



THE ROLE OF GEO-BASED TECHNOLOGY IN PLACE EXPERIENCES

Iis P. Tussyadiah
Florian J. Zach

Temple University, USA

Abstract: Today, as various context-aware technologies have become increasingly ubiquitous, tourists have access to retrieve voluminous geographic information about tourism destinations. These technologies are suggested to aid tourists in gaining meaningful experiences with places. This study identifies how the use of geo-based technology plays a role in the acquisition of geographic knowledge and behavior. It is identified that the use of geo-based technology while traveling contributes to the different components that frame the structure of tourism experience. Further, this study also confirms that tourism experience can be seen as a part of the everyday experience as geographic behavior exhibited on a day-to-day basis is found to have an effect on tourism experience. **Keywords:** geographic cognition, geographic behavior, tourism experience, geo-based technology. © 2011 Elsevier Ltd. All rights reserved.

INTRODUCTION

Tourism is an encounter between and amongst several things: people, space, and contexts (Crouch, 2005). Indeed, tourists seek benefits from the consumption of the experiential characteristics (i.e., physical, social and cultural) of places, spaces and landscapes. In the early conception of tourism experience, MacCannell (1973) characterizes tourists' sites as locations of the authentic and tourists visit these places in search for the reflection of their authentic selves. This implies tourism as "sightseeing," emphasizing the destinations as a package of visual materials or signs. This is akin to the concept of tourist gaze (Urry, 1990, 1995) that gives an emphasis to the 'signs' as the 'objects of gaze' while highlighting the subjectivity of the gaze. Indeed, recent discussion on tourism experience tends to be more subject-centered. Uriely (2005) identifies the pluralization of tourists, the multiplicity of tourist experiences, and the shift from tourism experience

Iis Tussyadiah is Assistant Professor at the School of Tourism and Hospitality Management (STHM), Temple University (Philadelphia, PA 19122, USA. Email <iist@temple.edu>). Her research interests are centered around the impacts of technology on tourism experiences and destination management. Florian Zach is Assistant Professor at STHM, Temple University. His main research interests include tourism innovation and collaboration for sustainable and competitive destinations.

as the consumption of displayed objects to the subjective interpretation and meaning. Similarly, Crouch (2005) suggests that being a tourist “is essentially the process of making meaning of spaces and cultures” (p. 28), which “does not equate making clear rationality, but rather working his/her way through things,” spaces and relations (p. 31).

Using the metaphor of tourism as a form of performance and tourist spaces as stages, Edensor (2001) argues that different tourist locations (e.g., mountains, cities, beaches, heritage sites) are often managed to provide and sustain the common sense understanding of a particular performance or activity to take place. Tourists’ encounters with these spaces (i.e., resulting in activities, interactions, interpretations), while subjective in nature, are contextualized by the geographic features of the destination with its sensual quality. Here, the geographic cognition, and the state of geographic knowledge, comes at play as a factor influencing how tourists perform in these stages.

The discussion of geographic experience is rooted in the fields of cognitive geography, which deals with human perception, memory, reasoning, problem solving, and communication involving earth phenomena (Montello & Freundschuh, 2005), and behavioral geography, which focuses on people’s behavior within space. Early conceptualizations of geographic cognition are dated back to the work of Lynch (1960) on images of cities, Lowenthal (1961) on environmental images, and Gould (1966) on mental maps, among others. Mark, Freska, Hirtle, Lloyd, and Tversky (1999) suggest that people extract geographical knowledge from their complex interactions with space. According to Kuipers (1983), as people move along the paths in the geographic space, they may recognize that the paths have some points in common, which allows them to use inference rules to build network models of places and connections. Kuipers (1983) calls this process *spatial knowledge acquisition*. Further, geographic cognition is intertwined with people’s spatial behavior, which can be detected from changes in locations over time. People need to act spatially to forage for food, to shop, to commute, etc. (Mark & Freundschuh, 1995). People’s movement in space (e.g., commuting, travelling, recreation, and migration) are overt behavior resulted from a cognitive process of spatial decision making (Lloyd, 1997). In summary, geographic experience is intimately associated with geographic knowledge acquisition from people’s complex interactions with and within space. It is argued in this study that tourists go through the process of geographic knowledge acquisition and representation as they move to and within a destination, and use spatial knowledge to gain a meaningful tourism experience.

Information and communication technology (ICT) has been widely believed to have a substantial geographic impact (Curry, 1998) and geographic technology (i.e., largely based on geographic information systems (GIS), global positioning systems (GPS), etc.) is increasingly available for idiosyncratic use of everyday experiences (Line, Jain, & Lyons, In Press). Due to the spatiotemporal nature of travel, tourists and businesses alike find these technologies relevant and important for various purposes, including leisure and business travels (Bask,

2001; Raubal & Rinner, 2004). Indeed, tourism has witnessed a vast development of various geographic technologies and platforms of technology applications for tourism purposes, including navigation systems, digital maps, portable guide and/or recommender systems created for general travel use or specific to tourism destinations (see Brown & Perry, 2001; Poslad et al., 2001; O'Grady & O'Hare, 2002; Maruyama, Shibata, Murata, Yasumoto, & Ito, 2004; Burigat & Chittaro, 2007). The development of location-aware or context-aware technologies has opened access for tourists to various venues for retrieving geographic information before, during and after traveling.

Research on the use of such technology in tourism has been limited to the areas of technology development (see Brown & Perry, 2001; O'Grady & O'Hare, 2002; Maruyama et al., 2004; Burigat & Chittaro, 2007), arguing that context-aware technology aids to better navigation and programming of tourism, and those using the devices to track tourist's movements (e.g., Shoval & Isaacson, 2007). For example, Brown and Chalmer (2003) argue that mobile technology, with context-aware applications, is useful to assist tourists in solving their problems, of which are idiosyncratic and largely related to navigation and way-finding. Modsching, Kramer, ten Hagen, and Gretzel (2007) organized a field study to evaluate the impacts of mobile recommender systems on tourists' experience. They uncovered that tourists using such systems were able to see four times more sights in a specific period of time compared to those who did not use the systems. These studies, however, did not provide a deeper analysis into how the different types of geographic technologies influence the ways tourists experience the destinations beyond the practical point of view of navigation and way-finding. Needed is a thorough analysis that involves tourists' spatial cognition and behavior, which cannot be separated from the experience of places in the everyday life. Therefore, this study aims at providing a better understanding on the influences of geo-based technology on people's experience. Specifically, this study explores the influence of geo-based technology use on geographic knowledge acquisition and its use when experiencing places.

THE INFLUENCE OF ICT ON PLACE EXPERIENCES

ICT increasingly influences the ways everyday lives are ordered, managed, and completed (Line & Jain, *In Press*; Schwanen & Kwan, 2008). It is suggested that, as people across social groups embrace ICT into their personal lives, they are taking advantage of the new opportunities to solve different issues that might shape their behavior, especially when faced with space-time constraints (Schwanen & Kwan, 2008). This study attempts to explore this area further to enrich the discussion on the intersection of technology and place experience by examining whether the use of geo-based technology and services (e.g., car navigation systems, map applications on mobile phones and personal computers, portable guides, etc.) on a day-to-day routine may add to

the acquisition of geographic knowledge and the use of this knowledge to experience places.

Travel is considered a part of people's life experiences as practices, activities, understandings, and identities used for travel originate from everyday understandings, ways of seeing, feeling and doing (Edensor, 2006; Hannam & Knox, 2010). Therefore, it is posited in this study that the acquisition of geographic knowledge and spatial behavior assisted by the use of geo-based technology on a day-to-day routine will influence travel experience. Therefore, the goals of this study are threefold: *first*, To identify the influence of the use of geo-based technology on a day-to-day routine on various aspects of people's experience with places, which include geographic cognition and behavior, *second*, to identify the influence of the use of geo-based technology for travel on various aspects of tourism experience, and, *third*, to identify the effect of geographic cognition and behavior on tourism experience assisted by the use of geo-based technology.

Previous studies on the influence of technology on geographic behavior and tourism experiences are typically based on experiments and observation. However, the increased interest in geographic technologies and their effectiveness in creating meaningful tourism experiences suggest that a standardized set of constructs and items is necessary to further complement and support past research with an unbiased representation of population. Hence, this study develops measurement items for survey design research on geographic experience when using geo-based technology on a day-to-day routine and for travel.

Conceptual Framework

Based on the goals of the study, the conceptual framework of this study suggests how the influence of geo-based technology on tourism experience might be caused by the role of geo-based technology use on everyday geographic experience (see Fig. 1). The model represents the following hypothesis:

H1. The ways everyday geo-based technology use influences everyday experience has an effect on the ways geo-based technology use for travel influences tourism experience.

Following a classical scale-development procedure recommended by Churchill (1979) and DeVellis (1991) an initial pool of items representing geographic and tourism experience were created. Further support for these items came from interviews with 18 individuals that travelled at least 50 miles away from home in the past two years.

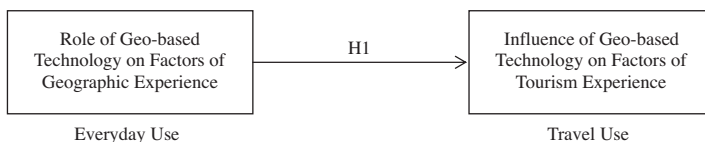


Figure 1. The Effect of Everyday Experience on Tourism Experience.

Item Development for Geographic Experience

To capture the dimensions of geographic cognition, it is necessary to explore the underlying constructs that represent people's perception of spatial relations. Siegel and White (1975) propose three stages that people go through in the process of geographical learning. They are *landmark knowledge*, which involves people learning and recognizing landmarks (i.e., the discrete spatial features that characterize specific locations), *route knowledge*, which involves the ability to use those landmarks to form routes, and *survey knowledge*, which involves forming a coherent whole through the formation of groups of landmarks. This framework is very influential in cognitive psychology literature (Montello (1998) refers to it as *the dominant framework*) and has been adopted in numerous experimental studies on spatial cognition (Thorndyke & Goldin, 1983; Thorndyke & Hayes-Roth, 1982).

Tversky (1981) and Mark et al. (1999) utilized different dimensions of geographic cognition in their experiments, which include distance judgment, sense of direction and orientation (i.e., relations amongst selves, objects, and spaces), judgment of spatial connections and relations (i.e., connections and positions of places relative to others), and effectiveness of communication, representing interactions with places as well as with objects and people within places. Additionally, Golledge (2002) suggests that knowledge *about* space (i.e., the intellectual base of geographic knowledge) includes geographic arrangement, organization, distribution, patterns, shape, hierarchy, distance, direction, orientation, regionalization, reference frame, and geographic association. The developed items measure the dimensions of geographic knowledge (Clark, 2008; Golledge, 2002; Mark et al., 1999; Thorndyke & Goldin, 1983; Tversky, 1981) typically acquired in the large-scale, geographic space (Freundschuh & Egenhofer, 1997; Montello, 1993).

Items measuring geographic behavior were developed from literature on spatial behavior and experience. Golledge and Stimson (1997) define human spatial behavior as "any sequence of consciously or subconsciously directed life processes that result in any changes of location through time" (p. 155). Geographic behavior can be understood as people's activities that require a significant use of geographic space (e.g., movement between places) that necessitate the attainment of geographic knowledge and/or spatial skills/abilities (Golledge, 2002). This can manifest in people's exploration of places, which often includes interaction (with others) for search and way-finding behavior (Golledge & Stimson, 1997).

Associated with spatial experience is the affective or emotional dimension embedded in the concept of place attachment or sense of place (Trentelman, 2009). It is posited that geographic behavior is intertwined with people's emotional connection to places. The continuing debate on conceptualization and theorizing of sense of place is largely based on two distinct approaches: positivist (e.g., how the geographic qualities of places contribute to human lives) and phenomenological research (e.g., how people's differing views manifest in everyday experiences with the qualities of places) (Schroeder, 2007;

Seamon & Sowers, 2009). While the latter dominates the literature on sense of place (Stedman, 2002), several positivist researchers have developed measures of place attachment in personal, community, and environmental contexts (Raymond, Brown, & Weber, 2010). For example, Schroeder (2007) shows that human–nature relationships (hence, the way people experience nature) differ based on people's view of themselves as being “a part of” or “apart from” nature. Hence, it can be argued that place attachment can be measured by whether or not people feel attached to or embedded in the places they experience.

Additionally, place attachment has also been explained by place belongingness (Mesch & Manor, 1998; Milligan, 1998), where people feel a membership to an environment. These studies emphasize how people make sense of and derive meaning from their experiences. Many studies in the management literature involve gauging whether or not people have meaningful experiences (Pine & Gilmore, 1999). Another dimension that has been utilized to evaluate experience is the notion of authenticity. Although the debate regarding the usefulness of the concept continues, authenticity is believed to be one of the putative motives for human activities and experiences (MacCannell, 1973; Scannell, 2001). Therefore, it is suggested in this study that having a meaningful and authentic experience represents the evaluation of people's experience with places.

Item Development for Tourism Experience

To identify how the use of geo-based technology influences travel experience, the dimensions of tourism experience were explored. In her attempt to explain how tourists conceive experience, Volo (2009) emphasizes the complexity of experience characterized by different dimensions ranging from the intensity of experience, the coupling of sensory and emotional elements (as suggested by Hirschman and Holbrook (1982)) and the variability among tourists (referencing Uriely's (2005) subjectivity of experience). Tourism is associated with experiences that involve multi-sensory dimensions, including sights and motions (Hetherington, Daniel, & Brown, 1993), sounds (Waitt & Duffy, 2010), smells and tastes (Chang, Kivela, & Mak, 2011; Kivela & Crofts, 2006). Rickly-Boyd and Metro-Roland (2010) argue that “tourists roam, visually, sensorily and physically, in large cities as well as in the most scripted of destinations” (p. 1166). They further assert that the sensory experience of place, along with the visual and symbolic elements, creates a whole tourist experience with the destination.

Based on embodiment theory, there are two facets of experience: sensation and cognition (Tsai, 2005). Sensation happens at the phenomenological level where tourists are aware of the destination. The interpretation of sensation leads to the processes of learning and transformation at the cognitive level (Volo, 2009). For example, through encountering a destination, tourists may engage in learning of place characteristics (Li, 2000), learning of other culture, custom,

lifestyle, etc. (Chambers, 2009), as well as learning and transformation of self (Bruner, 1991). This also brings about the human elements in tourism experience. It is posited that tourists' interactions and relationship with travel companions, other tourists, residents or tourism employees at the destination influence their experience (Goffman, 1967; Selstad, 2007; Trauer & Ryan, 2005). An obvious illustration of how tourists' social interactions make up an overall tourism experience is the concept of mediation or brokerage in tourism experience (Goffman, 1967; Jennings & Weiler, 2006; Tussyadiah & Fesenmaier, 2009), which is seen as the mechanism where people assist tourists by providing information or opening/limiting access to desired experiences.

Lastly, these different elements of tourism experience are believed to generate emotive outcomes among tourists (i.e., feelings, moods), which may lead to the affective transformation (Volo, 2009) in tourism experience. In the area of marketing, Schmitt (2002) introduces five dimensions of experience: sensory, affective, cognitive, physical, and relational. Applying these dimensions into tourism experience, Ye, Tussyadiah and Fesenmaier (2009) identify the relevance of these elements to make up the structure of experience based on tourists' interactions with places, people and artifacts. It can be summarized that tourism experience is a subjective performative action contextualized by the geographical characteristics of tourist destinations, which takes form in different physical, cognitive, social, and emotional dimensions resulting from interactions between tourists and places.

Based on the chronological dimension of experience (Craig-Smith & French, 1994; Jennings, 2006), tourists derive experiences from traveling to and returning from the destination (i.e., en-route experience) in addition to the tourism experiences at the destinations (i.e., on-site experience). Research on en-route travel experience from the tourist perspective has been dominated by tourism transportation through the investigation of route choice (Denstadli & Jacobsen, 2011; Jacobsen, 1996) and travel mode choice (Connell & Page, 2008). Jacobsen (1996) identifies several motivational factors influencing experiences of self-drive tourists on scenic route, which highlight the experience of en-route travel as a form of transportation to a destination and as an attraction in itself. Among the dimensions of en-route experience are experience of attractions and landscape along the way to the final destination and off the beaten track experience. To measure en-route experiences, items representing travel-related experience were developed for this study. Additionally items were developed to measure the overall travel experience, which encapsulate how the use of geo-based technology influences people's travel experience in general. As with the overall geographic experience, the notion of positive, meaningful experiences is emphasized to measure the overall tourism experience.

Pilot Study

Initially, a total of 50 items (27 for everyday experiences and 23 for tourism experiences) were created. In the next step, the items were

evaluated by two expert judges, who reduced the total item set to 48 items. These items were pretested in a pilot study and were measured on seven-point Likert scales with Strongly Disagree–Strongly Agree anchor statements. The pilot study was administered as an online survey within the last two weeks of August 2010 to test the developed items. Invitations were sent to 2,814 Americans who requested travel information about the US Midwestern states over the past three years. Feedback regarding the general comprehensibility of the instruments was also solicited from respondents after completing the survey. An incentive to win a \$100 or one of two \$50 gift cards was provided. Only those that indicated a travel of at least 50 miles away from home within the past two years (i.e., a filter question at the beginning of the survey) were allowed to complete the survey. Following three reminders, 104 complete responses were collected (3.7% response rate).

To identify the latent constructs underlying the set of items for the technology influences (i.e., everyday experience and tourism experience), exploratory factor analysis was conducted. Internal consistency of the identified constructs was evaluated using Cronbach's Alpha. All alpha coefficients were 0.8 or higher and thus exceed the value 0.6 as suggested for exploratory factor analysis (Hair, Anderson, Tatham, & Black, 1998). Furthermore, all factor loadings were above 0.5 with a substantial amount of variance explained by the items for each of the identified constructs. Based on the pilot study factor analyses, three multivariable constructs for everyday experiences and two multivariable constructs for tourism experiences were identified. Respondents in the pilot study were also asked to suggest changes to the items if they were unclear. As a result, several items were rephrased for better clarity (See Tables 1 and 2).

Method

An online survey was administered for data collection in this study. Invitations to participate in this study were distributed in mid February 2011 to 15,000 Americans randomly selected from an industry email list. This first call was followed by three weekly reminders. The same incentive and filter questions as in the pilot study were used. A total of 622 complete responses were collected (4% response rate), 415 of them were usable for analysis.

In addition to the pretested and improved items, respondents were asked to indicate the purposes of use of geo-based technology on the most recent trip. Several demographic variables were also collected. The majority of respondents are female (64.9%), are between the ages of 35 and 64 (72.7%), have at least a bachelor degree (58.3%) and have an income of up to \$100,000 (58.1%). In terms of devices, 74.2% of respondents used geo-based applications/software on computers, 72.8% used car navigation system, 43.4% used location-based applications on smart phones, 30.1% used portable audio guides (for museums, etc.), and 22.2% used portable GPS devices (for hiking etc.). Furthermore, it was found that essentially every respondent used geo-

Table 1. Measurement Items for Spatial Cognition and Behavior.

Concept	Definition	Supporting Literature	Developed Measurement Items
<i>Geographic knowledge</i>			
Landmark recognition	Knowledge to recognize the geographic features of and/or objects in places.	Montello (1998), Siegel and White (1975), Thorndyke and Goldin (1983), Thorndyke and Hayes-Roth (1982)	I am able to recognize signs, landmarks and other physical cues that give me the sense of where I am. I am able to distinguish places based on their characteristics.
Distance judgment	Knowledge to recognize spatial relations in terms of distance between pairs of objects within places.	Mark et al. (1999), Thorndyke and Hayes-Roth (1982), Tversky (1981)	I know how far I am from home. I have a feeling for distance.
Spatial categorization and boundaries	Knowledge to recognize spatial relations in terms of scale and boundaries of places.	Clark (2008), Golledge, 2002, Lloyd et al. (1997), Mark, Smith, and Tversky (1999)	I am aware of borders, areas, and territories. I realize it when I enter a new area. I realize it when I cross borders.
Sense of direction and orientation	Knowledge to recognize own position and movement within places.	Mark et al. (1999), Thorndyke and Hayes-Roth (1982), Tversky (1981)	I am aware of my current location. I have a strong sense of orientation. I am able to trace my movement. I have a recollection of my movement.
Effectiveness of communication	Knowledge results from people's interaction with places, artefacts, and/or other people.	Mark et al. (1999)	I better understand how people connect to places. I am more knowledgeable about places. I can express myself better.
<i>Geographic behaviour</i>			
Place experience	(1) Activities requiring the use of geographic space that necessitate the acquisition of spatial knowledge. (2) Experiences with places.	Golledge (2002), Golledge and Stimson (1997)	I pay more attention to places. I interact more with others. The places I visit make more sense. I have an authentic experience. I make meaningful decisions. I have a meaningful experience. I move around easily. I can explore the places I visit.
Place attachment	Emotional connection with places.	Mesch and Manor (1998), Milligan (1998), Schroeder (2007)	I feel a belonging to places. I feel embedded in the place.

Table 2. Measurement Items for Tourism Experience.

Concept	Definition	Supporting Literature	Developed Measurement Items
Sensory & physical experience	Experience characterized by sensation and physical activities.	Rickly-Boyd and Metro-Roland (2010), Schmitt (2002), Ye, Tussyadiah, and Fesenmaier (2009)	I recognized important sights and attractions at the destination. I associated certain sights, smells, sounds, tastes, and textures within the destination. I was aware of the different activities I could partake in the destination.
Affective experience	Experience resulting from emotions.	Schmitt (1999); Volo (2009), Ye et al. (2009)	I developed like/dislike toward the destination. I was emotionally connected with the destination.
Cognitive and perceptual experience	Experience characterized by the mental processes of knowing (through awareness, perception, association, and learning).	Li (2000), Schmitt (2002), Tsai (2005), Volo (2009)	I learned facts about the destination. I better understood the destination. I related the destination to specific concepts and/or lifestyles. I reflected on my memories from past experiences. I recognized the differences of the destination from home.
Social experience	Experience characterized by interactions with others.	Goffman (1967), Jennings and Weiler (2006), Selstad (2007)	I interacted with people at the destination. I understood the unique characters of local people at the destination
En-route experience	Experience while traveling to final destinations.	Denstadli and Jacobsen (2011), Jacobsen (1996)	The use of geo-based technology... ... put me off the beaten track. ...led me to other interesting places along the way to my final destination. ...made me skip places en-route to better experience the final destination.
Overall experience	Overall travel experience influenced by geo-based technology use.	(pilot study)	...assisted me in gaining a meaningful travel experience. ...added to my experience at places. ...helped me to enjoy my travel. ...contributed positively to my overall travel experience.

graphic technology for “Navigation and Way-Finding” on their most recent trip (90.8%), followed by “Itinerary Planning and Confirmation” (61.7%), “Learning about Places” (57.3%) and “Fun and Curiosity” (46.0%). Lastly, 6.7% of respondents indicated other uses such as geo-caching or retrieving weather information.

To identify the underlying factors of geographic experience and tourism experience, factor analysis using principal component with varimax rotation and reliability analysis were undertaken to identify the underlying constructs explaining geographic cognition and behavior as well as tourism experience. Items that explain less than 60% of the variance or insignificant item correlations ($p \leq 0.0001$) were deleted from the analyses. Next, in order to test the relationship between geographic cognition and behavior factors and tourism experience factors (Hypothesis 1), regression analyses using factor scores were conducted with tourism experience factors as dependent variables and everyday experience factors as independent variables.

Results and Discussion

Factor analyses identified a four factor solution (18 items) for everyday experiences assisted by geo-based technology (Table 3) and a two factor solution (10 items) for tourism experiences assisted by geo-based technology (Table 4). These factors are consistent with the results from pilot study. All constructs show very good or excellent internal consistencies as measures by Cronbach’s alpha, ranging from 0.78 to 0.95 (Nunnally, 1978). The use of geo-based technology for everyday experiences influences three dimensions of geographic cognition and one dimension of geographic behavior. The dimensions of geographic cognition confirm the dominant framework (Montello, 1998), representing three types of knowledge people acquire in spatial learning. They are labeled as Landmark Knowledge ($\alpha = 0.90$), Route Knowledge ($\alpha = 0.78$), and Survey Knowledge ($\alpha = 0.79$).

Landmark Knowledge, which is typically developed by acquiring information about discrete spatial features in the surroundings, is represented by people’s ability to recognize places from their characteristics and awareness when they move across borders, in that they distinguish one location from another through its distinctive spatial features. As people experience places, geo-based technology contributes to people’s identification of the discrete features that are significant to them to be able to recognize places. Route Knowledge involves acquiring information about the spatial and temporal relations of geographic features (Allen, 1982); it represents the acquisition of information on how landmarks are interconnected within the environment to form routes. That is to say, Route Knowledge is typically associated with the recognition of distance and directions (Mark et al., 1999; Thorndyke & Hayes-Roth, 1982; Tversky, 1981). The findings confirm that the use of geo-based technology assists people with the acquisition of Route Knowledge, which is represented by their awareness of distance and orientation and the ability to trace their

Table 3. Role of Geo-based Technology on Everyday Experience.

Scale Item	Mean	Standard Deviation	Eigenvalue (%)	Unidimensionality	
				Factor Loading	Variance Explained (%)
When using geo-based technology ...					
Factor 1 – Spatial Experience			43.4		
... I feel a belonging to the place.	4.20	1.254		.824	79.0
... I can express myself better.	4.40	1.319		.800	68.6
... I have an authentic experience.	4.64	1.273		.779	72.3
... I feel embedded in the place.	4.19	1.231		.777	71.0
... I interact more with others.	4.10	1.448		.698	74.7
... I better understand how people connect to places.	4.21	1.425		.678	77.5
... I have a meaningful experience.	4.80	1.179		.664	68.1
Factor 2 – Landmark Knowledge			13.8		
... I am aware of borders, areas, and territories.	5.21	1.408		.889	83.0
... I realize it when I cross borders (city/county/state/ country).	5.30	1.407		.854	76.3
... I am able to distinguish places based on their characteristics.	5.23	1.305		.846	77.8
... I realize it when I enter a new area.	5.51	1.242		.819	72.3
Factor 3 – Survey Knowledge			8.4		
... I am more knowledgeable about places.	5.35	1.240		.726	68.3
... I pay more attention to places.	4.98	1.375		.685	69.2
... I make meaningful decisions.	5.23	1.220		.635	62.8
Factor 4 – Route Knowledge			5.6		
... I have a feeling for distance.	5.43	1.119		.775	71.8
... I have a strong sense of orientation.	5.33	1.196		.691	60.9
... I have a recollection of my movement.	5.11	1.196		.667	66.8
... I move around easily.	5.82	1.037		.553	60.3

movements. Lastly, this study also points toward the role of geo-based technology in assisting people with the acquisition of Survey Knowledge, which could manifest in the comprehension of an orientation of or an interrelation between one landmark (or one route) and another (Thorndyke & Goldin, 1983). In summary, the findings of this study confirm that by using geo-based technology, people obtain

Table 4. Role of Geo-based Technology on Tourism Experience.

Scale Item	Mean	Standard Deviation	Eigenvalue (%)	Unidimensionality	
				Factor Loading	Variance Explained (%)
With/The use of geo-based technology...					
Factor 1 – Destination Experience			62.1		
... I understood the unique characters of local people at the destination.	3.92	1.511		.878	82.1
... I was emotionally connected with the destination.	3.86	1.512		.875	80.1
... I associated certain sights, smells, sounds, tastes, and textures with the destination.	3.93	1.524		.862	77.6
... I related the destination to specific concepts and/or lifestyles.	4.13	1.518		.828	75.6
... I interacted with people (other than travel partners) at the destination.	4.30	1.686		.817	71.0
... I reflected on my memories from past experiences.	4.04	1.555		.817	71.7%
... I recognized the differences between the destination and home.	4.46	1.592		.797	70.9
Factor 2 – Overall Travel Experience			15.2		
... contributed positively to my overall travel experience.	5.73	1.086		.921	86.8
... helped me to enjoy my travel.	5.52	1.197		.904	85.8
... assisted me in gaining a meaningful travel experience.	5.16	1.384		.721	70.9

knowledge about places and use this geographic knowledge to make meaningful spatial-related decisions and experiences.

Another dimension of everyday experience is labeled Spatial Experience ($\alpha = 0.92$), representing geographic behavior (i.e., people's activities) and the overall spatial experience (i.e., including meaning of experience and attachment to places). It is identified in this study that geo-based technology assists people with exploration and interaction with others, which confirms the concept of effectiveness of communication (Mark et al., 1999). Further, it was found that the use of geo-based technology contributes to the attainment of meaningful and authentic experiences with places and also to the development of emotional attachment to places.

Overall, based on this analysis, it can be summarized that the use of geo-based technology for everyday routine contributes to the acquisition of spatial knowledge and the use of this knowledge to gain meaningful everyday experiences with the geography of places. Geo-based technology provides people with information necessary to be aware of distinctive features that characterize places, to form routes connecting these features, and use it to experience places. It is also posited that as geo-based technology becomes a part of the everyday lives as people's use of geo-based technology becomes naturally embedded in the processes of geographical learning and behavior, which defines and shapes people's spatial experiences.

Two dimensions of tourism experience were identified to be affected by the use of geo-based technology while traveling: Destination Experience ($\alpha = 0.95$) and Overall Travel Experience ($\alpha = 0.87$). Destination Experience encapsulates the different elements of experience that are associated with the tourism destination (i.e., physical and sensory elements, social element, emotional attachment, and cognitive processes). This construct shows that these different elements of experience cannot be seen as separate concepts, but together they represent tourism experience as a coherent whole. This finding opposed previous researchers' approach to dissect the complexity of tourism into succinct conceptual frameworks that explain how tourism as an experience is structured (e.g., McKercher, 1999; Pearce, 1989; Ye, Tussyadiah & Fesenmaier, 2009). The construct suggests that these elements contribute to the formation of complex relationships that frame the Destination Experience as a whole. It is not necessarily the summation of its elements, but a result of the dynamic interrelationships among the elements. The findings also suggest the role of geo-based technology use for Overall Travel Experiences. It is identified that technology assists people to enjoy their travel and gain meaningful experience.

Regression analyses were conducted to identify whether geographic cognition and behavior has an effect on tourism experience assisted by the travel use of geo-based technology (see Table 5). The regression model is significant for Destination Experience ($R^2 = 0.24$). The model suggests that Destination Experience is mostly explained by all everyday experience factors, particularly Survey Knowledge ($\beta = .343$, $p = .000$) and Route Knowledge ($\beta = .327$, $p = .000$), and, to a lesser degree, Landmark Knowledge ($\beta = .082$, $p = .059$) and Spatial Experience ($\beta = .088$, $p = .042$). The ways tourists experiencing a destination while using geo-based technology are influenced mainly by how the technology plays a role in the acquisition of spatial knowledge to identify routes and spatial networks within the destination. This indicates that when tourists are able to gain a comprehension about places and develop a sense of orientation through the use of geo-based technology in a day-to-day routine, they will be able to experience tourism destinations better when using the technology while traveling. This suggests that the positive effect of the day-to-day use of geo-based technology enhances tourists' notions about their movement and sense of orientation, hence

Table 5. Regression: Technology Influence on Everyday Experience and Tourism Experience.

Factors	Destination Experience		Overall Travel Experience	
	Coeff.	Sig.	Coeff.	Sig.
<i>Everyday Experience Factors</i>				
Spatial Experience	.088	.042	.545	.000
Landmark Knowledge	.082	.059	.099	.013
Survey Knowledge	.343	.000	.212	.000
Route Knowledge	.327	.000	n.s.	
Intercept	.001		.000	
R^2	.24		.36	
FValue	32.18	.000	56.65	.000

Notes: n.s. = not significant. Variables = rotated factor scores. $N = 415$.

assisting them in better connection with the various touristic features of the destination.

The model is also significant for Overall Travel Experience ($R^2 = 0.36$). The model suggests that Spatial Experience ($\beta = .575$, $p = .000$) showed a significant effect on Overall Travel Experience as well as Survey Knowledge ($\beta = .212$, $p = .000$) and Landmark Knowledge ($\beta = .099$, $p = .013$). The results suggest that tourists who are able to gain reasoned comprehension of places, gain meaningful experiences with and are well connected to places through the use of technology in their day-to-day routine tend to gain positive, meaningful travel experiences when using geo-based technology for travel. It can be summarized that when the impact of technology use is felt at the intellectual base of geographic knowledge (i.e., people's comprehension and understanding about places; Survey Knowledge) and at the behavior level (with Spatial Experience), it will positively contribute to the attainment of meaningful experiences during travel. It is important to note that Route Knowledge was found not to be significant for the Overall Travel Experience as opposed to the Destination Experience. This indicates that respondents view this type of practical knowledge as particularly significant for movements and activities at the destination, but does not necessarily add to the evaluation of the overall travel.

CONCLUSION

ICT is becoming a part of everyday lives whereby its use can be seen as an element of people's experiences. This study sought to explain how the use of geo-based technology such as car navigation system, geo-based software and applications on personal computers or mobile technology, location-based portable recommender systems, and/or GPS-based devices for outdoor activities plays a role in the ways people experience places in a day-to-day routine and while traveling. The

findings of this study confirm that the use of geo-based technology assists people with the acquisition of knowledge necessary in the formation of geographic behavior and experience. Geo-based technology enables people to access information that allows them to be aware of the distinct features that distinguish one place from another. When situated within a large geographic space (e.g., a neighborhood or a city), the recognition of landmarks contributes to the formation of reference points necessary for different spatial-related decisions. These reference points are important to establish a sense of orientation.

It is also identified in this study that the use of geo-based technology enables people to form Route Knowledge, in that the opportunities presented by geo-based technology contribute to people's awareness of distance and direction and their ability to recognize and trace their movements across space. The findings further suggest that through the use of geo-based technology people are able to comprehend and connect the interrelationships among different landmarks and routes to form a coherent understanding about places (i.e., survey knowledge). In this study, it is confirmed that geo-based technology enables people to be more knowledgeable about places and to make meaningful spatial-related decisions. These different types of geographic knowledge are necessary to form geographic behavior and perform activities that necessitate people's interactions with and within places. Geo-based technology and the opportunities it presented allows people to explore and communicate effectively in order to gain meaningful experiences with places. This contributes to the formation of emotional attachment to places. Therefore, this study confirms that the use of geo-based technology influences various aspects of people's experiences with places on a day-to-day basis.

This study also contributes to the literature on the roles of ICT in tourism experience formation. The findings of this study suggest that the use of geo-based technology while traveling allows tourists to gain experiences with the different elements of destination. This includes the opportunities for tourists to sense the different qualities of the destination and to recognize that the destination is distinguishable from other places. Also, it is identified that by using geo-based technology, tourists are able to interact with other people at the destination and perform different cognitive processes related to the destination (e.g., reflect on past memories or associate destination with certain concepts). Importantly, it was also identified that the use of geo-based technology allows tourists to develop an emotional attachment to the tourism destination (i.e., affective transformation).

Further, the findings also support the role of geo-based technology in the overall travel experience. When used while traveling, geo-based technology enables tourists to enjoy their travel and to gain a meaningful tourism experience. Hence, this study provides an empirical support on how technology plays a role in the ways tourists experience the destination and how ICT contributes positively to tourism experience. As such, this study highlights the role of technology beyond the mere functional value for ease of navigation or identification of attractions, but the further understanding of how technology plays a

role in the various elements of everyday and tourism experiences. The use of geo-based technology by tourists not only helps them with finding locations within a destination, it was found that geo-based technology also assists them with the dimensions of sensory and emotion, as well as cognition and interaction.

Further, this study also extends our understanding on the significance of geographic behavior in everyday life on tourism experiences while using geo-based technology. The acquisition of geographic knowledge in everyday life contributes positively to tourists' experiences at the destination. The ability to recognize spatial features of the surroundings and construct a coherent whole from these features to understand more about certain places influences the process of attribution of attractions and meanings to a tourism destination. Also, it can be suggested that tourists' experience at the destination is essentially shaped by geographic behavior that results from the use of their geographic knowledge made possible through the assistance of geo-based technology. This finding confirms that while tourists might be displaced at a destination that is foreign to their homes, with the assistance of geo-based technology, the ways they typically experience the geographic features of places in a day-to-day routine might extend to geographic behavior in the destination. In other words, as the use of geo-based technology to acquire the necessary information to move within places becomes a norm in everyday lives, tourists will find it ordinary to express the same behavior at the destination.

Despite the theoretical contribution of this study, several opportunities for further research were observed. *First*, while this study confirms the role of ICT in Destination Experience and Overall Travel Experience, the influence of geo-based technology use on en-route experience (i.e., tourists' experience while traveling en route to the destination) was not identified. This might be due to the nature of travel investigated in this study. The respondents were asked to refer to their recent travel for at least 50 miles away, which prompts the supposition that the majority of long distance travels typically involves the use of public transportation (e.g., airplane, train), which could minimize the perceived importance of en-route experience as opposed to self-driving travels, particularly the ones through scenic roads. A further investigation on this issue is suggested to clarify the findings in this study.

Second, the study identified significant relationship between everyday and tourism experiences. However, relationships and causalities between the Tourism Experience constructs were not tested. Different analytical methods might be applied to re-test the relationships. *Third*, the low R^2 for the regression models for destination experience and overall travel experience indicates situational variables influencing the roles of geo-based technology on travel experiences that are beyond the scope of this study. A further study addressing this issue is important. Also, this can be a result of the skewed samples for both the pilot and the final study (i.e., females with a high level of education). Hence, a further study to test whether the conclusions can be a better representation of the general population is needed. *Fourth*,

the use of an industry mailing list may be the main cause of the low response rate (4%) in this survey as respondents might have been targeted to different surveys before. However, the number of responses is sufficient to test the hypothesis in this study. Despite these limitations, this study adds value to the important and growing area of research on the intersection of ICT and behavior as it provides researchers with a set of items to quantitatively evaluate the effects of ICT on everyday and tourism experiences. ■

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