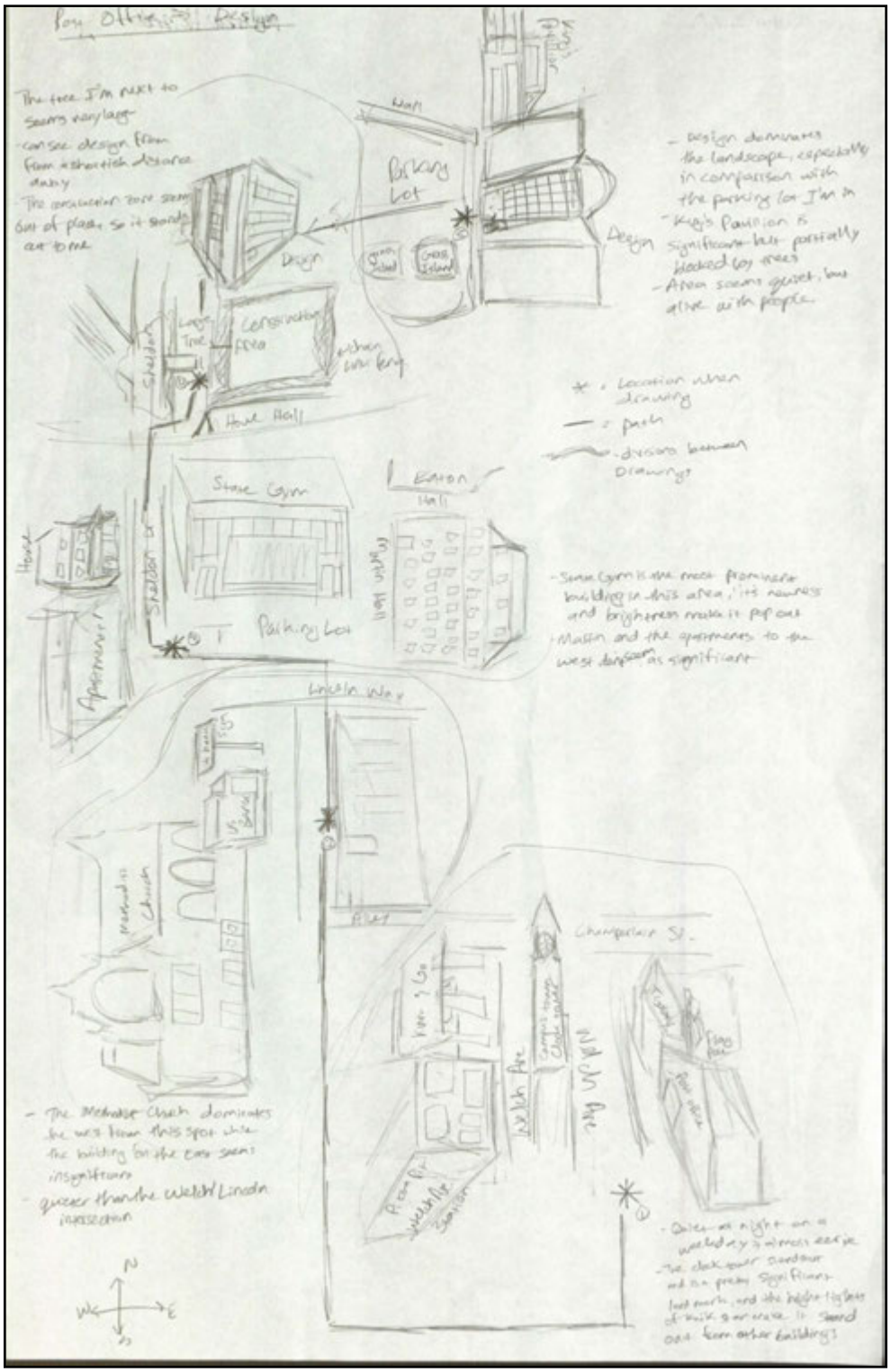


Figure 4.12. Map 102b used for Phase 2: CC

CHAPTER 5: DISCUSSION AND CONCLUSIONS

The initial concept of this project was the result of the Recommendations for Future Research of the researcher's first thesis (Gentry, 2010). In reviewing these recommendations, the researcher wondered how specific items overlap between his research interests from Interior Design and Graphic Design. The researcher began to discuss these ideas with his major professor, Paul Bruski, a faculty member in Graphic Design. One of Bruski's ideas was to somehow incorporate his passion of mapping (which was the component of his MFA thesis) and the researcher's particular interests. One of the outcomes from Bruski's pursuits was the implementation of an experimental course in the College of Design, Spring Semester, 2012, called "Explorative Mapmaking", course listing ART GR 585x. The course was an interdisciplinary course, primarily made up of graduate students for a variety of disciplines. According to Bruski, this course has been accepted to be offered again.

This study attempted to address the question what happens when someone has to interpret a map provided by someone else? How does one interpret the notation on this map? What if the elements drawn and indicated on the map are not understood by the the person using the map for navigation? A hypothesis was drawn to see if these hand-drawn maps of subjects traveling within the environment could be understood by those who were unfamiliar with that specific environment. Additional questions that were raised were if the subjects indicated a specific orientation style in their hand-drawn map, such as using guidance from landmark to landmark compared to a distance-based route. The question was raised regarding the differences between the drawing styles of the different

professional degree programs in the College of Design at Iowa State University: what are the differences? How are some of them similar? Do the maps of those who work in large-scale environments, such as Community and Regional Planning and Landscape Architecture vary to those who work in medium-scale environment, such as Architecture and Interior Design, compared to those who work at a more micro-level, such as Industrial Design and Graphic Design. Finally, how do these maps actually *function* in the field? This study took a small, random selection of the maps produced by subjects and tested the maps for comprehension and usability by a participant who was not familiar with the geographic areas.

Correlational Statistics

The correlational statistics indicate several obvious elements: The categories which were similar, such as the pairs of Cardinal Directions and Left, Right, Forward directions and Indicating a Path and Indicating Breadcrumbs, have a larger amount of overlapping between the two categories (a higher R^2 value indicates greater amount of overlap) because the description of the two paired categories are similar in nature. This is reflected by the significant R^2 values reported in Table 4.12.

Besides the obvious pairs, one significant pair that was not necessarily expected was between the combination of Not Been There Before and Asked Assistance, which received a R^2 value of 9.99. It is assumed that the subject would indicate that they would indicated on their map that they had not been to a specific place before within the annotations of the map, it was surprising to the researcher that the subject actually

stopped and asked someone along the way, while en route, where the specific destination was located. In most cases, this would be an instance where the subject might pull out a mediating device, such as a smart phone or GPS system to identify their location to the destination. However, since those elements were restricted in this study, the subject had to interact with the public and gather this information.

Other interesting results the researcher discovered were orientation of the drawn map page was almost equal: 47.7 % drew the map in a portrait orientation and 47.2 % drew the map in landscape orientation. The researcher assumed there would be a greater division between the two page orientations: especially since one origin:destination pair was along a North:South orientation (Design and the Post Office) and the other pair was an East:West orientation (Design and Capanna). This may indicate that the subjects did not truly understand the location of their assigned destination, and therefore did not correlate page orientation with the geographic orientation of the two landmarks.

In Phase 2 of the project, there was some difficulty of the participants in understanding the difference in the nomenclature of the elements drawn on the map. Almost every participant indicated some difficulty in differentiating the names: were they names of the streets or buildings? Unless the street names were explicitly stated with the proper label, (e.g.: Welch Avenue or Martin Hall), the participant was unclear as to what the subject had intended to label. This could be resolved by incorporating illustrations of street signs, as some maps had included, a legend or key to provide notation for the viewer of what they were indicating. In the defense of the subjects, they did not know that these maps would be used by other participants for navigational purposes. However,

if one would be consistent in including legends and keys within every map drawn, this would eliminate the need for viewers to question the notations and markings on the maps.

In the case of Phase 1, Different drawing orientations, such as those drawn using Z style or S style (see Table 4.10) didn't appear to play a major role in a single "right" way of drawing the map. This could also be the case for Phase Two: the vast range of opportunities in drawing style and representation from the participants in Phase One did not cause any apparent problems for the participants in Phase Two.

The researcher also noted a creation of hybrid of drawing styles. Prior to coding, the researcher developed a key with the basic drawing styles (e.g.: plan, perspective, elevation, and map). The researcher did not expect for the subject to fluctuate between drawing styles within the same document. One potential reason to support this would be the level of design of the subjects: just completing their first year of design school. It is assumed that if this study were to be implemented at the end of the subjects' academic career, there would be a more consistent drawing style within the singular map.

Implications

The findings from this study revealed that drawing styles have the potential to mature as the subject matures within their specific design discipline. This is not evident within this specific study, but assumptions can be made based upon what the researcher has observed in other classrooms and studios within his career as a graduate student in the undergraduate classroom.

Other implications show that participants who used the maps for navigational purposes had some difficulty in finding some of the major landmarks, especially if not explicitly labeled. When the researcher asked the participant to find the watertower in reality, and it was not clearly labeled but drawn on the map, the participant could not immediately identify the specific landmark in question. Therefore, clarity in mark-making and labeling is crucial for understanding and comprehension of any drawn map. Without these elements to guide one thought the map, it causes extreme difficulty when guiding through the real physical environment.

Educational Implications

Some of the educational implications which can be deduced from this study indicted that students still have a heavy reliance upon computers and assistive devices. This study could be conducted after the end of the subjects' professional academic career and the research predict that results would be different than those produced in this specific study. Additional educational implications to reinforce and support the findings of this project would consist of constant reinforcement and re-instruction of the Lynchian environmental cues in all disciplines. All scales of design utilize these principles within the specific discipline; additionally, large scale design relies on small scale design for guidance and wayfinding. No design discipline is all inclusive: each discipline is dependent upon the other for some nature, whether for providing a substrate in which to support the designed signage, or to provide protection from the external elements, a design discipline cannot exist solely independently. This is taught in the undergraduate studios; however, the researcher is sure the egos of those in a design discipline feel that

they may be superior to other and not have to rely upon other disciplines. Only through practical experience and trial and error, can this be realized.

Limitations

The purpose of this study was to compare the relationships between the hand-drawn maps themselves, and then how these maps specifically were understood and comprehended when used in the field. This study examined the connections between the specific drawing styles of subjects who were enrolled in DSNS 183, Design Cultures, a prerequisite for the first-year design students intending to apply for a professional degree program at the end of the academic year, as well as those enrolled in the course to fulfill a general education requirement for the College of Liberal Arts at Iowa State University.

First, the subject group (those who actively traveled the routes and documented the journey) had almost two weeks to complete this project. This large amount of time allowed the student to complete this project on their own time, working around other academic responsibilities and social activities. This created some difficulty for the coding process, as not every subject indicated the date and time on their maps. This could have added an additional layer of information to the content of the maps. Additionally, within this time the subject had to complete the map, a major university-wide festival was in progress and made an impact not only on the subjects' amount of free time, but also on the physical environment. A large number of students indicated that it was the Sunday after VEISHEA, and Welch Avenue was a mess, or that the area they were mapping was very crowded and was difficult to circulate.

A second limitation of this study was the subject (those who drew the maps) were not aware that these maps would be utilized for navigational purposes. The researcher made the assumption that if this information was released to the subjects, a different type of map would be drawn. The researcher had a difficult enough time convincing the subjects that this project was not necessarily a *designed* project (one which focuses on craft, neatness, creativity, and concept), but rather it was an observation of how the subjects indicated their physical environment and what elements were indicated on their map. As the researcher reviewed the maps, there was indication that some of the maps had been re-drawn by the subjects (as subjects noted this in their annotations and commentary). Controlling this would be extremely difficult, due to the size of the study. In order to eliminate this limitation for the next phase of the study, it is suggested that two groups be formed: one group would be given the same directions as this study (not aware that the maps would be used for navigational purposes), and the second group be told this information. It is believed that the maps drawn by the group who has all of the details and scope of the project, would produce a more thoughtful, navigational-based map (rather than indicating frivolous and anecdotal information on the maps). By doing this, a comparison could be established, creating a control group of maps.

Thirdly, it was assumed that the subjects would be divided somewhat evenly for the assignment of their destination. Table 4.7 shows that 31.7% of the subjects had a destination of the Post Office and 19.3% had a destination of Capanna Coffee and Gelato. This, again, was difficult to control to the scale of the project. The researcher had overheard that individuals were not following the assigned destinations based on the

handout and were selecting the alternate destination, perhaps because a friend had the same destination, or from other unaccountable factors. Because the two destinations are not equal, a true statistical comparison cannot be drawn from the data. When this study and methodology is revised for the next phase, this would be a necessary item to monitor and correct.

The issue of limiting the amount of time for the subject to sketch their map is the fourth limitation. In a dialogue with other faculty members, the question was raised about the subjects only having a minute to complete the sketch; what if subjects had a greater amount of time to complete this sketch? Would the quality of the sketched be better? Would more and accurate information be on these maps? In considering the next phase, it was also recommended that the participants only sketch for a minute at each stop. However, after both journeys have been completed, the subject could return to the stopping points to complete a more detailed and annotated image.

The coding process created vast amounts of data, created the fifth limitation. Coding for fifty-nine categories, using 400 maps created over 23,500 data points. The researcher was extremely pleased that there was a vast amount of data (acknowledges that even more coding could discover even more information from these maps), but attempting to sift through all of data might lead to overlooking some of the unexpected or unintended outcomes. For this project, the researcher attempted to evaluate only simple relationships and correlations of notations on the hand-drawn maps. Additionally, the researcher understands that there is a plethora of statistical examinations that could be used to evaluate the data. For this study, only the foundational statistical examinations

(frequency and correlations) were utilized. In reviewing the statistical literature, it stated numerous times that using correlational statistics and drawing inferences solely based on them has the opportunity to skew the interpreted results. The literature states that more focused, in-depth statistical examinations should be included to generate more accurate responses and results. The more complex relationships were calculated and can be found in the Appendix.

Next, there was some difficulty in obtaining participants to evaluate the second phase of the project. The researcher assumes that one of the reasons why people didn't participate was because the area drawn was a popular destination and university environment. Many of the individuals who were approached stated that they were familiar with the area, had attended university there, or visit the community because it supports of many different areas of the local economies (Iowa State University is a Land Grant Institution: some of the founding ideals of Land Grant institutions are to create outreach for the community and higher education be accessible to all. Iowa State University is the research center for University Extension for the state of Iowa) (Zanish-Belcher, 2007). If a different community had been the subject of the drawn maps, for example, a specific neighborhood in Des Moines or a different community in Central Iowa, the researcher believes that there would be a larger number of participants eager to participate in Phase 2. Additionally, the researcher claimed total responsibility for accompanying the participants as they navigated the maps. In further studies, it would be more efficient to implore additional, trained assistants to accompany the participants. Additionally, it was suggested that the participants be recorded – either using a video

camera or audio recorded – to document the journey. This would provide more evidence for review how and why the participant was confused or successful.

Finally, it would be interesting to conduct this experiment using a variety of demographics for both phases of the study. The focus of the first phase of the study was on the subjects within DSN S 183, who were aged in the late-teens to early twenties, although natural matriculation of individuals returning to higher education for a second degree or profession change, indicated that the age demographic was not as specific to the traditional first year college student. Additional studies could be based upon a defined demographic, such as evaluating participants, such as those defined as “Millennials”, “Generation X”, “Generation Y”, or “Baby Boomers”. It is assumed that the outcomes form these studies would be different, specifically because each age demographic plays a different role in the acceptance and incorporation of technology in their everyday life.

The researcher believes that in using a variety of demographics for both phases would incorporate a much more rich and variety of mapping styles, perhaps some that were not even indicated in this project. Although there would be some hesitation by participants who would not identify as a designer, their drawing skills would not be the primary indication for the data. Using the present methodology presented in this study, the researcher would be able to extrapolate a much more diverse breath and depth of information than from the subject and participants used in this study.

Recommendations for Future Research

Based upon the research findings and experiences from this study, the following recommendations are suggested for future research:

Use a more broad demographic of subjects and participants for both phases of the study. Because this study focused on subject who had indicated some sort of passion or desire to enter a design profession, the demographics of this study could be limiting towards a bias to the design professions. As stated earlier, other demographics could be utilized for either phase and using the same methodology, the results could be much more different than those reported here.

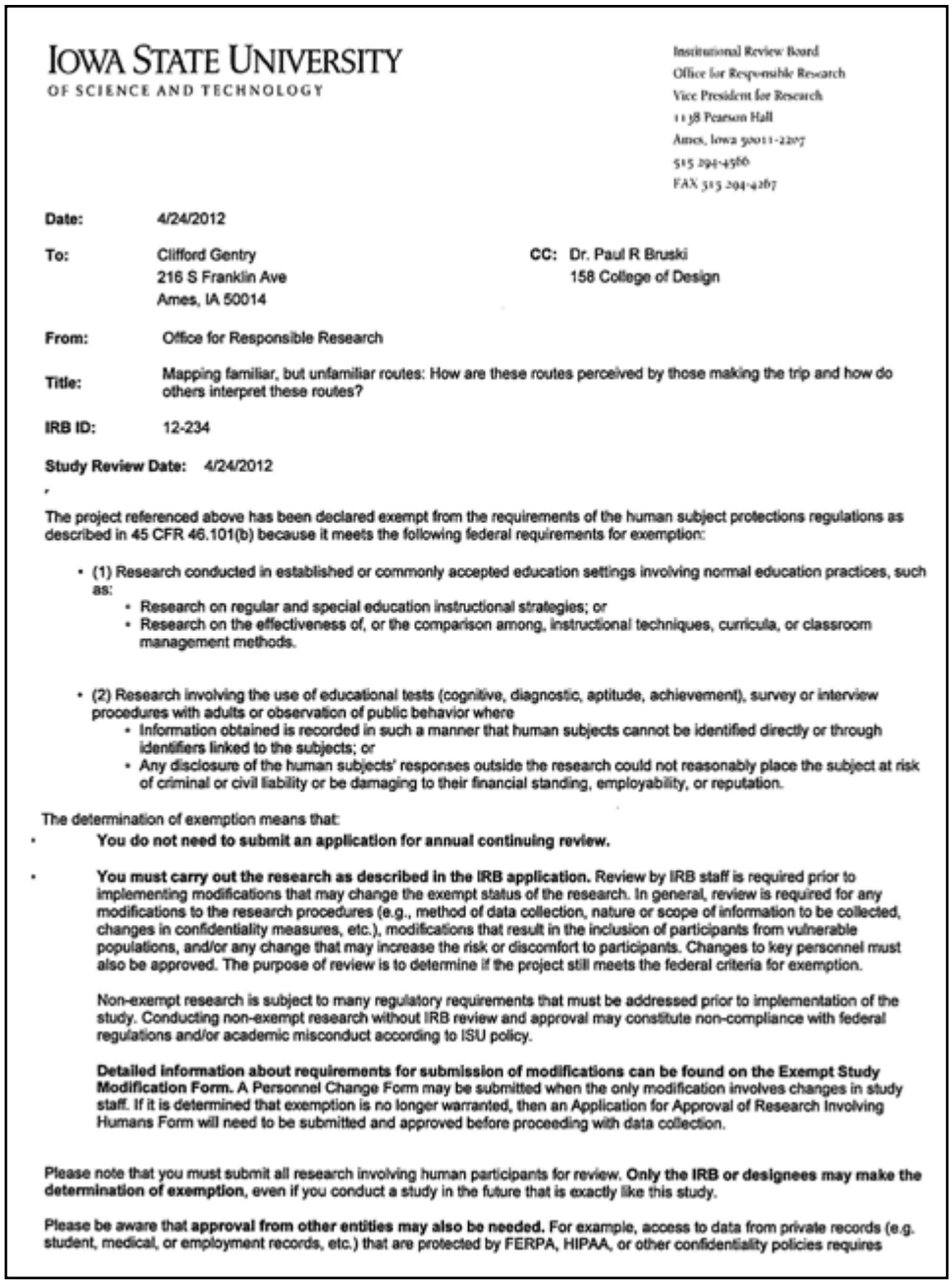
Collect further information regarding the acceptance of the subjects into the professional programs of study. The researcher had asked the subjects to indicate their first choice regarding their desired program of study in the survey. Obtaining records of the subjects, following though and noting if their first choice of program was the one they were accepted into. Additionally, for those subjects who were not accepted to their first choice of professional program, do their drawings indicate that they are more geared towards another professional program rather than the one they specifically desire?

The researcher has obtained this information for the 2011-2012 Core Class from the College of Design's Office of the Dean. Although this information was present as the researcher was compiling the data, none of is was used in the data analysis.

Finally, a long-term study of the subjects could be conducted as the subjects progress through their academic and professional programs. Some of the additional analysis could include how the mapping/drawing style has changed, and is there a

specific drawing style geared towards the differing professions. An extended long-term study could also follow these subjects through the early stages of their career. Items to note would be similar to those listed above, but also could include how specific design firms or professions create their own drawing/sketching conventions to facilitate the explanation and delivery of design concepts. This phase could potentially initiate as a pilot study to gather information of practicing professionals and how they communicate graphically.

APPENDIX A: INSTITUTIONAL REVIEW BOARD ACCEPTANCE LETTER



IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 4/24/2012

To: Clifford Gentry
216 S Franklin Ave
Ames, IA 50014

CC: Dr. Paul R Bruski
158 College of Design

From: Office for Responsible Research

Title: Mapping familiar, but unfamiliar routes: How are these routes perceived by those making the trip and how do others interpret these routes?

IRB ID: 12-234

Study Review Date: 4/24/2012

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (1) Research conducted in established or commonly accepted education settings involving normal education practices, such as:
  - Research on regular and special education instructional strategies; or
  - Research on the effectiveness of, or the comparison among, instructional techniques, curricula, or classroom management methods.

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**

- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

  Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

  Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption,** even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires

Figure 6.1. Institutional Review Board (IRB) Acceptance Letter

APPENDIX B: SURVEY INSTRUMENTS

Project 3: Mapping familiar but unknown routes

For your third project, you are asked to sketch your path as you make a round trip to a specific destination.

DsnS 183/Martin
Spring 2012

Map 1

For map 1, make sure you have two (2) 11" x 17" pieces of paper with you and a drawing instrument. On the back side of the first sheet, legibly write your name, date, and time of day. Before departing, take one (1) minute and sketch and annotate your surroundings: What do you see? What is important at this specific space? Why do you feel this space is significant? Does this specific space evoke or cause a specific emotion? Remember: you should only draw and write for about one minute—a complete and detailed landscape is not desired at this nor any point along your journey!

- About every two (2) minutes, stop at a safe location (the middle of the intersection is not considered a safe location!). Pull out your paper and take about a minute and draw your path and surroundings. How did you get from the previous point to this point? What has changed about the quality of the place you are in? Were there obstacles that you encountered along your path? How did you know this was the right path to the destination? *Remember: you should only draw/sketch/write for about one minute. This project is not about the neatness or craft of your map, but about your specific route, observations, and significant elements along the way.*
- After about a minute of sketching, continue along your route to your assigned destination. After about two (2) minutes of travel, stop and sketch and write for about a minute. Continue this process until you reach your destination.
- When you reach your destination, make a final sketch your surroundings, keeping in mind the same questions you were asked at the origin.

Map 2

For map 2, you are asked to return to the point of origin, but instead of taking the same route, you are asked to find an *alternative* route to the College of Design. Take out the second 11'" x 17" paper and make your first sketch before beginning your return.

- Again, every two minutes, stop in a safe location, sketch and write for about a minute, noting how this route was different, noting significant elements at that specific point.
- Continue this process (two minutes walking, one minute of sketching, two minutes walking, one minute sketching) until you return to your point of origin.
- When you arrive at the College of Design, create a final sketch of your surroundings.

Everyone will start from the College of Design.
If the color of this sheet is **BLUE**, your destination is the U.S. Post Office located in Campustown (210 Welch Avenue).
If the color of this sheet is **WHITE**, your destination is Capanna Coffee & Gelato (3329 Lincoln Way).

This project is collecting sketches and notes of your routes: **PLEASE DO NOT RECOPY, REDRAW, DIGITALLY ENHANCE, OR MANIPULATE YOUR SKETCH MAPS IN ANY WAY!** Additionally, do not use any mediating electronic devices, such as iPhones, mobile devices, GPS guidance systems, or other electronic or non-electronic mapping systems. If you are not familiar with your assigned destination point, you are encouraged to ask a friend if they are familiar with the location. Please, avoid referencing any form of map – both hard-copy and/or digital formats – for the duration of this project. We are looking for how you document your route, how things are indicated/annotated, and noted; this should not be a hand-drawn replication of an existing map.

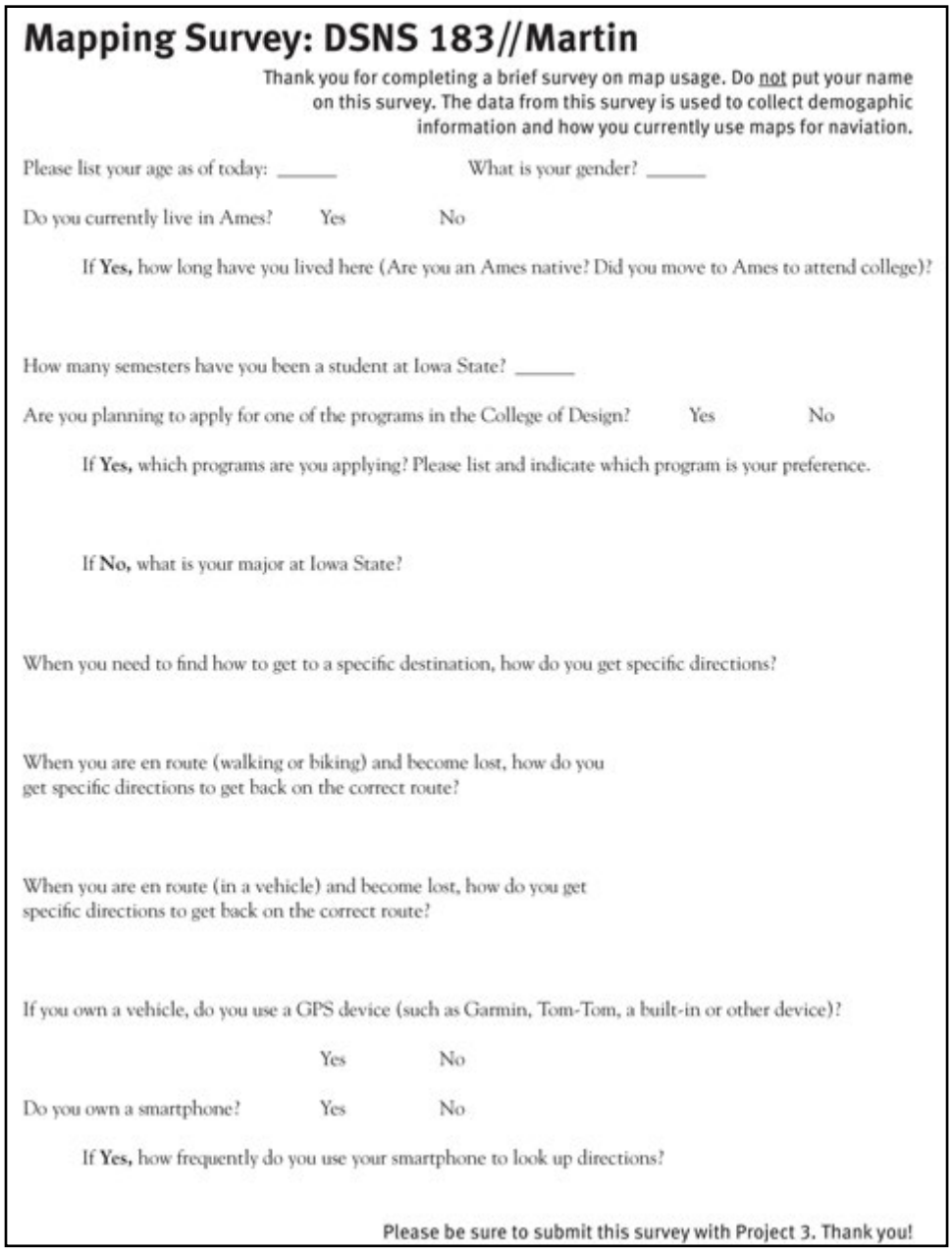
Project 3 is due **Tuesday, April 24, 2012,** at the **BEGINNING OF CLASS.** See course syllabus for late policy. No late, email or electronic submittals allowed.
Evaluation will be based on an assessment of your apparent commitment to making a unique cognitive map, and upon your commitment to producing something that is engaging and complete.
Please review this assignment sheet carefully and be sure you understand what is expected. Extra credit may be awarded for exceptional work.

This is one project in your design career where craft and neatness is not paramount! However, with this being said, your sketches need to be legible and readable. Extra credit points may be awarded for exceptional work, such as the richness of the sketches, legibility of the document and its annotations, and creative selection of the alternate route to the destination.

Further questions:

If you have additional questions regarding any phase of this project, please directly email Clifford Gentry (cjgentry@iastate.edu).

Figure 7.1. Handout and instructions for DSNS 183 Project 3



Mapping Survey: DSNS 183//Martin

Thank you for completing a brief survey on map usage. Do not put your name on this survey. The data from this survey is used to collect demogaphic information and how you currently use maps for naviation.

Please list your age as of today: _____ What is your gender? _____

Do you currently live in Ames? Yes No

If **Yes,** how long have you lived here (Are you an Ames native? Did you move to Ames to attend college)?

How many semesters have you been a student at Iowa State? _____

Are you planning to apply for one of the programs in the College of Design? Yes No

If **Yes,** which programs are you applying? Please list and indicate which program is your preference.

If **No,** what is your major at Iowa State?

When you need to find how to get to a specific destination, how do you get specific directions?

When you are en route (walking or biking) and become lost, how do you get specific directions to get back on the correct route?

When you are en route (in a vehicle) and become lost, how do you get specific directions to get back on the correct route?

If you own a vehicle, do you use a GPS device (such as Garmin, Tom-Tom, a built-in or other device)?

Yes No

Do you own a smartphone? Yes No

If **Yes,** how frequently do you use your smartphone to look up directions?

Please be sure to submit this survey with Project 3. Thank you!

Figure 7.2. Subject survey to collect demographic information and map usage

Destination: Business Name Address ID: _____

M1: _____

Please list your age of today: _____ What is your gender? _____ M2: _____

Date: _____

What is your profession? _____ Time: _____

In Map 1, what was difficult to understand about the drawn map provided?

In Map 1, what made it easy to understand about the drawn map provided?

Did you get lost? If so, how did you use the map to get back on track?

In Map 2, what was difficult to understand about the drawn map provided?

In Map 2, what made it easy to understand about the drawn map provided?

Did you get lost? If so, how did you use the map to get back on track?

Overall comments:

Figure 7.3. Survey Instrument (Phase 2), collecting demographic information and evaluation of hand-drawn maps

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APPENDIX C: CONTENT ANALYSIS CODING

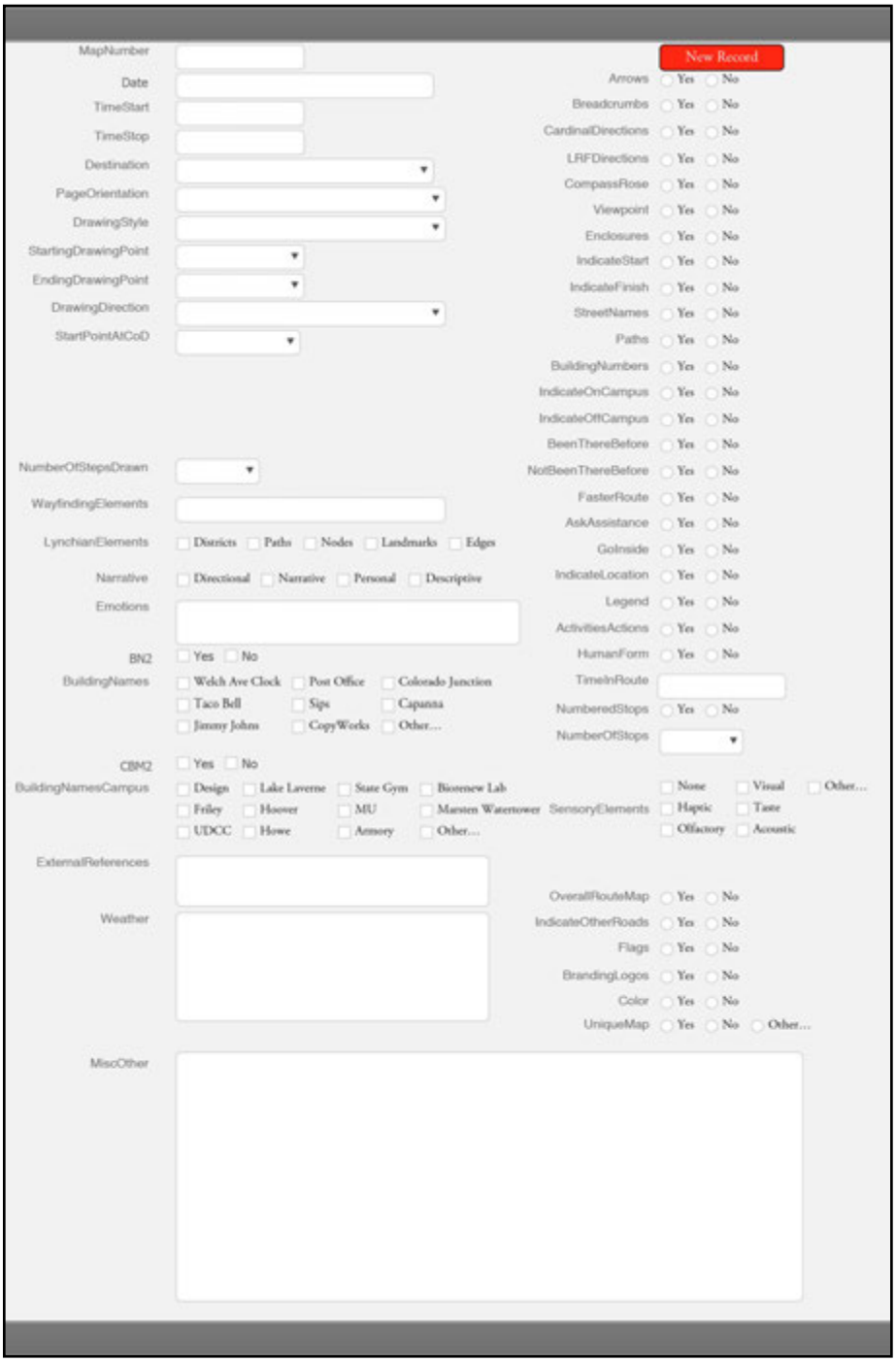

Figure 8.1. Categories used in coding hand-drawn maps

APPENDIX D: SUBJECT MAPS

Figure 9.1. Hand-drawn maps 4a-15b.

*** Indicates map rotated for optimal viewing.**

For full size images, please contact the researcher directly: cliffordjgentry@gmail.com

Figure 9.2. Hand-drawn maps 16a-28b

*** Indicates map rotated for optimal viewing**

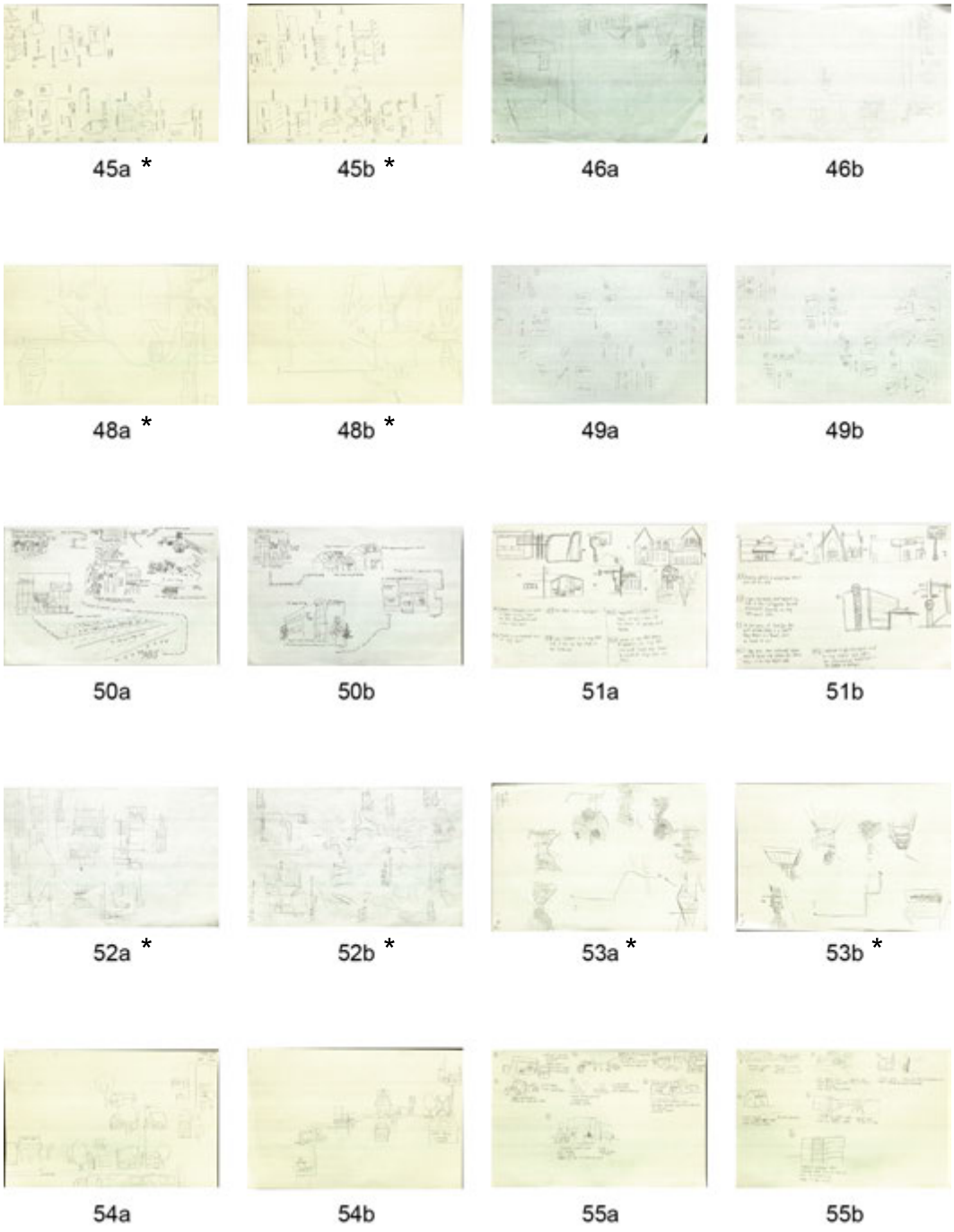

Figure 9.3. Hand-drawn maps 45a-55b.

*** Indicates map rotated for optimal viewing**

Figure 9.4. Hand-drawn maps 57a-69b.

*** Indicates map rotated for optimal viewing**

Figure 9.5. Hand-drawn maps 70a1-80b.

*** Indicates map rotated for optimal viewing**

Figure 9.6. Hand-drawn maps 81a-96b.

*** Indicates map rotated for optimal viewing**

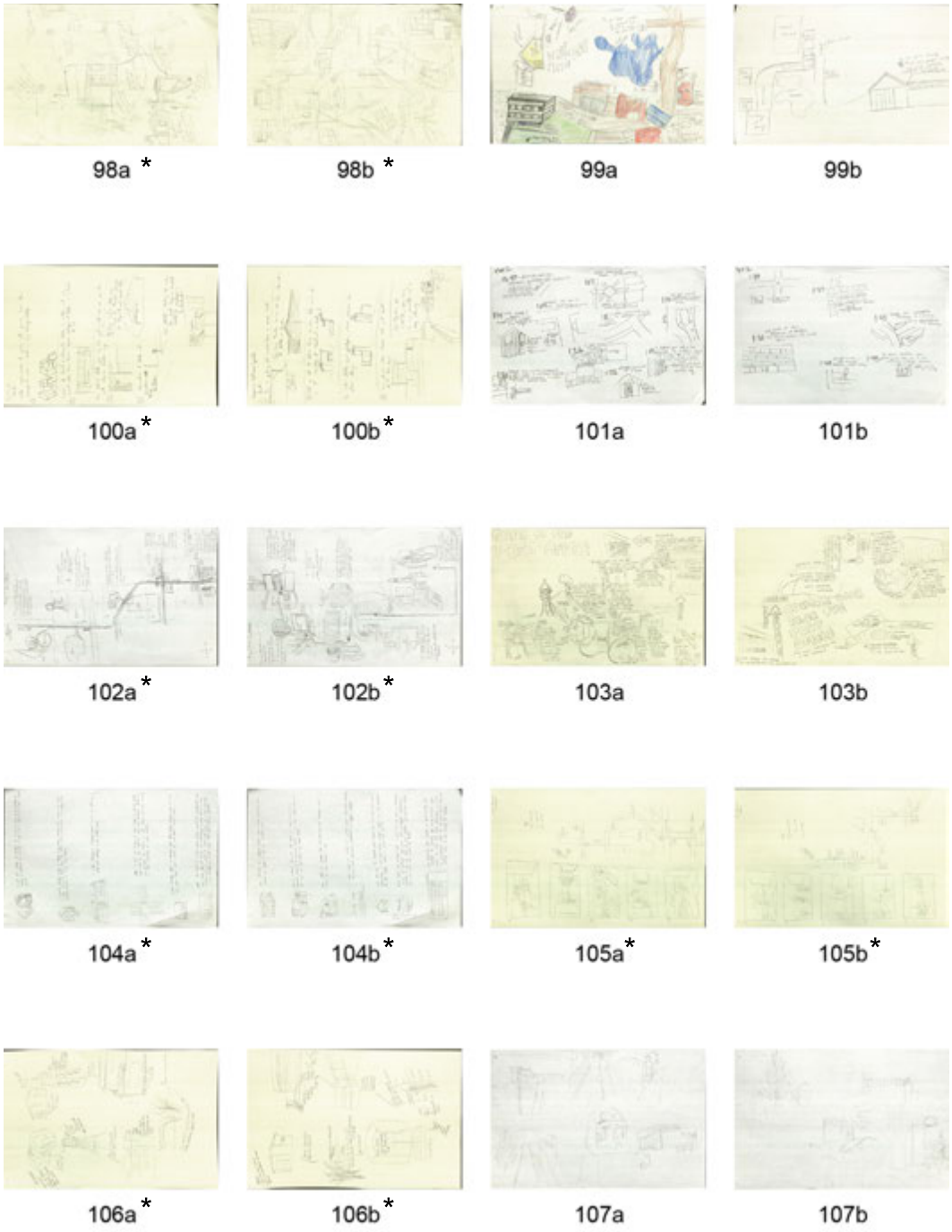

Figure 9.7. Hand-drawn maps 98a-107b.

*** Indicates map rotated for optimal viewing**

Figure 9.8. Hand-drawn maps 109a-125b.

*** Indicates map rotated for optimal viewing**

Figure 9.9. Hand-drawn maps 128a-143b.

*** Indicates map rotated for optimal viewing**

Figure 9.10. Hand-drawn maps 145a-158a.

*** Indicates map rotated for optimal viewing**

Figure 9.11. Hand-drawn maps 158b-169b.

*** Indicates map rotated for optimal viewing**

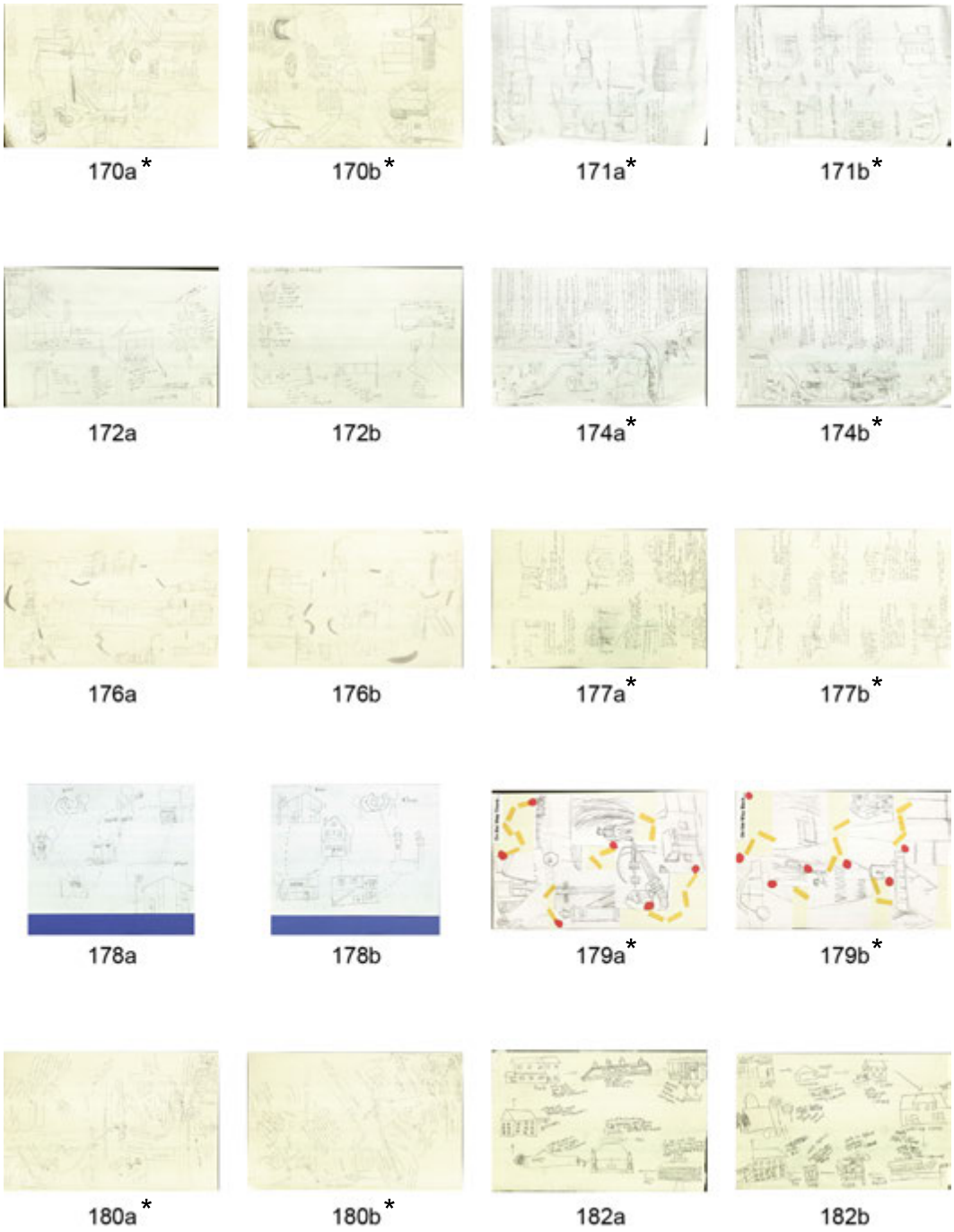

Figure 9.12. Hand-drawn maps 170a-182b.

*** Indicates map rotated for optimal viewing**

Figure 9.13. Hand-drawn maps 184a-198b.

*** Indicates map rotated for optimal viewing**

Figure 9.14. Hand-drawn maps 199a-211b.

*** Indicates map rotated for optimal viewing**

Figure 9.15. Hand-drawn maps 212a-221a.

*** Indicates map rotated for optimal viewing**

Figure 9.16. Hand-drawn maps 221b-238a.

*** Indicates map rotated for optimal viewing**

Figure 9.17. Hand-drawn maps 238b-251a.

*** Indicates map rotated for optimal viewing**

Figure 9.18. Hand-drawn maps 251b-263a.

*** Indicates map rotated for optimal viewing**

Figure 9.19. Hand-drawn maps 263-278a.

*** Indicates map rotated for optimal viewing**

Figure 9.20. Hand-drawn maps 278b-286b.

*** Indicates map rotated for optimal viewing**

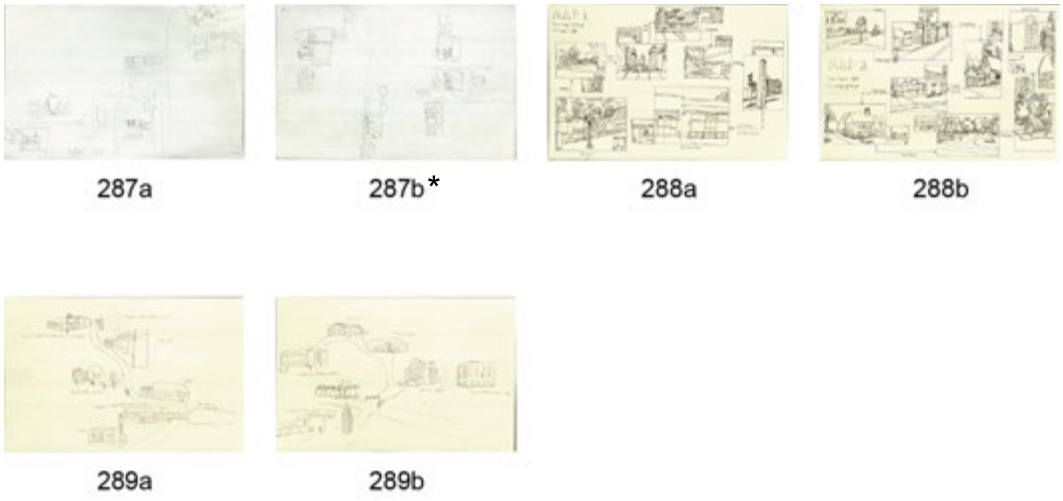

Figure 9.21. Hand-drawn maps 287a-289b.

*** Indicates map rotated for optimal viewing**

APPENDIX E: FURTHER STATISTICAL RESULTS

Crosstabulation Statistics

Page Orientation: Program

Table. 10.1. Crosstabulation: Program and Page Orientation (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Page Orientation	Rotational	Count	5a	3a	4a	3a	2a	1a	2a	20
		Expected Count	3.5	3.0	2.0	3.0	3.0	3.0	2.5	20.0
		% within Page Orientation	25.0%	15.0%	20.0%	15.0%	10.0%	5.0%	10.0%	100.0%
		% within Program	7.1%	5.0%	10.0%	5.1%	3.3%	1.7%	4.1%	5.0%
		% of Total	1.3%	0.8%	1.0%	0.8%	0.5%	0.3%	0.5%	5.0%
		Std. Residual	.8	.0	1.4	.0	-.6	-1.2	-.3	
	Portrait	Count	33a, b	32b, c	17a, b	29a, b, c	25a, b	39c	15a	190
		Expected Count	33.4	28.6	19.1	28.2	28.6	28.6	23.4	190.0
		% within Page Orientation	17.4%	16.8%	8.9%	15.3%	13.2%	20.5%	7.9%	100.0%
		% within Program	47.1%	53.3%	42.5%	49.2%	41.7%	65.0%	30.6%	47.7%
		% of Total	8.3%	8.0%	4.3%	7.3%	6.3%	9.8%	3.8%	47.7%
		Std. Residual	-.1	.6	-.5	.2	-.7	1.9	-1.7	
	Landscape	Count	32a, b	25a, b	19a, b, c, d	27a, b	33b, d	20a	32c, d	188
		Expected Count	33.1	28.3	18.9	27.9	28.3	28.3	23.1	188.0
		% within Page Orientation	17.0%	13.3%	10.1%	14.4%	17.6%	10.6%	17.0%	100.0%
		% within Program	45.7%	41.7%	47.5%	45.8%	55.0%	33.3%	65.3%	47.2%
		% of Total	8.0%	6.3%	4.8%	6.8%	8.3%	5.0%	8.0%	47.2%
		Std. Residual	-.2	-.6	.0	-.2	.9	-1.6	1.8	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Page Orientation	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.307[a]	12	.081
Likelihood Ratio	19.290	12	.082
Linear-by-Linear Association	2.890	1	.089
N of Valid Cases	398		

a. 7 cells (33.3%) have expected count less than 5. The minimum expected count is 2.01.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.215			.081
Interval by Interval	Pearson's R	.085	.050	1.704	.089[c]
Ordinal by Ordinal	Spearman Correlation	.071	.050	1.412	.159[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Drawing Style: Program

Table. 10.2. Crosstabulation: Program and Drawing Styles of Categories (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Drawing Style	Misc	Count	2a	0a	2a	0a	0a	0a	0a	4
		Expected Count	.7	.6	.4	.6	.6	.6	.5	4.0
		% within Drawing Style	50.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	2.9%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	1.0%
		% of Total	0.5%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	1.0%
		Std. Residual	1.5	-.8	2.5	-.8	-.8	-.8	-.7	
	Plan	Count	16a	4b	4a, b	8a, b	14a	6a, b	6a, b	58
		Expected Count	10.2	8.7	5.8	8.6	8.7	8.7	7.1	58.0
		% within Drawing Style	27.6%	6.9%	6.9%	13.8%	24.1%	10.3%	10.3%	100.0%
		% within Program	22.9%	6.7%	10.0%	13.6%	23.3%	10.0%	12.2%	14.6%
		% of Total	4.0%	1.0%	1.0%	2.0%	3.5%	1.5%	1.5%	14.6%
		Std. Residual	1.8	-1.6	-.8	-.2	1.8	-.9	-.4	
	Point of View	Count	13a	15a, b	8a, b	20b	15a, b	32c	18b, c	121
		Expected Count	21.3	18.2	12.2	17.9	18.2	18.2	14.9	121.0
		% within Drawing Style	10.7%	12.4%	6.6%	16.5%	12.4%	26.4%	14.9%	100.0%
		% within Program	18.6%	25.0%	20.0%	33.9%	25.0%	53.3%	36.7%	30.4%
		% of Total	3.3%	3.8%	2.0%	5.0%	3.8%	8.0%	4.5%	30.4%
		Std. Residual	-1.8	-.8	-1.2	.5	-.8	3.2	.8	
	Perspective	Count	5a	16b	5a, b	4a	7a	5a	7a, b	49
		Expected Count	8.6	7.4	4.9	7.3	7.4	7.4	6.0	49.0
		% within Drawing Style	10.2%	32.7%	10.2%	8.2%	14.3%	10.2%	14.3%	100.0%
		% within Program	7.1%	26.7%	12.5%	6.8%	11.7%	8.3%	14.3%	12.3%
		% of Total	1.3%	4.0%	1.3%	1.0%	1.8%	1.3%	1.8%	12.3%
		Std. Residual	-1.2	3.2	.0	-1.2	-.1	-.9	.4	
	Elevation	Count	23a, b	10c	20b	18a, b, c	15a, c	16a, c	13a, c	115
		Expected Count	20.2	17.3	11.6	17.0	17.3	17.3	14.2	115.0
		% within Drawing Style	20.0%	8.7%	17.4%	15.7%	13.0%	13.9%	11.3%	100.0%
		% within Program	32.9%	16.7%	50.0%	30.5%	25.0%	26.7%	26.5%	28.9%
		% of Total	5.8%	2.5%	5.0%	4.5%	3.8%	4.0%	3.3%	28.9%
		Std. Residual	.6	-1.8	2.5	.2	-.6	-.3	-.3	
	Plan/POV	Count	2a	9b	0a	2a	1a	0a	0a	14
		Expected Count	2.5	2.1	1.4	2.1	2.1	2.1	1.7	14.0

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
		% within Drawing Style	14.3%	64.3%	0.0%	14.3%	7.1%	0.0%	0.0%	100.0%
		% within Program	2.9%	15.0%	0.0%	3.4%	1.7%	0.0%	0.0%	3.5%
		% of Total	0.5%	2.3%	0.0%	0.5%	0.3%	0.0%	0.0%	3.5%
		Std. Residual	-.3	4.7	-1.2	-.1	-.8	-1.5	-1.3	
	Plan/Elev	Count	7a	4a, b	0b, c	7a	6a	0c	5a	29
		Expected Count	5.1	4.4	2.9	4.3	4.4	4.4	3.6	29.0
		% within Drawing Style	24.1%	13.8%	0.0%	24.1%	20.7%	0.0%	17.2%	100.0%
		% within Program	10.0%	6.7%	0.0%	11.9%	10.0%	0.0%	10.2%	7.3%
		% of Total	1.8%	1.0%	0.0%	1.8%	1.5%	0.0%	1.3%	7.3%
		Std. Residual	.8	-.2	-1.7	1.3	.8	-2.1	.8	
	Bird/Perspective	Count	0a	0a	0a	0a	1a	0a	0a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
		% within Drawing Style	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.3%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%
		Std. Residual	-.4	-.4	-.3	-.4	2.2	-.4	-.4	
	Bird/POBV	Count	0a	0a	0a	0a	0a	1a	0a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
		% within Drawing Style	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
		% within Program	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.3%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.3%
		Std. Residual	-.4	-.4	-.3	-.4	-.4	2.2	-.4	
	Plan/Elev/Persp	Count	2a	1a	0a	0a	0a	0a	0a	3
		Expected Count	.5	.5	.3	.4	.5	.5	.4	3.0
		% within Drawing Style	66.7%	33.3%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	2.9%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%
		% of Total	0.5%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%
		Std. Residual	2.0	.8	-.5	-.7	-.7	-.7	-.6	
	Elev/POV	Count	0a	0a	1a	0a	0a	0a	0a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
		% within Drawing Style	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.3%
		% of Total	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.3%
		Std. Residual	-.4	-.4	2.8	-.4	-.4	-.4	-.4	

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
	Persp/Plan	Count	0a	1a	0a	0a	1a	0a	0a	2
		Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
		% within Drawing Style	0.0%	50.0%	0.0%	0.0%	50.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	1.7%	0.0%	0.0%	1.7%	0.0%	0.0%	0.5%
		% of Total	0.0%	0.3%	0.0%	0.0%	0.3%	0.0%	0.0%	0.5%
		Std. Residual	-.6	1.3	-.4	-.5	1.3	-.5	-.5	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Drawing Style	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	134.525[a]	66	.000
Likelihood Ratio	124.017	66	.000
Linear-by-Linear Association	4.525	1	.033
N of Valid Cases	398		

a. 56 cells (66.7%) have expected count less than 5. The minimum expected count is .10.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.503			.000
Interval by Interval	Pearson's R	-.107	.049	-2.137	.033[c]
Ordinal by Ordinal	Spearman Correlation	-.094	.051	-1.879	.061[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Starting Point: Program

Table. 10.3. Crosstabulation: Program and Starting Point Categories (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Start Draw Pt	1	Count	38a	33a	34b	44b, c	34a	40a, c	32a, c	255
		Expected Count	45.0	38.5	25.1	37.9	38.5	38.5	31.5	255.0
		% within Start Draw Pt	14.9%	12.9%	13.3%	17.3%	13.3%	15.7%	12.5%	100.0%
		% within Program	54.3%	55.0%	87.2%	74.6%	56.7%	66.7%	65.3%	64.2%
		% of Total	9.6%	8.3%	8.6%	11.1%	8.6%	10.1%	8.1%	64.2%
		Std. Residual	-1.0	-.9	1.8	1.0	-.7	.2	.1	
	2	Count	3a, b	2a, b	0a, b	3a, b	0b	5a	3a, b	16
		Expected Count	2.8	2.4	1.6	2.4	2.4	2.4	2.0	16.0
		% within Start Draw Pt	18.8%	12.5%	0.0%	18.8%	0.0%	31.2%	18.8%	100.0%
		% within Program	4.3%	3.3%	0.0%	5.1%	0.0%	8.3%	6.1%	4.0%
		% of Total	0.8%	0.5%	0.0%	0.8%	0.0%	1.3%	0.8%	4.0%
		Std. Residual	.1	-.3	-1.3	.4	-1.6	1.7	.7	
	3	Count	6a	4a	1a	4a	6a	3a	4a	28
		Expected Count	4.9	4.2	2.8	4.2	4.2	4.2	3.5	28.0
		% within Start Draw Pt	21.4%	14.3%	3.6%	14.3%	21.4%	10.7%	14.3%	100.0%
		% within Program	8.6%	6.7%	2.6%	6.8%	10.0%	5.0%	8.2%	7.1%
		% of Total	1.5%	1.0%	0.3%	1.0%	1.5%	0.8%	1.0%	7.1%
		Std. Residual	.5	-.1	-1.1	-.1	.9	-.6	.3	
	4	Count	1a	1a	0a	0a	1a	2a	0a	5
		Expected Count	.9	.8	.5	.7	.8	.8	.6	5.0
		% within Start Draw Pt	20.0%	20.0%	0.0%	0.0%	20.0%	40.0%	0.0%	100.0%
		% within Program	1.4%	1.7%	0.0%	0.0%	1.7%	3.3%	0.0%	1.3%
		% of Total	0.3%	0.3%	0.0%	0.0%	0.3%	0.5%	0.0%	1.3%
		Std. Residual	.1	.3	-.7	-.9	.3	1.4	-.8	
	6	Count	0a	1a	0a	0a	2a	2a	0a	5
		Expected Count	.9	.8	.5	.7	.8	.8	.6	5.0
		% within Start Draw Pt	0.0%	20.0%	0.0%	0.0%	40.0%	40.0%	0.0%	100.0%
		% within Program	0.0%	1.7%	0.0%	0.0%	3.3%	3.3%	0.0%	1.3%
		% of Total	0.0%	0.3%	0.0%	0.0%	0.5%	0.5%	0.0%	1.3%
		Std. Residual	-.9	.3	-.7	-.9	1.4	1.4	-.8	
	7	Count	11a, b	12b	2a	7a, b	11a, b	4a	7a, b	54
		Expected Count	9.5	8.2	5.3	8.0	8.2	8.2	6.7	54.0
		% within Start Draw Pt	20.4%	22.2%	3.7%	13.0%	20.4%	7.4%	13.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.104			.631
Interval by Interval	Pearson's R	.003	.050	.065	.948[c]
Ordinal by Ordinal	Spearman Correlation	.006	.050	.112	.911[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Ending Drawing Point: Program

Table. 10.4. Crosstabulation: Program and Ending Point Categories (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
End Draw Pt	Not indicated	Count	3a	0a	1a	3a	0a	1a	1a	9
		Expected Count	1.6	1.4	.9	1.3	1.4	1.4	1.1	9.0
		% within End Draw Pt	33.3%	0.0%	11.1%	33.3%	0.0%	11.1%	11.1%	100.0%
		% within Program	4.3%	0.0%	2.6%	5.1%	0.0%	1.7%	2.0%	2.3%
		% of Total	0.8%	0.0%	0.3%	0.8%	0.0%	0.3%	0.3%	2.3%
		Std. Residual	1.1	-1.2	.1	1.4	-1.2	-.3	-.1	
	1	Count	10a	7a	1a, b	0b	4a	4a	5a	31
		Expected Count	5.5	4.7	3.0	4.6	4.7	4.7	3.8	31.0
		% within End Draw Pt	32.3%	22.6%	3.2%	0.0%	12.9%	12.9%	16.1%	100.0%
		% within Program	14.3%	11.7%	2.6%	0.0%	6.7%	6.7%	10.2%	7.8%
		% of Total	2.5%	1.8%	0.3%	0.0%	1.0%	1.0%	1.3%	7.8%
		Std. Residual	1.9	1.1	-1.2	-2.1	-.3	-.3	.6	
	2	Count	3a	3a	2a	1a	1a	0a	0a	10
		Expected Count	1.8	1.5	1.0	1.5	1.5	1.5	1.2	10.0
		% within End Draw Pt	30.0%	30.0%	20.0%	10.0%	10.0%	0.0%	0.0%	100.0%
		% within Program	4.3%	5.0%	5.1%	1.7%	1.7%	0.0%	0.0%	2.5%
		% of Total	0.8%	0.8%	0.5%	0.3%	0.3%	0.0%	0.0%	2.5%
		Std. Residual	.9	1.2	1.0	-.4	-.4	-1.2	-1.1	
	3	Count	11a, b	4b	4a, b	9a, b	12a	8a, b	7a, b	55
		Expected Count	9.7	8.3	5.4	8.2	8.3	8.3	6.8	55.0
		% within End Draw Pt	20.0%	7.3%	7.3%	16.4%	21.8%	14.5%	12.7%	100.0%
		% within Program	15.7%	6.7%	10.3%	15.3%	20.0%	13.3%	14.3%	13.9%

		Program							
		Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
	% within Program	22.9%	21.7%	25.6%	39.0%	20.0%	21.7%	34.7%	26.2%
	% of Total	4.0%	3.3%	2.5%	5.8%	3.0%	3.3%	4.3%	26.2%
	Std. Residual	-.5	-.7	-.1	1.9	-.9	-.7	1.2	
Total	Count	70	60	39	59	60	60	49	397
	Expected Count	70.0	60.0	39.0	59.0	60.0	60.0	49.0	397.0
	% within End Draw Pt	17.6%	15.1%	9.8%	14.9%	15.1%	15.1%	12.3%	100.0%
	% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	17.6%	15.1%	9.8%	14.9%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	74.093[a]	54	.036
Likelihood Ratio	83.918	54	.006
Linear-by-Linear Association	1.198	1	.274
N of Valid Cases	397		

a. 36 cells (51.4%) have expected count less than 5. The minimum expected count is .79.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.397			.036
Interval by Interval	Pearson's R	.055	.052	1.095	.274[c]
Ordinal by Ordinal	Spearman Correlation	.043	.052	.851	.395[c]
N of Valid Cases		397			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Drawing Direction: Program

Table. 10.5. Crosstabulation: Program and Drawing Direction Categories (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Drawing Direct	Z	Count	2a, b	7c	0a, b	1a, b	0b	1a, b	4a, c	15
		Expected Count	2.7	2.3	1.4	2.2	2.3	2.2	1.9	15.0
		% within Drawing Direct	13.3%	46.7%	0.0%	6.7%	0.0%	6.7%	26.7%	100.0%
		% within Program	2.9%	11.7%	0.0%	1.7%	0.0%	1.7%	8.2%	3.8%
		% of Total	0.5%	1.8%	0.0%	0.3%	0.0%	0.3%	1.0%	3.8%
		Std. Residual	-.4	3.1	-1.2	-.8	-1.5	-.8	1.6	
	S	Count	2a	0a	0a	0a	0a	0a	0a	2
		Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
		% within Drawing Direct	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
		% of Total	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
		Std. Residual	2.8	-.6	-.4	-.5	-.6	-.5	-.5	
	CW	Count	6a	3a	4a	5a	6a	3a	3a	30
		Expected Count	5.3	4.6	2.9	4.5	4.6	4.4	3.7	30.0
		% within Drawing Direct	20.0%	10.0%	13.3%	16.7%	20.0%	10.0%	10.0%	100.0%
		% within Program	8.6%	5.0%	10.5%	8.5%	10.0%	5.2%	6.1%	7.6%
		% of Total	1.5%	0.8%	1.0%	1.3%	1.5%	0.8%	0.8%	7.6%
		Std. Residual	.3	-.7	.7	.2	.7	-.7	-.4	
	CCW	Count	2a, b, c, d	0c, d	1a, b, c, d	1a, b, c, d	0b, d	4a	3a, b, c, d	11
		Expected Count	2.0	1.7	1.1	1.6	1.7	1.6	1.4	11.0
		% within Drawing Direct	18.2%	0.0%	9.1%	9.1%	0.0%	36.4%	27.3%	100.0%
		% within Program	2.9%	0.0%	2.6%	1.7%	0.0%	6.9%	6.1%	2.8%
		% of Total	0.5%	0.0%	0.3%	0.3%	0.0%	1.0%	0.8%	2.8%
		Std. Residual	.0	-1.3	-.1	-.5	-1.3	1.9	1.4	
	ZigZag	Count	7a	7a	4a	8a	4a, b	5a	0b	35
		Expected Count	6.2	5.3	3.4	5.2	5.3	5.2	4.4	35.0
		% within Drawing Direct	20.0%	20.0%	11.4%	22.9%	11.4%	14.3%	0.0%	100.0%
		% within Program	10.0%	11.7%	10.5%	13.6%	6.7%	8.6%	0.0%	8.9%
		% of Total	1.8%	1.8%	1.0%	2.0%	1.0%	1.3%	0.0%	8.9%
		Std. Residual	.3	.7	.3	1.2	-.6	-.1	-2.1	
	Map	Count	15a	10a	6a	11a	10a	8a	11a	71
		Expected Count	12.6	10.8	6.8	10.6	10.8	10.5	8.8	71.0
		% within Drawing Direct	21.1%	14.1%	8.5%	15.5%	14.1%	11.3%	15.5%	100.0%
		% within Program	21.4%	16.7%	15.8%	18.6%	16.7%	13.8%	22.4%	18.0%
		% of Total	3.8%	2.5%	1.5%	2.8%	2.5%	2.0%	2.8%	18.0%
		Std. Residual	.7	-.2	-.3	.1	-.2	-.8	.7	
	Circular	Count	0a	0a	0a	0a	2a	0a	0a	2
		Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
		% within Drawing Direct	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.5%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.5%
		Std. Residual	-.6	-.6	-.4	-.5	3.1	-.5	-.5	
	Perimeter	Count	1a	0a	0a	2a	2a	1a	1a	7
		Expected Count	1.2	1.1	.7	1.0	1.1	1.0	.9	7.0
		% within Drawing Direct	14.3%	0.0%	0.0%	28.6%	28.6%	14.3%	14.3%	100.0%
		% within Program	1.4%	0.0%	0.0%	3.4%	3.3%	1.7%	2.0%	1.8%
		% of Total	0.3%	0.0%	0.0%	0.5%	0.5%	0.3%	0.3%	1.8%
		Std. Residual	-.2	-1.0	-.8	.9	.9	.0	.1	
	Meandering	Count	9a, b, c, d, e	12d, e	9c, e	4b	10a, b, c, d, e	11a, c, d, e	8a, b, c, d, e	63
		Expected Count	11.2	9.6	6.1	9.4	9.6	9.3	7.8	63.0
		% within Drawing Direct	14.3%	19.0%	14.3%	6.3%	15.9%	17.5%	12.7%	100.0%
		% within Program	12.9%	20.0%	23.7%	6.8%	16.7%	19.0%	16.3%	16.0%
		% of Total	2.3%	3.0%	2.3%	1.0%	2.5%	2.8%	2.0%	16.0%
		Std. Residual	-.7	.8	1.2	-1.8	.1	.6	.1	
	Rows	Count	9a	11a, b, c	5a, b, c	16c	7a	16b, c	10a, b, c	74
		Expected Count	13.1	11.3	7.1	11.1	11.3	10.9	9.2	74.0
		% within Drawing Direct	12.2%	14.9%	6.8%	21.6%	9.5%	21.6%	13.5%	100.0%
		% within Program	12.9%	18.3%	13.2%	27.1%	11.7%	27.6%	20.4%	18.8%
		% of Total	2.3%	2.8%	1.3%	4.1%	1.8%	4.1%	2.5%	18.8%
		Std. Residual	-1.1	-.1	-.8	1.5	-1.3	1.5	.3	
	Columns	Count	3a, b	1a, b	4b	0a	3a, b	2a, b	0a	13
		Expected Count	2.3	2.0	1.3	1.9	2.0	1.9	1.6	13.0
		% within Drawing Direct	23.1%	7.7%	30.8%	0.0%	23.1%	15.4%	0.0%	100.0%
		% within Program	4.3%	1.7%	10.5%	0.0%	5.0%	3.4%	0.0%	3.3%
		% of Total	0.8%	0.3%	1.0%	0.0%	0.8%	0.5%	0.0%	3.3%
		Std. Residual	.5	-.7	2.5	-1.4	.7	.1	-1.3	

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
	Diagonal	Count	0a	1a	0a	2a	3a	2a	0a	8
		Expected Count	1.4	1.2	.8	1.2	1.2	1.2	1.0	8.0
		% within Drawing Direct	0.0%	12.5%	0.0%	25.0%	37.5%	25.0%	0.0%	100.0%
		% within Program	0.0%	1.7%	0.0%	3.4%	5.0%	3.4%	0.0%	2.0%
		% of Total	0.0%	0.3%	0.0%	0.5%	0.8%	0.5%	0.0%	2.0%
		Std. Residual	-1.2	-.2	-.9	.7	1.6	.8	-1.0	
	Down	Count	8a	6a	2a	7a	6a	4a	5a	38
		Expected Count	6.8	5.8	3.7	5.7	5.8	5.6	4.7	38.0
		% within Drawing Direct	21.1%	15.8%	5.3%	18.4%	15.8%	10.5%	13.2%	100.0%
		% within Program	11.4%	10.0%	5.3%	11.9%	10.0%	6.9%	10.2%	9.6%
		% of Total	2.0%	1.5%	0.5%	1.8%	1.5%	1.0%	1.3%	9.6%
		Std. Residual	.5	.1	-.9	.5	.1	-.7	.1	
	Up	Count	5a	1a, b	0a, b	0b	3a, b	1a, b	3a, b	13
		Expected Count	2.3	2.0	1.3	1.9	2.0	1.9	1.6	13.0
		% within Drawing Direct	38.5%	7.7%	0.0%	0.0%	23.1%	7.7%	23.1%	100.0%
		% within Program	7.1%	1.7%	0.0%	0.0%	5.0%	1.7%	6.1%	3.3%
		% of Total	1.3%	0.3%	0.0%	0.0%	0.8%	0.3%	0.8%	3.3%
		Std. Residual	1.8	-.7	-1.1	-1.4	.7	-.7	1.1	
	Right	Count	0a	1a	0a	0a	3a	0a	0a	4
		Expected Count	.7	.6	.4	.6	.6	.6	.5	4.0
		% within Drawing Direct	0.0%	25.0%	0.0%	0.0%	75.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	1.7%	0.0%	0.0%	5.0%	0.0%	0.0%	1.0%
		% of Total	0.0%	0.3%	0.0%	0.0%	0.8%	0.0%	0.0%	1.0%
		Std. Residual	-.8	.5	-.6	-.8	3.1	-.8	-.7	
	Left	Count	0a	0a	1a	0a	1a	0a	0a	2
		Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
		% within Drawing Direct	0.0%	0.0%	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	0.0%	2.6%	0.0%	1.7%	0.0%	0.0%	0.5%
		% of Total	0.0%	0.0%	0.3%	0.0%	0.3%	0.0%	0.0%	0.5%
		Std. Residual	-.6	-.6	1.8	-.5	1.3	-.5	-.5	
	DownUp	Count	1a	0a	2a	2a	0a	0a	1a	6
		Expected Count	1.1	.9	.6	.9	.9	.9	.7	6.0

		Program							
		Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
	% within Drawing Direct	16.7%	0.0%	33.3%	33.3%	0.0%	0.0%	16.7%	100.0%
	% within Program	1.4%	0.0%	5.3%	3.4%	0.0%	0.0%	2.0%	1.5%
	% of Total	0.3%	0.0%	0.5%	0.5%	0.0%	0.0%	0.3%	1.5%
	Std. Residual	-.1	-1.0	1.9	1.2	-1.0	-.9	.3	
Total	Count	70	60	38	59	60	58	49	394
	Expected Count	70.0	60.0	38.0	59.0	60.0	58.0	49.0	394.0
	% within Drawing Direct	17.8%	15.2%	9.6%	15.0%	15.2%	14.7%	12.4%	100.0%
	% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	17.8%	15.2%	9.6%	15.0%	15.2%	14.7%	12.4%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	130.331[a]	96	.011
Likelihood Ratio	136.764	96	.004
Linear-by-Linear Association	.809	1	.369
N of Valid Cases	394		

a. 87 cells (73.1%) have expected count less than 5. The minimum expected count is .19.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.499			.011
Interval by Interval	Pearson's R	.045	.052	.899	.369[c]
Ordinal by Ordinal	Spearman Correlation	.046	.051	.917	.359[c]
N of Valid Cases		394			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Lynchian Elements: Program

Table. 10.6. Crosstabulation: Program and Lynchian Categories (*n = 398).*

Crosstab

			Program							Total
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	
Lynchian	0	Count	60a	51a	29a	49a	48a	49a	37a	323
		Expected Count	56.8	48.7	32.5	47.9	48.7	48.7	39.8	323.0
		% within Lynchian	18.6%	15.8%	9.0%	15.2%	14.9%	15.2%	11.5%	100.0%
		% within Program	85.7%	85.0%	72.5%	83.1%	80.0%	81.7%	75.5%	81.2%
		% of Total	15.1%	12.8%	7.3%	12.3%	12.1%	12.3%	9.3%	81.2%
		Std. Residual	.4	.3	-.6	.2	-.1	.0	-.4	
	1	Count	1a	0a	0a	0a	0a	0a	0a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
		% within Lynchian	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
		% of Total	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
		Std. Residual	2.0	-.4	-.3	-.4	-.4	-.4	-.4	
	2	Count	2a	2a, b	6c	2a, b	4a, b, c	3a, b, c	6b, c	25
		Expected Count	4.4	3.8	2.5	3.7	3.8	3.8	3.1	25.0
		% within Lynchian	8.0%	8.0%	24.0%	8.0%	16.0%	12.0%	24.0%	100.0%
		% within Program	2.9%	3.3%	15.0%	3.4%	6.7%	5.0%	12.2%	6.3%
		% of Total	0.5%	0.5%	1.5%	0.5%	1.0%	0.8%	1.5%	6.3%
		Std. Residual	-1.1	-.9	2.2	-.9	.1	-.4	1.7	
	4	Count	3a	3a	2a	4a	7a	7a	3a	29
		Expected Count	5.1	4.4	2.9	4.3	4.4	4.4	3.6	29.0
		% within Lynchian	10.3%	10.3%	6.9%	13.8%	24.1%	24.1%	10.3%	100.0%
		% within Program	4.3%	5.0%	5.0%	6.8%	11.7%	11.7%	6.1%	7.3%
		% of Total	0.8%	0.8%	0.5%	1.0%	1.8%	1.8%	0.8%	7.3%
		Std. Residual	-.9	-.7	-.5	-.1	1.3	1.3	-.3	
	5	Count	1a	0a	0a	3a	1a	1a	2a	8
		Expected Count	1.4	1.2	.8	1.2	1.2	1.2	1.0	8.0
		% within Lynchian	12.5%	0.0%	0.0%	37.5%	12.5%	12.5%	25.0%	100.0%
		% within Program	1.4%	0.0%	0.0%	5.1%	1.7%	1.7%	4.1%	2.0%
		% of Total	0.3%	0.0%	0.0%	0.8%	0.3%	0.3%	0.5%	2.0%
		Std. Residual	-.3	-1.1	-.9	1.7	-.2	-.2	1.0	
	6	Count	0a	0a	0a	1a	0a	0a	0a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0

		Program							
		Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
	% within Lynchian	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.3%
	% of Total	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.3%
	Std. Residual	-.4	-.4	-.3	2.2	-.4	-.4	-.4	
8	Count	0a	0a	0a	0a	0a	0a	1a	1
	Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
	% within Lynchian	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
	% within Program	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	0.3%
	% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.3%
	Std. Residual	-.4	-.4	-.3	-.4	-.4	-.4	2.5	
11	Count	1a	0a	2a	0a	0a	0a	0a	3
	Expected Count	.5	.5	.3	.4	.5	.5	.4	3.0
	% within Lynchian	33.3%	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	1.4%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.8%
	% of Total	0.3%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.8%
	Std. Residual	.7	-.7	3.1	-.7	-.7	-.7	-.6	
12	Count	0a	2a	1a	0a	0a	0a	0a	3
	Expected Count	.5	.5	.3	.4	.5	.5	.4	3.0
	% within Lynchian	0.0%	66.7%	33.3%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	3.3%	2.5%	0.0%	0.0%	0.0%	0.0%	0.8%
	% of Total	0.0%	0.5%	0.3%	0.0%	0.0%	0.0%	0.0%	0.8%
	Std. Residual	-.7	2.3	1.3	-.7	-.7	-.7	-.6	
15	Count	0a	1a	0a	0a	0a	0a	0a	1
	Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
	% within Lynchian	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
	% of Total	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
	Std. Residual	-.4	2.2	-.3	-.4	-.4	-.4	-.4	
28	Count	0a	1a	0a	0a	0a	0a	0a	1
	Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
	% within Lynchian	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
	% of Total	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
	Std. Residual	-.4	2.2	-.3	-.4	-.4	-.4	-.4	

		Program							
		Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
31	Count	2a	0a	0a	0a	0a	0a	0a	2
	Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
	% within Lynchian	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
	% of Total	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
	Std. Residual	2.8	-.5	-.4	-.5	-.5	-.5	-.5	
Total	Count	70	60	40	59	60	60	49	398
	Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
	% within Lynchian	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
	% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	81.985a	66	.089
Likelihood Ratio	65.085	66	.509
Linear-by-Linear Association	2.565	1	.109
N of Valid Cases	398		

a. 76 cells (90.5%) have expected count less than 5. The minimum expected count is .10.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.413			.089
Interval by Interval	Pearson's R	-.080	.047	-1.605	.109[c]
Ordinal by Ordinal	Spearman Correlation	.051	.050	1.012	.312[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Narrative Style: Program

Table. 10.7. Crosstabulation: Program and Narrative Style (*n = 398).*

Crosstab

			Program							Total
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	
Narrative	0	Count	15a	17a	6a	19a	19a	15a	11a	102
		Expected Count	17.9	15.4	10.3	15.1	15.4	15.4	12.6	102.0
		% within Narrative	14.7%	16.7%	5.9%	18.6%	18.6%	14.7%	10.8%	100.0%
		% within Program	21.4%	28.3%	15.0%	32.2%	31.7%	25.0%	22.4%	25.6%
		% of Total	3.8%	4.3%	1.5%	4.8%	4.8%	3.8%	2.8%	25.6%
		Std. Residual	-.7	.4	-1.3	1.0	.9	-.1	-.4	
	1	Count	2a, b	4b	1a, b	0a	0a	2a, b	1a, b	10
		Expected Count	1.8	1.5	1.0	1.5	1.5	1.5	1.2	10.0
		% within Narrative	20.0%	40.0%	10.0%	0.0%	0.0%	20.0%	10.0%	100.0%
		% within Program	2.9%	6.7%	2.5%	0.0%	0.0%	3.3%	2.0%	2.5%
		% of Total	0.5%	1.0%	0.3%	0.0%	0.0%	0.5%	0.3%	2.5%
		Std. Residual	.2	2.0	.0	-1.2	-1.2	.4	-.2	
	2	Count	1a	0a	2a	0a	0a	0a	0a	3
		Expected Count	.5	.5	.3	.4	.5	.5	.4	3.0
		% within Narrative	33.3%	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	1.4%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.8%
		% of Total	0.3%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.8%
		Std. Residual	.7	-.7	3.1	-.7	-.7	-.7	-.6	
	3	Count	1a	0a	0a	0a	0a	2a	0a	3
		Expected Count	.5	.5	.3	.4	.5	.5	.4	3.0
		% within Narrative	33.3%	0.0%	0.0%	0.0%	0.0%	66.7%	0.0%	100.0%
		% within Program	1.4%	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.8%
		% of Total	0.3%	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.8%
		Std. Residual	.7	-.7	-.5	-.7	-.7	2.3	-.6	
	4	Count	4a, b	8a, b, c	5a, b, c	2b	4a, b, c	11c	7a, c	41
		Expected Count	7.2	6.2	4.1	6.1	6.2	6.2	5.0	41.0
		% within Narrative	9.8%	19.5%	12.2%	4.9%	9.8%	26.8%	17.1%	100.0%
		% within Program	5.7%	13.3%	12.5%	3.4%	6.7%	18.3%	14.3%	10.3%
		% of Total	1.0%	2.0%	1.3%	0.5%	1.0%	2.8%	1.8%	10.3%
		Std. Residual	-1.2	.7	.4	-1.7	-.9	1.9	.9	
	5	Count	0a	0a	1a	0a	0a	0a	1a	2
		Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
		% within Narrative	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	50.0%	100.0%

		Program							
		Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
	% within Program	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	2.0%	0.5%
	% of Total	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.3%	0.5%
	Std. Residual	-.6	-.5	1.8	-.5	-.5	-.5	1.5	
7	Count	4a, b	0b	5a	3a, b	3a, b	4a	6a	25
	Expected Count	4.4	3.8	2.5	3.7	3.8	3.8	3.1	25.0
	% within Narrative	16.0%	0.0%	20.0%	12.0%	12.0%	16.0%	24.0%	100.0%
	% within Program	5.7%	0.0%	12.5%	5.1%	5.0%	6.7%	12.2%	6.3%
	% of Total	1.0%	0.0%	1.3%	0.8%	0.8%	1.0%	1.5%	6.3%
	Std. Residual	-.2	-1.9	1.6	-.4	-.4	.1	1.7	
8	Count	4a	0a	0a	1a	0a	3a	0a	8
	Expected Count	1.4	1.2	.8	1.2	1.2	1.2	1.0	8.0
	% within Narrative	50.0%	0.0%	0.0%	12.5%	0.0%	37.5%	0.0%	100.0%
	% within Program	5.7%	0.0%	0.0%	1.7%	0.0%	5.0%	0.0%	2.0%
	% of Total	1.0%	0.0%	0.0%	0.3%	0.0%	0.8%	0.0%	2.0%
	Std. Residual	2.2	-1.1	-.9	-.2	-1.1	1.6	-1.0	
9	Count	7a	4a	4a	5a	6a	4a	2a	32
	Expected Count	5.6	4.8	3.2	4.7	4.8	4.8	3.9	32.0
	% within Narrative	21.9%	12.5%	12.5%	15.6%	18.8%	12.5%	6.2%	100.0%
	% within Program	10.0%	6.7%	10.0%	8.5%	10.0%	6.7%	4.1%	8.0%
	% of Total	1.8%	1.0%	1.0%	1.3%	1.5%	1.0%	0.5%	8.0%
	Std. Residual	.6	-.4	.4	.1	.5	-.4	-1.0	
10	Count	2a	3a	3a	5a	1a	4a	2a	20
	Expected Count	3.5	3.0	2.0	3.0	3.0	3.0	2.5	20.0
	% within Narrative	10.0%	15.0%	15.0%	25.0%	5.0%	20.0%	10.0%	100.0%
	% within Program	2.9%	5.0%	7.5%	8.5%	1.7%	6.7%	4.1%	5.0%
	% of Total	0.5%	0.8%	0.8%	1.3%	0.3%	1.0%	0.5%	5.0%
	Std. Residual	-.8	.0	.7	1.2	-1.2	.6	-.3	
11	Count	0a	0a	0a	1a	0a	0a	2a	3
	Expected Count	.5	.5	.3	.4	.5	.5	.4	3.0
	% within Narrative	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	66.7%	100.0%
	% within Program	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	4.1%	0.8%
	% of Total	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.5%	0.8%
	Std. Residual	-.7	-.7	-.5	.8	-.7	-.7	2.7	
12	Count	5a, b	8b	1a, b	5a, b	4a, b	2a	3a, b	28
	Expected Count	4.9	4.2	2.8	4.2	4.2	4.2	3.4	28.0

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
		% within Narrative	17.9%	28.6%	3.6%	17.9%	14.3%	7.1%	10.7%	100.0%
		% within Program	7.1%	13.3%	2.5%	8.5%	6.7%	3.3%	6.1%	7.0%
		% of Total	1.3%	2.0%	0.3%	1.3%	1.0%	0.5%	0.8%	7.0%
		Std. Residual	.0	1.8	-1.1	.4	-.1	-1.1	-.2	
	13	Count	4a, b	3a, b	5b, c	1a	13c	3a, b	4a, b, c	33
		Expected Count	5.8	5.0	3.3	4.9	5.0	5.0	4.1	33.0
		% within Narrative	12.1%	9.1%	15.2%	3.0%	39.4%	9.1%	12.1%	100.0%
		% within Program	5.7%	5.0%	12.5%	1.7%	21.7%	5.0%	8.2%	8.3%
		% of Total	1.0%	0.8%	1.3%	0.3%	3.3%	0.8%	1.0%	8.3%
		Std. Residual	-.7	-.9	.9	-1.8	3.6	-.9	.0	
	14	Count	14a	9a, b	5a, b	14a	4b	9a, b	8a, b	63
		Expected Count	11.1	9.5	6.3	9.3	9.5	9.5	7.8	63.0
		% within Narrative	22.2%	14.3%	7.9%	22.2%	6.3%	14.3%	12.7%	100.0%
		% within Program	20.0%	15.0%	12.5%	23.7%	6.7%	15.0%	16.3%	15.8%
		% of Total	3.5%	2.3%	1.3%	3.5%	1.0%	2.3%	2.0%	15.8%
		Std. Residual	.9	-.2	-.5	1.5	-1.8	-.2	.1	
	15	Count	7a	4a, b	2a, b	3a, b	5a, b	1b	2a, b	24
		Expected Count	4.2	3.6	2.4	3.6	3.6	3.6	3.0	24.0
		% within Narrative	29.2%	16.7%	8.3%	12.5%	20.8%	4.2%	8.3%	100.0%
		% within Program	10.0%	6.7%	5.0%	5.1%	8.3%	1.7%	4.1%	6.0%
		% of Total	1.8%	1.0%	0.5%	0.8%	1.3%	0.3%	0.5%	6.0%
		Std. Residual	1.4	.2	-.3	-.3	.7	-1.4	-.6	
	144	Count	0a	0a	0a	0a	1a	0a	0a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
		% within Narrative	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.3%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%
		Std. Residual	-.4	-.4	-.3	-.4	2.2	-.4	-.4	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Narrative	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	128.385[a]	90	.005
Likelihood Ratio	125.910	90	.007
Linear-by-Linear Association	.045	1	.831
N of Valid Cases	398		

a. 90 cells (80.4%) have expected count less than 5. The minimum expected count is .10.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.494			.005
Interval by Interval	Pearson's R	-.011	.039	-.213	.832[c]
Ordinal by Ordinal	Spearman Correlation	-.063	.049	-1.246	.213[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Sensory Elements: Program

Table. 10.8. Crosstabulation: Program and Start/End Points at College of Design (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Sensory	0	Count	4a, b, c	7c	0b	4a, b, c	6a, c	6a, c	5a, c	32
		Expected Count	5.6	4.8	3.2	4.7	4.8	4.8	3.9	32.0
		% within Sensory	12.5%	21.9%	0.0%	12.5%	18.8%	18.8%	15.6%	100.0%
		% within Program	5.7%	11.7%	0.0%	6.8%	10.0%	10.0%	10.2%	8.0%
		% of Total	1.0%	1.8%	0.0%	1.0%	1.5%	1.5%	1.3%	8.0%
		Std. Residual	-.7	1.0	-1.8	-.3	.5	.5	.5	
	1	Count	34a	33a	18a	31a	27a	33a	28a	204
		Expected Count	35.9	30.8	20.5	30.2	30.8	30.8	25.1	204.0
		% within Sensory	16.7%	16.2%	8.8%	15.2%	13.2%	16.2%	13.7%	100.0%
		% within Program	48.6%	55.0%	45.0%	52.5%	45.0%	55.0%	57.1%	51.3%
		% of Total	8.5%	8.3%	4.5%	7.8%	6.8%	8.3%	7.0%	51.3%
		Std. Residual	-.3	.4	-.6	.1	-.7	.4	.6	
	4	Count	1a	0a	0a	0a	0a	0a	0a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
		% within Sensory	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
		% of Total	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
		Std. Residual	2.0	-.4	-.3	-.4	-.4	-.4	-.4	
	5	Count	0a	0a	0a	0a	0a	2a	0a	2
		Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
		% within Sensory	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
		% within Program	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.5%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.5%
		Std. Residual	-.6	-.5	-.4	-.5	-.5	3.1	-.5	
	7	Count	1a	0a	0a	0a	0a	1a	3a	5
		Expected Count	.9	.8	.5	.7	.8	.8	.6	5.0
		% within Sensory	20.0%	0.0%	0.0%	0.0%	0.0%	20.0%	60.0%	100.0%
		% within Program	1.4%	0.0%	0.0%	0.0%	0.0%	1.7%	6.1%	1.3%
		% of Total	0.3%	0.0%	0.0%	0.0%	0.0%	0.3%	0.8%	1.3%
		Std. Residual	.1	-.9	-.7	-.9	-.9	.3	3.0	
	8	Count	1a	3a	3a	4a	2a	1a	2a	16
		Expected Count	2.8	2.4	1.6	2.4	2.4	2.4	2.0	16.0

Crosstab

		Program							
		Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
	% within Sensory	6.2%	18.8%	18.8%	25.0%	12.5%	6.2%	12.5%	100.0%
	% within Program	1.4%	5.0%	7.5%	6.8%	3.3%	1.7%	4.1%	4.0%
	% of Total	0.3%	0.8%	0.8%	1.0%	0.5%	0.3%	0.5%	4.0%
	Std. Residual	-1.1	.4	1.1	1.1	-.3	-.9	.0	
9	Count	6a	2a, b	5a	0b	2a, b	4a	2a, b	21
	Expected Count	3.7	3.2	2.1	3.1	3.2	3.2	2.6	21.0
	% within Sensory	28.6%	9.5%	23.8%	0.0%	9.5%	19.0%	9.5%	100.0%
	% within Program	8.6%	3.3%	12.5%	0.0%	3.3%	6.7%	4.1%	5.3%
	% of Total	1.5%	0.5%	1.3%	0.0%	0.5%	1.0%	0.5%	5.3%
	Std. Residual	1.2	-.7	2.0	-1.8	-.7	.5	-.4	
10	Count	11a	9a, b	9a	11a	3b	8a, b	4a, b	55
	Expected Count	9.7	8.3	5.5	8.2	8.3	8.3	6.8	55.0
	% within Sensory	20.0%	16.4%	16.4%	20.0%	5.5%	14.5%	7.3%	100.0%
	% within Program	15.7%	15.0%	22.5%	18.6%	5.0%	13.3%	8.2%	13.8%
	% of Total	2.8%	2.3%	2.3%	2.8%	0.8%	2.0%	1.0%	13.8%
	Std. Residual	.4	.2	1.5	1.0	-1.8	-.1	-1.1	
11	Count	2a	1a	0a	2a	2a	2a	1a	10
	Expected Count	1.8	1.5	1.0	1.5	1.5	1.5	1.2	10.0
	% within Sensory	20.0%	10.0%	0.0%	20.0%	20.0%	20.0%	10.0%	100.0%
	% within Program	2.9%	1.7%	0.0%	3.4%	3.3%	3.3%	2.0%	2.5%
	% of Total	0.5%	0.3%	0.0%	0.5%	0.5%	0.5%	0.3%	2.5%
	Std. Residual	.2	-.4	-1.0	.4	.4	.4	-.2	
23	Count	0a	0a	0a	0a	1a	0a	0a	1
	Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
	% within Sensory	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.3%
	% of Total	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%
	Std. Residual	-.4	-.4	-.3	-.4	2.2	-.4	-.4	
24	Count	0a	0a	0a	0a	2a	0a	0a	2
	Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
	% within Sensory	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.5%
	% of Total	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.5%
	Std. Residual	-.6	-.5	-.4	-.5	3.1	-.5	-.5	

		Program							
		Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
26	Count	0a	0a	0a	0a	0a	1a	0a	1
	Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
	% within Sensory	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	% within Program	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.3%
	% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.3%
	Std. Residual	-.4	-.4	-.3	-.4	-.4	2.2	-.4	
27	Count	0a	0a	0a	0a	2a	0a	0a	2
	Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
	% within Sensory	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.5%
	% of Total	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.5%
	Std. Residual	-.6	-.5	-.4	-.5	3.1	-.5	-.5	
28	Count	0a	0a	0a	1a	0a	0a	0a	1
	Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
	% within Sensory	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.3%
	% of Total	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.3%
	Std. Residual	-.4	-.4	-.3	2.2	-.4	-.4	-.4	
29	Count	2a, b, c, d	4c, d, e	3b, d, e	1a, b, c, d	7e	0a	0a, b, c, d	17
	Expected Count	3.0	2.6	1.7	2.5	2.6	2.6	2.1	17.0
	% within Sensory	11.8%	23.5%	17.6%	5.9%	41.2%	0.0%	0.0%	100.0%
	% within Program	2.9%	6.7%	7.5%	1.7%	11.7%	0.0%	0.0%	4.3%
	% of Total	0.5%	1.0%	0.8%	0.3%	1.8%	0.0%	0.0%	4.3%
	Std. Residual	-.6	.9	1.0	-1.0	2.8	-1.6	-1.4	
30	Count	1a	0a	1a	1a	1a	0a	0a	4
	Expected Count	.7	.6	.4	.6	.6	.6	.5	4.0
	% within Sensory	25.0%	0.0%	25.0%	25.0%	25.0%	0.0%	0.0%	100.0%
	% within Program	1.4%	0.0%	2.5%	1.7%	1.7%	0.0%	0.0%	1.0%
	% of Total	0.3%	0.0%	0.3%	0.3%	0.3%	0.0%	0.0%	1.0%
	Std. Residual	.4	-.8	.9	.5	.5	-.8	-.7	
31	Count	1a	0a	0a	0a	1a	0a	0a	2
	Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0

		Program							
		Other	Arch	BDSN_ISA_BPMI	LA_CRP	Graphic	Industrial	Interior	Total
	% within Sensory	50.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	100.0%
	% within Program	1.4%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.5%
	% of Total	0.3%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.5%
	Std. Residual	1.1	-.5	-.4	-.5	1.3	-.5	-.5	
43	Count	1[a]	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]	1
	Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
	% within Sensory	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
	% of Total	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
	Std. Residual	2.0	-.4	-.3	-.4	-.4	-.4	-.4	
45	Count	0[a]	0[a]	1[a]	1[a]	0[a]	0[a]	0[a]	2
	Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
	% within Sensory	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	0.0%	2.5%	1.7%	0.0%	0.0%	0.0%	0.5%
	% of Total	0.0%	0.0%	0.3%	0.3%	0.0%	0.0%	0.0%	0.5%
	Std. Residual	-.6	-.5	1.8	1.3	-.5	-.5	-.5	
48	Count	3[a]	1[a]	0[a]	2[a]	2[a]	1[a]	3[a]	12
	Expected Count	2.1	1.8	1.2	1.8	1.8	1.8	1.5	12.0
	% within Sensory	25.0%	8.3%	0.0%	16.7%	16.7%	8.3%	25.0%	100.0%
	% within Program	4.3%	1.7%	0.0%	3.4%	3.3%	1.7%	6.1%	3.0%
	% of Total	0.8%	0.3%	0.0%	0.5%	0.5%	0.3%	0.8%	3.0%
	Std. Residual	.6	-.6	-1.1	.2	.1	-.6	1.3	
49	Count	0[a]	0[a]	0[a]	1[a]	0[a]	0[a]	0[a]	1
	Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
	% within Sensory	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	% within Program	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.3%
	% of Total	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.3%
	Std. Residual	-.4	-.4	-.3	2.2	-.4	-.4	-.4	
51	Count	1[a]	0[a]	0[a]	0[a]	0[a]	1[a]	0[a]	2
	Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
	% within Sensory	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	100.0%
	% within Program	1.4%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.5%
	% of Total	0.3%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.5%
	Std. Residual	1.1	-.5	-.4	-.5	-.5	1.3	-.5	

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
	57	Count	0a	0a	0a	0a	2a	0a	0a	2
		Expected Count	.4	.3	.2	.3	.3	.3	.2	2.0
		% within Sensory	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.5%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.5%
		Std. Residual	-.6	-.5	-.4	-.5	3.1	-.5	-.5	
	61	Count	1a	0a	0a	0a	0a	0a	0a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
		% within Sensory	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
		% of Total	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
		Std. Residual	2.0	-.4	-.3	-.4	-.4	-.4	-.4	
	488	Count	0a	0a	0a	0a	0a	0a	1a	1
		Expected Count	.2	.2	.1	.1	.2	.2	.1	1.0
		% within Sensory	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
		% within Program	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	0.3%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.3%
		Std. Residual	-.4	-.4	-.3	-.4	-.4	-.4	2.5	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Sensory	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	169.427[a]	144	.073
Likelihood Ratio	150.165	144	.346
Linear-by-Linear Association	1.200	1	.273
N of Valid Cases	398		

a. 160 cells (91.4%) have expected count less than 5. The minimum expected count is .10.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.546			.073
Interval by Interval	Pearson's R	.055	.056	1.096	.274[c]
Ordinal by Ordinal	Spearman Correlation	-.071	.049	-1.408	.160[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Starting/Ending Point at CoD: Program

Table. 10.9. Crosstabulation: Program and Start/End Points at College of Design (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Start End CoD	None	Count	6a	2a, b	3a	0b	4a	3a, b	2a, b	20
		Expected Count	3.5	3.0	2.0	3.0	3.0	3.0	2.5	20.0
		% within Start End CoD	30.0%	10.0%	15.0%	0.0%	20.0%	15.0%	10.0%	100.0%
		% within Program	8.6%	3.3%	7.5%	0.0%	6.7%	5.0%	4.1%	5.0%
		% of Total	1.5%	0.5%	0.8%	0.0%	1.0%	0.8%	0.5%	5.0%
		Std. Residual	1.3	-.6	.7	-1.7	.6	.0	-.3	
	Front	Count	49a	44a	26a	39a	37a	46a	32a	273
		Expected Count	48.0	41.2	27.4	40.5	41.2	41.2	33.6	273.0
		% within Start End CoD	17.9%	16.1%	9.5%	14.3%	13.6%	16.8%	11.7%	100.0%
		% within Program	70.0%	73.3%	65.0%	66.1%	61.7%	76.7%	65.3%	68.6%
		% of Total	12.3%	11.1%	6.5%	9.8%	9.3%	11.6%	8.0%	68.6%
		Std. Residual	.1	.4	-.3	-.2	-.6	.8	-.3	
	Back	Count	10a	7a, b	1b	12a	11a	6a, b	7a, b	54
		Expected Count	9.5	8.1	5.4	8.0	8.1	8.1	6.6	54.0
		% within Start End CoD	18.5%	13.0%	1.9%	22.2%	20.4%	11.1%	13.0%	100.0%
		% within Program	14.3%	11.7%	2.5%	20.3%	18.3%	10.0%	14.3%	13.6%
		% of Total	2.5%	1.8%	0.3%	3.0%	2.8%	1.5%	1.8%	13.6%
		Std. Residual	.2	-.4	-1.9	1.4	1.0	-.8	.1	
	Side	Count	5a	7a, b	10b	8a, b	8a, b	5a	8a, b	51
		Expected Count	9.0	7.7	5.1	7.6	7.7	7.7	6.3	51.0
		% within Start End CoD	9.8%	13.7%	19.6%	15.7%	15.7%	9.8%	15.7%	100.0%
		% within Program	7.1%	11.7%	25.0%	13.6%	13.3%	8.3%	16.3%	12.8%
		% of Total	1.3%	1.8%	2.5%	2.0%	2.0%	1.3%	2.0%	12.8%
		Std. Residual	-1.3	-.2	2.2	.2	.1	-1.0	.7	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Start End CoD	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.648[a]	18	.204
Likelihood Ratio	26.229	18	.095
Linear-by-Linear Association	1.230	1	.267
N of Valid Cases	398		

a. 7 cells (25.0%) have expected count less than 5. The minimum expected count is 2.01.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.232			.204
Interval by Interval	Pearson's R	.056	.049	1.109	.268[c]
Ordinal by Ordinal	Spearman Correlation	.046	.049	.914	.361[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Arrows: Program

Table. 10.10. Crosstabulation: Program and Arrows (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Arrows	No	Count	38a, b, c	36a, b, c, d	18c	36a, b, c, d	43d	40b, d	21a, c	232
		Expected Count	40.8	35.0	23.3	34.4	35.0	35.0	28.6	232.0
		% within Arrows	16.4%	15.5%	7.8%	15.5%	18.5%	17.2%	9.1%	100.0%
		% within Program	54.3%	60.0%	45.0%	61.0%	71.7%	66.7%	42.9%	58.3%
		% of Total	9.5%	9.0%	4.5%	9.0%	10.8%	10.1%	5.3%	58.3%
		Std. Residual	-.4	.2	-1.1	.3	1.4	.8	-1.4	
	Yes	Count	32a, b, c	24a, b, c, d	22c	23a, b, c, d	17d	20b, d	28a, c	166
		Expected Count	29.2	25.0	16.7	24.6	25.0	25.0	20.4	166.0
		% within Arrows	19.3%	14.5%	13.3%	13.9%	10.2%	12.0%	16.9%	100.0%
		% within Program	45.7%	40.0%	55.0%	39.0%	28.3%	33.3%	57.1%	41.7%
		% of Total	8.0%	6.0%	5.5%	5.8%	4.3%	5.0%	7.0%	41.7%
		Std. Residual	.5	-.2	1.3	-.3	-1.6	-1.0	1.7	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Arrows	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.568[a]	6	.024
Likelihood Ratio	14.673	6	.023
Linear-by-Linear Association	.002	1	.960
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.68.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.188			.024
Interval by Interval	Pearson's R	-.002	.051	-.049	.961[c]
Ordinal by Ordinal	Spearman Correlation	-.017	.051	-.343	.732[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Breadcrumbs * Program

Breadcrumbs: Program

Table. 10.11. Crosstabulation: Program and Breadcrumbs (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Breadcrumbs	No	Count	38a, b	41b, c	26a, b, c	29a	39a, b	49c	30a, b	252
		Expected Count	44.3	38.0	25.3	37.4	38.0	38.0	31.0	252.0
		% within Breadcrumbs	15.1%	16.3%	10.3%	11.5%	15.5%	19.4%	11.9%	100.0%
		% within Program	54.3%	68.3%	65.0%	49.2%	65.0%	81.7%	61.2%	63.3%
		% of Total	9.5%	10.3%	6.5%	7.3%	9.8%	12.3%	7.5%	63.3%
		Std. Residual	-.9	.5	.1	-1.4	.2	1.8	-.2	
	Yes	Count	32a, b	19b, c	14a, b, c	30a	21a, b	11c	19a, b	146
		Expected Count	25.7	22.0	14.7	21.6	22.0	22.0	18.0	146.0
		% within Breadcrumbs	21.9%	13.0%	9.6%	20.5%	14.4%	7.5%	13.0%	100.0%
		% within Program	45.7%	31.7%	35.0%	50.8%	35.0%	18.3%	38.8%	36.7%
		% of Total	8.0%	4.8%	3.5%	7.5%	5.3%	2.8%	4.8%	36.7%
		Std. Residual	1.2	-.6	-.2	1.8	-.2	-2.3	.2	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Breadcrumbs	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.117[a]	6	.009
Likelihood Ratio	17.854	6	.007
Linear-by-Linear Association	1.863	1	.172
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.67.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.203			.009
Interval by Interval	Pearson's R	-.069	.050	-1.367	.173[c]
Ordinal by Ordinal	Spearman Correlation	-.087	.050	-1.746	.082[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Cardinal Directions: Program

Table. 10.12. Crosstabulation: Program and Cardinal Directions (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Cardinal Directions	No	Count	53a	52a, b	33a, b	53b	56b	54b	45b	346
		Expected Count	60.9	52.2	34.8	51.3	52.2	52.2	42.6	346.0
		% within Cardinal Directions	15.3%	15.0%	9.5%	15.3%	16.2%	15.6%	13.0%	100.0%
		% within Program	75.7%	86.7%	82.5%	89.8%	93.3%	90.0%	91.8%	86.9%
		% of Total	13.3%	13.1%	8.3%	13.3%	14.1%	13.6%	11.3%	86.9%
		Std. Residual	-1.0	.0	-.3	.2	.5	.3	.4	
	Yes	Count	17a	8a, b	7a, b	6b	4b	6b	4b	52
		Expected Count	9.1	7.8	5.2	7.7	7.8	7.8	6.4	52.0
		% within Cardinal Directions	32.7%	15.4%	13.5%	11.5%	7.7%	11.5%	7.7%	100.0%
		% within Program	24.3%	13.3%	17.5%	10.2%	6.7%	10.0%	8.2%	13.1%
		% of Total	4.3%	2.0%	1.8%	1.5%	1.0%	1.5%	1.0%	13.1%
		Std. Residual	2.6	.1	.8	-.6	-1.4	-.7	-.9	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Cardinal Directions	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.587[a]	6	.050
Likelihood Ratio	11.815	6	.066
Linear-by-Linear Association	8.255	1	.004
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.23.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.175			.050
Interval by Interval	Pearson's R	-.144	.050	-2.900	.004[c]
Ordinal by Ordinal	Spearman Correlation	-.148	.051	-2.986	.003[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

LRF Directions: Program

Table. 10.13. Crosstabulation: Program and Left, Right, Forward Directions (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
LRF Directions	No	Count	44a	42a	24a	37a	45a	43a	35a	270
		Expected Count	47.5	40.7	27.1	40.0	40.7	40.7	33.2	270.0
		% within LRF Directions	16.3%	15.6%	8.9%	13.7%	16.7%	15.9%	13.0%	100.0%
		% within Program	62.9%	70.0%	60.0%	62.7%	75.0%	71.7%	71.4%	67.8%
		% of Total	11.1%	10.6%	6.0%	9.3%	11.3%	10.8%	8.8%	67.8%
		Std. Residual	-.5	.2	-.6	-.5	.7	.4	.3	
	Yes	Count	26a	18a	16a	22a	15a	17a	14a	128
		Expected Count	22.5	19.3	12.9	19.0	19.3	19.3	15.8	128.0
		% within LRF Directions	20.3%	14.1%	12.5%	17.2%	11.7%	13.3%	10.9%	100.0%
		% within Program	37.1%	30.0%	40.0%	37.3%	25.0%	28.3%	28.6%	32.2%
		% of Total	6.5%	4.5%	4.0%	5.5%	3.8%	4.3%	3.5%	32.2%
		Std. Residual	.7	-.3	.9	.7	-1.0	-.5	-.4	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within LRF Directions	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.865[a]	6	.561
Likelihood Ratio	4.869	6	.561
Linear-by-Linear Association	1.412	1	.235
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.86.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.110			.561
Interval by Interval	Pearson's R	-.060	.050	-1.189	.235[c]
Ordinal by Ordinal	Spearman Correlation	-.068	.050	-1.356	.176[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Compass Rose: Program

Table. 10.14. Crosstabulation: Program and Compass Rose (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Compass Rose	No	Count	61a	54a	36a	56a	57a	58a	47a	369
		Expected Count	64.9	55.6	37.1	54.7	55.6	55.6	45.4	369.0
		% within Compass Rose	16.5%	14.6%	9.8%	15.2%	15.4%	15.7%	12.7%	100.0%
		% within Program	87.1%	90.0%	90.0%	94.9%	95.0%	96.7%	95.9%	92.7%
		% of Total	15.3%	13.6%	9.0%	14.1%	14.3%	14.6%	11.8%	92.7%
		Std. Residual	-.5	-.2	-.2	.2	.2	.3	.2	
	Yes	Count	9a	6a	4a	3a	3a	2a	2a	29
		Expected Count	5.1	4.4	2.9	4.3	4.4	4.4	3.6	29.0
		% within Compass Rose	31.0%	20.7%	13.8%	10.3%	10.3%	6.9%	6.9%	100.0%
		% within Program	12.9%	10.0%	10.0%	5.1%	5.0%	3.3%	4.1%	7.3%
		% of Total	2.3%	1.5%	1.0%	0.8%	0.8%	0.5%	0.5%	7.3%
		Std. Residual	1.7	.8	.6	-.6	-.7	-1.1	-.8	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Compass Rose	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.326[a]	6	.292
Likelihood Ratio	7.226	6	.300
Linear-by-Linear Association	6.205	1	.013
N of Valid Cases	398		

a. 6 cells (42.9%) have expected count less than 5. The minimum expected count is 2.91.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.134			.292
Interval by Interval	Pearson's R	-.125	.049	-2.507	.013[c]
Ordinal by Ordinal	Spearman Correlation	-.127	.048	-2.553	.011[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Viewpoint: Program

Table. 10.15. Crosstabulation: Program and Viewpoint (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Viewpoint	No	Count	69a	60a	38a	57a	60a	60a	49a	393
		Expected Count	69.1	59.2	39.5	58.3	59.2	59.2	48.4	393.0
		% within Viewpoint	17.6%	15.3%	9.7%	14.5%	15.3%	15.3%	12.5%	100.0%
		% within Program	98.6%	100.0%	95.0%	96.6%	100.0%	100.0%	100.0%	98.7%
		% of Total	17.3%	15.1%	9.5%	14.3%	15.1%	15.1%	12.3%	98.7%
		Std. Residual	.0	.1	-.2	-.2	.1	.1	.1	
	Yes	Count	1a	0a	2a	2a	0a	0a	0a	5
		Expected Count	.9	.8	.5	.7	.8	.8	.6	5.0
		% within Viewpoint	20.0%	0.0%	40.0%	40.0%	0.0%	0.0%	0.0%	100.0%
		% within Program	1.4%	0.0%	5.0%	3.4%	0.0%	0.0%	0.0%	1.3%
		% of Total	0.3%	0.0%	0.5%	0.5%	0.0%	0.0%	0.0%	1.3%
		Std. Residual	.1	-.9	2.1	1.5	-.9	-.9	-.8	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Viewpoint	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.615[a]	6	.142
Likelihood Ratio	9.874	6	.130
Linear-by-Linear Association	.578	1	.447
N of Valid Cases	398		

a. 7 cells (50.0%) have expected count less than 5. The minimum expected count is .50.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.154			.142
Interval by Interval	Pearson's R	-.038	.030	-.760	.448[c]
Ordinal by Ordinal	Spearman Correlation	-.052	.029	-1.033	.302[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Enclosures: Program

Table. 10.16. Crosstabulation: Program and Enclosures (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Enclosures	No	Count	61a	46a, b, c	33a, b, c	40c	46a, b, c	51a	33b, c	310
		Expected Count	54.5	46.7	31.2	46.0	46.7	46.7	38.2	310.0
		% within Enclosures	19.7%	14.8%	10.6%	12.9%	14.8%	16.5%	10.6%	100.0%
		% within Program	87.1%	76.7%	82.5%	67.8%	76.7%	85.0%	67.3%	77.9%
		% of Total	15.3%	11.6%	8.3%	10.1%	11.6%	12.8%	8.3%	77.9%
		Std. Residual	.9	-.1	.3	-.9	-.1	.6	-.8	
	Yes	Count	9a	14a, b, c	7a, b, c	19c	14a, b, c	9a	16b, c	88
		Expected Count	15.5	13.3	8.8	13.0	13.3	13.3	10.8	88.0
		% within Enclosures	10.2%	15.9%	8.0%	21.6%	15.9%	10.2%	18.2%	100.0%
		% within Program	12.9%	23.3%	17.5%	32.2%	23.3%	15.0%	32.7%	22.1%
		% of Total	2.3%	3.5%	1.8%	4.8%	3.5%	2.3%	4.0%	22.1%
		Std. Residual	-1.6	.2	-.6	1.6	.2	-1.2	1.6	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Enclosures	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.492[a]	6	.052
Likelihood Ratio	12.552	6	.051
Linear-by-Linear Association	3.114	1	.078
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.84.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.174			.052
Interval by Interval	Pearson's R	.089	.049	1.769	.078[c]
Ordinal by Ordinal	Spearman Correlation	.081	.049	1.613	.107[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Indicate Start: Program

Table. 10.17. Crosstabulation: Program and Indicate Start (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Indicate Start	No	Count	42a	36a	30a	35a	34a	39a	29a	245
		Expected Count	43.1	36.9	24.6	36.3	36.9	36.9	30.2	245.0
		% within Indicate Start	17.1%	14.7%	12.2%	14.3%	13.9%	15.9%	11.8%	100.0%
		% within Program	60.0%	60.0%	75.0%	59.3%	56.7%	65.0%	59.2%	61.6%
		% of Total	10.6%	9.0%	7.5%	8.8%	8.5%	9.8%	7.3%	61.6%
		Std. Residual	-.2	-.2	1.1	-.2	-.5	.3	-.2	
	Yes	Count	28a	24a	10a	24a	26a	21a	20a	153
		Expected Count	26.9	23.1	15.4	22.7	23.1	23.1	18.8	153.0
		% within Indicate Start	18.3%	15.7%	6.5%	15.7%	17.0%	13.7%	13.1%	100.0%
		% within Program	40.0%	40.0%	25.0%	40.7%	43.3%	35.0%	40.8%	38.4%
		% of Total	7.0%	6.0%	2.5%	6.0%	6.5%	5.3%	5.0%	38.4%
		Std. Residual	.2	.2	-1.4	.3	.6	-.4	.3	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Indicate Start	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.336[a]	6	.631
Likelihood Ratio	4.520	6	.607
Linear-by-Linear Association	.004	1	.948
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.38.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.104			.631
Interval by Interval	Pearson's R	.003	.050	.065	.948[c]
Ordinal by Ordinal	Spearman Correlation	.006	.050	.112	.911[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Indicate Finish: Program

Table. 10.18. Crosstabulation: Program and Indicate Finish (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Indicate Finish	No	Count	39a	34a	26a	37a	31a	40a	31a	238
		Expected Count	41.9	35.9	23.9	35.3	35.9	35.9	29.3	238.0
		% within Indicate Finish	16.4%	14.3%	10.9%	15.5%	13.0%	16.8%	13.0%	100.0%
		% within Program	55.7%	56.7%	65.0%	62.7%	51.7%	66.7%	63.3%	59.8%
		% of Total	9.8%	8.5%	6.5%	9.3%	7.8%	10.1%	7.8%	59.8%
		Std. Residual	-.4	-.3	.4	.3	-.8	.7	.3	
	Yes	Count	31a	26a	14a	22a	29a	20a	18a	160
		Expected Count	28.1	24.1	16.1	23.7	24.1	24.1	19.7	160.0
		% within Indicate Finish	19.4%	16.2%	8.8%	13.8%	18.1%	12.5%	11.2%	100.0%
		% within Program	44.3%	43.3%	35.0%	37.3%	48.3%	33.3%	36.7%	40.2%
		% of Total	7.8%	6.5%	3.5%	5.5%	7.3%	5.0%	4.5%	40.2%
		Std. Residual	.5	.4	-.5	-.4	1.0	-.8	-.4	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Indicate Finish	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.462[a]	6	.614
Likelihood Ratio	4.465	6	.614
Linear-by-Linear Association	.956	1	.328
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.08.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.105			.614
Interval by Interval	Pearson's R	-.049	.050	-.978	.329[c]
Ordinal by Ordinal	Spearman Correlation	-.047	.050	-.945	.345[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Street Names: Program

Table. 10.19. Crosstabulation: Program and Indicate Street Names (*n = 398).*

Crosstab

			Program						
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior
Street Names	No	Count	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		Expected Count	24.4	21.0	14.0	20.6	21.0	21.0	17.1
		% within Street Names	20.1%	11.5%	7.2%	10.8%	12.2%	23.7%	14.4%
		% within Program	40.0%	26.7%	25.0%	25.4%	28.3%	55.0%	40.8%
		% of Total	7.0%	4.0%	2.5%	3.8%	4.3%	8.3%	5.0%
		Std. Residual	.7	-1.1	-1.1	-1.2	-.9	2.6	.7
	Yes	Count	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		Expected Count	45.6	39.0	26.0	38.4	39.0	39.0	31.9
		% within Street Names	16.2%	17.0%	11.6%	17.0%	16.6%	10.4%	11.2%
		% within Program	60.0%	73.3%	75.0%	74.6%	71.7%	45.0%	59.2%
		% of Total	10.6%	11.1%	7.5%	11.1%	10.8%	6.8%	7.3%
		Std. Residual	-.5	.8	.8	.9	.6	-1.9	-.5
Total		Count	70	60	40	59	60	60	49
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0
		% within Street Names	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%

			Total
Street Names	No	Count	139
		Expected Count	139.0
		% within Street Names	100.0%
		% within Program	34.9%
		% of Total	34.9%
		Std. Residual	
	Yes	Count	259
		Expected Count	259.0
		% within Street Names	100.0%
		% within Program	65.1%
		% of Total	65.1%
		Std. Residual	
Total		Count	398
		Expected Count	398.0
		% within Street Names	100.0%
		% within Program	100.0%
		% of Total	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.206[a]	6	.004
Likelihood Ratio	18.926	6	.004
Linear-by-Linear Association	2.107	1	.147
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.97.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.215			.004
Interval by Interval	Pearson's R	-.073	.051	-1.454	.147[c]
Ordinal by Ordinal	Spearman Correlation	-.084	.052	-1.678	.094[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Paths: Program

Table. 10.20. Crosstabulation: Program and Indicate Paths (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Paths	No	Count	27a	27a, b	17a, b	20a	28a, b	37b	29b	185
		Expected Count	32.5	27.9	18.6	27.4	27.9	27.9	22.8	185.0
		% within Paths	14.6%	14.6%	9.2%	10.8%	15.1%	20.0%	15.7%	100.0%
		% within Program	38.6%	45.0%	42.5%	33.9%	46.7%	61.7%	59.2%	46.5%
		% of Total	6.8%	6.8%	4.3%	5.0%	7.0%	9.3%	7.3%	46.5%
		Std. Residual	-1.0	-.2	-.4	-1.4	.0	1.7	1.3	
	Yes	Count	43a	33a, b	23a, b	39a	32a, b	23b	20b	213
		Expected Count	37.5	32.1	21.4	31.6	32.1	32.1	26.2	213.0
		% within Paths	20.2%	15.5%	10.8%	18.3%	15.0%	10.8%	9.4%	100.0%
		% within Program	61.4%	55.0%	57.5%	66.1%	53.3%	38.3%	40.8%	53.5%
		% of Total	10.8%	8.3%	5.8%	9.8%	8.0%	5.8%	5.0%	53.5%
		Std. Residual	.9	.2	.3	1.3	.0	-1.6	-1.2	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Paths	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.564[a]	6	.024
Likelihood Ratio	14.678	6	.023
Linear-by-Linear Association	7.083	1	.008
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.59.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.188			.024
Interval by Interval	Pearson's R	-.134	.050	-2.682	.008[c]
Ordinal by Ordinal	Spearman Correlation	-.144	.050	-2.903	.004[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Building Number: Program

Table. 10.21. Crosstabulation: Program and Indicate Building Numbers (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Buildling Number	No	Count	68a	57a, b	34b	57a	54a, b	54a, b	47a, b	371
		Expected Count	65.3	55.9	37.3	55.0	55.9	55.9	45.7	371.0
		% within Buildling Number	18.3%	15.4%	9.2%	15.4%	14.6%	14.6%	12.7%	100.0%
		% within Program	97.1%	95.0%	85.0%	96.6%	90.0%	90.0%	95.9%	93.2%
		% of Total	17.1%	14.3%	8.5%	14.3%	13.6%	13.6%	11.8%	93.2%
		Std. Residual	.3	.1	-.5	.3	-.3	-.3	.2	
	Yes	Count	2a	3a, b	6b	2a	6a, b	6a, b	2a, b	27
		Expected Count	4.7	4.1	2.7	4.0	4.1	4.1	3.3	27.0
		% within Buildling Number	7.4%	11.1%	22.2%	7.4%	22.2%	22.2%	7.4%	100.0%
		% within Program	2.9%	5.0%	15.0%	3.4%	10.0%	10.0%	4.1%	6.8%
		% of Total	0.5%	0.8%	1.5%	0.5%	1.5%	1.5%	0.5%	6.8%
		Std. Residual	-1.3	-.5	2.0	-1.0	1.0	1.0	-.7	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Buildling Number	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.882[a]	6	.130
Likelihood Ratio	9.416	6	.152
Linear-by-Linear Association	.748	1	.387
N of Valid Cases	398		

a. 7 cells (50.0%) have expected count less than 5. The minimum expected count is 2.71.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.156			.130
Interval by Interval	Pearson's R	.043	.042	.865	.388[c]
Ordinal by Ordinal	Spearman Correlation	.045	.044	.895	.371[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Indicate Off Campus: Program

Table. 10.22. Crosstabulation: Program and Indicate Off Campus (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Off Campus	No	Count	63a	56a	38a	52a	58a	58a	47a	372
		Expected Count	65.4	56.1	37.4	55.1	56.1	56.1	45.8	372.0
		% within Off Campus	16.9%	15.1%	10.2%	14.0%	15.6%	15.6%	12.6%	100.0%
		% within Program	90.0%	93.3%	95.0%	88.1%	96.7%	96.7%	95.9%	93.5%
		% of Total	15.8%	14.1%	9.5%	13.1%	14.6%	14.6%	11.8%	93.5%
		Std. Residual	-.3	.0	.1	-.4	.3	.3	.2	
	Yes	Count	7a	4a	2a	7a	2a	2a	2a	26
		Expected Count	4.6	3.9	2.6	3.9	3.9	3.9	3.2	26.0
		% within Off Campus	26.9%	15.4%	7.7%	26.9%	7.7%	7.7%	7.7%	100.0%
		% within Program	10.0%	6.7%	5.0%	11.9%	3.3%	3.3%	4.1%	6.5%
		% of Total	1.8%	1.0%	0.5%	1.8%	0.5%	0.5%	0.5%	6.5%
		Std. Residual	1.1	.0	-.4	1.6	-1.0	-1.0	-.7	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Off Campus	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.775[a]	6	.342
Likelihood Ratio	6.589	6	.361
Linear-by-Linear Association	2.356	1	.125
N of Valid Cases	398		

a. 7 cells (50.0%) have expected count less than 5. The minimum expected count is 2.61.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.129			.342
Interval by Interval	Pearson's R	-.077	.048	-1.538	.125[c]
Ordinal by Ordinal	Spearman Correlation	-.083	.048	-1.661	.098[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Indicate On Campus: Program

Table. 10.23. Crosstabulation: Program and Indicate On Campus (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
On Campus	No	Count	65a	48b	36a, b	50a, b	55a, b	57a	44a, b	355
		Expected Count	62.4	53.5	35.7	52.6	53.5	53.5	43.7	355.0
		% within On Campus	18.3%	13.5%	10.1%	14.1%	15.5%	16.1%	12.4%	100.0%
		% within Program	92.9%	80.0%	90.0%	84.7%	91.7%	95.0%	89.8%	89.2%
		% of Total	16.3%	12.1%	9.0%	12.6%	13.8%	14.3%	11.1%	89.2%
		Std. Residual	.3	-.8	.1	-.4	.2	.5	.0	
	Yes	Count	5a	12b	4a, b	9a, b	5a, b	3a	5a, b	43
		Expected Count	7.6	6.5	4.3	6.4	6.5	6.5	5.3	43.0
		% within On Campus	11.6%	27.9%	9.3%	20.9%	11.6%	7.0%	11.6%	100.0%
		% within Program	7.1%	20.0%	10.0%	15.3%	8.3%	5.0%	10.2%	10.8%
		% of Total	1.3%	3.0%	1.0%	2.3%	1.3%	0.8%	1.3%	10.8%
		Std. Residual	-.9	2.2	-.2	1.0	-.6	-1.4	-.1	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within On Campus	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.974[a]	6	.126
Likelihood Ratio	9.535	6	.146
Linear-by-Linear Association	.918	1	.338
N of Valid Cases	398		

a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 4.32.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.156			.126
Interval by Interval	Pearson's R	-.048	.048	-.958	.339[c]
Ordinal by Ordinal	Spearman Correlation	-.048	.047	-.947	.344[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Been There Before: Program

Table. 10.24. Crosstabulation: Program and Been There Before (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Been There	No	Count	61a	57a	34a	50a	52a	52a	43a	349
		Expected Count	61.4	52.6	35.1	51.7	52.6	52.6	43.0	349.0
		% within Been There	17.5%	16.3%	9.7%	14.3%	14.9%	14.9%	12.3%	100.0%
		% within Program	87.1%	95.0%	85.0%	84.7%	86.7%	86.7%	87.8%	87.7%
		% of Total	15.3%	14.3%	8.5%	12.6%	13.1%	13.1%	10.8%	87.7%
		Std. Residual	.0	.6	-.2	-.2	-.1	-.1	.0	
	Yes	Count	9a	3a	6a	9a	8a	8a	6a	49
		Expected Count	8.6	7.4	4.9	7.3	7.4	7.4	6.0	49.0
		% within Been There	18.4%	6.1%	12.2%	18.4%	16.3%	16.3%	12.2%	100.0%
		% within Program	12.9%	5.0%	15.0%	15.3%	13.3%	13.3%	12.2%	12.3%
		% of Total	2.3%	0.8%	1.5%	2.3%	2.0%	2.0%	1.5%	12.3%
		Std. Residual	.1	-1.6	.5	.6	.2	.2	.0	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Been There	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.848[a]	6	.697
Likelihood Ratio	4.553	6	.602
Linear-by-Linear Association	.506	1	.477
N of Valid Cases	398		

a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 4.92.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.098			.697
Interval by Interval	Pearson's R	.036	.049	.711	.477[c]
Ordinal by Ordinal	Spearman Correlation	.029	.049	.569	.570[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Not Been There Before: Program

Table. 10.25. Crosstabulation: Program and Indicate Not Been There Before (*n = 398).*

Crosstab

			Program						
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior
Not Been There	No	Count	7a, b, c, d, e, f, g, h	54e, f, g, h, i	34i	55c, d, g, h, i	53b, d, f, h, i	64[illegible], b, c, d, e, f, g, h, i	
		Expected Count	64.9	55.6	37.1	54.7	55.6	55.6	45.4
		% within Not Been There	18.2%	14.6%	9.2%	14.9%	14.4%	16.3%	12.5%
		% within Program	95.7%	90.0%	85.0%	93.2%	88.3%	100.0%	93.9%
		% of Total	16.8%	13.6%	8.5%	13.8%	13.3%	15.1%	11.6%
		Std. Residual	.3	-.2	-.5	.0	-.4	.6	.1
	Yes	Count	3a, b, c, d, e, f, g, h	6e, f, g, h, i	6i	4c, d, g, h, i	7b, d, f, h, i	0[illegible], b, c, d, e, f, g, h, i	
		Expected Count	5.1	4.4	2.9	4.3	4.4	4.4	3.6
		% within Not Been There	10.3%	20.7%	20.7%	13.8%	24.1%	0.0%	10.3%
		% within Program	4.3%	10.0%	15.0%	6.8%	11.7%	0.0%	6.1%
		% of Total	0.8%	1.5%	1.5%	1.0%	1.8%	0.0%	0.8%
		Std. Residual	-.9	.8	1.8	-.1	1.3	-2.1	-.3
Total		Count	70	60	40	59	60	60	49
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0
		% within Not Been There	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%

Crosstab

			Total
Not Been There	No	Count	369
		Expected Count	369.0
		% within Not Been There	100.0%
		% within Program	92.7%
		% of Total	92.7%
		Std. Residual	
	Yes	Count	29
		Expected Count	29.0
		% within Not Been There	100.0%
		% within Program	7.3%
		% of Total	7.3%
		Std. Residual	
Total		Count	398
		Expected Count	398.0
		% within Not Been There	100.0%
		% within Program	100.0%
		% of Total	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.650[a]	6	.070
Likelihood Ratio	15.097	6	.020
Linear-by-Linear Association	.341	1	.559
N of Valid Cases	398		

a. 6 cells (42.9%) have expected count less than 5. The minimum expected count is 2.91.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.169			.070
Interval by Interval	Pearson's R	-.029	.044	-.584	.560[c]
Ordinal by Ordinal	Spearman Correlation	-.037	.043	-.736	.462[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Faster Route: Program

Table. 10.26. Crosstabulation: Program and Indicate a Faster Route (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Faster Route	No	Count	68a	59a	38a	57a	57a	59a	49a	387
		Expected Count	68.1	58.3	38.9	57.4	58.3	58.3	47.6	387.0
		% within Faster Route	17.6%	15.2%	9.8%	14.7%	14.7%	15.2%	12.7%	100.0%
		% within Program	97.1%	98.3%	95.0%	96.6%	95.0%	98.3%	100.0%	97.2%
		% of Total	17.1%	14.8%	9.5%	14.3%	14.3%	14.8%	12.3%	97.2%
		Std. Residual	.0	.1	-.1	.0	-.2	.1	.2	
	Yes	Count	2a	1a	2a	2a	3a	1a	0a	11
		Expected Count	1.9	1.7	1.1	1.6	1.7	1.7	1.4	11.0
		% within Faster Route	18.2%	9.1%	18.2%	18.2%	27.3%	9.1%	0.0%	100.0%
		% within Program	2.9%	1.7%	5.0%	3.4%	5.0%	1.7%	0.0%	2.8%
		% of Total	0.5%	0.3%	0.5%	0.5%	0.8%	0.3%	0.0%	2.8%
		Std. Residual	.0	-.5	.9	.3	1.0	-.5	-1.2	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Faster Route	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.879[a]	6	.693
Likelihood Ratio	4.962	6	.549
Linear-by-Linear Association	.283	1	.595
N of Valid Cases	398		

a. 7 cells (50.0%) have expected count less than 5. The minimum expected count is 1.11.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.098			.693
Interval by Interval	Pearson's R	-.027	.039	-.531	.596[c]
Ordinal by Ordinal	Spearman Correlation	-.030	.040	-.602	.548[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Ask Assistance: Program

Table. 10.27. Crosstabulation: Program and Asked for Assistance (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Ask Assistance	No	Count	70a	58a	40a	58a	58a	60a	49a	393
		Expected Count	69.1	59.2	39.5	58.3	59.2	59.2	48.4	393.0
		% within Ask Assistance	17.8%	14.8%	10.2%	14.8%	14.8%	15.3%	12.5%	100.0%
		% within Program	100.0%	96.7%	100.0%	98.3%	96.7%	100.0%	100.0%	98.7%
		% of Total	17.6%	14.6%	10.1%	14.6%	14.6%	15.1%	12.3%	98.7%
		Std. Residual	.1	-.2	.1	.0	-.2	.1	.1	
	Yes	Count	0a	2a	0a	1a	2a	0a	0a	5
		Expected Count	.9	.8	.5	.7	.8	.8	.6	5.0
		% within Ask Assistance	0.0%	40.0%	0.0%	20.0%	40.0%	0.0%	0.0%	100.0%
		% within Program	0.0%	3.3%	0.0%	1.7%	3.3%	0.0%	0.0%	1.3%
		% of Total	0.0%	0.5%	0.0%	0.3%	0.5%	0.0%	0.0%	1.3%
		Std. Residual	-.9	1.4	-.7	.3	1.4	-.9	-.8	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Ask Assistance	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.051[a]	6	.316
Likelihood Ratio	8.494	6	.204
Linear-by-Linear Association	.175	1	.676
N of Valid Cases	398		

a. 7 cells (50.0%) have expected count less than 5. The minimum expected count is .50.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.132			.316
Interval by Interval	Pearson's R	-.021	.035	-.418	.677[c]
Ordinal by Ordinal	Spearman Correlation	-.015	.032	-.306	.760[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Go Inside: Program

Table. 10.28. Crosstabulation: Program and Go Inside (destination) (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Go Inside	No	Count	65a	57a	36a	55a	51a	54a	45a	363
		Expected Count	63.8	54.7	36.5	53.8	54.7	54.7	44.7	363.0
		% within Go Inside	17.9%	15.7%	9.9%	15.2%	14.0%	14.9%	12.4%	100.0%
		% within Program	92.9%	95.0%	90.0%	93.2%	85.0%	90.0%	91.8%	91.2%
		% of Total	16.3%	14.3%	9.0%	13.8%	12.8%	13.6%	11.3%	91.2%
		Std. Residual	.1	.3	-.1	.2	-.5	-.1	.0	
	Yes	Count	5a	3a	4a	4a	9a	6a	4a	35
		Expected Count	6.2	5.3	3.5	5.2	5.3	5.3	4.3	35.0
		% within Go Inside	14.3%	8.6%	11.4%	11.4%	25.7%	17.1%	11.4%	100.0%
		% within Program	7.1%	5.0%	10.0%	6.8%	15.0%	10.0%	8.2%	8.8%
		% of Total	1.3%	0.8%	1.0%	1.0%	2.3%	1.5%	1.0%	8.8%
		Std. Residual	-.5	-1.0	.3	-.5	1.6	.3	-.1	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Go Inside	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.700[a]	6	.583
Likelihood Ratio	4.456	6	.615
Linear-by-Linear Association	1.006	1	.316
N of Valid Cases	398		

a. 2 cells (14.3%) have expected count less than 5. The minimum expected count is 3.52.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.108			.583
Interval by Interval	Pearson's R	.050	.047	1.003	.316[c]
Ordinal by Ordinal	Spearman Correlation	.051	.048	1.007	.315[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Indicate Location: Program

Table. 10.29. Crosstabulation: Program and Indicate Location Along Route (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Indicate Location	No	Count	55a, b	48a, b	38c	39b	51a, c	54a, c	46c	331
		Expected Count	58.2	49.9	33.3	49.1	49.9	49.9	40.8	331.0
		% within Indicate Location	16.6%	14.5%	11.5%	11.8%	15.4%	16.3%	13.9%	100.0%
		% within Program	78.6%	80.0%	95.0%	66.1%	85.0%	90.0%	93.9%	83.2%
		% of Total	13.8%	12.1%	9.5%	9.8%	12.8%	13.6%	11.6%	83.2%
		Std. Residual	-.4	-.3	.8	-1.4	.2	.6	.8	
	Yes	Count	15a, b	12a, b	2c	20b	9a, c	6a, c	3c	67
		Expected Count	11.8	10.1	6.7	9.9	10.1	10.1	8.2	67.0
		% within Indicate Location	22.4%	17.9%	3.0%	29.9%	13.4%	9.0%	4.5%	100.0%
		% within Program	21.4%	20.0%	5.0%	33.9%	15.0%	10.0%	6.1%	16.8%
		% of Total	3.8%	3.0%	0.5%	5.0%	2.3%	1.5%	0.8%	16.8%
		Std. Residual	.9	.6	-1.8	3.2	-.3	-1.3	-1.8	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Indicate Location	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.919[a]	6	.001
Likelihood Ratio	24.245	6	.000
Linear-by-Linear Association	5.053	1	.025
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.73.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.238			.001
Interval by Interval	Pearson's R	-.113	.046	-2.259	.024[c]
Ordinal by Ordinal	Spearman Correlation	-.115	.046	-2.312	.021[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Legend: Program

Table. 10.30. Crosstabulation: Program and Legend (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Legend	No	Count	68a	60a	40a	57a	60a	59a	49a	393
		Expected Count	69.1	59.2	39.5	58.3	59.2	59.2	48.4	393.0
		% within Legend	17.3%	15.3%	10.2%	14.5%	15.3%	15.0%	12.5%	100.0%
		% within Program	97.1%	100.0%	100.0%	96.6%	100.0%	98.3%	100.0%	98.7%
		% of Total	17.1%	15.1%	10.1%	14.3%	15.1%	14.8%	12.3%	98.7%
		Std. Residual	-.1	.1	.1	-.2	.1	.0	.1	
	Yes	Count	2a	0a	0a	2a	0a	1a	0a	5
		Expected Count	.9	.8	.5	.7	.8	.8	.6	5.0
		% within Legend	40.0%	0.0%	0.0%	40.0%	0.0%	20.0%	0.0%	100.0%
		% within Program	2.9%	0.0%	0.0%	3.4%	0.0%	1.7%	0.0%	1.3%
		% of Total	0.5%	0.0%	0.0%	0.5%	0.0%	0.3%	0.0%	1.3%
		Std. Residual	1.2	-.9	-.7	1.5	-.9	.3	-.8	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Legend	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.352[a]	6	.385
Likelihood Ratio	7.902	6	.245
Linear-by-Linear Association	.578	1	.447
N of Valid Cases	398		

a. 7 cells (50.0%) have expected count less than 5. The minimum expected count is .50.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.125			.385
Interval by Interval	Pearson's R	-.038	.047	-.760	.448[c]
Ordinal by Ordinal	Spearman Correlation	-.041	.049	-.818	.414[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Activities/Actions: Program

Table. 10.31. Crosstabulation: Program and Activities and Actions (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Activities Actions	No	Count	32a	22a	14a	26a	25a	30a	25a	174
		Expected Count	30.6	26.2	17.5	25.8	26.2	26.2	21.4	174.0
		% within Activities Actions	18.4%	12.6%	8.0%	14.9%	14.4%	17.2%	14.4%	100.0%
		% within Program	45.7%	36.7%	35.0%	44.1%	41.7%	50.0%	51.0%	43.7%
		% of Total	8.0%	5.5%	3.5%	6.5%	6.3%	7.5%	6.3%	43.7%
		Std. Residual	.3	-.8	-.8	.0	-.2	.7	.8	
	Yes	Count	38a	38a	26a	33a	35a	30a	24a	224
		Expected Count	39.4	33.8	22.5	33.2	33.8	33.8	27.6	224.0
		% within Activities Actions	17.0%	17.0%	11.6%	14.7%	15.6%	13.4%	10.7%	100.0%
		% within Program	54.3%	63.3%	65.0%	55.9%	58.3%	50.0%	49.0%	56.3%
		% of Total	9.5%	9.5%	6.5%	8.3%	8.8%	7.5%	6.0%	56.3%
		Std. Residual	-.2	.7	.7	.0	.2	-.6	-.7	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Activities Actions	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.691[a]	6	.584
Likelihood Ratio	4.719	6	.580
Linear-by-Linear Association	1.438	1	.230
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.49.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.108			.584
Interval by Interval	Pearson's R	-.060	.050	-1.200	.231[c]
Ordinal by Ordinal	Spearman Correlation	-.061	.050	-1.212	.226[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Human Form: Program

Table. 10.32. Crosstabulation: Program and Indicate Human Form (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Human Form	No	Count	56a	55a, b, c	38b, c	57c	53a, b, c	51a, b	45a, b, c	355
		Expected Count	62.4	53.5	35.7	52.6	53.5	53.5	43.7	355.0
		% within Human Form	15.8%	15.5%	10.7%	16.1%	14.9%	14.4%	12.7%	100.0%
		% within Program	80.0%	91.7%	95.0%	96.6%	88.3%	85.0%	91.8%	89.2%
		% of Total	14.1%	13.8%	9.5%	14.3%	13.3%	12.8%	11.3%	89.2%
		Std. Residual	-.8	.2	.4	.6	-.1	-.3	.2	
	Yes	Count	14a	5a, b, c	2b, c	2c	7a, b, c	9a, b	4a, b, c	43
		Expected Count	7.6	6.5	4.3	6.4	6.5	6.5	5.3	43.0
		% within Human Form	32.6%	11.6%	4.7%	4.7%	16.3%	20.9%	9.3%	100.0%
		% within Program	20.0%	8.3%	5.0%	3.4%	11.7%	15.0%	8.2%	10.8%
		% of Total	3.5%	1.3%	0.5%	0.5%	1.8%	2.3%	1.0%	10.8%
		Std. Residual	2.3	-.6	-1.1	-1.7	.2	1.0	-.6	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Human Form	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.784[a]	6	.047
Likelihood Ratio	13.061	6	.042
Linear-by-Linear Association	1.305	1	.253
N of Valid Cases	398		

a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 4.32.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.176			.047
Interval by Interval	Pearson's R	-.057	.054	-1.143	.254[c]
Ordinal by Ordinal	Spearman Correlation	-.049	.056	-.979	.328[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Indicate Overall Route: Program

Table. 10.33. Crosstabulation: Program and Overall Route (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Overall Route	No	Count	41a	38a	25a	32a	36a	49b	33a, b	254
		Expected Count	44.7	38.3	25.5	37.7	38.3	38.3	31.3	254.0
		% within Overall Route	16.1%	15.0%	9.8%	12.6%	14.2%	19.3%	13.0%	100.0%
		% within Program	58.6%	63.3%	62.5%	54.2%	60.0%	81.7%	67.3%	63.8%
		% of Total	10.3%	9.5%	6.3%	8.0%	9.0%	12.3%	8.3%	63.8%
		Std. Residual	-.5	.0	-.1	-.9	-.4	1.7	.3	
	Yes	Count	29a	22a	15a	27a	24a	11b	16a, b	144
		Expected Count	25.3	21.7	14.5	21.3	21.7	21.7	17.7	144.0
		% within Overall Route	20.1%	15.3%	10.4%	18.8%	16.7%	7.6%	11.1%	100.0%
		% within Program	41.4%	36.7%	37.5%	45.8%	40.0%	18.3%	32.7%	36.2%
		% of Total	7.3%	5.5%	3.8%	6.8%	6.0%	2.8%	4.0%	36.2%
		Std. Residual	.7	.1	.1	1.2	.5	-2.3	-.4	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Overall Route	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.137[a]	6	.059
Likelihood Ratio	12.983	6	.043
Linear-by-Linear Association	2.794	1	.095
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.47.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.172			.059
Interval by Interval	Pearson's R	-.084	.049	-1.675	.095[c]
Ordinal by Ordinal	Spearman Correlation	-.097	.049	-1.935	.054[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Indicate Other Roads: Program

Table. 10.34. Crosstabulation: Program and Other Roads (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Other Roads	No	Count	38a, b	31a, b	22a, b	32a, b	26b	49c	33a, c	231
		Expected Count	40.6	34.8	23.2	34.2	34.8	34.8	28.4	231.0
		% within Other Roads	16.5%	13.4%	9.5%	13.9%	11.3%	21.2%	14.3%	100.0%
		% within Program	54.3%	51.7%	55.0%	54.2%	43.3%	81.7%	67.3%	58.0%
		% of Total	9.5%	7.8%	5.5%	8.0%	6.5%	12.3%	8.3%	58.0%
		Std. Residual	-.4	-.6	-.3	-.4	-1.5	2.4	.9	
	Yes	Count	32a, b	29a, b	18a, b	27a, b	34b	11c	16a, c	167
		Expected Count	29.4	25.2	16.8	24.8	25.2	25.2	20.6	167.0
		% within Other Roads	19.2%	17.4%	10.8%	16.2%	20.4%	6.6%	9.6%	100.0%
		% within Program	45.7%	48.3%	45.0%	45.8%	56.7%	18.3%	32.7%	42.0%
		% of Total	8.0%	7.3%	4.5%	6.8%	8.5%	2.8%	4.0%	42.0%
		Std. Residual	.5	.8	.3	.5	1.8	-2.8	-1.0	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Other Roads	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.732[a]	6	.001
Likelihood Ratio	24.171	6	.000
Linear-by-Linear Association	5.546	1	.019
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.78.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.232			.001
Interval by Interval	Pearson's R	-.118	.049	-2.369	.018[c]
Ordinal by Ordinal	Spearman Correlation	-.127	.049	-2.549	.011[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Indicate Flags: Program

Table. 10.35. Crosstabulation: Program and Flags (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Flags	No	Count	62a, b, c	47c	36a, b, c	48a, b, c	55b	46a, c	43a, b, c	337
		Expected Count	59.3	50.8	33.9	50.0	50.8	50.8	41.5	337.0
		% within Flags	18.4%	13.9%	10.7%	14.2%	16.3%	13.6%	12.8%	100.0%
		% within Program	88.6%	78.3%	90.0%	81.4%	91.7%	76.7%	87.8%	84.7%
		% of Total	15.6%	11.8%	9.0%	12.1%	13.8%	11.6%	10.8%	84.7%
		Std. Residual	.4	-.5	.4	-.3	.6	-.7	.2	
	Yes	Count	8a, b, c	13c	4a, b, c	11a, b, c	5b	14a, c	6a, b, c	61
		Expected Count	10.7	9.2	6.1	9.0	9.2	9.2	7.5	61.0
		% within Flags	13.1%	21.3%	6.6%	18.0%	8.2%	23.0%	9.8%	100.0%
		% within Program	11.4%	21.7%	10.0%	18.6%	8.3%	23.3%	12.2%	15.3%
		% of Total	2.0%	3.3%	1.0%	2.8%	1.3%	3.5%	1.5%	15.3%
		Std. Residual	-.8	1.3	-.9	.7	-1.4	1.6	-.6	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Flags	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.636[a]	6	.141
Likelihood Ratio	9.667	6	.139
Linear-by-Linear Association	.003	1	.958
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.13.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.154			.141
Interval by Interval	Pearson's R	.003	.049	.053	.958[c]
Ordinal by Ordinal	Spearman Correlation	.015	.049	.290	.772[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Branding/Logos: Program

Table. 10.36. Crosstabulation: Program and Branding/Logos (*n = 398).*

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Branding Logos	No	Count	58a, b	51b	22c	41a, c	46a, b	46a, b	40a, b	304
		Expected Count	53.5	45.8	30.6	45.1	45.8	45.8	37.4	304.0
		% within Branding Logos	19.1%	16.8%	7.2%	13.5%	15.1%	15.1%	13.2%	100.0%
		% within Program	82.9%	85.0%	55.0%	69.5%	76.7%	76.7%	81.6%	76.4%
		% of Total	14.6%	12.8%	5.5%	10.3%	11.6%	11.6%	10.1%	76.4%
		Std. Residual	.6	.8	-1.5	-.6	.0	.0	.4	
	Yes	Count	12a, b	9b	18c	18a, c	14a, b	14a, b	9a, b	94
		Expected Count	16.5	14.2	9.4	13.9	14.2	14.2	11.6	94.0
		% within Branding Logos	12.8%	9.6%	19.1%	19.1%	14.9%	14.9%	9.6%	100.0%
		% within Program	17.1%	15.0%	45.0%	30.5%	23.3%	23.3%	18.4%	23.6%
		% of Total	3.0%	2.3%	4.5%	4.5%	3.5%	3.5%	2.3%	23.6%
		Std. Residual	-1.1	-1.4	2.8	1.1	.0	.0	-.8	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Branding Logos	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.541[a]	6	.011
Likelihood Ratio	15.501	6	.017
Linear-by-Linear Association	.411	1	.521
N of Valid Cases	398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.45.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.200			.011
Interval by Interval	Pearson's R	.032	.046	.641	.522[c]
Ordinal by Ordinal	Spearman Correlation	.019	.047	.371	.710[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Use Color: Program

Table. 10.37. Crosstabulation: Program and Used Color in Map (*n = 398).*

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.148			.181
Interval by Interval	Pearson's R	.031	.052	.625	.532[c]
Ordinal by Ordinal	Spearman Correlation	.021	.051	.409	.683[c]
N of Valid Cases		398			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Crosstab

			Program							
			Other	Arch	BDSN_ISA_BP MI	LA_CRP	Graphic	Industrial	Interior	Total
Color	No	Count	62a, b, c	56a, b, c	35a, b, c	54a, b, c	50c	58b	41a, c	356
		Expected Count	62.6	53.7	35.8	52.8	53.7	53.7	43.8	356.0
		% within Color	17.4%	15.7%	9.8%	15.2%	14.0%	16.3%	11.5%	100.0%
		% within Program	88.6%	93.3%	87.5%	91.5%	83.3%	96.7%	83.7%	89.4%
		% of Total	15.6%	14.1%	8.8%	13.6%	12.6%	14.6%	10.3%	89.4%
		Std. Residual	-.1	.3	-.1	.2	-.5	.6	-.4	
	Yes	Count	8a, b, c	4a, b, c	5a, b, c	5a, b, c	10c	2b	8a, c	42
		Expected Count	7.4	6.3	4.2	6.2	6.3	6.3	5.2	42.0
		% within Color	19.0%	9.5%	11.9%	11.9%	23.8%	4.8%	19.0%	100.0%
		% within Program	11.4%	6.7%	12.5%	8.5%	16.7%	3.3%	16.3%	10.6%
		% of Total	2.0%	1.0%	1.3%	1.3%	2.5%	0.5%	2.0%	10.6%
		Std. Residual	.2	-.9	.4	-.5	1.5	-1.7	1.2	
Total		Count	70	60	40	59	60	60	49	398
		Expected Count	70.0	60.0	40.0	59.0	60.0	60.0	49.0	398.0
		% within Color	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%
		% within Program	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	17.6%	15.1%	10.1%	14.8%	15.1%	15.1%	12.3%	100.0%

Each subscript letter denotes a subset of Program categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.867[a]	6	.181
Likelihood Ratio	9.550	6	.145
Linear-by-Linear Association	.392	1	.531
N of Valid Cases	398		

a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 4.22.

Program:Drawing Style: Gender

Table. 10.38. Crosstabulation: Program, Drawing Style, Gender (*n = 398)*

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Program * Drawing Style * Gender	200	50.3%	198	49.7%	398	100.0%

Program * Drawing Style * Gender Crosstabulation

Gender				Drawing Style				
				Misc	Plan	Point of View	Perspective	Elevation
Female	Program	Other	Count	1	3	3	1	7
			% within Program	5.0%	15.0%	15.0%	5.0%	35.0%
			% within Drawing Style	50.0%	25.0%	10.7%	8.3%	20.6%
			% of Total	1.0%	2.9%	2.9%	1.0%	6.7%
			Std. Residual	1.0	.5	-1.0	-.9	.2
		Arch	Count	0	1	3	4	2
			% within Program	0.0%	10.0%	30.0%	40.0%	20.0%
			% within Drawing Style	0.0%	8.3%	10.7%	33.3%	5.9%
			% of Total	0.0%	1.0%	2.9%	3.8%	1.9%
			Std. Residual	-.4	-.1	.2	2.7	-.7
		BDSN_ISA_BPMI	Count	1	0	3	2	7
			% within Program	7.7%	0.0%	23.1%	15.4%	53.8%
			% within Drawing Style	50.0%	0.0%	10.7%	16.7%	20.6%
			% of Total	1.0%	0.0%	2.9%	1.9%	6.7%
			Std. Residual	1.5	-1.2	-.3	.4	1.4
		LA_CRP	Count	0	1	1	0	4
			% within Program	0.0%	11.1%	11.1%	0.0%	44.4%
			% within Drawing Style	0.0%	8.3%	3.6%	0.0%	11.8%
			% of Total	0.0%	1.0%	1.0%	0.0%	3.8%
			Std. Residual	-.4	.0	-.9	-1.0	.6
		Graphic	Count	0	3	3	2	5
			% within Program	0.0%	16.7%	16.7%	11.1%	27.8%
			% within Drawing Style	0.0%	25.0%	10.7%	16.7%	14.7%
			% of Total	0.0%	2.9%	2.9%	1.9%	4.8%
			Std. Residual	-.6	.7	-.8	.0	-.3
		Industrial	Count	0	1	7	1	2
			% within Program	0.0%	9.1%	63.6%	9.1%	18.2%
			% within Drawing Style	0.0%	8.3%	25.0%	8.3%	5.9%
			% of Total	0.0%	1.0%	6.7%	1.0%	1.9%
			Std. Residual	-.5	-.2	2.4	-.2	-.8
		Interior	Count	0	3	8	2	7
			% within Program	0.0%	12.5%	33.3%	8.3%	29.2%
			% within Drawing Style	0.0%	25.0%	28.6%	16.7%	20.6%
			% of Total	0.0%	2.9%	7.6%	1.9%	6.7%
			Std. Residual	-.7	.2	.6	-.4	-.3
	Total		Count	2	12	28	12	34
			% within Program	1.9%	11.4%	26.7%	11.4%	32.4%
			% within Drawing Style	100.0%	100.0%	100.0%	100.0%	100.0%
			% of Total	1.9%	11.4%	26.7%	11.4%	32.4%

Program * Drawing Style * Gender Crosstabulation

Gender				Drawing Style			
				Plan/POV	Plan/Elev	Bird/Perspective	Bird/POBV
Female	Program	Other	Count	0	4	0	
			% within Program	0.0%	20.0%	0.0%	
			% within Drawing Style	0.0%	28.6%	0.0%	
			% of Total	0.0%	3.8%	0.0%	
			Std. Residual	-.4	.8	-.4	
		Arch	Count	0	0	0	
			% within Program	0.0%	0.0%	0.0%	
			% within Drawing Style	0.0%	0.0%	0.0%	
			% of Total	0.0%	0.0%	0.0%	
			Std. Residual	-.3	-1.2	-.3	
		BDSN_ISA_BPMI	Count	0	0	0	
			% within Program	0.0%	0.0%	0.0%	
			% within Drawing Style	0.0%	0.0%	0.0%	
			% of Total	0.0%	0.0%	0.0%	
			Std. Residual	-.4	-1.3	-.4	
		LA_CRP	Count	0	3	0	
			% within Program	0.0%	33.3%	0.0%	
			% within Drawing Style	0.0%	21.4%	0.0%	
			% of Total	0.0%	2.9%	0.0%	
			Std. Residual	-.3	1.6	-.3	
		Graphic	Count	1	3	1	
			% within Program	5.6%	16.7%	5.6%	
			% within Drawing Style	100.0%	21.4%	100.0%	
			% of Total	1.0%	2.9%	1.0%	
			Std. Residual	2.0	.4	2.0	
		Industrial	Count	0	0	0	
			% within Program	0.0%	0.0%	0.0%	
			% within Drawing Style	0.0%	0.0%	0.0%	
			% of Total	0.0%	0.0%	0.0%	
			Std. Residual	-.3	-1.2	-.3	
		Interior	Count	0	4	0	
			% within Program	0.0%	16.7%	0.0%	
			% within Drawing Style	0.0%	28.6%	0.0%	
			% of Total	0.0%	3.8%	0.0%	
			Std. Residual	-.5	.4	-.5	
	Total		Count	1	14	1	
			% within Program	1.0%	13.3%	1.0%	
			% within Drawing Style	100.0%	100.0%	100.0%	
			% of Total	1.0%	13.3%	1.0%	

Program * Drawing Style * Gender Crosstabulation

Gender				Drawing Style: Plan/Elev/Persp	Total
Female	Program	Other	Count	1	20
			% within Program	5.0%	100.0%
			% within Drawing Style	100.0%	19.0%
			% of Total	1.0%	19.0%
			Std. Residual	1.9	
		Arch	Count	0	10
			% within Program	0.0%	100.0%
			% within Drawing Style	0.0%	9.5%
			% of Total	0.0%	9.5%
			Std. Residual	-.3	
		BDSN_ISA_BPMI	Count	0	13
			% within Program	0.0%	100.0%
			% within Drawing Style	0.0%	12.4%
			% of Total	0.0%	12.4%
			Std. Residual	-.4	
		LA_CRP	Count	0	9
			% within Program	0.0%	100.0%
			% within Drawing Style	0.0%	8.6%
			% of Total	0.0%	8.6%
			Std. Residual	-.3	
		Graphic	Count	0	18
			% within Program	0.0%	100.0%
			% within Drawing Style	0.0%	17.1%
			% of Total	0.0%	17.1%
			Std. Residual	-.4	
		Industrial	Count	0	11
			% within Program	0.0%	100.0%
			% within Drawing Style	0.0%	10.5%
			% of Total	0.0%	10.5%
			Std. Residual	-.3	
		Interior	Count	0	24
			% within Program	0.0%	100.0%
			% within Drawing Style	0.0%	22.9%
			% of Total	0.0%	22.9%
			Std. Residual	-.5	
	Total		Count	1	105
			% within Program	1.0%	100.0%
			% within Drawing Style	100.0%	100.0%
			% of Total	1.0%	100.0%

Program * Drawing Style * Gender Crosstabulation

Gender				Drawing Style				
				Misc	Plan	Point of View	Perspective	Elevation
Male	Program	Other	Count		5	4	1	4
			% within Program		33.3%	26.7%	6.7%	26.7%
			% within Drawing Style		35.7%	12.1%	6.2%	19.0%
			% of Total		5.3%	4.2%	1.1%	4.2%
			Std. Residual		1.9	-.5	-1.0	.4
		Arch	Count		1	6	5	2
			% within Program		5.0%	30.0%	25.0%	10.0%
			% within Drawing Style		7.1%	18.2%	31.2%	9.5%
			% of Total		1.1%	6.3%	5.3%	2.1%
			Std. Residual		-1.1	-.4	.9	-1.2
		BDSN_ISA_BPMI	Count		2	2	1	2
			% within Program		28.6%	28.6%	14.3%	28.6%
			% within Drawing Style		14.3%	6.1%	6.2%	9.5%
			% of Total		2.1%	2.1%	1.1%	2.1%
			Std. Residual		1.0	-.3	-.2	.4
		LA_CRP	Count		1	10	2	5
			% within Program		4.8%	47.6%	9.5%	23.8%
			% within Drawing Style		7.1%	30.3%	12.5%	23.8%
			% of Total		1.1%	10.5%	2.1%	5.3%
			Std. Residual		-1.2	1.0	-.8	.2
		Graphic	Count		3	2	3	4
			% within Program		25.0%	16.7%	25.0%	33.3%
			% within Drawing Style		21.4%	6.1%	18.8%	19.0%
			% of Total		3.2%	2.1%	3.2%	4.2%
			Std. Residual		.9	-1.1	.7	.8
		Industrial	Count		2	9	3	4
			% within Program		10.5%	47.4%	15.8%	21.1%
			% within Drawing Style		14.3%	27.3%	18.8%	19.0%
			% of Total		2.1%	9.5%	3.2%	4.2%
			Std. Residual		-.5	.9	-.1	-.1
		Interior	Count		0	0	1	0
			% within Program		0.0%	0.0%	100.0%	0.0%
			% within Drawing Style		0.0%	0.0%	6.2%	0.0%
			% of Total		0.0%	0.0%	1.1%	0.0%
			Std. Residual		-.4	-.6	2.0	-.5
	Total		Count		14	33	16	21
			% within Program		14.7%	34.7%	16.8%	22.1%
			% within Drawing Style		100.0%	100.0%	100.0%	100.0%
			% of Total		14.7%	34.7%	16.8%	22.1%
Total	Program	Other	Count	1	8	7	2	11
			% within Program	2.9%	22.9%	20.0%	5.7%	31.4%
			% within Drawing Style	50.0%	30.8%	11.5%	7.1%	20.0%
			% of Total	0.5%	4.0%	3.5%	1.0%	5.5%
			Std. Residual	1.1	1.6	-1.1	-1.3	.4
		Arch	Count	0	2	9	9	4
			% within Program	0.0%	6.7%	30.0%	30.0%	13.3%

Program * Drawing Style * Gender Crosstabulation

Gender				Drawing Style			
				Plan/POV	Plan/Elev	Bird/Perspective	Bird/POBV
Male	Program	Other	Count	1	0		0
			% within Program	6.7%	0.0%		0.0%
			% within Drawing Style	16.7%	0.0%		0.0%
			% of Total	1.1%	0.0%		0.0%
			Std. Residual	.1	-.8		-.4
		Arch	Count	4	2		0
			% within Program	20.0%	10.0%		0.0%
			% within Drawing Style	66.7%	50.0%		0.0%
			% of Total	4.2%	2.1%		0.0%
			Std. Residual	2.4	1.3		-.5
		BDSN_ISA_BPMI	Count	0	0		0
			% within Program	0.0%	0.0%		0.0%
			% within Drawing Style	0.0%	0.0%		0.0%
			% of Total	0.0%	0.0%		0.0%
			Std. Residual	-.7	-.5		-.3
		LA_CRP	Count	1	2		0
			% within Program	4.8%	9.5%		0.0%
			% within Drawing Style	16.7%	50.0%		0.0%
			% of Total	1.1%	2.1%		0.0%
			Std. Residual	-.3	1.2		-.5
		Graphic	Count	0	0		0
			% within Program	0.0%	0.0%		0.0%
			% within Drawing Style	0.0%	0.0%		0.0%
			% of Total	0.0%	0.0%		0.0%
			Std. Residual	-.9	-.7		-.4
		Industrial	Count	0	0		1
			% within Program	0.0%	0.0%		5.3%
			% within Drawing Style	0.0%	0.0%		100.0%
			% of Total	0.0%	0.0%		1.1%
			Std. Residual	-1.1	-.9		1.8
		Interior	Count	0	0		0
			% within Program	0.0%	0.0%		0.0%
			% within Drawing Style	0.0%	0.0%		0.0%
			% of Total	0.0%	0.0%		0.0%
			Std. Residual	-.3	-.2		-.1
	Total		Count	6	4		1
			% within Program	6.3%	4.2%		1.1%
			% within Drawing Style	100.0%	100.0%		100.0%
			% of Total	6.3%	4.2%		1.1%
Total	Program	Other	Count	1	4	0	0
			% within Program	2.9%	11.4%	0.0%	0.0%
			% within Drawing Style	14.3%	22.2%	0.0%	0.0%
			% of Total	0.5%	2.0%	0.0%	0.0%
			Std. Residual	-.2	.5	-.4	-.4
		Arch	Count	4	2	0	0
			% within Program	13.3%	6.7%	0.0%	0.0%

Program * Drawing Style * Gender Crosstabulation

Gender				Drawing Style: Plan/Elev/Persp	Total
Male	Program	Other	Count		15
			% within Program		100.0%
			% within Drawing Style		15.8%
			% of Total		15.8%
			Std. Residual		
		Arch	Count		20
			% within Program		100.0%
			% within Drawing Style		21.1%
			% of Total		21.1%
			Std. Residual		
		BDSN_ISA_BPMI	Count		7
			% within Program		100.0%
			% within Drawing Style		7.4%
			% of Total		7.4%
			Std. Residual		
		LA_CRP	Count		21
			% within Program		100.0%
			% within Drawing Style		22.1%
			% of Total		22.1%
			Std. Residual		
		Graphic	Count		12
			% within Program		100.0%
			% within Drawing Style		12.6%
			% of Total		12.6%
			Std. Residual		
		Industrial	Count		19
			% within Program		100.0%
			% within Drawing Style		20.0%
			% of Total		20.0%
			Std. Residual		
		Interior	Count		1
			% within Program		100.0%
			% within Drawing Style		1.1%
			% of Total		1.1%
			Std. Residual		
	Total		Count		95
			% within Program		100.0%
			% within Drawing Style		100.0%
			% of Total		100.0%
Total	Program	Other	Count	1	35
			% within Program	2.9%	100.0%
			% within Drawing Style	100.0%	17.5%
			% of Total	0.5%	17.5%
			Std. Residual	2.0	
		Arch	Count	0	30
			% within Program	0.0%	100.0%

Program * Drawing Style * Gender Crosstabulation

Gender			Drawing Style				
			Misc	Plan	Point of View	Perspective	Elevation
		% within Drawing Style	0.0%	7.7%	14.8%	32.1%	7.3%
		% of Total	0.0%	1.0%	4.5%	4.5%	2.0%
		Std. Residual	-.5	-1.0	.0	2.3	-1.5
	BDSN_ISA_BPMI	Count	1	2	5	3	9
		% within Program	5.0%	10.0%	25.0%	15.0%	45.0%
		% within Drawing Style	50.0%	7.7%	8.2%	10.7%	16.4%
		% of Total	0.5%	1.0%	2.5%	1.5%	4.5%
		Std. Residual	1.8	-.4	-.4	.1	1.5
	LA_CRP	Count	0	2	11	2	9
		% within Program	0.0%	6.7%	36.7%	6.7%	30.0%
		% within Drawing Style	0.0%	7.7%	18.0%	7.1%	16.4%
		% of Total	0.0%	1.0%	5.5%	1.0%	4.5%
		Std. Residual	-.5	-1.0	.6	-1.1	.3
	Graphic	Count	0	6	5	5	9
		% within Program	0.0%	20.0%	16.7%	16.7%	30.0%
		% within Drawing Style	0.0%	23.1%	8.2%	17.9%	16.4%
		% of Total	0.0%	3.0%	2.5%	2.5%	4.5%
		Std. Residual	-.5	1.1	-1.4	.4	.3
	Industrial	Count	0	3	16	4	6
		% within Program	0.0%	10.0%	53.3%	13.3%	20.0%
		% within Drawing Style	0.0%	11.5%	26.2%	14.3%	10.9%
		% of Total	0.0%	1.5%	8.0%	2.0%	3.0%
		Std. Residual	-.5	-.5	2.3	-.1	-.8
	Interior	Count	0	3	8	3	7
		% within Program	0.0%	12.0%	32.0%	12.0%	28.0%
		% within Drawing Style	0.0%	11.5%	13.1%	10.7%	12.7%
		% of Total	0.0%	1.5%	4.0%	1.5%	3.5%
		Std. Residual	-.5	-.1	.1	-.3	.0
Total		Count	2	26	61	28	55
		% within Program	1.0%	13.0%	30.5%	14.0%	27.5%
		% within Drawing Style	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	1.0%	13.0%	30.5%	14.0%	27.5%

Program * Drawing Style * Gender Crosstabulation

Gender			Drawing Style			
			Plan/POV	Plan/Elev	Bird/Perspective	Bird/POBV
		% within Drawing Style	57.1%	11.1%	0.0%	0.0%
		% of Total	2.0%	1.0%	0.0%	0.0%
		Std. Residual	2.9	-.4	-.4	-.4
	BDSN_ISA_BPMI	Count	0	0	0	0
		% within Program	0.0%	0.0%	0.0%	0.0%
		% within Drawing Style	0.0%	0.0%	0.0%	0.0%
		% of Total	0.0%	0.0%	0.0%	0.0%
		Std. Residual	-.8	-1.3	-.3	-.3
	LA_CRP	Count	1	5	0	0
		% within Program	3.3%	16.7%	0.0%	0.0%
		% within Drawing Style	14.3%	27.8%	0.0%	0.0%
		% of Total	0.5%	2.5%	0.0%	0.0%
		Std. Residual	.0	1.4	-.4	-.4
	Graphic	Count	1	3	1	0
		% within Program	3.3%	10.0%	3.3%	0.0%
		% within Drawing Style	14.3%	16.7%	100.0%	0.0%
		% of Total	0.5%	1.5%	0.5%	0.0%
		Std. Residual	.0	.2	2.2	-.4
	Industrial	Count	0	0	0	1
		% within Program	0.0%	0.0%	0.0%	3.3%
		% within Drawing Style	0.0%	0.0%	0.0%	100.0%
		% of Total	0.0%	0.0%	0.0%	0.5%
		Std. Residual	-1.0	-1.6	-.4	2.2
	Interior	Count	0	4	0	0
		% within Program	0.0%	16.0%	0.0%	0.0%
		% within Drawing Style	0.0%	22.2%	0.0%	0.0%
		% of Total	0.0%	2.0%	0.0%	0.0%
		Std. Residual	-.9	1.2	-.4	-.4
Total		Count	7	18	1	1
		% within Program	3.5%	9.0%	0.5%	0.5%
		% within Drawing Style	100.0%	100.0%	100.0%	100.0%
		% of Total	3.5%	9.0%	0.5%	0.5%

Program * Drawing Style * Gender Crosstabulation

Gender			Drawing Style: Plan/Elev/Persp	Total
		% within Drawing Style	0.0%	15.0%
		% of Total	0.0%	15.0%
		Std. Residual	-.4	
	BDSN_ISA_BPMI	Count	0	20
		% within Program	0.0%	100.0%
		% within Drawing Style	0.0%	10.0%
		% of Total	0.0%	10.0%
		Std. Residual	-.3	
	LA_CRP	Count	0	30
		% within Program	0.0%	100.0%
		% within Drawing Style	0.0%	15.0%
		% of Total	0.0%	15.0%
		Std. Residual	-.4	
	Graphic	Count	0	30
		% within Program	0.0%	100.0%
		% within Drawing Style	0.0%	15.0%
		% of Total	0.0%	15.0%
		Std. Residual	-.4	
	Industrial	Count	0	30
		% within Program	0.0%	100.0%
		% within Drawing Style	0.0%	15.0%
		% of Total	0.0%	15.0%
		Std. Residual	-.4	
	Interior	Count	0	25
		% within Program	0.0%	100.0%
		% within Drawing Style	0.0%	12.5%
		% of Total	0.0%	12.5%
		Std. Residual	-.4	
Total		Count	1	200
		% within Program	0.5%	100.0%
		% within Drawing Style	100.0%	100.0%
		% of Total	0.5%	100.0%

Chi-Square Tests

Gender		Value	df	Asymp. Sig. (2-sided)
Female	Pearson Chi-Square	50.699[b]	48	.368
	Likelihood Ratio	49.406	48	.417
	Linear-by-Linear Association	.293	1	.588
	N of Valid Cases	105		
Male	Pearson Chi-Square	39.498[c]	36	.316
	Likelihood Ratio	39.245	36	.326
	Linear-by-Linear Association	.300	1	.584
	N of Valid Cases	95		
Total	Pearson Chi-Square	69.928[a]	54	.071
	Likelihood Ratio	66.399	54	.120
	Linear-by-Linear Association	.213	1	.644
	N of Valid Cases	200		

a. 56 cells (80.0%) have expected count less than 5. The minimum expected count is .10.

b. 58 cells (92.1%) have expected count less than 5. The minimum expected count is .09.

c. 45 cells (91.8%) have expected count less than 5. The minimum expected count is .01.

Directional Measures

Gender				Value	Asymp. Std. Error[a]	Approx. T[b]
Female	Nominal by Nominal	Lambda	Symmetric	.092	.060	1.491
			Program Dependent	.074	.073	.978
			Drawing Style Dependent	.113	.073	1.476
		Goodman and Kruskal tau	Program Dependent	.077	.015	
			Drawing Style Dependent	.075	.027	
Male	Nominal by Nominal	Lambda	Symmetric	.110	.050	2.108
			Program Dependent	.149	.060	2.360
			Drawing Style Dependent	.065	.070	.898
		Goodman and Kruskal tau	Program Dependent	.082	.022	
			Drawing Style Dependent	.069	.023	
Total	Nominal by Nominal	Lambda	Symmetric	.112	.032	3.330
			Program Dependent	.133	.040	3.189
			Drawing Style Dependent	.086	.047	1.783
		Goodman and Kruskal tau	Program Dependent	.060	.012	
			Drawing Style Dependent	.047	.015	

Directional Measures

Gender				Approx. Sig.
Female	**Nominal by Nominal**	**Lambda**	**Symmetric**	**.136**
			Program Dependent	**.328**
			Drawing Style Dependent	**.140**
		Goodman and Kruskal tau	**Program Dependent**	**.459[c]**
			Drawing Style Dependent	**.080[c]**
Male	**Nominal by Nominal**	**Lambda**	**Symmetric**	**.035**
			Program Dependent	**.018**
			Drawing Style Dependent	**.369**
		Goodman and Kruskal tau	**Program Dependent**	**.122[c]**
			Drawing Style Dependent	**.331[c]**
Total	**Nominal by Nominal**	**Lambda**	**Symmetric**	**.001**
			Program Dependent	**.001**
			Drawing Style Dependent	**.075**
		Goodman and Kruskal tau	**Program Dependent**	**.053[c]**
			Drawing Style Dependent	**.005[c]**

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

Symmetric Measures

Gender			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Female	Nominal by Nominal	Phi	.695			.368
		Cramer's V	.284			.368
		Contingency Coefficient	.571			.368
	Interval by Interval	Pearson's R	-.053	.103	-.540	.591[c]
	Ordinal by Ordinal	Spearman Correlation	-.072	.101	-.734	.465[c]
	N of Valid Cases		105			
Male	Nominal by Nominal	Phi	.645			.316
		Cramer's V	.263			.316
		Contingency Coefficient	.542			.316
	Interval by Interval	Pearson's R	-.056	.103	-.546	.587[c]
	Ordinal by Ordinal	Spearman Correlation	-.019	.105	-.181	.856[c]
	N of Valid Cases		95			
Total	Nominal by Nominal	Phi	.591			.071
		Cramer's V	.241			.071
		Contingency Coefficient	.509			.071
	Interval by Interval	Pearson's R	-.033	.075	-.461	.646[c]
	Ordinal by Ordinal	Spearman Correlation	-.035	.074	-.492	.624[c]
	N of Valid Cases		200			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

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BIOGRAPHICAL SKETCH

Clifford J. Gentry received a Bachelor of Arts in Literature, Science, and the Arts from the University of Iowa, in 1996, a Master of Arts in Art and Design with an emphasis in Interior Design, from Iowa State University, in 2010, and a Master of Fine Arts in Art and Design with an emphasis in Graphic Design from Iowa State University, in 2012.

Gentry was named a 2008 IDEC Foundation Graduate Scholar by the Interior Design Educators Council. He was selected to present papers at the Midwest Regional Interior Design Educators Council Conferences in Chicago (2009 and 2011); Interior Design Educators Council International Conferences in Atlanta, GA (2010), Denver, CO (2011), and Baltimore, MD (2012); ACM CHI Conference on Human Factors in Computing Systems: Special Interest Groups – Computer Human Interaction (SIGCHI) Student Design Competition in Vancouver, BC, Canada (2011); and International Association of Societies of Design Research Conference (IASDR) 4th World Conference on Design Research at Delft University of Technology, in Delft, the Netherlands (2011).

In addition to his coursework, he has been a Teaching Assistant and Graduate Research Assistant in the College of Design, and a Graduate Research Assistant in the College of Human Sciences.

Gentry currently resides in West Des Moines, IA, with his partner and their two dogs, Sheba and Stanley, where they are even *closer* to the planes on final approach at the Des Moines International Airport.

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