Wayfinding Performance in an Outpatient Clinic

-Focused on Outdoor Space from Driveway to Entrance-

외래 클리닉에서의 길찾기 행위

-진입로에서 출입구까지의 외부공간을 중심으로-

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Abstract

본 연구는 미국 텍사스 주의 소도시에 있는 스캇 앤 화이트 클리닉의 외부공간을 대상으로 하여 외래환자와 방문객들이 직면하는 길찾기의 문제점을 분석한다. 연구의 공간적 범위는 클리닉의 외부공간으로 한정하여 진입도로에서 진입하여 주차한 후 출입구에 도달하는 경로에서 관찰되는 행태적 특성을 분석한다. 분석의 초점은 진입도로에서 이루어지는 경로선택의 결정과 그것이 클리닉에 진입하기 위한 출입구 결정에 미치는 영향관계에 둔다. 분석은 외부공간에서의 길찾기에 관한 기존 연구문헌을 참고하여 작성한 연구모형에 의해 이루어진다. 구체적으로 보면, 이용자들이 보이는 날씨, 성별, 그리고 나이에 따른 길찾기 행태의 차이를 클리닉의 남동측 출입구와 남서측 출입구에서 발생하는 이용자들의 하차 빈도를 측정하였다. 또한 하차의 위치를 행태 지도에 기록하여 연구모델에 나타나는 상관성을 분석하였다. 길찾기 행태분석 결과를 통해 파악된 외부주차장에 주차한 후 클리닉에 접근하는 이용자들의 경로선택의 문제점과 클리닉의 입구 공간에서 하차한 이용자들의 입구선택에서 나타나는 문제점을 토대로 하여 외부공간에서 발생하는 길찾기 행위의 효율성을 증진시키기 위한 디자인 추천 사항을 다음과 같이 제시한다: (1) 시각적 단서를 제공하기 위해 남서쪽 출입구의 형태와 색채 차별화; (2) 도로에서 클리닉 진입공간에 위치한 안내판의 글자 크기 확대; (3) 학습된 길찾기 행태를 보조하기 위해 동쪽에 랜드마크 시설물 설치 및 목적 지점의 최종경관 개선; (4) 과도한 클리닉의 정보에 의해 감소되는 가독성을 고려하여 안내판의 정보 간략화; (5) 색채의 대조를 고려(출입구 벽에 설치된 클리닉의 이름이 갈색에 푸른색으로 설치되어 있어 색채의 대비가 낮아 가독성 떨어짐); (6) 클리닉 중앙 출입구의 하차 공간 상부에 설치된 캐노피 기둥의 과도한 크기에 의해 발생하는 가시공간의 감소에 의해 발생하는 하차 공간 사용의 혼잡 문제를 제거하기 위해 기둥규모 축소; (7) 하차점 6까지 캐노피를 확장하여 우천시에 발생하는 공간 사용의 문제점 제거; 그리고 (8) 올바른 하차공간 사용을 위해 진입 접근도로에 차선 설치.

키워드 외부 길찾기 행위, 회전의 공간적 결정; 하차 행태

Keyword outdoor wayfinding performance; spatial decision-making of turning; drop-off behavior

1. Introduction

1.1 Problem Statement

This study reviews (possible) problems (and solutions) in wayfinding in an outdoor setting. Specifically, do undifferentiated environments require the creation of environmental differentiation in order to identify optimal wayfinding points?

1.2 Research Objectives

Research objectives are: (1) to identify whether different degrees of decision-making at the turning point exist between gender, and between age (i.e., young adult vs. elderly).

(2) to determine the functionality of person to environment relationship at the drop-off area, by identifying inappropriate drop-off usage and comparing behavior on a sunny and rainy day.

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1.3 Research Limitations

The Scott and White Clinic in College Station is an outpatient clinic which serves to a small local area. Most subjects includes here might be frequent outpatients, thus, convenient and easy turning points and/or drop-off area usage may be learned behavior. This study is limited in terms of depth and the extent to which differences in weather, gender, and age have been analyzed. Thus, observations should be prolonged in order to acquire more salient findings involving these factors. Patients/visitors' self-reports about wayfinding performances also should be considered.

2. Literature Review

The growing body of literature about wayfinding performance shows a variety of person to environment relationships. Wayfinding performance is related to many factors: (1) human involvement, including individual characteristics (Zimring, 1981: 47-53); gender (Schmitz, 1997: 312-323); age (Passini, et al., 1998: 115-122; Andiel and Liu, 1995: 25-31; and Kirasic, 1991: 211-217); and physical conditions, such as those with optical impairments and the disabled (Taylor and Taylor, 1997: 47-52; and Passini, 1990: 35-41); and (2) the built environment, including visual cues such as landmarks (Witmer, et al., 1996: 97-105; Weisman, 1987; Kaplan and Kaplan, 1981; and Lynch, 1960) and signage (Carpman and Grant, 1993; Wright, et al., 1993; Arthur and Passini, 1992; O'neill, 1991: 387-394; and Weisman, 1987). Based on these studies, it is assumed that environmental design significantly determines an object's usage in relation to the person-environment relationship.

With these studies related to wayfinding, this study evaluates the Scott and White Clinic in College Station with respect to the following two concerns: (1) decision-making prior to a turning point, and (2) entrance selection.

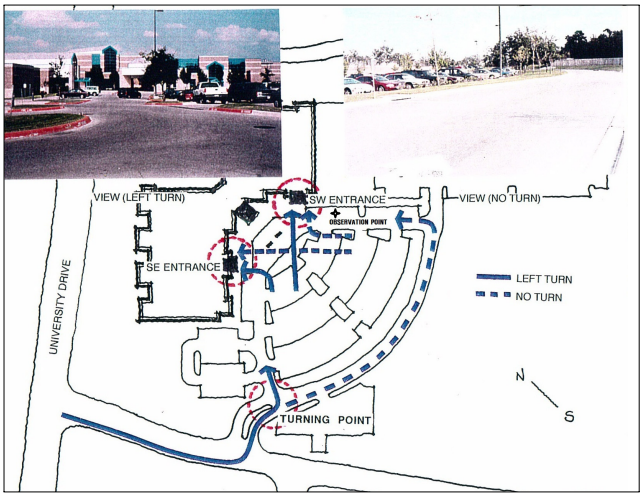
One of the behavior strategies (Weisman, 1979) implies that if the environmental setting is not very simple or complex, the mechanism of wayfinding behavior will be a sequential path to a destination by moving from point to point. Seemingly, in this sequential mechanism, the navigator does not have a holistic cognitive map about the environmental setting in question. Consequently, a navigator follows only a particular route and cannot take shortcuts when necessary. The navigator also might make a wrong decision by selecting a path destination based on prior knowledge or singular usage of that path. To test this behavioral strategy mechanism for wayfinding, the frequencies of wrong decision-making were observed at the drop-off area of the Scott and White Clinic by observing behavior at the drop-off area on a sunny and rainy day.

3. Method

3.1 Observation Setting

The Scott and White Clinic in College Station is part of the Scott and White Health Care System, the largest multi-speciality practice in Texas (i.e., 25 key speciality services for adults and children). The Scott and White Clinic in College Station has six entrances. One entrance is for staff only. The urgent care clinic has a different service schedule and its own entrance. The urgent care clinic is open from 8 A.M. to 8 P.M. (Monday through Thursday), and from 8 A.M. to 5 P.M. (Friday through Sunday), while other regular clinics are open from 8 A.M. to 5 P.M. (Monday through Friday). The outpatient surgery clinic also has its own entrance and parking space. In addition, these three entrances are not visible from the observation point (Figure 1) due to their location.

Observation was done one hour each morning and afternoon from Monday through Friday. Friday observation from 4 P.M. to 5 P.M. was excluded because patient/visitor numbers differ significantly with Monday through Thursday usage numbers, i.e., about one half. Weather conditions during observation days included four sunny days and four rainy days.



[Figure 1] Scott and White Clinic in College Station, TX

3.2 Subjects

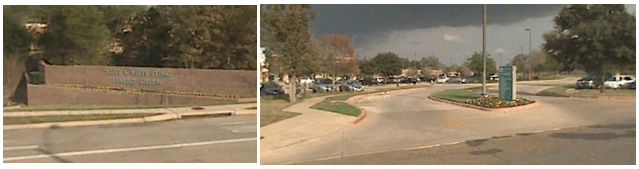
The subjects of this study are patients/visitors who come to the clinic via automotive transportation. To define the subjects for this observational study, several inclusion and exclusion criteria were generated. Subjects consisted of single person drivers and/or single person drivers with one or more minority dependents. As it was difficult to identify the driver in cases of group visitors, subjects accessing an entrance by group were excluded. In addition, gender exclusions were based on gender identifiability due to physical distance between the entrances and the observation point. Subjects using only one of either the South-East entrance or the South-West entrance are included (Figure 1), while main entrance users are excluded, since their destination was not clear (The main entrance is connected to an elevator hall, thereby providing access to an outpatient surgery clinic on the second floor, radiology on the first floor, and connections with other clinics, such as family medicine and pediatrics and pediatric dentistry which are accessible by the South-East and the South-West entrances, respectively).

3.3 Research Method

Observation was done from a parked vehicle permitting observation of both turning behavior at a turning point and navigation to the drop-off area. First, an unobtrusive observation technique was selected to observe the natural behavior of subjects at the turning point. Second, behavior mapping techniques were utilized for the purpose of behavior analysis of navigation in relation to nearby entrances.

3.4 Procedure

This study consists of two procedures. The first procedure is to identify turning behavior at a turning point (Figure 2). The frequencies of left-turn and no-turn to a turning point were counted (Tables 1 to 4).



Signage shown to University Drive Clinic view & turning point from entrance

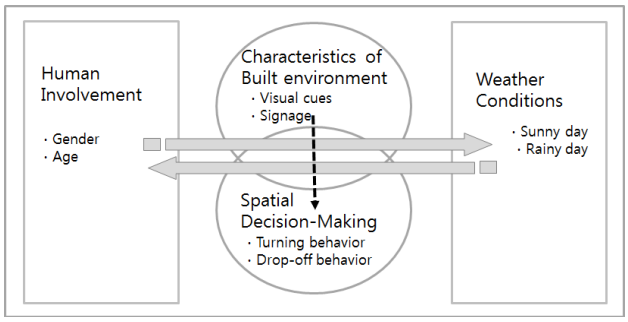
[Figure 2] View nearby turning point

Visual access to entrances affects the decision-making for turning or going straight. When a person makes a left turn, distinctive entrances are perceived. By contrast, when a person does not make a turn, a distinctive visual cue is absent (Figure 1). This procedure consists of: (1) constructing a check list; (2) counting the turning patterns of left turn or no-turn choices (i.e., going straight); (3) counting the number of persons entering each clinic entrance; and (4) analyzing turning patterns in terms of gender and age.

The second procedure is behavior mapping at the drop-off area. At the drop-off area around nearby entrances, stop patterns of vehicles were tracked by applying place-centered behavior mapping techniques. If a person made a wrong decision due to visual cue distractions of entrances, actions will be made to compensate the wrong decision, which might be inappropriate in terms of drop-off area usage. The procedure consists of: (1) constructing a check list; (2) observing the drop-off behavior at two nearby entrances; (3) constructing a place-centered behavior map; and (4) comparing the behavior maps of sunny vs. rainy days.

3.5 Research Model

The following Figure 3 illustrates relationships between the characteristics of built environment and spatial decision-making behavior, within relationships between human involvement and weather conditions.



[Figure 3] Research model

4. Results and Discussion

4.1 Turning Behavior

According to site plan, the Scott and White Clinic, the appropriate approach to the clinic is: (1) the South-East entrance from left turns; and (2) the South-West entrance from no turns.

The average frequency of left turns per hour on sunny and rainy days was 34 and 41, respectively. In the case of a left turn, South-East entrance usage increased from 55% on a sunny day to 73% on a rainy day (Tables 1 & 2).

[Table 1] Sunny day average numbers of left-turn per hour at turning point

Turning	Gender	Age	SE entrance	SW entrance	Sum
Left Turn	Female	Young	10 (29.41%)	10.75 (31.62%)	20.75 (61.03%)
		Elderly	2 (5.88%)	0.75 (2.21%)	2.75 (8.09%)
		Sum	12 (35.29%)	11.5 (33.83%)	23.5 (69.12%)
	Male	Young	5.5 (16.18%)	3.5 (10.29%)	9 (26.47%)
		Elderly	1.25 (3.67%)	0.25 (0.74%)	1.5 (4.41%)
		Sum	6.75 (19.85%)	3.75 (11.03%)	10.5 (30.88%)
Grand Sum			18.75 (55.15%)	15.25 (44.85%)	34 (100%)

[Table 2] Rainy day average numbers of left-turn per hour at turning point

Turning	Gender	Age	SE entrance	SW entrance	Sum
Left Turn	Female	Young	15.5 (37.80%)	4.5 (10.98%)	20 (48.78%)
		Elderly	3 (7.32%)	0 (0%)	3 (7.32%)
		Sum	18.5 (45.12%)	4.5 (10.98%)	23 (56.1%)
	Male	Young	10.5 (25.61%)	6 (14.63%)	16.5 (40.24%)
		Elderly	1 (2.44%)	0.5 (1.22%)	1.5 (3.66%%)
		Sum	11.5 (28.05%)	6.5 (15.85%)	18 (43.9%)
Grand Sum			30 (73.17%)	11 (26.83%)	41 (100%)

In contrast, the average frequency of no turns per hour on sunny and rainy days was 9.75 and 14, respectively, and the usage of the South-West entrance also increased from 82% on a sunny day to 89% on a rainy day.

An average of 23.5 female patients/visitors per hour made left turns on a sunny day, while 23 made left turns on a rainy day. Female usage of the South-East entrance increased significantly from 51% on a sunny day to 80% on a rainy day, while male usage of the South-East entrance stayed the same at 64%. In the case of no turns, female usage of the South-West entrance also increased from 81% on a sunny day to 87% on a rainy day. Male usage of the South-West entrance increased slightly from 88% on a sunny day to 92% on a rainy day (Tables 3 & 4).

[Table 3] Sunny day average numbers of no-turn per hour at turning point

Turning	Gender	Age	SE entrance	SW entrance	Sum
No Turn	Female	Young	1.5 (15.39%)	6 (61.54%)	7.5 (76.93%)
		Elderly	0 (0%)	0.25 (2.56%)	0.25 (2.56%)
		Sum	1.5 (15.38%)	6.25 (64.10%)	7.75 (79.49%)
	Male	Young	0.25 (2.56%)	1.75 (17.95%)	2 (20.51%)
		Elderly	0 (0%)	0 (0%)	0 (0%)
		Sum	0.25 (2.56%)	1.75 (17.95%)	2 (20.51%)
Grand Sum			1.75 (17.95%)	8 (82.05%)	9.75 (100%)

[Table 4] Rainy day average numbers of no-turn per hour at turning point

Turning	Gender	Age	SE entrance	SW entrance	Sum
No Turn	Female	Young	1 (7.14%)	5 (35.71%)	6 (42.85%)
		Elderly	0 (0%)	1.5 (10.71%)	1.5 (10.71%)

		Sum	1 (7.14%)	6.5 (46.42%)	7.5 (53.56%)
	Male	Young	0.5 (3.57%)	4 (28.57%)	4.5 (32.14%)
		Elderly	0 (0%)	2 (14.30%)	2 (14.30%)
		Sum	0.5 (3.57%)	6 (42.87%)	6.5 (46.44%)
	Grand Sum		1.5 (10.71%)	12.5 (89.29%)	14 (100%)

This implies that the weather conditions affect outdoor wayfinding performance. The South-East entrance, the appropriate approach to the clinic in the case of left turn, was more used on a rainy day (i.e., sunny day 42.86% vs. rainy day 54.55%, meaning 11.69% increase), while the South-West entrance, the appropriate approach to the clinic in the case of no turn, was more used on a rainy day (i.e., sunny day 18.29% vs. rainy day 22.73%, meaning 4.44% increase) (Table 5). People might be more meticulous in their wayfindings on rainy days by focusing better on environmental wayfinding cues. More details are shown in Table 5.

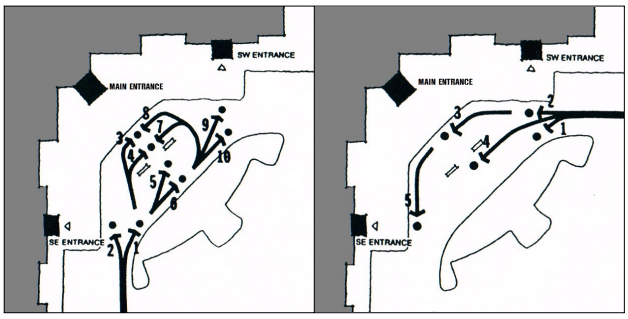
[Table 5] Average percentages of left-turn and no-turn per hour at turning point

Turning	Gender	Age	SE entrance	SW entrance	Sum
Left Turn	Female	Young	22.86[a]	24.57	47.43
			(28.18)[b]	(8.18)	(36.36)
		Elderly	4.57	1.71	6.29
			(5.45)	(0.00)	(5.45)
	Male	Young	12.57	8.00	20.57
			(19.09)	(10.91)	(30.00)
		Elderly	2.86	0.57	3.43
			(1.82)	(0.91)	(2.73)
	Sum		42.86	34.86	77.71
			(54.55)	(20.00)	(74.55)
No Turn	Female	Young	3.43	13.71	17.14
			(1.82)	(9.09)	(10.9)
		Elderly	0.00	0.57	0.57
			(0.00)	(2.73)	(2.73)
	Male	Young	0.57	4.00	4.57
			(0.91)	(7.27)	(8.18)
		Elderly	0.00	0.00	0.00
			(0.00)	(3.64)	(3.64)
	Sum		4.00	18.29	22.29
			(2.73)	(22.73)	(25.45)
Grand Sum			46.86	53.14	100
			(57.27)	(42.73)	(100)

[a] Sunny day; [b] (Rainy day)

4.2 Drop-off Behavior

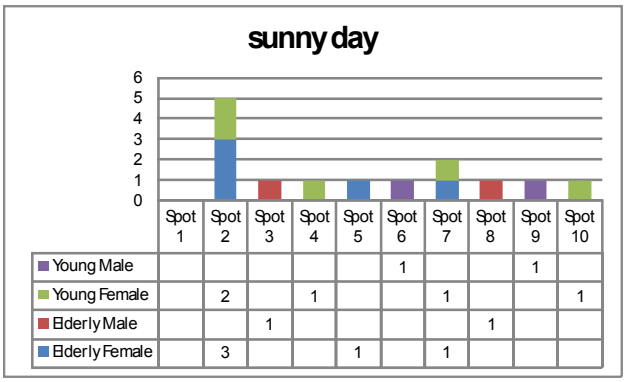
Stop patterns of vehicles at the drop-off area were recorded on place-centered behavior maps as follows(Figures 4 & 5).



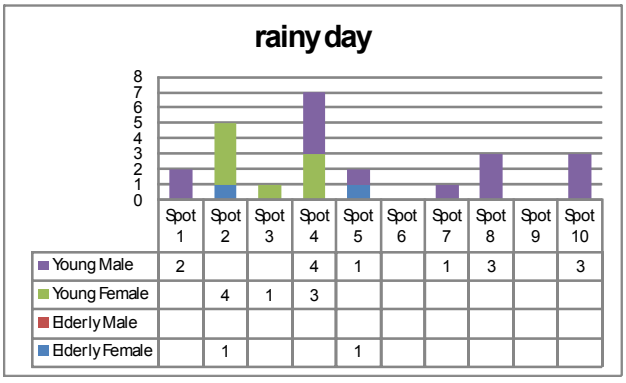
[Figure 4] Rainy day drop-off patterns: left turn

[Figure 5] Rainy day drop-off patterns: no turn

On a sunny day, people used the drop-off area as a mode of even distribution. In the case of left turn, drop-off point 2 was more frequently used than other spots(Figure 6). On the other hand, in the case of no turn, drop-off points 2 and 3 were evenly used (Figure 8).



[Figure 6] Sunny day drop-off area usage of left turn



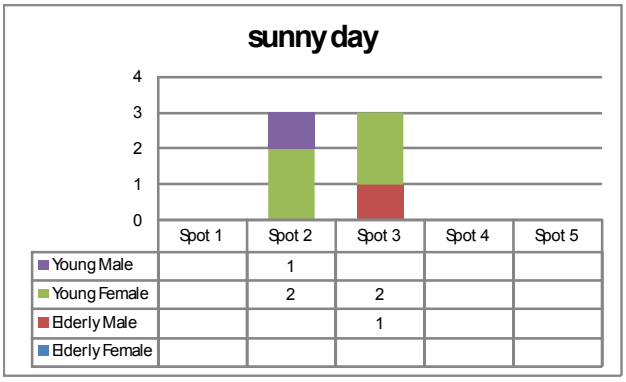
[Figure 7] Rainy day drop-off area usage of left turn

On a rainy day, people used the drop-off area more than on a sunny day. Thus, it is assumed that if the

drop-off area is designed inappropriately, the misuse of the area is maximized on a rainy day.

In the case of the left turn, drop-off behavior shows inappropriate usage patterns. When traffic flows are considered, drop-off points, such as 2, 3, 5, 7, and 9 are problematic (Figure 4). These spots hinder opposite direction traffic flows. On sunny days, point 2 was most frequently used (5 times) (Figure 6). Point 4, however, was used most frequently on the rainy day (7 times) (Figure 5 & 7). Despite points 2, 3, 5 and 7 being inappropriate drop-off areas, most people used these points. One reason might be distractions by entrance distinctions, as patient/visitors see distinctive entrances from a distance then make wayfinding decisions. When they notice their navigation is not appropriate for drop-off/pick-up, they simply cross the driveway for drop-off/pick-up.

The drop-off behavior in the case of no turn was appropriate except point 1 (Figure 5), as it shows smoothly flowing traffic. On sunny days. points 2 & 3 were evenly used (3 times) (Figure 8). On the rainy day, however, point 3 was most frequently used (5 times) (Figure 9).

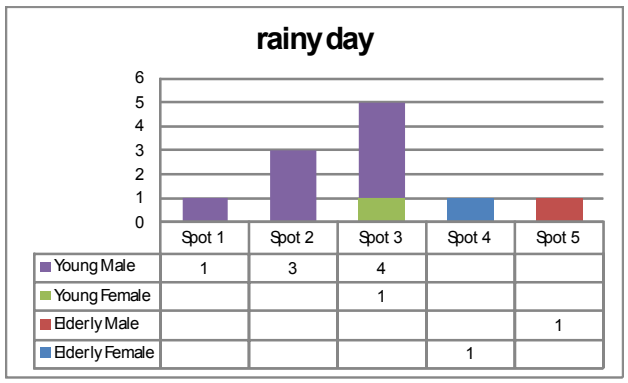


[Figure 8] Sunny day drop-off area usage of no turn

5. Conclusions

The problems related to wayfinding performance at the Scott and White Clinic are the lack of landmarks at the outdoor space, signage, color contrast and the misused drop-off area. For more improved wayfinding performance of the users, the followings are suggested.

(1) Consider differentiation of the South-West entrance in terms of shape or color.



[Figure 9] Rainy day drop-off area usage of no turn

(2) Increase the letter sizes on signboards. According to Carpman and Grant (1993), it is suggested that no smaller than 4 inches high where speed limits are 30 to 35 miles per hour.

(3) Build a landmark at the East and terminal view in order to aid learned wayfinding behavior.

(4) Reduce signboard information. The signboard is infrequently read due to numerous clinic names on it.

(5) Consider color contrast. The color combination of the clinic name on the wall, when shown to University Drive, is blue on brown—a weak contrast.

(6) Reduce the columns oversized of an covered entrée canopy over the drop-off area; They block visual access from the driveway to the drop-off area. Consequently, they cause misusage of the drop-off area.

(7) Expand the covered entrée canopy over the drop-off point 6.

(8) Draw lanes on the driveway to help guide proper destination usage.

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