TOURISM COGNITIVE DISTANCE
A Set of Research Propositions

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Abstract: A series of propositions relating to cognitive distance in the context of tourism is presented. The propositions are intended to frame the state of existing knowledge and to guide the development of future research. They are developed from inferences and transitions from work reported in other fields, as well as from exploratory findings reported in the literature of tourism. The two schools of thought about how cognitive distance distortions are caused suggest that distortion occurs while either encoding or decoding information. These two processing perspectives provide a framework for the discussion and development of the propositions. Keywords: cognitive distance, attractions, destinations, forecasting.

INTRODUCTION

Monetary, physical, and temporal resources have to be invested to overcome the friction of distance, which is likely to be a constraint in tourism destination selection decisions. Many travel decision models have incorporated actual distance measurements between areas of origin and actual or potential destinations using miles or hours of travel...
time (see review article by Calatone, di Benedetto and Bojanic 1987). However, the utility of using actual distance in such models is challengeable. Subjective distance rather than actual distance may best depict what goes on in individuals’ minds when they are making travel decisions. Thus, rather than viewing space as being composed of points or locations existing independently from the individuals occupying them, space should be construed as “an individual and social reflection of our senses, our education, our organizational structure, our life experiences, and also our imaginations” (Bailly 1986:86).

Because individuals differ in terms of their life experiences, the same space may be perceived differently by different people. The process by which information of geographic distance between locations or phenomena in the external environment is acquired, mentally represented, transformed to spatial knowledge, and recalled for distance judgment is referred to as distance cognition, and the product of this process is called cognitive distance (Cadwallader 1979). Cognitive distance is defined as the distance estimates made by individuals based on the use of information stored in their memory and their beliefs (Middelstaedt, Grossbart and Curtin 1977). It is the mental representation of actual distance molded by an individual’s social, cultural, and general life experiences.

The concept of cognitive distance has its origins in the fields of geography and psychology. Until the 1960s, human geographers primarily directed their research efforts toward observing, recording, describing, and classifying the spatial manifestations of human actions on the environment. Whenever explanations were sought for these manifestations, they were mainly in the form of “coincidental relationships between overt activity and the structural characteristics of the environment and its resource base” (Golledge and Rayner 1982). Psychological explanations for these activities were not considered.

This changed when Torsten Hagerstrand, a Swedish geographer employing methods from psychology, produced his innovative works on migration (1952) and later on diffusion of innovation (1968). As a result of Hagerstrand’s work, a growing number of geographers realized that a greater understanding of both human and physical phenomena and the relationship between them could be gained by a knowledge of individuals and their thoughts and actions (Golledge and Rayner 1982). Among the geographic research efforts that employed methods from psychology during the 1960s and early 1970s were the investigation of perceptions of natural hazards under the leadership of White, Kates and Burton (1963); Lowenthal (1972); and Lowenthal and Prince’s (1965) work on perception of landscapes; Gould’s (1973) mental maps and preferences for place; Wolpert’s (1964, 1966) use of the concept of satisfaction in his studies of risks and uncertainties; and Downs (1970) and Downs and Stea’s (1973, 1977) studies of cognitive maps.

About the same time that geographers were reaching out to psychology for alternative explanations to spatial problems, psychologists such as Wohlwill (1966) began questioning the circumscribed nature of their field and calling for extending research beyond experimentation with animals and humans, to investigating the relationship between humans and their everyday physical environment. It was argued that humans
exist in a complex external environment that has an impact on the way they live and act, and a complete understanding of human feelings, thoughts, and behavior cannot be gained by isolating humans from their external environment. A consequence of moving psychological research out of the laboratory into the realm of the external real world was that it made psychologists more aware of tools and techniques used in the field of geography (Golledge and Rayner 1982).

Given the evolution of the concept of cognitive distance, it is not surprising to find that much of the research in cognitive distance has been done by academicians with backgrounds in geography and psychology. In the field of tourism, relatively little has been reported on the concept of cognitive distance. The purposes of this article are to review the literature that has been published in a variety of fields, to integrate it, and to develop from it an inventory of propositions that will serve as a comprehensive framework for directing future research into the role and impact of cognitive distance in the field of tourism.

The different disciplinary backgrounds of researchers who have investigated cognitive distance are reflected in the two types of objectives that have been pursued. Some researchers have focused on identifying variables that appear to influence estimates of cognitive distance. Typically, they have examined the impact of environmental characteristics such as topographic, cultural, and political boundaries, or personal attributes and trip characteristics such as age, frequency or duration of visit, attractiveness of destination, or level of involvement in the travel experience.

Other researchers have focused on seeking psychological explanations for cognitive distance distortion. The present authors believe this latter approach is likely to be more fruitful in developing theory. Hence, a process perspective has been adopted in this article, and an attempt has been made to incorporate the variable identification literature into that framework.

Although there is a lack of agreement in the literature on the specific cause of differences between cognitive distance estimates and actual physical distance, there is some general consensus that it is attributable to the processes individuals use to code spatial information into memory, to store it, and to retrieve it (Lloyd and Heivly 1978). There are two schools of thought about how information processing causes cognitive distance distortions. The first suggests that distance distortion occurs at the time information is encoded and stored in memory. Those in the alternative school believe that people code and store spatial information accurately in memory, but that it becomes distorted during the decoding or retrieval process. These two processing perspectives provide the broad framework for discussion and development of the propositions in this article.

DISTORTION WHILE ENCODING INFORMATION

Several variations of hierarchical models have been proposed to explain cognitive distance distortion attributable to inaccurate encoding and storage of spatial information. Proponents of these models claim that spatial information is internally organized and stored in memory
in hierarchies (Stevens and Coupe 1978), discrete categories (Kosslyn, Pick and Fariello 1974; Tversky and Hemenway 1983), or semantic clusters (Hirtle and Mascolo 1986).

It is argued that clustering spatial information into categories results in mental displacement of landmarks and accounts for subsequent perception of distance being distorted (Hirtle and Jonides 1985). The underlying premise of these models is that different "regions" of an environment are stored as different segments in memory. This kind of mental arrangement allows individuals to explicitly and precisely encode and store spatial relationships among superordinate units (higher-order units in the hierarchy), or among subordinate units (lower-order units) within a superordinate unit (Lloyd and Heivly 1987). However, spatial relationships among subordinate units belonging to different superordinate units are not explicitly encoded and stored to memory. As a result, such spatial relationships must be inferred from the stored spatial relationships among superordinate units.

For example, relationships between cities within states or between landmarks within a neighborhood region are stored precisely, but relationships between cities in different states or between landmarks in different urban-neighborhood regions are not stored in memory. Thus, spatial relationships between cities in different states or between landmarks in different urban neighborhoods can only be inferred from knowledge of spatial relationships between different states in which the cities are located or the different urban neighborhoods containing those landmarks (Lloyd and Heivly 1987). It is the lack of explicit encoding and storage of spatial relationships among subordinate units of different superordinate units that causes people to mentally misplace cities or landmarks. This causes misconceptions about the relative location of these entities and consequent cognitive distance distortions. Spatial environment might be divided into superordinate hierarchies by physical boundaries (e.g., rivers or mountain ranges); peripheral boundaries (e.g., political jurisdictions or lines drawn on a map); or cultural or linguistic boundaries (McNamara 1986).

People tend to align particular tourism destinations (subordinates) that are located within different states (superordinates) to conform with the relative alignments of the respective states as they appear on a cartographic map. Stevens and Coupe (1978) suggest it was this encoding and storage process that caused their respondents to locate Reno (Nevada, USA) northeast of San Diego (California, USA), rather than north of it. They believed their respondents had a tendency to perceive alignments between the two cities as being synonymous with the general spatial alignments of the two states.

Similar findings were reported by McNamara (1986) in a laboratory study. Three groups of subjects (a map group and two direct-experience groups) learned the location of objects and participated in three tasks: item recognition, direction judgment, and distance estimation. McNamara reported that all the subjects, irrespective of the group to which they belonged, recognized a target object faster when it was primed by a close object in the same region than when it was cued by a close object in a different region. In the direction judgment, the three groups also demonstrated similar patterns of results. They all
tended to distort spatial judgments to correspond with superordinate spatial relations. That is, direction judgments between objects with vertical superordinates (objects in regions with a vertical orientation) tended to be distorted in a vertical direction, and judgments between objects with horizontal superordinates tended to be distorted in a horizontal direction. As with the other two tasks, distance judgments showed no group differences. All subjects tended to underestimate distance between objects in the same region and overestimate distance between objects in different regions.

McNamara (1986) also reported that subjects tended to overestimate distances between close objects in different regions. He observed that the magnitude of alignment distortion was much larger for closer objects in different regions than for distant objects in different regions. On the basis of this observation, McNamara reasoned that the displacement of locations of objects resulting from alignment distortions tended to have an impact on closer objects in different regions more than distant objects in different regions. In other words, the alignment of objects (subordinates) to conform with the alignment between their respective superordinates tended to expand psychologically the distance between relatively closer objects in different regions and contract that between distant objects in different regions.

Hirtle and Jonides (1985) used undergraduates from Michigan State University (USA) as subjects and asked them to perform a series of tasks. These included memorizing and recalling the location of 32 landmarks in Central Ann Arbor (Michigan, USA) and undertaking relative judgments of the distances between 64 pairs of these landmarks. Findings from two different measures showed that subjects tended to overestimate across cluster distances and underestimate within cluster distances. That is, subjects underestimated distances between landmarks perceived as belonging to the same recall set and overestimated distances between landmarks perceived as belonging to different recall sets.

Proposition 1: Distances between an origin and a destination that are in different superordinate hierarchies are likely to be overestimated, while a similar distance between an origin and a destination located within a superordinate hierarchy are likely to be underestimated.

Proposition 1(a): Distances between two relatively close tourism destinations that are located in different superordinate hierarchies are likely to be overestimated, while distances between destinations that are far apart and located in different superordinate hierarchies are likely to be underestimated.

Superordinates can be created by spatial biases resulting from differential information availability. Gould and White (1986) consistently demonstrated this phenomenon in the mental maps they developed that identified cognitive geographic profiles of ignorance, desirable locations, and preferred locations. They showed that the segment of
the geographical environment for which information is readily available may be construed as a different hierarchy from segments for which relatively little or no information is available.

In a typical case, they reported that respondents in Inverness, in the north of Scotland (United Kingdom), identified the areas around Inverness and around Glasgow and Edinburgh as being substantially more desirable areas in which to live than elsewhere in Scotland and northern and central England. However, they also identified areas in the south of England as being superhierarchies that were desirable places in which to live. This pattern may be explained by differential media exposure. These respondents are likely to be exposed to information from newspapers, television, and radio in the Inverness area and from the major Scottish cities of Glasgow and Edinburgh. They also may be exposed to the national media in Britain that are predominantly based in the south of England. The consequence of this spatial bias created by differential information availability is that potential tourists may know more about tourism destinations within information rich superordinates than in information-poor superordinates. The increased knowledge may result in those superordinates about which they have most information being perceived as being more familiar and in closer proximity.

**Proposition 1(b):** Cognitive distance estimates of tourist destinations within information rich superordinates are likely to be underestimates, while those within information poor superordinates are likely to be overestimates.

Another corollary of Proposition 1 emerged from the work of McNamaara, Ratcliff and McKoon (1984) whose findings suggested that a distinctive route could be a superordinate and places located along it perceived as subordinates. Their subjects were asked to learn the locations of cities on simplified road maps and then to undertake a recognition test. They were also requested to estimate distances between these cities. Results indicated that a specified city was recognized more quickly when it was primed by a close city on the same route, compared to when it was cued by an equally close city located on a different route. It was suggested this demonstrated that close cities on the same route were stored "closer in the mental representation than close cities on different routes." The researchers also reported that subjects had a greater tendency to underestimate distances between locations that were comparatively close to each other in both actual physical (Euclidean) distance and route distances, than in locations that were similarly close to each other in Euclidean distance but located on different routes.

**Proposition 1(c):** The distance between tourism destinations located on the same main route is likely to be underestimated, and to be perceived as less than the distance between destinations located a similar distance apart but on different main routes.

In a further corollary of Proposition 1, Allen and Kirasic (1985), in a series of three laboratory experiments, demonstrated that environ-
mental features could create distinctive segments along a route that could be perceived as superordinates, while destinations along the route within each of these segments could be perceived as subordinates. This had the effect of making distances between destinations within a common route segment seem shorter than equivalent distances between destinations located on different route segments. Results of their study indicated that distance estimates across individual segment boundaries tended to be overestimates, while distance estimates within the same route segment tended to be underestimates.

Similar results were reported by Cohen, Baldwin and Sherman (1978) in their investigation of distance judgment distortion within the confines of a summer camp. They observed that subjects tended to overestimate distances between locations on a route crossing distinctive environmental barriers compared to distance estimates made in situations where the route did not cross such barriers.

Proposition 1(d): Cognitive estimates made from a standard reference point (e.g., place of residence) of the distance between tourism destinations perceived as being located within the same route segment are likely to be underestimates, while those made between destinations perceived to be in different route segments are likely to be overestimates.

Hirtle and Mascolo (1986) conducted three laboratory experiments and their findings suggested that superordinate cluster groups can be created by semantic information without using explicit environmental features, because clustering is a memory as well as a perceptual phenomenon. This suggests a further corollary of Proposition 1: that superordinate boundaries can be created semantically as well as physically in space. Spatial information may be organized into cluster categories based on the semantic names given to landmarks that already exist in the memory.

Proposition 1(e): Cognitive estimates of distances between attractions perceived as likely to be located near to each other in a city are likely to be underestimates, while those made between attractions of equivalent distances but not perceived as likely to be located close together are likely to be overestimates.

DISTORTION WHILE DECODING INFORMATION

Two types of models have been proposed by proponents of the notion that cognitive distance distortion occurs at the stage of decoding and information retrieval. They are analog and implicit-scaling models. In contrast to those used to explain encoding distortions, both of these types of models are nonhierarchical because they propose that spatial attributes of the external environment are stored in memory without any mental reorganization of the attributes. In effect, the mental representations are mirror images of corresponding spatial relations in the external environment. Proponents of these nonhierarchical mod-
els suggest that “cognitive maps may have contained consistent spatial information, but spatially inconsistent information can be obtained from these representations due to retrieval or inference processes” (Moar and Bower 1983:112).

**Analog Models**

Proponents of analog models suggest that people make cognitive distance judgments by retrieving from memory mental images or pictures of spatial relationships between locations in the external environment, and then with the mind's eye they scan the mental distance separating the locations whose distance is to be estimated. It is believed that the more intervening points there are between location X and location Y whose distance is being judged, the longer it takes the mind's eye to scan from location X to location Y in the mental picture. This occurs because the eye has to wander from starting point X through the various intervening points until it reaches the terminal location Y. The longer it takes the eye to scan the mental picture, the longer the distance is perceived to be. In other words, the more features of the external environment that are recollected in the mental picture as being interposed between destinations whose distance is being estimated, the longer the distance is perceived to be. Proponents also suggest that short distances between locations in a particular external environment only constitute a relatively small portion of the total mental picture of that environment and consequently are more difficult to evaluate by scanning with the mind's eye. As a result, such distances are more likely to be overestimated than longer distances.

A number of empirical studies have reported findings that verify the outcomes associated with the analog model. Some of this evidence is drawn from laboratory studies. This evidence should be regarded as tentative, because distance estimation at room scale is likely to be at least partially based on visual perception and memory rather than upon pure cognitive construction, which is more likely to be present in distance estimates made at a city, regional, or national scale.

Kosslyn, Pick and Fariello (1974), in a study requiring both adults and children to judge distance between objects in a room from memory, found that these distances tended to be overestimated when barriers were placed between the objects. On a larger scale, Thorndyke (1981) demonstrated that intervening points, which he termed *clutter*, between cities affected distance judgment. In a series of four experiments, he investigated the effects of map clutter (number of cities along a route) on subjective distance estimates. His findings indicated that subjects' mean distance estimates tended to increase as the number of intervening cities on the connecting route increased, irrespective of whether subjects were estimating distance from memory or while viewing the map. Byrne's (1979) experimental study sought to ascertain the influence on cognitive distance of number of bends on a route, actual length of the route, and type of route (central shopping district compared to residential). His results indicated there was a relative overestimation of distance on routes in the town center, routes having several major bends and short routes. Byrne suggested, “subjects use
mental representations which do not generally encode vector distances, and rely on the heuristics that the more locations remembered on that route, the longer it must be" (Byrne 1979:152).

Staplin and Sadalla (1981) reported that two components of route structure, namely, turns and intersections, influenced cognitive distance estimates of that route. The effects of turns were investigated in the laboratory by asking 40 students to walk along two 200-foot-long, fixed paths one containing two right-angle turns and the other, seven right-angle turns. They reported that 38 of the 40 subjects estimated the path with seven turns to be longer than the path with two turns. Subjects required no more time to walk the seven-turn pathway than they did the two-turn pathway, demonstrating that the effect of pathway structure could not be attributed to differences in the time duration of travel.

A second experiment, also by Staplin and Sadalla (1981), was designed to test the influence of intersections on cognitive distance. The lengths of three paths laid out with tape on the floor of a laboratory were estimated by 72 students. The paths were segmented by cross-paths at regular intervals and contained a varying number of intersections (either 1, 4, or 7) marked with solid red circles overlying the tape. All the experimental paths were equal in length. Results of the intersection effects on cognitive distance estimates were similar to the turn effects, that is, subjects’ estimates of path lengths increased with the increasing number of intersections along the pathway. Mean traversal times were identical for all paths.

Staplin and Sadalla (1981) replicated the intersection part of their study in a field context. Subjects were randomly selected from shoppers at a mall in the greater Phoenix (USA) area and asked to estimate the distance to two different target points situated in opposite directions along a major street adjacent to the mall. The target points were equidistant (1.5 miles) and were defined by intersections with well-known cross streets. The routes connecting the target points consisted of straight roads with two or six main intersections. The subjects also were requested to indicate the number of intersections they could remember along the routes connecting the two target points to the shopping mall. It was reported that subjects considered the target point located along the six-intersection route to be significantly further away from the mall than the target point on the two-intersection route. Also, subjects tended to remember more intersections along the route segment represented as being subjectively longer.

In a field situation, the amount of “clutter” that is perceived to exist between two destinations is likely to be at least partially dependent on degree of familiarity with the route between those destinations. Greater familiarity is likely to result in awareness of more landmarks.

Golledge, Briggs and Demko (1969); Eriksen (1975); Briggs (1973); Golledge and Zannaras (1973); and Byrne (1979) all reported relative overestimation of distances by subjects from given reference points toward the central business district in cities they studied. These studies suggested that the more features of a route that are remembered, the longer that route is perceived to be. Accordingly, it is suggested that distance overestimation toward a city center may be explained by sub-
jects being more familiar with that part of the city. The familiarity may be the result of relatively frequent visits and possibly also the effect of heavy traffic slowing mobility and making it possible for subjects to encode and store more features on that route. In contrast, it is suggested that the less busy highways leading out of the city to the less-frequented suburbs do not facilitate encoding and storage of detailed spatial features.

**Proposition 2:** Cognitive distance estimates to tourism destinations a relatively short distance apart are likely to be overestimates, while distance estimates to destinations a relatively long distance apart are likely to be underestimates.

**Proposition 3:** Cognitive estimates of distance between tourism destinations located on routes with many intervening landmarks or environmental features are likely to be overestimates, while estimates of distance between destinations with relatively few intervening landmarks or environmental features are likely to be underestimates.

It might reasonably be assumed that those whose experience with a route has been relatively active and involving would be more likely to perceive and memorize intervening landmarks; thus, they are prone to overestimating cognitive distance. However, empirical evidence from several studies suggests that this does not occur. Rather, the evidence suggests that active involved travelers offer relatively accurate estimates of distance. Thus, Brown and Broadway (1981) reported that respondents who drove frequently were more accurate in their cognitive distance judgments than infrequent drivers. Female gender and infrequent car use were found to correlate with confusion about inter-town distances. Appleyard, Lynch and Myers (1964), in a study of the perception of near and distant landmarks by drivers and passengers of automobiles, found that passengers were more likely to distort distance estimates than drivers. It was reasoned that because automobile drivers must keep track of their itineraries, they process more landmarks than a passenger who pays attention to fewer details of the journey. However, instead of leading to more "clutter," this leads to greater accuracy. Downs and Stea's (1977) studies confirmed Appleyard's earlier findings that active travel experience (e.g., by driving or cycling) requires more interaction with elements in an environment and more attention to the environment which subsequently leads to more spatial learning.

**Proposition 4:** Cognitive distance estimates made by active travelers (e.g., those who drive) are likely to be more accurate than estimates of those whose travel experience is passive (e.g., those who are driven or travel by air).

Knowledge about travel routes may be encoded to memory through direct experience, as when one travels along them, or indirectly by looking at a map (Lloyd 1989). Some passengers are actively involved by serving as the travel group's map readers and route navigators. This leads to a corollary of Proposition 4, which suggests that because
map readers see "the big picture," their cognitive distance estimates may be more accurate than drivers who do not refer to a map. Spatial knowledge acquired from a map is holistic in that a visual impression of the total environment can be encoded and memorized. In contrast, information acquired through direct travel occurs in discrete chunks from which it is more difficult to form and store in memory an holistic image.

Lloyd (1989) compared the cognitive maps of subjects who acquired spatial information about a city only through navigation (direct experience) with those of map reading subjects who had no prior navigation experience. He reported that although both groups generally overestimated distances, those with direct experience tended to overestimate distances more than those who had studied the cartographic map. This is consistent with an expectation that they would be more aware of intervening landmarks. It was also found that the navigation group was slower in performing the distance estimation task. Consequently, Lloyd suggests that "subjects who had learned the locations from a cartographic map performed the task significantly faster probably because the spatial information they were using to solve the problem was stored in an imagery mode as survey knowledge and could be looked at with the mind's eye as one would look at a cartographic map to determine locations" (Lloyd 1989:122).

**Proposition 4(a):** The cognitive distance estimates of those who learned about a given route from maps will be more accurate than estimates made by those who learned about the same route through direct travel.

The two attributes of active experience and seeing "the big picture," which are hypothesized in Propositions 4 and 4(a) as being related to accuracy of cognitive distance estimates, may be the product of both length of residency in an environment and frequency of usage. This suggests two further corollaries to Proposition 4.

Individuals who have been in an environment for a longer time and explored it frequently are likely to possess a greater quantity and more accurate knowledge about that environment than their relatively new counterparts. As a consequence, the cognitive distance estimates of the two groups using that environment as a reference point will be different in terms of their accuracy.

Researchers who have linked length of residence in, and degree of experience with, an environment and cognitive distance include Golledge and Spector (1978), Golledge and Rayner (1982), Golledge and Zannaras (1973), and Foley and Cohen (1984). Golledge and Spector (1978) investigated cognitive maps of residents in Columbus (Ohio, USA) and reported that the length of time respondents had lived in the city and their familiarity were related to distortion of cognitive distance. Relatively new and less familiar residents distorted distance more than their longer-established and more familiar counterparts. Golledge and Rayner (1982) reported similar results. Foley and Cohen (1984) examined the differences between first-year undergraduate students and fourth-year undergraduates in cognitive distance dis-
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tortions of locations on campus. Their findings showed that first-year students were more likely to distort distances than the fourth-year counterparts.

Proposition 4(b): Cognitive distance estimates of places in the vicinity of a tourist destination made by long-time residents who actively explore their environment are likely to be more accurate than those made by relatively new residents.

Proposition 4(c): Cognitive distance estimates of places in the vicinity of a tourist destination made by long-time residents who are frequent explorers of that environment are likely to be more accurate than those made by similar long-term but inactive residents.

The more individuals frequent a destination, the more accurate their knowledge of its environs is likely to be. Those who have previously visited a destination have information stored in memory, while those with no direct experience of it have to rely on secondary information sources and their imagination. Unless there has been an active search for information specifically related to the destination, the lack of direct experience is likely to lead to distance distortion.

Proposition 4(d): Cognitive distance estimates of places in the vicinity of a destination made by frequent visitors are likely to be more accurate than those made by new or infrequent visitors.

In one of the earliest studies to apply the concept of cognitive distance to the conventional gravity model, Thompson (1963) reported that subjects who did not patronize a store overestimated both time and distance required to drive to that store, while those who did patronize it underestimated distance and time. Thompson believed that a subject's negative feeling about a particular store not only inhibited patronage of it but "was further extended by him to influence his evaluation of physical distance between his own home and store" (Thompson 1963: 5). In other words, affective feelings about a retail establishment distorted cognitive distance estimates.

In contrast to the findings reported by several investigators that were noted earlier in the article in the discussion of Propositions 2 and 3, Lee (1963, 1970, 1973) reported in three separate studies that subjects underestimated distances from reference points toward the central business district and overestimated distances from reference points away from the town center. Lee attributed these findings to the relative desirability of downtown destinations by his respondents, suggesting that respondents perceived downtown destinations as being more attractive than periphery destinations.

Mayo, Jarvis and Xander (1988) tested the hypothesis that the attractiveness of tourist destinations will increase as cognitive distance increases. They reported that faraway destinations were perceived by respondents to be more attractive than closer destinations. Because potential tourists have to incur monetary, effort, time, and opportunity
costs to overcome the friction of distance, they may underestimate cognitive distances to destinations perceived as attractive in order to place them within the parameters of their cost threshold.

*Proposition 5:* Cognitive distance is likely to be underestimated if the tourism destination is perceived as being very attractive and overestimated if the destination is perceived as being less attractive.

Hartley (1981) timed subjects as they estimated the length of lines shown at various degrees of orientation (from horizontal through to vertical orientation) on a computer screen. He reported that the longer a line, the longer it took subjects to judge its length. Further, the more a line deviated from a horizontal position, the longer it was estimated to be. He also reported that 58 of the 60 subjects indicated they first formed a mental image of the standard line he provided to facilitate their distance estimates and then used it as a mental analog of a rule with which to measure the target line. Hartley attributed overestimation of lines that deviated from the horizontal position to an anchoring effect. That is, the deviation of a target line from the horizontal position caused subjects to misplace their mental marker at the point where the slant of the line departs from the horizontal, resulting in a cognitive lengthening of the target line.

*Proposition 6:* Subjects are more likely to underestimate the distance from a given reference point to tourism destinations located on flat topography and to overestimate the distance to equidistant destinations located in areas of relatively steep topography.

Canter and Tagg (1975) reported findings that they claimed harmoniously linked the theoretical differences between the findings of Golledge and Zannaras (1973) and Lee (1963, 1970, 1973) on the conflicting effects of direction (toward or away from) a city center had on cognitive distance. They conducted 11 studies in cities in five countries to examine the effects of the form of a given city on distance estimate distortion. In all cases, residents of each city were asked to judge the distance between selected points distributed across their city and well-known locations.

Results of the study indicated that in three cities (i.e., Glasgow, Heidelberg, and London) subjects tended to underestimate distances by judging them to be only about \( \frac{3}{4} \) of what they actually were. In contrast, subjects in three other cities (Nagoya, Tokyo, and Edinburgh) generally overestimated distances by considering places to be about \( \frac{5}{8} \) further away than was actually the case. Observation of the forms of each of the six cities showed that the cities characterized by distance underestimation were divided by rivers, while those cities in which distances were overestimated were bounded by bays or oceans.

As a consequence of this observation, two cities, Glasgow (representing cities with underestimated distances) and Tokyo (representing cities with overestimated distances) were selected and subjected to a more detailed analysis. They reported that individuals place some
mental structure upon a city in order to cope with its complexity. "This means individuals place on their concepts some simplifying scheme which enables them to remember and act on their image readily" (Canter and Tagg 1975:71). Based on this concept, the investigators reasoned that the Clyde River, which flows through Glasgow city center, provided subjects with a reference line from which they could organize their concept of the city. Specifically, all locations in the city were remembered with reference to the Clyde. By acting as a reference line or focal point around which subjects organized their conceptual structure of the city, the Clyde River had the cognitive effect of drawing places toward the city center. This accounted for the distance underestimation. In contrast, the city of Tokyo lacked a distinct central reference line like the Clyde, around which subjects could organize their conceptual structure of the city. As a consequence of the absence of an overall reference line, individuals resorted to the use of other features like railway stations that were located away from the center of the city as reference points for their conceptual simplification of this intricate city. This lack of a formal component tended to psychologically act in the opposite way to a central river (drawing places away from the center), thus leading to overestimation of distances.

On the basis of these results, Canter and Tagg argued that the contrast between the findings of Golledge and Zannaras (1973) and Lee (1963, 1970, 1973) on the conflicting effects of direction on distance estimates in relation to the city center, possibly related to the cities having different forms. Lee's (1963, 1970, 1973) studies, which found underestimation toward the city center and the reverse away from it, dealt with cities with distinct central reference structure, while Golledge, Briggs and Demko (1969), who observed the opposite, dealt with featureless cities. In a concluding remark to their study, Canter and Tagg asserted that "in dealing with concepts at the scale of a city, road, railways, and rivers rather than act as barriers may act to give the city its coherent structure" (Canter and Tagg 1975:79).

**Proposition 7(a):** Cognitive distance estimates to attractions within a city with distinct geographical features are likely to be underestimates, while distance estimates to attractions within a similar city with no distinctive features are likely to be overestimates.

**Proposition 7(b):** Cognitive distance estimates to tourism destinations by residents of a city with distinct geographical features are likely to be underestimates, while similar estimates by residents of a city with no distinct features to the same destinations are likely to be overestimates.

**Implicit Scaling Models**

Proponents of the second type of nonhierarchical models—implicit scaling models—suggest that cognitive distance judgments are executed by using a mental scale to make an internal comparison among memory representations of locations in the external environment. This comparison is termed *implicit scaling* because, though it is not visible, it
is perceived to be conceptually similar in nature to a cartographer’s use of scales to measure map distances. Implicit scaling models are characterized by the phenomenon of distance judgment asymmetry, which is the tendency to judge the distance from a familiar reference point to a terminal location (a nonfamiliar point) as being longer than vice versa. A corollary of this is that distances to locations in the vicinity of a reference point are overestimated, while distances to locations far from the reference point are underestimated. This process suggests similar relationships to those espoused in Propositions 2 and 3—that short-distance estimates are likely to be overestimated and the long-distance estimates underestimated, and that estimates of distances between destinations with many intervening points will be overestimates, while those with few intervening points will be underestimates. The difference in outcome suggested by the implicit scaling models appears to be a caveat that the relationships proposed in Propositions 2 and 3 will be upheld only if the distance estimates are made from a familiar reference point.

Implicit-scaling models attribute the asymmetry in distance estimation to processes occurring in an individual’s working memory at the time of distance judgment. In making distance judgments between, say, a familiar point A and two different locations, namely, B, in the vicinity of the reference point and E far from the reference point, individuals retrieve and recode the location value of each stimulus (subjective distances of A–B and A–E) stored in the long-term memory into the working memory. It is in the working memory that distance judgment using an internal category scale is purported to occur. Implicit scaling models assume that the width of the categories on the internal scale varies with the number of intervening points individuals remember as being between a reference point and a target terminal location. The categories will be spaced wider for the distance to a terminal location with more intervening points separating it and a reference point, than for the distance to a terminal location interspersed with fewer locations. The effect of varying the width of categories on the internal scale to conform with the number of remembered intervening points is to transform the underlying continuum (subjective distance) retrieved from the long-term memory. This stretches the perceived distances between locations in the vicinity of a reference point leading to overestimates because individuals are likely to be familiar with more locations in the vicinity of their reference location than elsewhere and, therefore, will use wider-spaced categories on their internal scale when measuring distances to locations near them.

Holyoak and Mah (1982), using the Pacific and Atlantic Oceans as reference points, asked subjects to judge pairs of US cities in terms of their distance to and from the Pacific and Atlantic Oceans. They found that subjects using the Pacific Ocean as a reference point tended to “expand” the distance between western cities relative to comparable distances between eastern cities. The reverse occurred among subjects when the Atlantic Ocean was used as a reference point. Subjects tended to overestimate the distance between eastern cities relative to comparable distances between western cities. The investigators explained their results in terms of subjects’ high familiarity with more
locations in the vicinity of their reference point. When the Pacific Ocean was used as the reference point, subjects tended to be more familiar with western cities that are located within the vicinity of the reference point than eastern cities that are far from it. The consequence of subjects' familiarity with more cities on the west coast, using the Pacific Ocean as a reference point, was to stretch cognitively the distance between western cities. On the other hand, subjects' unfamiliarity with many eastern coast cities, using the Pacific Ocean as a reference point, cognitively contracted distances between the eastern cities. The reverse occurred when the Atlantic Ocean, rather than the Pacific Ocean, served as the reference point. Holyoak and Mah suggested their results provided evidence that cognitive distance estimates can be influenced by the reference point with respect to which the judgments are made and are likely to be different when different reference points are used.

Similar findings were reported by Lloyd and Heivly (1987), who investigated whether the location of neighborhoods in an urban area significantly affected distortions in cognitive distance estimates. They found that distances were overestimated around familiar reference points.

Proposition 8: Cognitive distance estimates to tourism destinations located in the vicinity of a familiar reference point (e.g., place of residence) are likely to be overestimates, while distance estimates to destinations far away from this reference point are likely to be underestimates.

CONCLUSIONS

The importance of cognitive distance in forecasting tourism demand was emphasized by Cook and McCleary (1983). They pointed out that most travel destination decision models incorporate a distance variable that is specified by actual distance or travel time. However, because tourists may rely on cognitive distance, rather than actual distance, in evaluating a destination, these decision models are likely to be inaccurate.

There are two possible outcomes from cognitive distance distortion, both of which may adversely impact a destination. First, distance to a destination from potential tourists in a given target market may be overestimated. In this case, the magnitude of the distance constraint is increased and the probability of the destination or attraction being visited is reduced. Second, the distance may be underestimated. Ostensibly, this may appear to be advantageous—it reduces the distance constraint and makes visitation more likely. However, this is a myopic perspective. The expectancy paradigm proposes that expectations provide a baseline that determines level of satisfaction (Oliver and DeSarbo 1988). Dissatisfaction occurs when the experience does not match expectations. In the underestimation distortion case, the expectations of a shorter travel distance will not be met when the trip is undertaken leading to negative reactions by visitors. If distance distor-
tions can be identified, then destinations can make efforts to rectify the distortion effect in their promotional efforts.

The general consensus in the literature is that differences between cognitive distance estimates and actual physical distance are attributable to the processes individuals use to code information into memory, to store it, and to retrieve it (Lloyd and Heivly 1987). However, it is not reasonable to attribute all this variation to the distortion associated with processing the information. Some of the distortion may be attributable to the initial information that is processed being inaccurate. The extent to which the initial information that is encoded is accurate is likely to vary. Some of the sources from which passive and active information on distance is gathered are likely to be more accurate and reliable than others.

For ease of exposition in this review, all the findings reported were attributed to one of the two schools used to explain the distortion that underlies the concept of cognitive distance. However, because neither the encoding nor the decoding information approaches appear to fully explain cognitive distance distortions in all contexts, it is probable that in any given situation both processes may contribute to the distortion.

In any given situation, various features that have been identified as influencing distortion may have a multiplicative effect that magnifies cognitive distance error or a counterbalancing effect that mitigates cognitive distance error. For example, Proposition 1 states that distances to tourism destinations in different superordinate hierarchies are likely to be overestimated. If those destinations are very attractive to the individual, then distance to them is likely to be underestimated (Proposition 5), and this may offer a counterbalancing effect so that cognitive distance to those destinations is not overestimated as Proposition 1 proposes. On the other hand, if the destinations are perceived as being very unattractive, Proposition 5 suggests that distances to them will be overestimated. The compounding effect of being in different superordinates and being unattractive may lead to very large overestimate distortions in distance.

Smith has noted that work in the area of perceptual distance “remains an area of needed research.” He observes, “Distances . . . are measured as straight lines on a map. In reality, this ignores the effects of perceptions, border, physical barriers and transportation networks. . . . Little work has been done to develop the use of perceptual distance or accessibility as substitutes so it remains an area of needed research” (1989:223).

Several researchers have recognized the need to understand tourists’ perceptions of the physical world in order to better predict and perhaps modify behavior (Bronner and de Hoog 1985; Cook and McCleary 1983; Crompton 1979; Davidson 1985; Mayo, Jarvis and Xander 1988). It is individuals’ perceptions of the physical world that determines their subsequent behavior in it: “Decision making is circumscribed by our cognitive representations” (Cadwallader 1979:559). Consequently, researchers can only understand the impact of geographic distance on travel decisions through gaining insights into how potential tourists perceive travel distance to a destination in subjective
rather than objective terms. This requires a knowledge of what cognitive representations of physical distance are likely to emerge and of the processes involved in the organization of these representations (Cadwallader 1979).

The few published studies that have explored the concept of cognitive distance in the tourism field have been atheoretical. The propositions presented in this article are grounded in theoretical frameworks that make it possible to integrate the various findings relating to cognitive distance. However, the propositions should be regarded as tentative hypotheses derived from very specific contexts. They should not be interpreted as general principles. They propose relationships that have been developed either from inferences or transitions made from studies done in other fields or, in a few instances, from exploratory work reported in the tourism field. The propositional inventory is intended to frame the state of existing knowledge and to guide the development of hypotheses and empirical verification by others who may be interested in exploring the concept of cognitive distance.

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