Understanding Perceptions of Accessibility and Mobility Through Structuration Theory

Mark Graham
Western Kentucky University

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Understanding Perceptions of Accessibility and Mobility Through Structuration Theory

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UNDERSTANDING PERCEPTIONS OF ACCESSIBILITY AND MOBILITY THROUGH STRUCTURATION THEORY

Mark Graham
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Directed by: Dr. Katie Algeo

Department of Geography and Geology
Western Kentucky University

Structuration theory in geography states that social systems are reproduced through the relationships between systems, structures, actors and their perceptions. Therefore, understanding the modes through which social systems are reproduced will allow for a clearer understanding of the nature of society. However, much of the relevant social theory has not been empirically tested. Thus, by empirically examining general perceptual differences between different built environments, on a macro and a micro level, it is hoped that the links between perceptions, social structures, and the built environment can be more fully understood. A better understanding of these links will, in turn, allow the relevant social theory (in this case, structuration theory) in geography to be advanced from a theoretical to an empirical stage. A clearer understanding of the links between perceptions, the built environment, and the reproduction of social systems will not only advance the field of geography, but will also have ramifications in the fields of psychology, sociology, economics, marketing, and urban planning.

The purpose of this study is to examine how structural differences between locations may result in differences in people’s perceptions about and interactions with the landscape. I hypothesize that there are fundamental differences in the way people perceive and interact with landscapes in Bowling Green, Kentucky, and Penzance, England, in part because of the broader structural and environmental differences between these settings. Specifically, I hypothesize that perceptions about preferred forms of transportation to leisure and retail activities will be significantly different between residents of locations that have a significant difference in the modes of transportation to such leisure and retail activities. Bowling Green and Penzance have been chosen as study sites because great differences exist between these cities in how transportation systems to leisure and retail activities are structured.
I. Introduction

Much of what is written, analyzed, and thought about in cultural geography and other fields concerns the structure and organization of our landscape. Our landscape, whether human-made or natural, planned or unplanned, provides the setting for all of our activities. Therefore, to a large extent, our physical and cultural environment structures our lives (Doughty, 1981; Giddens, 1984; Massey, 1985; Hall, 1988).

Throughout history, humans have incessantly altered the landscape. Forests were felled, swamps were drained, fields ploughed, and cities built. The relationship between humans and the environment was manipulated in order to maximize the quality of life for some or all members of a community. Today, in the Western world most of our forests have been felled, our swamps have been drained, our fields are ploughed, but our cities are still undergoing change. Most people now live in some form of urban environment. These environments are wholly human made, and have been made the way they are to benefit social groups in different contexts (Hart, 1995).

Although humans structure the urban landscapes in which most of us live, our lives are also unavoidably structured by those very landscapes (Doughty, 1981; Giddens, 1984; Hall, 1988). Many of our feelings such as pleasure, desire, fear, comfort, and belonging relate to our environmental setting (Doughty, 1981). Our landscapes can also influence how long we live, how likely we are to get certain diseases, what our professions might be, what kind of community relationships we might have, and what we can do with our time, amongst other things (Arnott, 1998; Barker, 1981; Freeman, 2001; Friedmann, 2002; Gottlieb and Lentnek, 2001; Jacobs, 1961; Plas and Lewis, 1996; Silverman and Della-Giustina, 2001; Massey,
The landscape provides us with both constraints and opportunities for action (Peet, 1998; Giddens, 1984). It can be said that we have fundamentally altered our landscape, yet at the same time our landscape has fundamentally altered us (Cloke et al. 1991; Giddens, 1984).

Much research in the fields of geography, sociology, psychology, and economics is performed within this framework and many of the questions asked in these fields can be traced back to one underlying question: how can we either individually or as a society, for others, or ourselves, improve our quality of life? Answers to this question have usually involved a change in the overlying institutional, political, economic, social, and cultural structures, or an alteration of the human or physical environment.

The importance of our built environment has long been recognized, and change in the landscape often either results from pecuniary forces, a desire to improve quality of life, or some combination of the two. We all naturally want our quality of life to be improved by the landscape, but what sort of landscape do we want? A pristine natural environment, a bustling city, a big house in the forest, a road without traffic, a clear stream, a field full of crops, and a community where friends and family live next door are all examples of commonly expressed notions of landscapes that might serve to improve quality of life. Many of these ‘ideal’ landscapes contradict each other and, at the same time, contradict some of the other common perceptions of quality of life, such as constant availability of food and water, lower taxes, stronger communities, more social interaction, insulation from natural elements, more privacy, less crime, shorter commutes, lower land and building costs, a compact community, constant economic growth, and less racial segregation (Hall, 1988).
We all have a perception of what an ideal environment is, but our own ideals can contradict themselves, let alone the ideals of others. This jumbled up mess of ideals can congeal into various institutional, political, economic, and social theories, practices, beliefs, and approaches in various ways. It is these theories, practices, beliefs, and approaches that give direction to the various institutional, political, economic, social, and cultural structures in society, and it is these structures that can create and mold each other, the built environment, and influence how we perceive and interact with the landscape. Structure can be seen as “the structuring properties allowing the ‘binding’ of time-space in social systems, the properties which make it possible for discernibly similar social practices to exist across varying spans of time and space and which lend them to ‘systematic’ form” (Giddens, 1984; p.16). Dance might be seen as a structure of society. More often than not, interactions influenced by such structures are repeating, reinforcing, and thereby further entrenching the structural theories, practices, beliefs, and approaches that influenced the very interactions. On the other hand, a “de-routinization” (Giddens, 1984; p.16) of an action may weaken or even eliminate the responsible structure (Giddens, 1984; Cloke et al., 1991; Peet, 1998; Gregory, 1989).

Why are environmental effects on human experience important? Because our perceptions and interactions with the external environment structure our lives. Humans can escape the bonds of the here and now. We can transcend the constraints of the physical world through our minds, we can interact with both the real and the virtual through cyberspace, we can even simply turn on a television or radio and ignore our location in space, but we still are physically bound to, and have effects on, our environment (Kitchin, 1998; Soja, 1996; Zelinsky, 2001). Our external perceptions and interactions with the external
environment can cause us to lead a life that is happy or sad, boring or exciting, 
communitarian or individualistic, fulfilling or unfulfilling.

However, even though Western concepts of the “ideal” built landscape have metalevel 
similarities and similar types of goals, there are fundamental differences at regional and local 
scales. These differences result, in part, from the institutional, political, economic, social, 
and cultural structures that shape individual and community perceptions about, and 
interactions with, the built landscape (Cloke et al. 1991, Giddens, 1984; Hall, 1988; Gregory, 
1989).

The purpose of this study is to examine the differences in institutional, political, 
economic, social, and cultural systems, the concepts and ideas about quality of life, and the 
built landscapes in two urban locations, and to focus on how the structural differences 
between the locations may result in differences in people’s perceptions about, and 
interactions, with the landscape. Bowling Green, Kentucky, and Penzance, England, are 
chosen as the two urban locations to examine. I hypothesize that there are fundamental 
differences in the way people perceive and interact with landscapes in Bowling Green and 
Penzance in part because of the broader structural and environmental differences between 
these settings.
II. Background

If structural and environmental differences exist between these settings, it is important to know why they exist and what implications they have. While structures in society influence our perceptions, we at the same time are fashioning those societal structures by our perceptions and actions (Figure 1) (Giddens, 1984). By understanding people’s perceptual differences in the two cities, our overall understanding of the interplay between perceptions and structures, and perceptions and the landscape, will be strengthened (Giddens, 1984; Soja, 1996). This improved understanding of perceptual differences can have ramifications in the fields of psychology, philosophy, sociology, economics, and geography, but especially in the field of urban planning.

Figure 1.
Idealized Pathways of Interaction

Source: Adapted from Giddens (1984)
The nature of analysis, study, or research is usually on very focused or concentrated issues or problems (Cutter et al., 2002). Psychologists might focus on issues related to our perceptions about quality of life; sociologists, human geographers, economists, theologists, and students of government might tend to focus on issues related to societal structures; while, physical geographers, and geologists would be more inclined to concentrate on issues relating to the landscape (Hart, 1995). It seems as if planners have the most daunting task of all. They are faced with the task of gaining an understanding of all the above-mentioned fields in order to comprehend the interrelationships and interactions between human perceptions and interactions about and with the landscape, institutions and structures, and the built landscapes. For planners to create an informed and effective plan, they must better understand the true effects that an implementation of their plan might have.

In addition to better understanding the effects of the implementation of a plan, planners must also realize that their knowledge of how a specific pathway of interaction might work is largely limited to the region in which it is located. Studying the pathways of interaction might better illustrate the processes of interaction between the three components; yet in order to be of any practical use, the planner must also have a somewhat intricate knowledge of the three components of the model. Hence, a planner familiar with perceptions, structures and systems, landscapes, and the interactions between them in region X would probably not be as competent in region Y. A precise definition of what a region is or where one region ends and another begins will never exist. Figure 2 shows an idealized notion of a region. According to Figure 2, a location might be deemed to be in a region if it can claim to be within pre-defined limits of: a) closeness in time to benchmark x; b) similarities in structures, systems, and institutions to benchmark x; and c) closeness in space to benchmark x (Peet, 1998 p. 151;
Giddens, 1984; Hagerstrand, 1970; Thrift, 1983). While it can be argued that regions are subjective constructs, this diagram illustrates what is meant by a region in this research.

Figure 2. 
Idealized Notion of a Region

There remains much debate today as to how our urban landscapes should be structured. Natural contradictions and confusions dealing with what people want from an urban environment exist on the input side of the planning process, and at the same time, there is much confusion and speculation as to how plans will affect the built landscape, our perceptions about it, and interactions with it (Hall, 1988). Our understanding of interactions shaping and shaped by the planning process may be enhanced by the model of the pathways of interaction.

Pathways of interaction are naturally more complicated than Figure 1 illustrates. The Figure is overly simplified in that it ignores other possible inputs and outputs. The questions as to where things like cyberspace, globalization, mass media, or irrational actions fit into the
system stand out. The figure can also be misleading by showing the pathways of interaction as being lines of equal strength. However, the concept that Figure 1 is meant to express transcends these questions. The concept of the idealized pathways of interaction does seek to simplify the real world, as all models do. Its usefulness is not that it seeks to explain in all detail why built landscapes, structures, and perceptions are why they are, but that it captures a fundamental truth about how they came to be that way. It also does not claim that two people living in the same place, with their lives shaped by the same structures, will have the same perceptions about quality of life (Hart, 1995). Rather, it seeks to better explain the influences and impacts that the components of the model exert on one another. In the words of Allan Pred (Cloke et al. 1991, p.117), “the reproduction of social and cultural forms, the formation of biographies, and the transformation of nature and space ceaselessly become one another....” Edward Soja’s (1996, p.65) discussion of the works of Henri Lefebvre provides further insight into the functioning of the model by asking, “Is it consciousness that produces the material world or the material world that produces consciousness?” and responds that the answer is “yes to both alternatives, and also something more: a combinatorial and unconfinable third choice that is radically open to the accumulation of new insights [and …] invites further expansion.”

It might also be important to clarify the box in Figure 1 entitled “Institutional and structural ideas, rules, theories, practices, beliefs, and approaches.” The box represents any structure or system that can enable or constrain our actions. Giddens recommends that structures be conceptualized as rules and resources that are implemented in interaction, rather than a framework or skeleton that organizes our lives (Giddens, 1984). Giddens (Giddens, 1984 p.26) elucidates, “Structure has no existence independent of the knowledge that agents
have about what they do in their day-to-day activity”. Therefore, structure is not external to individuals; yet, there are clearly ‘structures’ larger than the individual. In order to better understand the pathways of interaction it seems necessary to view structure in the Giddensian way: as a duality between agents and structures, and as not being external to individuals. The box in Figure 1 titled “Institutional and structural ideas, rules, theories, practices, beliefs, and approaches,” therefore, is not an attempt to contradict this way of thinking; rather, it means to represent the non-environmental, and non-biological forces that enable and constrain our actions (Giddens, 1984).

Indeed, the model represented by Figure 1 is by no means the only way to conceptualize the pathways of interaction. A visualization that might make structures appear less external would be to view structures and systems as filters or frameworks that enable and constrain how we see the landscape (Figure 3 and Figure 4), with every action reinforcing a structure and structures influencing actions (the duality of structure) (Giddens, 1984; Gregory; 1989). Such a model allows a better visualization of how “structure is reproduced in and through the succession of situated practices which are organized by it” (Gregory; 1989 p.7). In Figure 4, the model is given further specification, with differences in structures and landscapes being noted. However, the exact model used to represent the interplay between humans and the environment is not as important as actually being able to conceptualize how and why certain interactions with the landscape occur.

In his model of the Trialectics of Being, Edward Soja (1996) provides another paradigm that may be of use for looking at human-environment perceptions and interactions. He asserts that the forces of spatiality, history, and sociality (summary terms for the social production of space, time, and being-in-the-world) must be thought of in an intertwined
manner, instead of being conceptualized as isolated from one another; any ontological
knowledge must be constructed keeping this paradigm in mind. He urges that the world
cannot be fully understood from a purely geographical, historical, or sociological perspective.
The human ‘being-in-the-world’ must be understood as actively participating, individually
and collectively, simultaneously in histories, geographies, and societies (Soja, 1996).

Figure 3.
Alternate Conception of the Idealized Pathways of Interaction.

To integrate this way of thinking into the model of the idealized pathways of interaction,
it needs to be recognized that structures and perceptions are influenced and shaped by other
structures and perceptions, that are absent not only in space, but also in time (see Figure 5)
(Cloke et al. 1991; Giddens, 1984; Gregory, 1989). Again, this diagram does not intend to
illustrate structure as a framework, or skeleton external to individuals, and it simplifies the
more indirect influences that structures have on other structures by omitting the individual
hosts. The important point is that the influence of time is seen as another dimension in the
model.
While adding the dimension of time to the model creates a new set of challenges to understanding the influences between perceptions, structures, and landscapes, our perceptions and ideas remain the primary complications in the model. Individuals have perceptions and ideas; through actions, these perceptions can either directly influence the built landscape or through the duality of structure can be molded into institutional, political, economic, social, and cultural structures, which, in turn, can shape other perceptions and the built landscape. The perceptions that influence structures can have either originated in few agents or many, in agents that are still alive, or possibly in agents that have been deceased for centuries, yet it still remains that all of the complexities in this model seem either directly or
indirectly to emanate from our perceptions. So if general differences in perceptions between the two locations can be analyzed and comprehended, our understanding of the interrelationship between our perceptions, institutional, political, economic, social, and cultural structures, and the built environment might become better understood.

As regards such perceptual differences, Soja (1996) contributes to the direction of this research. Just as he contends in his theory of the Trialectics of Being that the world cannot be perceived in a purely geographical, historical, or sociological manner, Soja issues a similar warning, in his notion of the Trialectics of Spatiality (Figure 6), about how we are to understand perceptions of space. He distinguishes between firstspace, secondspace, and thirdspace. Firstspace is a perceived space; it is “directly sensible and open, within limits, to accurate measurement and description. It is the traditional focus of attention in all the spatial disciplines” (Soja, 1996 p.66), and encompasses our attempts at an objective representation of space. Secondspace is a conceived space; it is a subjective and symbolic representation of the world. “In secondspace the imagined geography tends to become the ‘real’ geography, with the image or representation coming to define and order the reality” (Soja, 1996 p.79).

An example of the difference between firstspace and secondspace can be provided with reference to a street map. Such a map drawn in firstspace might be created with remote sensing techniques and a GIS. Secondspace maps would be mental maps. A mental map is a person's own map of his or her known world. It is important that the differences between these perceived and conceived spaces are recognized, and, at the same time, it is important that, in studying human-environment interactions, one space is not given overarching priorities over the other.
Figure 5
Idealized Structural Influences

Idealized Structural Influences
(Omitting perceptions and landscapes)

Structure
Structure
Structure
Structure
Structure

Source: Adapted from Giddens (1984)

Figure 6.
Conceptualization of the Triadectics of Spatiality.

Secondspace, Representations of space, Conceived space.

Space of representations, Lived space, Center, I, Thirdspace.

Source: Adapted from Soja (1996)

Soja contends that the approach to looking at human-environment relationships should not be limited to either firstspace or secondspace, yet it should also not be limited to a firstspace-secondspace duality. Thirdspace is distinct from the other two spaces, but also
encompasses them. It is a space of representations as opposed to the representations of (second)space. It is “spaces as directly lived, with all its intractability intact, a space that stretches across the images and symbols that accompany it, the space of ‘inhabitants’ and ‘users’” (Soja, 1996 p. 67). Thirdspace is designed to critique the firstspace and secondspace modes of thought, and also to “reinvigorate their approaches to spatial knowledge with new possibilities heretofore unthought of inside the traditional spatial disciplines” (Soja, 1996 p. 81). It is important to recognize that it is the body along with space, in space, that is the producer of space (Lefebvre, 1991). Thirdspace is composed of conceived, perceived, and the lived spaces of the body. However, the lived spaces should be chosen as “a strategic location from which to encompass, understand, and potentially transform all spaces simultaneously” (Soja, 1996 p. 68).

Soja’s descriptions of the Trialectics of Spatiality are ambiguous and somewhat vague. However, the theory can provide guidance for any study of human environment relationships. It shows that while both firstspace and secondspace have their uses, the centered thirdspace, the space of representations, and the lived space of the body can go beyond both approaches and allow for a more comprehensive analysis of both our perceptions and interactions with the landscape, and possible regional differences in the pathways of interaction.

If there are regional differences in perceptions and interactions with the landscape, then the subsequent step is to ask what the causes of these differences are. Regional differences in landscapes, human biology, and structure (past and present) are the immediately apparent possibilities that could instigate such differences. If possible regional biological differences between humans are ignored, landscapes and structures can be further examined as the causes of regional differences in perceptions and interactions with the landscape. With some
exceptions, humans are the main agents of change in the landscape, and it cannot really be argued with that landscapes do exert some influence on shaping our perceptions and interactions. However, the focus should fall on how structures affect our perceptions and interactions for two reasons. Firstly, it cannot be argued that structures also have some influence on shaping our perceptions and interactions; to deny this would be to make the claim of environmental determinism. Secondly, for the most part, the landscape that we interact with and have our perceptions about is a landscape that has been either partly or wholly shaped by humans. The shaping of the landscape has been performed by individuals who are either directly guided by structures, or who are seeing the landscape through a structural filter.

In addition, environmental differences between regions are immediately apparent, while structural differences, such as ethics, norms, or traditions, are less noticeable, in part because of ‘system integration,’ a term devised by Giddens to refer to influences that can occur over extended space and time, outside conditions of co-presence in immediate space and time (Giddens, 1984). Therefore, a study that focuses on differences in the way in which people perceive and interact with the landscape, in part, because of structural differences, might serve to provide a fuller understanding of both the pathways of interaction and the roots of regional differences in individual perceptions about and interactions with the landscape. In turn, this fuller understanding of both the pathways of interaction and the roots of regional differences in individual perceptions about and interactions with the landscape will enable more competent planning of the built landscape. Competent planning will enable better built environments for a specific community in a specific place to be created (Duany and Talen, 2002). There is no such thing as a universally optimal plan, as the pathways of interaction
have an infinite number of configurations and are unique for all configurations of time and space. Yet, a fuller understanding of the process of the pathways of interaction might have universal applications in developing specific optimal plans.

Of course, it may not be possible to ever develop fully deterministic plans and models. However, a fuller understanding of the variables involved will allow for a more accurate calculation of probabilities. In this case, to have more accurate probabilities would mean that the likelihood of a certain plan having a certain impact in a certain region might be better determined. This study will attempt a first step, by hypothesizing that there are differences in human perceptions about the landscape in two different locations, in part because of the differences in structures between the locations.

This analytical method follows the principle of the expansion method, whereby a paradigm is contextualized in order to move the conceptual model from an initial general state into an applied and specific state in order to generate accurate and unambiguous inferences (Foster, 1991). The local-scale research will explore “the processes shaping the essential character of a city from ‘the inside out.’ Local actors, institutions, community structure, labor divisions, levels of accessibility, cultural iconography, and economic activities all drive urban restructuring in specific and mutually reinforcing ways” (Keeling, 2000 p.3). If this local-scale research is subsequently added to macro-level structural research, the spatial changes in the urban fabric might be more clearly understood (Foster, 1991; Keeling, 2000). The significance here is that if it is established that there is indeed a relationship between structures, perceptions, and landscapes, which to some extent has already been done (Arnott, 1998; Barker, 1981; Freeman, 2001; Friedmann, 2002; Frug, 1999; Gottlieb and Lentnek, 2001; Hall, 1988; Jacobs, 1961; Marshall, 2000; Massey, 1998;
Orfield, 1997; Plas and Lewis, 1996; Rusk, 1999; Silverman and Della-Giustina, 2001; Smith, 1998; Talen, 1999; Tuan, 2001; Verbrugge and Taylor, 1980; Yancey, 1971), or specifically if it can be shown that regional differences in perceptions about the landscape are in part caused by regional structural differences, then the conceptual model can be set up. Once the equation has been set up, the opportunity for and implications of further questions become apparent. For example, a question might be asked as to how changes in structure alter the way people respond to their landscape. Or more generally, how sensitive are the components of the model to one another, and what effect would a change in one of the components have on the other components? The immediately apparent limitations of this approach are that a specification, change, or elaboration of the basic setup of the model can only be applicable in a specific region, and that due to the intricate nature of what is being attempted, the model can never be fully deterministic (Foster, 1991; Hart, 1995). However, if regional fine-tunings of the model serve only to make this stochastic process more predictable, then enough has been done.
III. Focus

The pathways of interaction are infinitely complex. Therefore, a way to narrow down a study of the pathways of interaction must be found. If people were observations, they would be attributed with different values for their labor, capital, and place. A combination of all the values of all the observations results in the total physical and cultural humanly altered environment. The pathways of interaction give form to the regional differences in human cultural and physical environments created by labor, capital, and place. Fundamental to these ideas are the notions of accessibility and mobility. Accessibility and mobility transform a static physical and cultural environment into a fluid and metamorphosising physical and cultural environment (Figure 7) (Button and Rothengatter, 1993).

![Figure 7](image)

The Importance of Accessibility and Mobility

Because of the importance of accessibility and mobility, this study will focus on the effects of the pathways of interaction on accessibility and mobility. More specifically, Gidden’s (1984) theory of structuration will be broadly applied within the contexts of the
pathways of interaction to look at differences in accessibility and mobility between Bowling Green, Kentucky, and Penzance, England. To establish a first step or a foothold within the complex pathways of interaction, the link between perceptions and the structure of systems of accessibility and mobility will be explored. It is hypothesized that perceptions about accessibility and mobility are related to the structure of systems of accessibility and mobility. This hypothesis will not be tested in its entirety. Rather, a sub-hypothesis that is the working hypothesis of this project will be tested. Namely, it is hypothesized that perceptions about preferred forms of transportation to leisure and retail activities will be significantly different between residents of locations that have a significant difference in the structure of systems of accessibility and mobility to such leisure and retail activities. It is also hypothesized that Bowling Green and Penzance have a significant difference in the structure of systems of accessibility and mobility to leisure and retail activities. If this is proven to be true then the working hypothesis will be tested in Bowling Green and Penzance.

Prior to an elaboration of the methods, a clearer definition of Giddens’ theory of structuration will be supplied, as it will provide a backdrop for much of this project. Central to Giddens’ theory is the notion of duality of structure, which already has been discussed in the Background section: “the rules and resources drawn upon in the production and reproduction of social action are at the same time the means of system reproduction” (Giddens, 1984 p.19).

Giddens (1984 p.17) defines structure as:

...the structuring properties allowing the ‘binding’ of time-space in social systems, the properties which make it possible for discernibly similar social practices to exist across varying spans of time and space and which lend them ‘systemic’ form.
This conception of structure should not be seen as a skeleton around which individual lives are shaped. Social systems do not have structures, but instead display structural properties, which exist only in instantiations of the structurally guided process (Giddens, 1984).

A hierarchical classification of structures made by Giddens distinguishes ‘structural principles’ and ‘institutions.’ Structural principles are the structural properties that are most deeply embedded within a whole society. Practices, which extend over a wide swath of space and time within a society, are referred to as institutions. This classification, however, is still talking only about the rules and resources that are only present in their instantiations, and memory traces. A social system, on the other hand, represents reproduced activities organized as regular social practices. Giddens’ definition of structuration might be seen to take the thirdspace approach to find ground between structures and systems; “Analyzing the structuration of social systems means studying the modes in which such systems, grounded in the knowledgeable activities of situated actors who draw upon rules and resources in the diversity of action contexts, are produced and reproduced in interaction” (Giddens, 1984 p.25). The last phrase of Giddens’ quote is significant for what is being attempted by this project. Giddens is not claiming that societies are unified collectivities, and by no means intends to imply that there is a pure sense of social cohesion in any given society. Rather, he intends to bring across that a society cannot be effectively studied solely by looking at rules and resources, or reproduced activities. Society is not a mold that people are born into and should not be studied in that manner. To have a fuller grasp of any part of society, the modes in which social systems are reproduced must be studied. To undertake this study, both, rules
and resources, and the reproduced relations between actors must be examined, but with the end purpose of understanding the modes of reproduction (Giddens, 1984).

To wrap up but by no means to summarize adequately the observations made by Giddens, understanding the modes through which social systems are reproduced, by looking at both rules and resources and reproduced relations between actors, will allow for a truer understanding into the nature of society. Looking at the modes through which social systems are reproduced is to look at the relationship between actors and their perceptions, and systems and structures. Clearly, actors and perceptions shape systems and structures, just as systems and structures shape actors and perceptions, and so it is supposed that a difference in systems and structures would result in a difference in actors and perceptions. In other words, a difference in the “conditions governing the continuity or transmutation of structures, and therefore the reproduction of social systems” (Giddens, 1984 p.25), or structuration would result in a difference in the perceptions and actions of actors, acting in a particular social system.

This project aims to look at whether perceptions about accessibility and mobility are profoundly dissimilar in different regions with differences in the structure of systems of accessibility and mobility. Studying the structuration of systems of accessibility and mobility will involve looking at the ways in which those systems are produced and reproduced in interaction by drawing upon structures, perceptions, labor, capital, and place.
IV. Methods

The working hypothesis of this project states that perceptions about preferred forms of transportation to leisure and retail activities will be different between residents of locations that have a significant difference in the structure of systems of accessibility and mobility to such leisure and retail activities. To test the hypothesis, macro and micro scales of analysis have been used in Bowling Green and Penzance. The macro scale of analysis consists of comparing perceptions about preferred forms of transportation to leisure and retail activities to the structure of systems of accessibility and mobility to such leisure and retail activities between Bowling Green and Penzance. The micro scale of analysis compares the same domains, but between the census tracts of the Bowling Green region and the census wards of the Penzance region. It is also hypothesized that Bowling Green and Penzance have a fundamental difference in the structure of systems of accessibility and mobility to leisure and retail activities. If this is proven to be true then the working hypothesis will be tested in Bowling Green and Penzance.

Step A

The first step in this analysis is to examine the structure of systems of accessibility and mobility to leisure and retail activities. The historical landscape of both towns is examined. This provides a backdrop for understanding the contemporary structure of systems of accessibility and mobility in both towns. An inventory is also taken of all modes of transportation in both places, thereby allowing an assessment to be made as to
whether differences exist between the structure of systems of accessibility and mobility to leisure and retail activities in both towns.

**Step B**

The second step of analysis involves examining perceptions about preferred forms of transportation to leisure and retail activities and testing to see if they are significantly different between residents of locations that have a significant difference in the structure of systems of accessibility and mobility to such leisure and retail activities. This procedure is done through closed response surveys and open ended interviews.

**B1. Survey technique**

As regards the survey instrument, two *a priori* assumptions have been made. It is assumed that both regions have a ‘downtown’ and a ‘fringe.’ The terms ‘core’ and ‘periphery’ will not be used because these terms might be seen to relate to cores and peripheries of accessibility. Another assumption is that the downtowns and the fringes have different levels of accessibility and mobility. These assumptions do not mean to imply that there are rigid borders between the downtown and fringe; they merely assert that there are differences between the downtown / center / historical portion of a region and the fringe / outskirts / periphery of a region. The survey has been conducted at two sites of leisure or retail activity in each of the respective downtowns and fringes of both the Bowling Green and Penzance regions (Figure 8, Figure 9).

Questions were asked of people with regard to a map of their region. Figure 10 is a copy of the Bowling Green map. Figure 11 is a copy of the Penzance map. Respondents
were shown larger versions of these maps and were asked to identify the cell and the tract or ward in which they live.

Figure 8
Survey Locations in Bowling Green, Kentucky

Source: Author (2003), base map provided by Bowling Green Public Works.

Figure 9
Survey Locations in Penzance, England

Source: Author (2003), base map from MultiMap.com.
The survey consisted of a number of closed questions, which are listed in appendix A.
B2. Interviews

A snowball sample has been used to elicit ten interviews in both Bowling Green and Penzance. In a snowball sample, the interviewer contacts a personal acquaintance and asks that person to provide a contact of his or hers with the telephone number of the interviewer. The interviewer then interviews that person. Following the interview, the interviewer asks the interviewee to provide a contact of his or hers with the telephone number of the interviewer. This process continues until all necessary interviews have been conducted. Obviously this procedure is flawed in that it does not provide a fully representative sample (especially with a sample size of ten). However, the interviewees did seem to represent a reasonable cross-section of the population (blacks, whites, young, middle-aged, old, unemployed, underemployed, professional etc.). The interviewer had only met or heard of one of the interviewee in each town (the first interviewee).

There is a checklist of topics (listed below), but the sequence of questions was not pre-defined (Lindsay, 1997). The interviewee's own words were recorded, rather than allocating the response to a category. Respondents were asked questions relating to problems that they perceive to exist with the structure of systems of accessibility and mobility that they use (e.g., Do environmental concerns influence your choice of transportation? What are some of the aspects of the transportation infrastructure (sidewalks, roads, parking lots, bus/train frequencies) in this area that you like? What are some aspects that you do not like? Why do you not like these aspects?). Respondents were asked what changes they would like to see in their region regarding how systems of accessibility and mobility are structured. In addition, respondents were asked to elaborate about their ideal mode of transportation to leisure and retail activities.
V. Findings

A. Landscapes

In this section the development of the urban form of both regions will be examined with a particular focus on the contribution of transportation systems to urban development. The results will contribute to providing an overview of the systems of accessibility and mobility in both towns.

Penzance

Penzance is the westernmost borough in England. The town is about 280 miles west of London and ten miles east of Land’s End and has a population of 17,508 (National Statistics, 2003). It rests on the southern coast of England on the shore of Mount’s Bay, which derives its name from St. Michael’s Mount, located in the bay. Penzance is located within the County of Cornwall and the district (a sub-unit of a county) of Penwith, which can be translated as ‘far end’ in Cornish, the Celtic language of Cornwall (Pool, 1974).

In the western third of Mount’s bay, a rocky headland extends southeastwards into the bay. This headland, sufficiently deep water, and protection from the prevailing westerly winds enabled the construction of a small quay for fishing. A fishing village that eventually became the town of Penzance grew up around the headland. Penzance owes not only its existence but also its name to the headland that it was founded around. Pen sans in Cornish can be translated as “Holy Headland.” Penzance was given this name because of a chapel that was built on the end of the headland, where St. Mary’s Church now stands (Figure 12, item 15). However people lived in or around the town long
before the chapel was built, and it is possible that a settlement existed in Penzance as long as 5500 years ago (Pool, 1974).

Figure 12
Penzance Before 1900


Penzance, like the rest of Cornwall, is in a distinct geographical position (Figure 13). Cornwall is bordered to the east by the county of Devon. However, Cornwall remains almost an island because along with its 326 mile-long coast line on its northern, southern, and western borders, there are only a few miles of the border between Cornwall and Devon that do not run along the river Tamar. The geographical characteristics of the county, along with the distance between Penzance, the rest of Cornwall, and the major centers of population and commercial trade, have meant isolation from mainstream life in
Britain for much of the county’s history (Hardie, 2000). However, the same isolation has ensured that the historical development of Cornwall has been markedly distinct from the rest of the country.

In the warm conditions that existed after the last Ice Age, all of Cornwall apart from the very highest ground became covered by forest. Mesolithic (Mid Stone Age) Man inhabited the forests and survived by hunting and fishing. Neolithic (New Stone Age) Man arrived from the Atlantic seaboard of Europe in about 3500BCE. These settlers knew how to use a variety of stone tools and weapons, how to make pottery, and how to raise crops and rear herds of livestock. They established settlements in forest clearings by using axes made of greenstone (Mason, 2001).

In about 2000BCE the Beaker Folk arrived in Cornwall. They introduced the bow and arrow and the art of metalworking. They erected the stone circles and standing stones thought to have been of religious significance found all over Cornwall (Mason, 2001). They also began to trade with other settlements in Europe (Hardie, 2000).

During the Bronze Age (1500BCE to 700BCE) it was discovered that adding tin to copper could create more effective tools and weapons. These discoveries brought new
development to Cornwall because of the tin deposits there. Metal goods, bronze axes, and tools were sent to Ireland and Europe in exchange for ornaments and other articles (Hardie, 2000). The earliest evidence of human occupation of Penzance can be dated to this time period. Bronze implements, including a palstave, a spearhead, a knife and pins were found on a site at Tredarvah (Figure 12) (Pool, 1974).

The Celts from northwestern Europe were the next migrants to reach southern Britain about 700BCE. They introduced the iron-making process and the Cornish language that was widely spoken in the region until English replaced it at the end of the 16th century. They erected many of the hill forts and cliff castles that can be seen around Penzance (Mason, 2001). The largest prehistoric antiquity in Penzance is the large defensive earthwork or castle at Lescudjack (Figure 12, item 48), which is thought to date from this time period (Pool, 1974). The name Cornwall is supposed to have been derived from the Cornish word *cornovii* meaning cliff castles. Trade with Europe increased in the 1st century BCE. The Greek historian Diodorus Siculus describes how tin was taken on wagons to St Michael’s Mount, and then by sea to Brittany, from where it could be transported to the Mediterranean (Mason, 2001).

The Romans conquered Cornwall in 47CE. They never extended their road network into Cornwall, and there is no evidence of any Roman settlement in the county (Pool, 1974). However, it seems as if they used existing paths or roads to transport the extracted tin from the Cornish tin mines (Mason, 2001). During this period, the county engaged in activities for which it is still known: fishing, farming, tin streaming, metalworking, and pottery making (Hardie, 2000).
The name *Pensans* was first recorded in 1284 (Pool, 1974 p.9). Although according to Pool (1974) "we shall never know the actual date on which the settlement around the headland came into existence or received this name." For much of the middle ages it was uncertain whether Penzance, Mousehole, or Marazion would emerge as the principal trading hub and port of Mount’s Bay (Figure 14). From the post-Roman period, until the end of the Dark Ages, substantial traffic passed through Penwith. Indeed, most of the traffic coming from the Mediterranean passed through Penwith to serve the rest of western Britain rather than risk the treacherous sea passage by Land’s End. This international traffic brought a cosmopolitan flavor to Penwith (Hardie, 2000).

Figure 14
Mounts Bay

In 1322 Edward III granted permission for Penzance to hold markets and fairs. Penzance was subsequently granted permission to hold weekly markets in 1332, further fairs in 1404, and was granted a Harbour Charter in 1512, which allowed the town to
collect harbor dues. Although the town originated as a fishing cove, it was a place of less maritime importance in the 14th century than the neighboring towns of Mousehole, Marazion, or St. Ives. In 1595 four Spanish Galleys sailed into Mount’s Bay and burned the settlements of Mousehole, Newlyn, and Penzance to the ground (Hardie, 2000; Pool, 1974). Although any hopes for the future of Penzance seemed to have been destroyed with the fire, a bright future lay ahead, partially because of sympathy felt for the population of the town by the monarchy because of the burning of the town. The town was rebuilt and much of the street system that was introduced still exists today. The rebuilt town was permitted to hold a partial market on Saturdays in 1604, which allowed it to draw customers away from more vibrant regional centers such as Marazion. Additionally, Penzance was granted a Charter of Incorporation on 9 May 1614, making it only the second town in Penwith after Marazion to receive this status. The charter allowed the newly formed borough to be more fully in control of its own affairs. Thus, at the beginning of the 17th century, Penzance had a population of no more than one or two thousand, a chapel, a quay, markets and fairs, numerous mills, a prison, an almshouse, a coinage hall, a shoemaker, a butcher, a shipwright, a blacksmith, numerous other merchants, and a harvest festival (Pool, 1974). The workers lived in cottages and, according to Richard Carew who conducted a survey of Cornwall in 1602, “some have windows in their cottages, some wooden floorboards on which they walk” (Hardie, 2000, pp.37). According to the diary of Celia Fiennes in 1698, the roads in Penzance were both rough and muddy (Hardie, 2000). The sea-borne trade of Penzance was in a prosperous state. The main exports of the borough were pilchards to the Mediterranean and tin to London. The presence of the coinage hall (where tin was weighed, identified by source,
and taxed for the Duchy benefit) not only affected the shipping trade but would also be significant in establishing Penzance as the center of the administration of the tin trade for the west of Cornwall (Hardie, 2000; Pool, 1974).

In the 18th and 19th centuries Penzance underwent a period of growth and prosperity. In 1801 the population of Penzance had reached 3,382. During the 1800s, the harbor would be enlarged, many new public buildings and a promenade would be built, streets would be paved, and, most importantly, the railway would come to the town in 1852. In 1833 a report commissioned by the town stated, “the town is...fast increasing, both in extent and prosperity. Many houses are being erected. The occupations of the inhabitants are very miscellaneous. The shops are numerous and good, and the markets tolerable” (Pool, 1974, p.127). Figures 15 and 16 show the layout of the town in 1815 and 1851 respectively. Much urban development occurred between this forty-year time-span (note the development in the north of the town). Despite the rapid growth of the town, it seems as if development took place at the fringes of the urbanized areas, leaving the general form of the older core relatively unaltered (Figures 15 and 16). A report by a Superintending Inspector of Public Health (Pool, 1974, pp.142-143) provides insight into the state of the roads in Penzance in the mid-nineteenth century:

The main streets of the town are either paved or Macadamised, chiefly the latter, the principal footways are almost all flagged with granite slabs. In the smaller streets the paving is very deficient indeed. The narrow lanes behind rows of houses are not paved at all, and many of them are in wet seasons impassable...The public walks and footpaths about the town and along the sea are numerous, well-formed and dry.
An expansion of the English road system brought Penzance and the rest of Cornwall within much easier reach of London. However, even though improvement had been made in the road network, transportation was still slow. According to John Davy, "there was only one cart in the Town of Penzance, and that if a carriage occasionally appeared in the streets it attracted universal attention. Packhorses then were in general use for conveying merchandise, and the prevailing manner of traveling was on horseback" (Pool, 1974, p.115). Otherwise, everybody walked, and the town was built accordingly for these modes of transportation. Figure 17 shows the layout of central Penzance in 1805. The layout of these central streets has not changed much by 2003 (Figure 18). Communication and transportation links to other regions were spurred by the needs of industry. Boats regularly sailed to import coal and export minerals, and passenger services were available to Plymouth, London, and France (Hardie, 2000).
Accessibility in and to the town was clearly changing in the 19th century, and the arrival of the railway in the town did much to accelerate such change. Previously, transportation to London and other urban centers had been slow, expensive, and unreliable. In 1817, it may have taken four or five days to reach London from Penzance by stagecoach (Figure 19). This mode of transportation was the only one to the heart of the country, as there were no services to London by boat. By 1859, a trip from Penzance
to London Paddington on the Great Western Railway would take just one day (Figure 20).

Figure 19
The Penzance, Helston, and Falmouth Coach still being used in approx. 1875.


Figure 20
Penzance Railway Station about 1870

Source: Watkiss (1975), p.31

The increased accessibility of Penzance meant that not only was it significantly easier for residents of Penzance to travel and to trade their wares with centers of population in Britain but it was now also much easier for visitors to get to Penzance. The result was that the tourist traffic assumed economic importance for the first time in the history of the
town. From 1800 to 1871, the population of Penzance tripled to 10,425. The population growth resulted in the expansion of the urban area consuming almost all available space within the borough boundary (Hardie, 2000; Pool, 1974).

In the 1880s, Penzance was a thriving industrial town. A list, published in 1883, includes some of the industries in Penzance: tin smelting, ice-works, aerated water manufacture, rope-making, basket making, flour milling, brick manufacture, serpentine working, boat building, iron foundries, leather-curriers, and steam works. Penzance was the economic, industrial, and cultural hub of Penwith, and was also a major hub within Cornwall. The population steadily rose to a peak of 13,328 in 1911. However, by 1931 the population had shrunk back to 11,342, largely due to a decline in the mining industry. The loss of the mines also led to the closing of smelting houses, which in turn contributed to failure of the Penzance Bank in 1896 (Pool, 1974).

In 1934 the area of the borough was enlarged from 438 to 3,155 acres. The new borough included parts of Gulval, Madron, and Paul, and the towns of Newlyn and Mousehole (Figure 21). The population of the newly enlarged borough was estimated at 19,340 in 1939 and has remained at about this level until the present day. Between 1936 until 1972, the enlarged borough has had a policy of providing municipal housing. A good deal of this housing stock has taken the form of high-density apartments in the northeastern fringe of the town. Between those years, it provided 1,760 homes. However, German bombing raids during the Second World War destroyed 48 houses (Hardie, 2000; Pool, 1974).
Figure 21
The Enlarged Borough

Source: Hardie (2000), inside cover

Figure 22 shows the street grid and urban area of Penzance in 1945. If compared to Figures 15 and 16, it can be seen that the urban area of the town has gradually increased by expansion at the edges, but the general form of the central street grid has remained relatively unaltered. Figure 23 shows the 1996 urban boundaries of the town. The A30 bypass road spawned significant development. The southwestern edge of the town has also developed.
After the Second World War, a policy of slum clearance led the corporation of Penzance to tear down some of the older buildings in the town and replace them with more contemporary buildings. This practice did little to change street widths or layouts in the town significantly; it merely replaced old buildings with newer ones. In Figure 24, older buildings adjoin more modern buildings on Market Jew Street. However, even
while the form and layout of central Penzance have not drastically changed in a century or longer, “the steam engine, the beam engine, the telephone, electricity, the motor car, the tractor, the airplane, the radio, the television, the computer, the digital age – all means of getting something or someone from here to there quicker,” (Hardie, 2000, pp.104) have all had an effect on accessibility and mobility within the town (Hardie, 2000).

After the war, part of the old harbor was filled in to create a parking lot with 1000 spaces, partially to encourage the growth of the tourist trade (Figure 25). This act would have been unthinkable a century before when the harbor was the town’s connection to the outside world. However, automobile transportation is not the only way that people get around in the town. Many visitors and residents alike choose to arrive on the railway that terminates in the eastern end of town. Direct services are available to Birmingham, Bristol, Cardiff, London, Manchester, and Plymouth. As there is only one station in Penzance, no local commuting can be done on the train. However, people who arrive by rail, and visitors in particular, are likely to use other modes of public transport or pedestrian means to move around in the region. Visitors also have the option of arriving at the Land’s End airport, which has flights to and from Newquay, Plymouth, Exeter, and
Bristol. The Penzance heliport and a ship named the *Scillonian III* both offer means of access to the Isles of Scilly. Long distance bus services also connect Penzance to the rest of the country, while short distance bus services allow shorter commutes within the region. Sixteen local bus routes run at least once on a daily basis. Most of the roads have sidewalks on at least one side. There is also a bicycle path that runs along the coast throughout the entire county. Clearly there is no lack of modes of transportation, and the town is not as remote as it once was.

![Figure 26](image1.jpg)  
*The A30 in Penzance*  
Source: Author (2003)

![Figure 27](image2.jpg)  
*Shopping Center: Eastern Penzance*  
Source: Author (2003)

However, it remains that the private automobile is the preferred mode of transportation to get in and around the town (Hardie, 2000). Suburban sprawl has occurred to a limited degree in the outlying areas of the town. The A30 road is lined with businesses and industries that cater to the automobile (see Figures 26 and 27). Many of the postwar housing developments are also designed for the automobile oriented family (see Figure 28). Yet, the physical form of the older core of Penzance has remained relatively unchanged for centuries. While individual structures have been demolished and rebuilt in the town, the layout and width of central streets in the town have been altered only slightly. This older layout makes parts of the town barely compatible with
the modern automobile age. There are many narrow and one-way streets, and a shortage of on-street parking, and parking lots. Figure 29 shows a street in the inner core of the town. Penzance is a town that rests between modern and historical times. Parts of the town facilitate use of the automobile, while other parts of Penzance are more suited for traditional modes of mobility.

**Figure 28**
Suburban Housing in Gulval, Penzance

**Figure 29**
North of Market Jew Street, Central Penzance

Source: Author (2003)  
Source: Author (2003)

**Bowling Green**

Bowling Green is the fourth largest city in the Commonwealth of Kentucky. It is a major economic and transportation hub of the Commonwealth and also serves as the seat of Warren County. Little is also known about the first explorers and settlers of European origin who lived in the area.

It is known that many hunters and explorers following Indian trails from eastern and northern parts of Kentucky to Middle Tennessee crossed a shallow section of the Barren River near the present-day I-65 bridge. Kentucky achieved statehood in 1792, and four years later settlers began to migrate to the area in large numbers. Many of the settlers had received land warrants that granted property as payment for military service during the
Revolutionary War. Other settlers had either purchased land warrants from the settlers or were squatters (Baird, 1989).

Much of the land in Warren County at that time was treeless and referred to as the “barrens.” Settlers tended to avoid such areas and instead stake claims along watercourses and in wooded areas that provided fuel and building materials. However, it did not take long before the new migrants realized that the barrens’ soil was rich and fertile. It is supposed that Native Americans had sporadically set fire to the land to remove trees and improve habitat for game (Baird, 1989; Sauer, 1963).

By 1796 the population of the area had grown sufficiently for residents to recognize the need for local government. The state legislature was petitioned and subsequently approved the creation of a new county to be named after Dr. Joseph Warren, a hero at the battle of Bunker Hill. The subsequent year county officials decided to construct a log courthouse and a log jail on what is now Fountain Square. In 1798 the county commissioners plotted a town around the new public buildings (Baird, 1989; Baird and Crowe-Carraco, 1999).

In 1799, the first lot in the new town of Bowling Green sold for sixteen dollars. By 1810, the town had a population of 154 residents and contained a few stores, a brick tavern, and several homes facing the square. In 1816, the county built a brick courthouse in the middle of the town square (Figure 30). By 1827 “the town boasted a locally owned and printed newspaper, a resident physician, a private school for boys... a Masonic lodge, at least one church, a number of mercantile shops and an array of other business establishments” (Baird, 1989 p.1).
A stagecoach line with services to Louisville, Nashville, and Hopkinsville arrived in Bowling Green three times a week. However, from the days of its first settlers, Bowling Green had depended on the Barren River for trade with the rest of the country. Produce such as tobacco, hams, and whiskey were loaded onto flatboats in the winter when the river was high and shipped to New Orleans via the Ohio and Mississippi rivers. The overland return trip from Bowling Green to New Orleans at this time took about six months, as the return trip would be carried out on the Natchez Trace. The city was clearly relatively inaccessible from major centers of population in this period (Baird, 1989; Baird and Crowe-Carraco, 1999).

In the 1820s the state authorized locks, dams, and other general improvements to be made to the Green and Barren rivers. The improvements were designed to allow steamboats to ascend from the Ohio River to Bowling Green in order to promote river trade (Figure 31). To further assist transportation between the wharf and the center of town, a railroad was built in 1832 connecting the river to a depot near the present-day
courthouse. Mule-drawn wagons carried passengers and goods between these two sites (Baird, 1989; Baird and Crowe-Carraco, 1999).

Figure 31
The Bowling Green Steamboat

Source: Baird et. al. (1983), p. 72

Until the 1830s Russellville had been the largest and most prosperous town in south central Kentucky. However, the advent of steamboat travel gave Bowling Green a distinct advantage over its neighbor, as it could more easily trade with towns on the Ohio and Mississippi Rivers. By the 1850s Bowling Green had become the commercial center of south-central Kentucky, which possibly contributed to the decision by the Louisville and Nashville Railroad Company to build tracks through the town. Bowling Green was experiencing rapid growth in both the population and the built area of the town by this period. The extent of the town’s urban area can be seen in Figure 32 (Baird, 1989; Baird, Crowe-Carraco, and Morse, 1983).

After the Civil War, Fountain Square Park, a new courthouse and cemetery, lights for town streets, homes, and businesses, and a city waterworks were all constructed. Steamers and stagecoaches had been replaced by trains as the principal carriers of
passengers and freight. Figure 33 shows the Louisville and Nashville Railroad depot, machine shop and roadhouse in about 1879. Much of the social and economic activity in Bowling Green during the 1880s also revolved around the railroad. Long distance travelers would often detrain at Bowling Green to eat and sleep at the Ritter House (Figure 34). Many employees of the L&N also lived close to the station. The railroad was a reliable and relatively inexpensive form of transport, which helped to stimulate another wave of growth. During the Civil War, Bowling Green had been a village of less than 2,000 residents. By 1870, the population of the town had grown to 4,574, and between 1882 and 1885, 625 buildings were constructed. Figure 35 shows the form of the city in 1877. When compared to Figure 32, it can be seen that most of the urban growth since 1863 followed the western streetcar line down to the river. The grid layout of roads in central Bowling Green has remained much the same to the present (Baird, 1989; Baird Crowe-Carraco, and Morse. 1983).
In 1898, an electric trolley service replaced the older mule drawn cars. By 1911, the Bowling Green Railway Company operated six miles of track and ten cars within the city (Figure 36). The arrival of the automobile spurred even more development, particularly hotels, restaurants, and related businesses. By 1910, the horse and buggy as a means of transportation had begun to be replaced by the automobile, and in the 1920s the use of automobiles was becoming even more widespread. The city recognized the need for better streets and purchased a steamroller and four trucks in order to maintain and improve city roads. This new technology and the general cultural acceptance of it may have contributed to the decision by the city not to continue the streetcars when the Bowling Green Railway Company discontinued the service in 1921 (Baird, 1989; Baird, Crowe-Carraco, and Morse, 1983).

During this period, Bowling Green experienced an oil boom. People flocked to the town from all over the country. This new influx of migrants caused housing to be at a premium. The result was that many workers were relegated to live in outbuildings and even tents. Figure 37 shows the layout of the city in 1931. The urban form of the town
had stretched since 1877, yet the new growth remained constrained to the similar grid-like pattern that the town had displayed since its inception.

Figure 35
**Bowling Green in 1877**

Source: D. G. Beers & Co. (1877)

Figure 36
**The Electric Streetcar in Bowling Green**

Source: Baird, Crowe-Carraco, and Morse (1983), p. 45
After World War II a period of industrial expansion began that has continued to the present day. By 1950, the population had risen to 22,800 from 19,000 in 1940. The population further rose to 28,228 in 1960 and climbed even more dramatically to 36,705 by 1970. A rise in population also meant a rise in the number of automobiles driven; this in turn resulted in more traffic in the town. The US31W Bypass was constructed in 1949 to channel traffic around instead of through downtown. However, the dramatic population growth that Bowling Green experienced meant that land at the fringes of the town was constantly being converted into urban uses. This rapid urban expansion of the physical form of Bowling Green meant that by the 1960s the bypass that had been
constructed to avoid the town now went straight through it (Figure 38). This map shows the town bursting at the seams. Few of the new roads conform to the older grid pattern. The city occupies a much larger area and is no longer as compact as it once was. The bypass had become the growth axis of the city for commercial activity.

Figure 38
Bowling Green in 1950

Source: Adapted from Lawson (1950)

The automobile had become cheap, practical, and allowed owners great freedom of mobility. The car was rapidly integrated into the culture of the region, and an ever-increasing number of residents purchased their first automobile. This boom in automobile use "led to demands for improved streets – demands quickly endorsed by politicians, construction companies, and paving contractors" (Baird, Crowe-Carraco, and Morse, 1983, p.74). Bowling Green had readily accepted the new automobile age, and thus the role of the railroads, which had contributed a great deal to the development of
the town, began to decline. Passenger trains began to stop less frequently, and the service was eventually discontinued in 1979 (Baird, Crowe-Carraco, and Morse, 1983).

During the 1960s and 70s, Bowling Green experienced urban growth at the fringes that was intensified by the completion of I-65 in the mid 1960s and the construction of the Owensboro Parkway a decade later. By this time Bowling Green had become large enough to achieve second-class city status. By the 1980s, two malls had been built in south Bowling Green. The growth axis of the city now followed Scottsville road towards I-65, resulting in much “construction, which has turned acres of farmland into shopping centers, car lots, restaurants and motels” (Baird, 1989 p.6).

Figure 39 shows the layout of the town in 1976. There has been massive growth since 1950. The town has grown in all directions, but the growth is most intense on the southeastern part of town facing I-65. Figure 40 shows the town less than a decade later. The city is even more dispersed, and the growth in the south, stretching towards the interstate, has become even more intense.

Between 1950 and 1985 the number of automobiles in Bowling Green and Warren County increased by 294%. This rate was higher than state or even national averages. Today, Bowling Green is heavily reliant on the motor vehicle. Pedestrian opportunities are limited, not only because of the large size of the city but also because of the lack of sidewalks. Cycling is also a rather unfeasible option for most residents as bikeways are almost nonexistent and the lanes of roads are narrow. Two forms of public transport do exist within the city. Western Kentucky University provides a bus service for students that allows students to travel from residence halls to lectures and also provides service for
commuters to a remote lot. Hourly bus services are also available from downtown Bowling Green to the fringes of the city (Figure 41) (Davis, 1989).

Figure 39
Bowling Green in 1976

Figure 40
Bowling green in 1983

Source: City County Planning Commission (1976)
Source: Champion Map Corporation (1983)

The majority of Bowling Greens’ urban area was developed during the era of the automobile and the built form of these relatively newer landscapes was designed for the motor vehicle. Figure 42 shows the first known photograph of Bowling Green; the houses are row houses, as people needed to live close to the central city because of the lack of fast and efficient modes of transportation. Mass automobile ownership today has made this style of architecture unnecessary. Figure 43 shows a typical residential neighborhood in the town. With improvements in transportation technology, space can now be used much less efficiently.
In conclusion, even while the street layout of central Bowling Green has remained relatively unaltered for almost two centuries, there have been significant changes in urban form to accommodate the automobile even in the older part of the city. Therefore, even though Bowling Green has retained vestiges of an older model of urban form from the streetcar and steamboat eras, much of the original city has changed to accommodate the automobile, while the newer areas of Bowling Green have been able to create new landscapes to fit the automobile rather than adapt older forms of the city (Meinig, 1979).
B. An Inventory of Contemporary Accessibility and Mobility

Bowling Green

Possibilities for accessibility and mobility within Bowling Green include roads (which can be used by motorized vehicles and bicycles), sidewalks, and bus services. The 217 miles of city streets, the 80 miles of sidewalks, the three bus routes, and the many parking lots in the city can all be seen in Figure 44. Figure 45 shows an overlay of all of these modes and structures of transportation. In order to create the overlay, a 100-meter buffer was extended around each feature. This extension allowed features such as sidewalks and roads, which do not occupy the same space, to be buffered as if they do occupy the same space. Each area of the map is assigned a value based on the number of modes present. A clear core-periphery difference is visible. A bus service also connects Bowling Green to local destinations such as Park City and Franklin and more distant locations such as Louisville and Nashville (Figure 46).

![Figure 44: Systems and Structures of Accessibility and Mobility in Bowling Green](source: Author (2003), based on data provided by Bowling Green Public Works)
Figure 45
Transportation Mode and Structure Overlay in Bowling Green.

Source: Author (2003), based on data provided by Bowling Green Public Works

Figure 46
Greyhound Bus Routes in Kentucky

Source: Author (2003), based on data from Greyhound Lines Inc.
Penzance

Accurate digital data about systems and structures of accessibility and mobility are not freely available for the Penzance region. However, observations about systems and structures of accessibility and mobility in the region can still be made. Just as in Bowling Green, streets connect and tie together the entire urban area. However, in Penzance very few roads lack sidewalks. The rail service not only connects Penzance to distant urban centers but also provides services to towns and villages such as St. Erth, Lelant, Carbis Bay, St. Ives, and Hayle to the east and north of Penzance (Figure 47). At least sixteen different local bus services pass through central Penzance (the number varies depending on how a bus service is classified. Minor route changes resulting in a different letter characterization for the route are ignored, and only bus services with different number designations are counted).

Figure 47
Public Transport in Penwith.
The parking lots in central Penzance are shown in Figure 48. Even though this map is zoomed in tightly to the central city and therefore ignores parking lots in more peripheral areas, it nonetheless illustrates the contrast in non-roadside parking availability between Bowling Green and Penzance. There are far fewer parking lots in central Penzance than there are in central Bowling Green. The design of roads also differs greatly between Bowling Green and Penzance. Many of the roads in central Penzance are narrow one-way streets or are entirely pedestrianized (Figure 49). At the same time, many of roads in the periphery of Penzance are much wider than roads in the core and are more suited to the automobile (Figures 26 and 27).

According to 2000 census data, 92.6% of households in Warren County had an automobile, while 1991 census data reveal that 75.5% of households in Cornwall had an automobile. While differences in these statistics certainly exist at the more local levels of
Bowling Green and Penzance, it is unlikely that the differences deviate greatly from these figures.

In part A of this chapter, it has been shown that the urban forms of Bowling Green and Penzance are significantly different from one another. The development of both towns was not too dissimilar until the beginning of the 20th century. At that time Bowling Green underwent a rapid transformation in part because of the automobile and Penzance adopted the new transportation technology at a much slower pace. Part B of this chapter demonstrates that a significant difference exists in the transportation infrastructure in both cities. Pedestrians have access to most of Penzance, but only to the core of Bowling Green. The reverse is true for automobiles. Cars have access to most of Bowling Green, but significant automobile traffic is confined to the fringes of Penzance. Public transport can be used to travel between most settlements in Penwith, while only three local bus routes serve the Bowling Green area. Penzance is also much better connected to its regional urban network by public transportation than Bowling Green. At the same time, Bowling Green has a far superior infrastructure (abundance of parking lots, driveways and garages in residential areas, and multilane roads) for automobiles than does Penzance.

Because a difference exists in the transportation infrastructure and urban forms of both cities, it can be stated that Bowling Green and Penzance have a fundamental difference in the structure of systems of accessibility and mobility to leisure and retail activities. It has also been shown that the structure of systems of accessibility and mobility is different between the cores and the peripheries of Bowling Green and Penzance. If it is shown that perceptions about preferred forms of transportation to
leisure and retail activities are different between these two cities, then the hypothesis can be accepted that perceptions about preferred forms of transportation to leisure and retail activities will be different between residents of locations that have a fundamental difference in the structure of systems of accessibility and mobility to such leisure and retail activities.
C. Perceptions About Accessibility and Mobility

Bowling Green

Figure 50
Modes of Transportation Used in Bowling Green

Source: Author (2003), base map provided by City of Bowling Green Public Works.

Two hundred and seventy-nine surveys were conducted in Bowling Green. Figures 50 and 51 show some of the results of this survey. The figures illustrate that residents living in the grid cells covering the downtown area are more likely to use a mode of transportation other than an automobile to get to the survey locations and are more likely to have an ideal mode of transportation other than an automobile than respondents living in other grid cells. The number of respondents choosing a response other than ‘automobile’ thus generally decays with distance from the downtown. Figures 52 and 53 represent the same data at a different scale (census tracts as opposed to rectangular grid cells). It can be seen that in one census tract in the downtown area responses other than
'automobile' make up the majority. Again the distance decay of responses other than 'automobile' is apparent. A series of difference of proportions tests support the notion that a core-periphery difference exists by revealing that both actual and ideal modes of transport are different between the core and periphery.

Figure 51
Ideal Modes of Transportation in Bowling Green

Source: Author (2003), base map provided by City of Bowling Green Public Works.

Perceptions about ideal modes of transportation closely correspond to actual modes of transportation in Bowling Green. However, ten interviews have been conducted in the city in order to explore the richness of human perceptions and feelings about transportation choices. A series of questions were asked of each interviewee. Each interviewee was encouraged to elaborate on any issues of specific concern to them that related to transportation choices.

Most people (seven out of ten) mentioned that their ideal mode of transportation was a car. At the same time, the majority of interviewees indicated that they felt that they...
should walk more (six out of ten) and that there should be more sidewalks in Bowling Green (eight out of ten). It is unclear why so many people favored pedestrian mobility. Some respondents mentioned health reasons or environmental concerns. However, there seemed to be a general sense with many of the respondents that walking and sidewalks were an unquestionably ‘good’ element of the urban scene. While this theme was repeated by a number of the interviewees, many of those same people also paradoxically stated that they do not walk on a regular basis. One person stated that he would like to walk more. However, upon being asked if he walks very often he replied “Usually, No… My excuse is that I am lazy. But, if I wasn’t lazy, that would be my ideal mode. I drive everywhere, even to my neighbor’s house usually.”

Figure 52
Modes of Transportation Used in Bowling Green (by Census Tract)

Source: Author (2003), base map provided by City of Bowling Green Public Works.
A number of somewhat contradictory results have also been extracted from the interviews. Six out of the ten interviewees noted that there should be a viable public bus service in Bowling Green (three did not mention the issue and one noted that there shouldn’t be a bus service), yet only two out of ten mentioned a bus as being their ideal mode of transportation. Four of the interviewees even explicitly stated that they thought Bowling Green should have a bus service, but they themselves wouldn’t use it. There is relatively strong support for public transport yet at the same time there is a general reluctance to use it. Many people mentioned that a functioning public transport system would be beneficial to the elderly, handicapped, and poor. One person stated that she thought public transportation “is needed for those that don’t have proper transportation,” and also noted that “I am thankful that I don’t have to use it.” Another interviewee
claimed the lack of public transportation in Bowling Green to be an aspect of the transportation that she did not like, yet when asked if she would use a bus service she responded that “I think it’s more of a social issue for people of low income and stuff. Here in Bowling Green, I don’t know how practical it would be for me to use it just given time constraints.” It seems that many respondents were only content with the idea of a bus if other people had to use it and they were allowed to continue driving. This viewpoint may be due to a lack of first-hand experience with a viable public transit system where routes are well connected and operate frequently. If this lack of experience on the part of the local population with public transit is seen in the context of Giddens’ (1984) duality of structure much can be understood from the results of this interview. The structure of public transit is not being widely reproduced in Bowling Green because of lack of widespread use. The structure of the automobile-oriented society, on the other hand, is being widely reproduced in the city. The lack of public transit on the structure side of the equation of the duality of structure appears in part to equate to a reduced desire for public transit on the agency side of the equation. The general sense amongst residents that they should walk more and that there should be more possible modes of transportation in the area appear to be less of a desire for modes of transportation that don’t readily exist within the city and more of a desire to express ‘correct’ viewpoints.

Thus, it initially seems as if most people are, in a general way, satisfied with the current state of transportation in the city. Seven out of ten state that a private automobile is their preferred mode of transportation. However, when asked what their preferred mode of transportation would be if time were not a factor, the responses tended to differ greatly. Seven out of ten stated that either walking or public transportation would be
their preferred form of transportation in such a scenario. If these responses are viewed in combination with the widespread comments that there should be more sidewalks and that people should walk more, it can be seen that a general desire to use other modes of transportation does exist, albeit on an abstract level. The automobile remains the dominant and most desired form of transportation in Bowling Green.

**Penzance**

Two hundred and eighty surveys were conducted in Penzance. Figures 54 and 55 show some of the results of this survey. These figures illustrate that residents living in the grid cells covering central Penzance are more likely to use a mode of transportation other than an automobile to get to the survey locations and are more likely to have an ideal mode of transportation other than an automobile than respondents living in other grid cells. The number of respondents choosing a response other than ‘automobile,’ thus generally decays with distance from the downtown. The results displayed in Figures 54 and 55 are quite similar, indicating that there is a strong correlation between actual and ideal modes of transportation. Although, in the core area, slightly more people choose “automobile” for their preferred mode than for their actual mode. This choice may be an expression of a desire to participate in the car culture despite the practicalities of economics and lack of parking. As in Bowling Green, a series of difference of proportions tests support the notion that a core-periphery difference exists by revealing that both actual and ideal modes of transport are different between the core and periphery.
The percentage of respondents choosing "foot, bicycle, or other" for either their actual or ideal mode of transportation is much higher in grid cells that are near the survey locations (Figure 9) than other cells. These relatively high results may exist because it is much easier for people living in these cells to walk to the survey locations than it is for people living in cells that are more remote. However, upon closer inspection it can be noticed that cells (8,8) and (8,6) have a higher number of respondents choosing "foot, bicycle, or other" for their ideal modes than other cells that are equally remote from the survey locations. It should be noted that the origin of the grid (0,0) is at the bottom-right hand corner of the map. One explanation for this may be that both cells contain a significant amount of urban and pedestrian friendly space (the towns of Marazion and Ludgvan are located within these cells).

Figure 54
Modes of Transportation Used in Penzance

Source: Author (2003)
Figures 56 and 57 represent the same data at a different scale (wards as opposed to rectangular grid cells). It can be seen that in three wards, in the downtown area and abutting the downtown area, responses other than ‘automobile’ make up the majority. Again the distance decay of responses other than ‘automobile’ is apparent although not as obvious as on the previous maps. Figure 57 shows an unusually high percentage of respondents choosing “Public Transport” as their ideal mode of transportation in the most northerly ward. However, when the same results are examined at the grid cell level (Figure 54), it can be seen that the spike in “Public Transportation” responses can be attributed to cell (6,6) and not the census ward as a whole. Cell (6,6) is located in the A30 corridor and has highly frequent bus services to downtown Penzance. Thus, it appears that the transportation infrastructure in cell (6,6) influences the perceptions of people who live in that cell.

Figure 55
Ideal Modes of Transportation in Penzance

Source: Author (2003)
The data indicate that perceptions about ideal modes of transportation closely correspond to actual modes of transportation in Penzance. However, in order to explore the richness of human perceptions and feelings about transportation choices, ten interviews have been conducted in Penzance. Half (five out of ten) mentioned that their ideal mode of transportation was a car. However, the majority of interviewees (nine out of ten) mentioned that there should be better public transportation in Penzance. Yet, at the same time, four of the nine respondents who favored better public transportation noted that they would not use it themselves. When asked if she would use local buses, one interviewee replied “I wouldn’t use them, no, but I know a lot of people that do use them, and they are quite restricted if they live out in rural areas. Some areas only have one bus one way and one back again in one day. You are very restricted then in how you do your shopping.”

Figure 56
Modes of Transportation Used in Penzance (by Ward)

Source: Author (2003)
It does not seem that the interviewees support improved transportation for environmental reasons, as seven out of ten respondents stated environmental concerns do not influence their choice of transportation. A common theme among the interviewees was how bad their public transportation is. All ten interviewees mentioned some aspect of the public transportation system that they either did not like or they thought should be improved. One person noted, “The buses aren’t very friendly – they don’t run at the right hours. They don’t run at night time.” When asked if they ever use a bus or train another interviewee answered “very, very rarely because they are so unreliable.” Common themes mentioned were late, infrequent, and unreliable buses and trains and rude drivers. This theme is further reflected in the interviews in that eight out of ten respondents mentioned that they would use a car if cost were not an issue. However, when asked what their preferred mode of transportation would be if time were not a factor, the responses tended to differ greatly. Only one interviewee favored a car, while the other nine related that they would use a bicycle, walk, or take public transportation.

Figure 57
Ideal Modes of Transportation Used in Penzance (by Ward)

Source: Author (2003)
Public transportation does not rank highly in the preferences of the residents of Penzance. Only one out of ten interviewees noted that they would ideally use a bus or train. In fact there were more interviewees in Bowling Green that favored public transportation (although often for people other than themselves) despite a minimal service in that city. These results may initially seem to be a disconnect with the relationship between actors and structure discussed in structuration theory. However, these findings may derive from the fact that residents of Penzance tend to have specific complaints about the public transportation service and infrastructure, while most people interviewed in Bowling Green were unaware that a bus system was even present in their city. If it is accepted that the system of public transportation in Penzance is substandard or is of a lower quality than it was in previous years, then structuration can adequately explain the general rejection by interviewees of public transportation as an ideal or preferred mode. The interplay between the poor bus and train services (structure) and the people who use those services (agents) is expressed in the results of this interview. The premise that the system of public transportation in Penzance is substandard or is of a lower quality than it was in previous years can be supported by the comments provided by the interviewees and by the first-hand experience of the interviewer (listening to conversations in the city and using the bus and train networks).

People are split evenly about their ideal modes of transportation with 50% of interviewees holding the car to be their ideal mode of transportation and 50% of interviewees considering public transportation, bicycles, or walking to be their ideal mode of transportation. The number of interviewees who would ideally use a car for transportation jumps to 80% if cost were not an issue and sinks to 10% if time were not
an issue. These findings appear to support two claims. First, that there seems to be a
general desire by people in Penzance to participate in the car culture. The high costs and
difficulties of automobile ownership in Penzance may deter many people from using cars
as frequently as they would like. The fact that eight out of ten interviewees would ideally
use a car for transportation if cost were not an issue accentuates this point. Second, there
is also a general desire for a more efficient, reliable, and cheaper system of public
transportation. Only one out of ten interviewees noted that they would ideally use a bus
or train, yet if time were not an issue then four out of ten respondents mentioned that they
would ideally use a bus or train. All interviewees implied that the local public transport
needed some improvement, and nine of ten interviewees in some manner expressed that
there should be a system of public transportation in Penzance, indicating that a general
desire to use public transport exists.
Comparison

The following graphs (Figure 58) show the total counts of all responses in Bowling Green and Penzance for actual and preferred modes of transportation. It has already been shown that relationships exist between actual and ideal modes of transportation on the micro scale with each city. The following graphics seems to indicate that actual and preferred modes of transportation are closely related at the macro city level. However, the two sets of observations (actual and preferred modes of transportation) from each city do not share a statistically similar distribution.

Figure 58
Total Counts of Survey Responses

Source: Author (2003)

A Chi-Square test was performed on actual and ideal modes in Bowling Green. The test is used to examine whether a significant difference exists in the underlying
distribution between two sets of observations. The null hypothesis is that there is no difference between the observed and expected frequencies. A high $X^2$ value of 184.6 and a p-value of 0 resulted from the analysis (see Figure 59). The low p-value means that the null hypothesis is to be rejected and the alternate hypothesis accepted. The alternate hypothesis states that there is a significant difference between observed and expected frequencies. A marked difference in the frequency counts of one category can result in the rejection of the null hypothesis.

**Figure 59**

<table>
<thead>
<tr>
<th><strong>Bowling Green Actual vs. Preferred Modes</strong></th>
<th><strong>Chi-Square</strong></th>
<th><strong>Chance that a Type I error has been made if $H_0$ is rejected.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>all</td>
<td>184.6</td>
</tr>
<tr>
<td>walk</td>
<td>all other</td>
<td>1.6</td>
</tr>
<tr>
<td>automobile</td>
<td>all other</td>
<td>19.3</td>
</tr>
<tr>
<td><strong>Downtown Responses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walk</td>
<td>all other</td>
<td>1.71</td>
</tr>
<tr>
<td>automobile</td>
<td>all other</td>
<td>5.01</td>
</tr>
<tr>
<td><strong>Periphery Responses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walk</td>
<td>all other</td>
<td>0.173</td>
</tr>
<tr>
<td>automobile</td>
<td>all other</td>
<td>33.56</td>
</tr>
</tbody>
</table>

*Responses are classified as either 'downtown,' or 'periphery.' Two grid cells (3,4) and (4,4) are the downtown cells. They are selected as they contain historic Bowling Green, as well as the traditional central business district. All other cells are classified as periphery.

**$H_0$: Proportions are the same.**

Source: Author (2003)

To explore whether there are significant differences between the choice of walking as the actual mode and the choice of walking as the preferred mode, the categories were reduced to "walked" and "other," with "other" including all categories except walking. This can be done using the Chi-Square test, as it will generate a high $X^2$ value and subsequent low p-value if at least one category is significantly different. The generated
X² value of 1.6 is relatively low and the p-value of 20% allows the null hypothesis not to be rejected, indicating that there is no significant difference between the reclassified actual and preferred datasets. This finding suggests that Bowling Green residents showed the same level of preference for walking whether we consider what they actually do or what they say they would like to do. Another reclassification was performed, this time with the categories being “automobile” and “other.” “Automobile” includes both the drivers and passengers of automobiles and “other” includes everything else. A Chi-Squared test generated a high X² value of 19.3 and a p-value of 0. This indicates that there is a significant difference between the reclassified actual and preferred datasets.

Further tests were run on responses only in the downtown and responses only in the periphery. The tests reveal that both the downtown and periphery exhibit similar relationships between actual and preferred modes of transportation. Residents of both the downtown and periphery are just as likely to walk as they are to say they would prefer to walk. Likewise, responses from both the downtown and periphery indicate that a difference exists in the use, versus the preference to use, an automobile. The difference is a result of fewer people preferring to use a car (59.3% of people surveyed in the downtown and 86.7% of people surveyed in the periphery) than actually using a car (69% of people surveyed in the downtown and 95.8% of people surveyed in the periphery).

To summarize, in Bowling Green there is a significant difference between actual and preferred modes of transportation. Yet, when responses are reclassified to “walked” and “other,” there is no statistical difference between actual and ideal modes. When responses are reclassified to “automobile” and “other,” there is a statistical difference between actual and ideal modes. The conflicting results can be explained by looking at
Figure 60. While the graph appears to show a correlation between actual and preferred modes of transportation, the two datasets are nonetheless statistically different. The statistical difference may be due largely to a relatively high number of responses received for the preferred modes of “bicycle,” “bus,” and “train” compared to the actual modes. The lack of statistical difference when the dataset is reclassified to “walked” and “everything else” is attributable to the relative similarity between the number of people who actually walk and the number of people who say that they would prefer to walk. The statistical difference when the dataset is reclassified to “automobile” and everything else is a result of the lower values for the preferred modes of “automobile (driver)” and “automobile (passenger)” than for the actual modes. The indication is that the use of automobiles in Bowling Green outweighs the desire for the use of automobiles. The desire to use a bicycle, bus, or train outweighs the use of those modes of transportation.

Figure 60
Actual and Preferred Modes of Transportation in Bowling Green

Actual and Preferred Modes of Transportation. Bowling Green, Kentucky.

Source: Author (2003)
A Chi-Square test was also performed on actual and ideal modes in Penzance. A high $X^2$ value of 50.7 and a p-value of 0 resulted from the analysis (see Figure 61). The low p-value means that the null hypothesis is rejected and the alternate hypothesis accepted. As in Bowling Green, there is a significant difference in actual and ideal modes of transportation in Penzance.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Chi-Square</th>
<th>Chance that a Type I error has been made if $H_0$ is rejected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>all</td>
<td>50.7</td>
</tr>
<tr>
<td>walk</td>
<td>all other</td>
<td>5.5</td>
</tr>
<tr>
<td>automobile</td>
<td>all other</td>
<td>2.2</td>
</tr>
<tr>
<td>Downtown Responses*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>walk</td>
<td>all other</td>
<td>7.68</td>
</tr>
<tr>
<td>automobile</td>
<td>all other</td>
<td>2.28</td>
</tr>
<tr>
<td>Periphery Responses*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>walk</td>
<td>all other</td>
<td>2.39</td>
</tr>
<tr>
<td>automobile</td>
<td>all other</td>
<td>7.43</td>
</tr>
</tbody>
</table>

*Responses are classified as either ‘downtown,’ or ‘periphery.’ Two grid cells (4,4) and (4,5) are the downtown cells. They were selected as they contain historic Penzance, as well as the central business district. All other cells are classified as periphery.

** $H_0$: Proportions are the same.

Source: Author (2003)

To explore the data further, the categories were reduced to “walked” and “other,” with “other” including all categories except walking. The generated $X^2$ value of 5.5 is relatively low, but the p-value of 2% means that the null hypothesis is to be rejected, indicating that there is a significant difference between the reclassified actual and preferred datasets, meaning that residents of Penzance showed a different level of preference for walking whether we consider what they actually do or what they say they would like to do. Another reclassification was performed, this time with the categories
being “automobile” and “other.” A Chi-Squared test generated a low $X^2$ value of 2.2 and a p-value of 14%, indicating that there is no significant difference between the reclassified actual and preferred datasets, meaning that residents of Penzance showed the same level of preference for using an automobile whether we consider what they actually do or what they say they would like to do.

Further tests were run on responses only in the downtown and responses only in the periphery. The tests reveal that the downtown and periphery exhibit fundamentally different relationships between actual and preferred modes of transportation. Responses from the downtown reveal that there is a difference between the number of respondents who say that they walk versus the number who say that they would prefer to walk (72.3% and 56.9% respectively). There are also fewer people in the periphery who say that they would prefer to walk (10.7%) versus people in the periphery who actually walk (7.4%). However, this difference is not statistically significant. The Chi-Squared tests also expose the uneven relationship between the use and preference for the use of automobiles in the periphery of Penzance. There are more people (76.3%) in the periphery of Penzance who use an automobile than people in the periphery who say that they would ideally to use an automobile (68.4%). At the same time, in downtown Penzance, there are more people who say that they would prefer to use a car (29.2%) than there are people who actually use a car (21.5%). This difference is not statistically significant; however, it is enough to cancel out some of the difference between actual and preferred use of the automobile in the periphery and create the low general $X^2$ value of 2.2, which initially indicated that the use and preference of automobiles amongst residents of Penzance was the same.
In summary, there is a significant difference between actual and preferred modes of transportation. The same holds true, when the city is examined as a whole and when it is subdivided into categories of ‘downtown’ and ‘periphery.’ Residents of Penzance generally walk more than they would like to and, as a whole, use a car as much as they would like to. Figure 62 illustrates these trends and also reveals a larger desire to use a bus, bicycle, or train than an actual use of these modes.

A Chi-Squared test was performed on actual modes of transportation between the Bowling Green and Penzance datasets (Figure 63). A high $X^2$ value of 40.64 and a p-value of 0 were generated from the analysis. The low p-value means that the null hypothesis is to be rejected and the alternate hypothesis accepted. Hence, the actual modes of transportation used in Bowling Green and Penzance are statistically different from one another. The Chi-Squared test was also performed on preferred modes of...
transportation between the Bowling Green and Penzance datasets (figure 64). A large $X^2$ value of 24.7 and a p-value of 0 result from the analysis, indicating that the preferred modes of transportation used in Bowling Green and Penzance are statistically different.

Figure 63
Actual Modes of Transportation in Bowling Green and Penzance

![Bar chart showing actual modes of transportation in Bowling Green and Penzance](image)

Source: Author (2003)

Difference of proportions tests were conducted between the Bowling Green and Penzance datasets (Figure 65). The results reveal that both actual and preferred modes of transportation (in this case only walking and automobiles have been examined as these are the dominant responses) are fundamentally different between the two cities. The only exception is row 11, which indicates that there is a 6.16% chance of making a type I error by rejecting the null hypothesis. Thus, the proportion of people in the periphery of Bowling Green who prefer to walk is not different from the proportion of people in the periphery of Penzance who prefer to walk. The lack of difference may be a result of the unusually low proportion of responses in this category (only 3% in the periphery of Bowling Green and 7.4% in the periphery of Penzance). These low
proportions may in turn be a result of an upper limit on the distance people are willing to walk to the survey locations. It remains that both actual and preferred forms of transportation are fundamentally different between the core and peripheries of each city, as well between as each city as a whole.

Figure 64
Preferred Modes of Transportation in Bowling Green and Penzance

Source: Author (2003)
### Difference of Proportions between Bowling Green and Penzance

<table>
<thead>
<tr>
<th>Difference of Proportions tests*</th>
<th>Z-Score</th>
<th>Chance that a Type I error has been made if ( H_0 ** ) is rejected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) actually walk (Bowling Green responses) vs. actually walk (Penzance responses)</td>
<td>-3.89</td>
<td>0%</td>
</tr>
<tr>
<td>(2) actually use a car (Bowling Green responses) vs. actually use a car (Penzance responses)</td>
<td>5.88</td>
<td>0%</td>
</tr>
<tr>
<td>(3) prefer to walk (Bowling Green responses) vs. prefer to walk (Penzance responses)</td>
<td>-3.11</td>
<td>0.18%</td>
</tr>
<tr>
<td>(4) prefer to use a car (Bowling Green responses) vs. prefer to use a car (Penzance responses)</td>
<td>4.19</td>
<td>0%</td>
</tr>
<tr>
<td>(5) actually walk (downtown Bowling Green responses) vs. actually walk (downtown Penzance responses)</td>
<td>-6.18</td>
<td>0%</td>
</tr>
<tr>
<td>(6) actually use a car (downtown Bowling Green responses) vs. actually use a car (downtown Penzance responses)</td>
<td>6.11</td>
<td>0%</td>
</tr>
<tr>
<td>(7) prefer to walk (downtown Bowling Green responses) vs. prefer to walk (downtown Penzance responses)</td>
<td>-5.10</td>
<td>0%</td>
</tr>
<tr>
<td>(8) prefer to use a car (downtown Bowling Green responses) vs. prefer to use a car (downtown Penzance responses)</td>
<td>3.86</td>
<td>0%</td>
</tr>
<tr>
<td>(9) actually walk (periphery Bowling Green responses) vs. actually walk (periphery Penzance responses)</td>
<td>-2.59</td>
<td>0.96%</td>
</tr>
<tr>
<td>(10) actually use a car (periphery Bowling Green responses) vs. actually use a car (periphery Penzance responses)</td>
<td>5.26</td>
<td>0%</td>
</tr>
<tr>
<td>(11) prefer to walk (periphery Bowling Green responses) vs. prefer to walk (periphery Penzance responses)</td>
<td>-1.87</td>
<td>6.16%</td>
</tr>
<tr>
<td>(12) prefer to use a car (periphery Bowling Green responses) vs. prefer to use a car (periphery Penzance responses)</td>
<td>4.17</td>
<td>0%</td>
</tr>
</tbody>
</table>

*Responses in Penzance are classified as either 'downtown' or 'periphery.' Two grid cells (4,4) and (4,5) are the downtown cells. They were selected as they contain historic Penzance, as well as the central business district. All other cells are classified as periphery. Responses in Bowling Green are classified as either 'downtown' or 'periphery.' Two grid cells (3,4) and (4,4) are the downtown cells. They were selected as they contain historic Bowling Green, as well as the traditional central business district. All other cells are classified as periphery.

** \( H_0 **: Proportions are the same.

Source: Author (2003)
Discussion

It was hypothesized that there are fundamental differences in the way people perceive and interact with landscapes in Bowling Green, Kentucky, and Penzance, England, in part because of the broader structural and environmental differences between these settings. Specifically, it is hypothesized that perceptions about preferred forms of transportation to leisure and retail activities will be significantly different between residents of locations that have a significant difference in the modes of transportation to such leisure and retail activities. It has been shown that Bowling Green and Penzance exhibit significant differences in their systems and structures of accessibility and mobility. Furthermore, it has been demonstrated that perceptions about preferred forms of transportation to leisure and retail activities are significantly different between residents of the two cities.

Therefore, the hypothesis that there are fundamental differences in the way people perceive and interact with landscapes in Bowling Green, Kentucky, and Penzance, England, in part because of the broader structural and environmental differences between these settings, can be accepted. The hypothesis that perceptions about preferred forms of transportation to leisure and retail activities will be different between residents of locations that have a fundamental difference in the modes of transportation to leisure and retail activities has been shown to be true on three counts in this study. A difference in the modes of transportation to leisure and retail activities exists between the core and periphery areas of Bowling Green, the core and periphery areas of Penzance, and between the towns of Bowling Green and Penzance as a whole. Perceptions about preferred forms of transportation to leisure and retail activities between these areas are significantly different. Yet, while it has been shown that perceptions about preferred
forms of transportation to leisure and retail activities will be different between residents of locations that have a fundamental difference in the modes of transportation to leisure and retail activities, it has not been demonstrated without reasonable doubt that actual modes of transportation are correlated to preferred modes of transportation. While actual and preferred modes of transportation do resemble each other, this study has illustrated some of the specific differences. People in Penzance favor more bicycling, buses, and trains, and would like to walk less than they actually do. People in the periphery of Penzance would like to drive less than they actually do, while people in downtown Penzance do not drive very often, but would like to drive more, thus indicating a general desire to participate in the car culture. As in Penzance, residents of Bowling Green are in favor of more bicycling, buses, and trains. Residents of Bowling Green would like to walk and drive less than they actually do and thus favor alternate modes of transportation. However, this desire for more bicycling, buses, and trains appears to exist on an abstract and perhaps unrealistic level.

Further analysis should be performed in other environments before the hypothesis that perceptions about preferred forms of transportation to leisure and retail activities will be different between residents of locations that have a fundamental difference in the modes of transportation to leisure and retail activities is unconditionally accepted. This study moves beyond ideographic research by examining ways to empirically study structuration theory. Further research will allow nomothetic generalizations to be made about the concomitance of certain perceptions and certain urban forms and structures and systems of accessibility and mobility.
VI. Conclusion

This study has shown that there are fundamental differences in the way people perceive and interact with landscapes in Bowling Green, Kentucky, and Penzance, England, in part because of the broader structural and environmental differences. Perceptions about preferred forms of transportation to leisure and retail activities will be different between residents of locations that have a fundamental difference in the modes of transportation to leisure and retail activities. It has also been demonstrated, in most cases, that people’s perceptions about transportation infrastructures are closely related to the urban forms and transportation infrastructures they are surrounded by (despite being statistically different).

This study has also revealed that residents in Penzance seem to have a general desire to participate in the car culture and, at the same time, want an efficient, reliable, and inexpensive system of public transportation. Residents of Bowling Green are somewhat discontented with an automobile-dominated structure of transportation. The general sense amongst residents that there should be more possible modes of transportation in the area appears to be, in part, a reaction to the dominance of the automobile in Bowling Green and, in part, less of a desire for modes of transportation that don’t readily exist within the city and more of a desire to express ‘correct’ viewpoints.

The results of this study provide a base from which further questions can be asked. For instance, multivariate regressions might be constructed and used to predict perceptions about preferred forms of transportation to leisure and retail activities now that it has been shown that a correlation exists between the structure of systems of
accessibility and mobility to leisure and retail activities and perceptions about preferred forms of transportation to leisure and retail activities in a place.

Accessibility and mobility are the foundations upon which our lives and our societies rest. This study examined accessibility and mobility within the contexts of the pathways of interaction. It may provide an alternate way of looking at systems of accessibility and mobility rather than a purely spatial, perceptual, or structural analysis. Using deduction, this thesis should shed more light on regional differences in the pathways of interaction and the subsequent variations in systems of accessibility and mobility. Additionally, a fuller understanding of the relationship between perceptions and the structure of actual systems may allow planners of the landscape to become more familiar with the functionings of the structuration of accessibility and mobility and the pathways of interaction, thereby possibly eventually helping in the development of regionally relevant and specific plans created within the broader framework of the pathways of interaction.
VII Bibliography

Cornwall County Council (2001) http://www.cornwall.gov.uk/Transport/centofe/Td_map.htm
Millett (1880) *Penzance: Past and Present*, Penzance: Beare and Son
The Penwith Local History Group. (no date) *In and around Penzance during Napoleonic Times*. The Penwith Local History Group. Penzance.
Appendix

Transportation Questionnaire
Transportation Questionnaire

The purpose of this survey is to better understand relationships between transportation infrastructure and attitudes about preferred modes of transportation. All information will be anonymous, and forms will be destroyed after the completion of this research. Participating in this survey is entirely voluntary and implies informed consent to participate.

Please fill in the number of your choice to the right of the question.

1. Which grid cell on the attached map do you live in (if any)?
   [ ] Grid cell

2. What is the color of the area on the attached map that you live in (if any)?
   [ ] Color

3. What mode of transport did you primarily use to get here?
   [ ] walked
   [ ] private automobile (driver)
   [ ] bicycle
   [ ] train
   [ ] private automobile (passenger)
   [ ] bus
   [ ] other

4. How many minutes does it usually take you to get here from your home?
   [ ] 0-5
   [ ] 6-10
   [ ] 11-15
   [ ] 16-20
   [ ] >61

5. How many times a month do you come to this part of town (within ½ a mile of this location)?
   [ ] <1
   [ ] 1-2
   [ ] 3-4
   [ ] >8

6. What would your preferred form of transport to this area be if you were given the choice?
   [ ] walked
   [ ] private automobile (driver)
   [ ] bicycle
   [ ] train
   [ ] private automobile (passenger)
   [ ] bus
   [ ] other
   [ ] don't know

7. How many minutes would you be willing to walk in order to get here?
   [ ] 0-5
   [ ] 6-10
   [ ] 11-15
   [ ] 16-20
   [ ] >61
   [ ] don't know

8. Would you be willing to use a form of public transport to get here if it were available?
   [ ] yes
   [ ] no
   [ ] don't know

9. How many minutes would you be willing to walk to get to a mode of transport (such as a car, bus or train) that would take you here?
   [ ] 0-5
   [ ] 6-10
   [ ] 11-15
   [ ] 16-20
   [ ] >61
   [ ] don't know
10. Are you satisfied with the amount of time that it took you to get here?

- [ ] yes
- [ ] no
- [ ] don't know

11. How many minutes would you prefer your journey to take?

- [ ] 0-5
- [ ] 6-10
- [ ] 11-15
- [ ] 16-20
- [ ] 21-25
- [ ] 26-30
- [ ] 31-45
- [ ] 46-60
- [ ] >61
- [ ] don't know

12. How many separate trips a week do you use a car?

(e.g. a trip is a journey to and from your home)

- [ ] don't use a car
- [ ] 0-1
- [ ] 2-3
- [ ] 4-5
- [ ] 6-7
- [ ] >7
- [ ] don't know