

INDIVIDUAL DIFFERENCES IN THE TOURIST WAYFINDING DECISION MAKING PROCESS

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KEY WORDS: Individual differences, Tourism, Wayfinding, Decision making, Physical movement, GIS, GPS

ABSTRACT:

Wayfinding is an important aspect that should be considered by tourist park managers when allocating resources and facilities to aid tourists navigating their way through a park. This paper discusses the influence of individual differences such as age, gender, travel group, and familiarity with the environment towards the wayfinding decision making process and physical movement. A case study was conducted where respondents' movements were traced using GPS receivers to look at the movement patterns and at the end, they were asked to complete a questionnaire particularly to determine the individual differences. The spatial and attribute data were analysed using ESRI ArcGIS Tracking Analyst and ET Geowizards. SPSS 17 were used for statistical purposes. As a result, in terms of decision making, specific landmarks and strategies were noticed for specified age, gender, travel group, and familiarity with the environment. Furthermore, correlations were found between gender and familiarity with the environment with the physical movement such as direction, distance, and arrival time. This paper highlights the need for tourist managers to understand that tourists use different methods of wayfinding and produce different results based on different individual differences and that management should provide complementary materials to assist in wayfinding.

1. INTRODUCTION

1.1 Tourism and wayfinding

Tourism management is a critical issue. The major challenges in regards to tourism is the diversity of users competing for the same resource, and the need to balance these multiple objectives while maintaining a positive tourism experience (O' Connor, Zerger, and Itami 2005). The key to overcome the issue, according to them is by understanding tourist behaviour. One of the sub-areas in the discussion would be on tourism navigation and wayfinding (Walmsley and Jenkins 1992).

Wayfinding is a cognitive psychological process for finding a pathway from an origin to a specified destination (Xia 2008). It is a complex process and will be different for individuals depending on the purpose of the trip or in response to external environmental conditions (Golledge 1999).

1.2 Decision making and physical movement of wayfinding

This paper defines the wayfinding process into two areas which are decision making and physical movement. Decision making will influence physical movement during wayfinding. People referred to two items in terms of decision making during wayfinding. They are landmarks and wayfinding strategies. According to Sorrows and Hirtle (1999), a landmark is a distinct object that people referred to help memorise and distinguish routes, and locate themselves in terms of their destination. Examples of landmarks is signboard.

People are different in the strategies they use when navigating through an environment, from noting landmarks to using a map or spatial layout of the environment (Passini 1984). Generally, in terms of spatial knowledge, there are two strategies

commonly used which are egocentric and allocentric wayfinding strategies (Gramann et al. 2005). Wayfinding also deals with physical movement. Physical movement concerns the location and arrival time during wayfinding (Xia 2007). It also can be elaborated into direction and speed, duration, and the mode of movement (Xia 2008).

1.3 Individual differences

Individual differences are the ways in which people differ in their behaviour. Individual differences could directly or indirectly influence wayfinding (Xia 2008). Psychological research has shown that individual differences exist for spatial task performance in the laboratory (Malinowski and Gillespie 2001). The primary aim of this research is to ascertain if tourist wayfinding behaviours correlate with individual differences.

2. ARE THERE DIFFERENCES IN THE WAY WE WAYFIND?

2.1 Age

Previous research has shown that older adults do not perform as well as younger adults on a variety of spatial tasks, including those requiring information about specific environmental layout (Kirasic 2000) and forming cognitive maps or surrounding environment (Iaria et al. 2009).

2.2 Gender

Gender differences can influence wayfinding performances. A tenacious stereotype is that males are more efficient (Chebat, Gelinias-Chebat and Therrien 2008). Males have better knowledge of geographical maps and draw better maps (Harrell, Bowlby, and Hall-Hoffarth 2000), which is usually attributed to

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the fact that men are more socialised with maps (Lawton 1994). Some researchers have found that men are more efficient at finding destinations (Malinowski 2001).

Another implication of gender differences is that women and men may differ in strategies for finding a destination where females are more likely to adopt the egocentric strategy and the males are more likely to adopt the allocentric strategy (Chen, Chang and Chang 2008). Another possible implication of gender differences is that women and men may differ in the way they feel about performing tasks that appear to require a sense of direction (Lawton and Kallai 2002). Women show a higher level of anxiety than men such as trying a new shortcut without the aid of a map or figuring out which way to turn when emerging from a parking garage (Lawton 1994).

2.3 Travel group

Individual differences between types of travel groups may be an important factor in wayfinding behaviours and strategies because of the various influences each member may have on decisions (Xia, Packer, and Dong 2009). The difference between various travel groups can be observed in the usage of landmarks. Individuals are less likely than other travel groups to navigate using signposts, while couples are more likely than other types of groups to do so (Xia, Packer, and Dong 2009).

2.4 Familiarity with the environment

Familiarity with the environment does influence strategy choice in directed wayfinding tasks (Holscher et al. 2007). Xia et al. (2008) has found that the type of landmark used was related to the familiarity that tourists have with the site. Linear landmarks such as pathways were used more often by those tourists that are either totally familiar or have never visited the site (Xia 2008). In another research by Xia, Packer, and Dong (2009), it has been discovered that the more tourists that are familiar with the environment, the less chance they use landmarks.

3. METHODOLOGY

3.1 Theoretical framework

The methodology has looked into the relationship between individual differences with wayfinding. Four individual differences will be involved which are age, gender, travel group, and familiarity with the environment. Wayfinding is divided into two components which are decision making and physical movement (Xia 2007). In making decisions during wayfinding, people depend on strategies and landmarks.

There are three components in the physical movement of wayfinding which are spatial, temporal and spatio-temporal. Spatial involves location, temporal involves time, while spatio-temporal involves both location and time (Xia 2007). Spatial elements include direction, location, and distance. Temporal elements include arrival time and duration while spatio-temporal element only includes speed (Xia 2008).

3.2 Case study area

The Koala Conservation Centre (KCC) is centrally located on Phillip Island. It was established in 1991 to protect koalas from cars and dogs and provide close viewing opportunities for tourists. The KCC is composed of six hectares of enclosed woodland (Woodland Bush), a half hectare koala viewing area

that includes two boardwalks, a nine hectare plantation and visitor centre (Xia et al. 2008). A further seven hectares is available for expansion of the woodland habitat (Reed 2000). The KCC features a treetop boardwalk so tourists can see the koalas at close range. They can also walk through eucalyptus bush to see more koalas. There are on average 120,000 tourists who visit the KCC each year (Hallahan and Bomford 2005). Figure 1 shows the map of KCC.

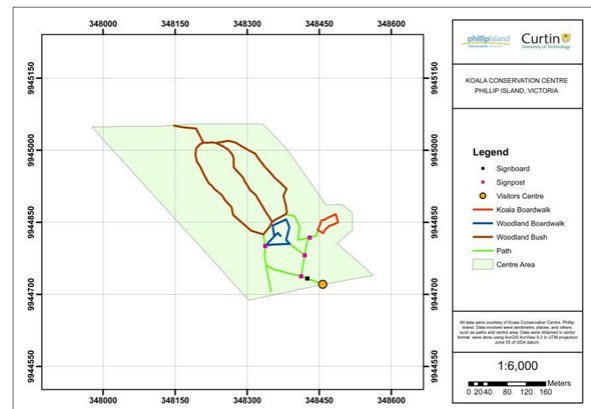


Figure 1. Koala Conservation Centre map

3.3 Data gathering

The researcher has used secondary data obtained from previous research by Xia et al. (2008). A case study was conducted by Xia at KCC from January 17 to 20 in 2005. For the case study, 124 tourists, six group tour guides and two rangers were questioned using a random intercept method, given GPS receivers and tracked using a method similar to that adopted by Arrowsmith, Zanon, and Chhetri (2005). The participants were then interviewed after their visit. GPS surveys enabled spatio-temporal movements to be ascertained whilst interviews and questionnaires provided demographic data and wayfinding methods employed by the participants (Xia 2008).

3.3.1 Individual differences classifications

Participants were interviewed using questionnaires. They were asked to determine their individual differences classifications. The researcher has classified all four individual differences based on the details below:

1. Age – 18 to 34 as young, 35 to 54 as middle and 55 or above as old.
2. Gender – male and female.
3. Travel group – individuals, couples, relatives and friends and groups.
4. Familiarity with the environment – very familiar, familiar but not sure, first visit and follows interest and first visit and follows landmarks.

3.3.2 Landmarks and wayfinding strategies classifications

Besides determining their individual differences, participants were also asked to verify their landmarks and wayfinding strategies used based on classifications below:

1. Landmarks – signboard, signpost, track surface, vegetation type, follow the crowd and avoid the crowd.

- Wayfinding strategies – shortest path, least time, fewest turns, scenic, first noticed, different from previous.

- Independent-measures t Test as this research goal is to compare two unpaired groups and the type of data is interval.

3.4 Physical movement aspects that was analysed

Based on Figure 1, the researcher has selected six sub-components of wayfinding physical movement to be analysed. The sub-components and their aspects that were analysed are like below:

- Direction – to determine whether participant’s direction was clockwise/anti-clockwise (Asakura and Iryo 2007)
- Distance, duration, and speed – during the whole wayfinding task.
- Arrival time – how long does it take to reach each destination.
- Location – Show route (edge) usage frequency based on gender and age.

3.5 ESRI Tracking Analyst and ET GeoWizards

The main intention of using ESRI ArcGIS 9.3 for this research is to look into the movement patterns of each respondent. This is done through the Tracking Analyst. Using Tracking Analyst, the point data can be manipulated to show the movement of participants throughout the time of carrying the GPS receiver. This is called spatio-temporal analysis in GIS where different time (temporal) can determine different locations for the same spatial entity. The outcome will be various spatial patterns indicating the participant’s movement. Tracking Analyst was very useful in determining the direction, location and arrival time sub-components of wayfinding.

Another important role of ESRI ArcGIS 9.3 is to derive the distance used by each respondent during their wayfinding task. This is done through an add-on called ET GeoWizards which has the capability of deriving the distance of the route used by respondent. After obtaining both distance and duration for each respondent, the researcher is able to derive the speed by dividing the distance in kilometre by time.

3.6 Data Analysis

At first place, the researcher is using Odds-ratio test to seek relations between individual differences with wayfinding behaviours. Odds-ratio test is a method to compare whether the probability of a certain event is the same for two groups, in other words, how strong the difference is. For example, this method can be used to compare the probability of females and males using track surface in the KCC. An Odds-ratio greater than one implies that the behaviour is more likely to happen in the first group. An Odds-ratio less than one implies that the event is less likely to happen in the first group. The weakness of this method is that, it only can compare binary data such as male and female, old and young, and Republican or Democrat.

In order to overcome the weakness, the researcher has chosen other statistical tests such as below:

- Chi-square test for independence as this research goal is to compare two unpaired groups and the type of data is binomial.
- Independent-measures ANOVA as this research goal is to compare three or more unmatched group and the type of data is interval.

4. RESULTS

4.1 Landmarks and strategies based on age

Table 1 indicates that there was a significant age difference in the usage of fewest turns as a wayfinding strategy. Old age respondents were more likely to use the first noticed strategy as a wayfinding strategy with four or 14 % of the respondents who were using it. In terms of landmarks, there were two landmarks that produced significant differences with age.

The two landmarks were the signposts with a p-value of 0.061 and vegetation types with a p-value of 0.014. The usage of signpost was closely related to middle age respondents with 41 or 82 % of the respondents using it. Old age respondents were found to utilise vegetation types with 18 % or five respondents who were using it compared to other age respondents.

Table 1. Age differences in wayfinding strategies and landmarks usage

Strategies or Landmarks	Chi-square		
	Value	df	Asymp. Sig. (2-sided)
First noticed (Old)	5.651	2	0.059
Signpost (Middle)	5.607	2	0.061
Vegetation types (Old)	8.533	2	0.014

4.2 Landmarks and strategies based on gender

Based on Table 2, it can be noticed that female respondents were more likely to use first noticed as a wayfinding strategy with an odds of 2.045. In terms of landmarks used, a landmark has proven to produce a significant difference which was signboard with a p-value of 0.054. The odds of 2.198 has shown that, females were more than twice higher than male’s odds.

Table 2. Gender differences in wayfinding strategies and landmarks usage

Strategies or Landmarks	Chi-square		
	Value	df	Asymp. Sig. (2-sided)/ Odds-Ratio
First noticed (Female)	3.201	1	0.074/2.045
Signboard (Female)	3.7	1	0.054/2.198

4.3 Landmarks and strategies based on travel group

Table 3 shows that only one wayfinding strategy and three landmarks have recorded significant differences which were shortest path as the strategy and signboard, signpost, and vegetation types as the landmarks. P-value for shortest path was 0.05, signboard was 0.035, signpost was 0.008, and vegetation types was 0.062. Groups were more likely to use shortest path strategy with 17 % or one respondent who was using it. In terms of signboard and signpost usage, it is noticed that, couples were more likely to utilise it during wayfinding task with 94 % or 31

respondents who have been using signboard and 79 % or 26 respondents who have been using signpost. Vegetation types were more likely to be used by groups where 10 % or one of them who was using it.

Table 3. Travel group differences in wayfinding strategies and landmarks usage

Strategies or Landmarks	Chi-square		
	Value	df	Asymp. Sig. (2-sided)
Shortest path (Groups)	12.607	3	0.05
Signboard (Couples)	13.56	3	0.035
Signpost (Couples)	17.379	3	0.008
Vegetation types (Groups)	12.011	3	0.062

4.4 Landmarks and strategies based on familiarity with the environment

Table 4 indicates that there were significant differences produced in terms of landmarks and there were multiple. Firstly, there was a significant difference in the usage of signboard and signpost in terms of familiarity with the environment. It can be noticed that first visitors that follow interest were more likely to use signboard and signpost as landmarks with 82 % or 81 respondents who were using signboard and 79 % or 78 respondents who were using signpost.

There were also significant differences between the usage of track surface and vegetation types in terms of familiarity with the environment. It has been found that first visitors who follow landmarks were more likely to utilise track surface where 64 % or seven of them who were using it. The same respondents have also been found to utilise vegetation types with 27% or three respondents who were using it. Not any of the familiar visitors has been found to generally utilise any landmarks.

Table 4. Familiarity with the environment differences in wayfinding strategies and landmarks usage

Strategies or Landmarks	Chi-square		
	Value	df	Asymp. Sig. (2-sided)
Signboard (First visitors, interest)	11.725	3	0.008
Signpost (First visitors, interest)	11.235	3	0.011
Track Surface (First visitors, landmarks)	7.316	3	0.062
Vegetation types (First visitors, landmarks)	10.811	3	0.013

4.5 Direction used based on gender

There was a significant difference with a p-value of 0.066 between genders in the direction chosen during wayfinding. Based on Table 5, it can be noticed that the majority of male respondents used anti-clockwise direction with 19 respondents or 54 % using it. For female respondents, 65 % or 39 of them have chosen to use a clockwise direction during the wayfinding process. Thus, males were more likely to use an anti-clockwise direction while females were more likely to use clockwise.

Table 5. Gender differences in the direction used

Direction	Chi-square		
	Value	df	Asymp. Sig. (2-sided)
Clockwise (Female)	3.373	1	0.066
Anti-clockwise (Male)			

4.6 Distance used based on gender

There was a clear significant difference with a p-value of 0.004 between genders in distances used during wayfinding. Based on Table 6, the mean distance of male respondents was 1.40640 km which was below the general mean distance whilst for females, the mean distance was 1.71572 km which was above the general mean distance. It can be noticed that the mean distance taken by females was longer than males.

Table 6. Gender differences in the distance used

Distance (km)	Chi-square		
	Value	df	Asymp. Sig. (2-sided)
1.40640 (Male)	3.373	1	0.066
1.71572 (Female)			

4.7 Arrival Time Based on Gender

Based on Table 7, two significant differences exist in terms of gender differences in arrival time involving arrival time at Woodland Boardwalk and Woodland Bush. For Woodland Boardwalk, the p-value was 0.075 while for Woodland Bush the p-value was 0.063. For both destinations, the mean arrival time for males was around 10 minutes later than female.

Table 7. Gender differences in the arrival time

Destination	Mean Arrival Time (minutes)	T-Test		
		Value	df	Sig. (2-tailed)
Woodland Boardwalk	38.55 (Male)	1.842	33	0.075
	29.73 (Female)			
Woodland Bush	48.18 (Male)	1.926	33	0.063
	38.55 (Female)			

4.8 Arrival time based on familiarity with the environment

Based on Table 8, there was a significant difference with a p-value of 0.092 between arrival time at Woodland Bush and

familiarity with the environment. First time visitors took less time in finding their way to the destination when compared to familiar respondents. First time visitors who followed landmarks tended to be the earliest respondents arriving at Woodland Bush with a mean arrival time of 33 minutes.

Table 8. Familiarity with the environment differences in the arrival time

Mean Arrival Time (minutes)	T-test		
	Value	df	Sig. (2-tailed)
64.5 (Very familiar)	2.355	33	0.092
50 (Familiar, not sure)			
40.21 (First visit, interests)			
33 (First visit, landmarks)			

4.9 Route usage based on gender

Based on Table 9, route AD or DA had the highest frequency of usage of 96 movements compared to the others. Table 9 shows that female used these routes the most with 50 respondents. Route AC or CA have the lowest usage of 28. Males used these routes the most with 28 respondents. We could also observe that all routes to and from the Koala Boardwalk such as DE or ED and CD or DC were dominated by female.

Table 9. Gender differences in route usage frequency

Route	Usage Frequency	
	Male	Female
AB or BA	30	29
AC or CA	20	8
AD or DA	46	50
BC or CB	37	45
BE or EB	47	48
CD or DC	34	42
CE or EC	25	21
DE or ED	20	21

4.10 Route usage based on age

Based on Table 10, young age respondents dominated route AD or DA with 44 respondents followed closely by middle age with 42 respondents. Although route AD and DA were dominated by young age, all routes toward and from Koala Boardwalk such as CD or DC and DE or ED were dominated by middle age.

Table 10. Age differences in route usage frequency

Route	Usage Frequency		
	Young	Middle	Old
AB or BA	24	30	5
AC or CA	8	17	3
AD or DA	44	42	10
BC or CB	34	37	11
BE or EB	39	50	6
CD or DC	22	47	7
CE or EC	23	20	3
DE or ED	15	21	5

5. DISCUSSION

One of the significant outcomes of this research was the prominence of gender differences in relation to five of the tourist behaviours. Females were more likely to use signboards as a landmark. This shows a similarity with Xia, Packer, and Dong’s finding that suggests females are more eager to use a signboard (Xia, Packer, and Dong 2009). There was also a significant difference between gender and first noticed. Females were more likely to use that strategy. Again, this was the same with Xia, Packer, and Dong’s finding (2009) that suggest females prefer utilising first noticed in their wayfinding task.

In terms of direction, females were more likely to use the clockwise direction while males were more likely to use the anti-clockwise. In terms of distance, males’ average distance was 1.40640 km while females’ average distance was 1.71572 km. This corresponds with the mainstream findings that suggest males are better than females in wayfinding, thus distance taken by males should be shorter (Chebat, Gelinas-Chebat, and Therrien 2008). However, this can be argued that tourist wayfinding can be categorised as leisure activity. Hence, the longer the distance is, the more tourists want to enjoy the tour by visiting more places, producing larger distance. This is called hedonistic values (Babin, Darden, and Griffin 1994). Hedonistic values has also influenced the time taken to arrive at Woodland Boardwalk and Woodland Bush where time taken by males were generally 10 minutes longer than females.

Another important finding was with the familiarity with the environment differences where it has shown relations with two of the tourist wayfinding behaviours. Firstly, in terms of landmarks used, first visitors who follow interests were more likely to use signboards and signposts while first visitors that used landmarks were more likely to use track surfaces and vegetation types as landmarks. The more tourists are familiar with the environment, the less chances of them using landmarks (Xia, Packer, and Dong 2009). In terms of arrival time, the more familiar the tourists are with the environment, the longer time they will take to end their wayfinding tasks. The shortest time taken was by first visitors who follow landmarks and this has proved that the utilization of landmarks has greatly assisted the wayfinding tasks (Sorrows and Hirtle 1999).

Both age and travel group differences have shown relations with two of the tourist wayfinding behaviours which were wayfinding strategies and landmarks used. Firstly, in terms of age, middle age respondents were more likely to use signposts as their landmarks. Old age respondents were more likely to use vegetation type. This is parallel with Xia, Packer, and Dong’s finding (Xia, Packer, and Dong 2009). Secondly, in terms of wayfinding strategy used, old age respondents were more likely to use the first noticed strategy.

Lastly, in terms of travel group differences in relation with landmarks used, couples were more likely to use the signboard and signpost. This is similar to Xia, Packer, and Dong’s finding that suggested couples were the highest travel groups who have been using signboard during wayfinding (Xia, Packer, and Dong 2009). Groups were more likely to use vegetation type. In terms of travel group differences in relation to strategy used, group respondents were more likely to use the shortest path. This was due to the fact that the only group respondent was a tourist guide and he might want to finish the task as quickly as possible due to frequency of his visits.

The researcher has also generated some outputs involving the location part of the tourist wayfinding behaviours. In terms of route usage, females have dominated routes towards and from the Koala Boardwalk while males dominated routes towards and from the Woodland Bush. In terms of age, same as female, middle age respondents have dominated routes towards and from the Koala Boardwalk. These have shown the effects that the difference of age and gender has in producing different interest in the determination of route towards any destination.

6. CONCLUDING REMARKS

Individual differences such as gender and familiarity with the environment have been proven to have impact on tourist wayfinding behaviours. Tourism is one of the most rapidly developing industries in the world. The methodology developed and the findings in this thesis can assist tourists, tourist agencies and tour operators in designing tour itineraries and packages and help tourist organisations improve facility management. This methodologies and findings can also be used to further clarify and develop the knowledge of tourist movements.

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