Wayfinding at the East Campus of Cayuga Medical Center in Ithaca, NY

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Current Issues with Wayfinding in Healthcare Facilities: Eliminated Architectural Cues & Relying on Signage

Wayfinding is a cognitive process that involves recognition of a stable, comprehensive set of spatial relationships. As we attempt to find our ways to certain destinations, directional cues in the environment become critical. Once full of such environmental cues, today's cities and their buildings have replaced them with standardized structures, making it extremely difficult to understand the space. For instance, a hill gives a stronger sense of direction than a level street (De Jesus, 1994).

With larger and more complex buildings, people saw standardization as the solution to quickly organize and fit a great number of different facilities together. However, wayfinding inevitably became a chronic problem for these facilities, including subway, hospitals, schools, and large government buildings (O'Neill, 1991). Identical hallways and symmetrical layout provided absolutely no directional cues or distinct points for recognition. Architect Andrea Branzi from Milan said that "the environmental presence once represented by architecture was replaced by industrial objects."

An effective wayfinding system is particularly necessary for health care facilities, because of their differences from other spaces, such as shopping centers. Unlike shoppers who need to wander in order to shop, patients should not need to enter into unnecessary areas. Their anxiety must be reduced by clarifying their destinations and corresponding paths (Del Nord, 1999).

Even with the increased awareness of its importance, wayfinding in hospitals has not improved. Most of their efforts have been put into implementing signage to compensate for the complex floor plan (O'Neill, 1991). However, signage as the only guide to users is often inadequate to solve the problem. In fact, it is critical to focus on other variables of a successful wayfinding system that are more effective (Del Nord, 1999). Many hospitals only utilize one or two of these components, and wayfinding remains to be a pervasive problem. Overwhelming number of studies criticize this simple-minded approach to the problem, asserting that signage itself does not solve the problem. Professor Donald Preziosi at UCLA wrote that "buildings remain in the visual channel to be continually used and inter-subjectively

appropriated; sentences do not."

Signage sometimes does enhance wayfinding and reduce confusion, but users can completely ignore it (O'Neill, 1991). In one nursing home, only 18% of the residents used signage for wayfinding (Weisman, 1987). Users' initial wayfinding behaviors are also affected more by the visual configuration of the space than the visible signage (Carpman, Grant, & Simmons, 1985; Gray, Moore, & Robinson, 1984). Overall, there is no solid consensus on signage's effectiveness on wayfinding, because the degree of its influence varies on different elements, depending on other factors, e. g. the overall floor plan (Best, 1970; O'Neill, 1991).

What else does a good wayfinding system require besides signage? The three major variables are landmarks (Weisman, 1981; Passini, 1984; Scialfa, Laberge, & Ho, 2004), architectural differentiations for different areas (e.g. color, texture changes), and the overall floor plan (Passini, 1984; Marberry; Weisman, 1981). Obviously, these elements are most effective when implemented early on through strategic planning (MacKEnzie & Krusberg, 1996).

Carpman and Grant (1993) define wayfinding as a multistage trip from one's home to the facility's reception area. In addition to the signage and three major variables, any factors that can physically and cognitively facilitate or hinder the process are also considered important wayfinding variables.

Reasons to Change: Cost of ineffective wayfinding system

There are two major reasons to have a good wayfinding system in health care facilities. The first reason is to improve patients and visitors' experience. Visitors' frustration hurts the institution's image and credibility (MacKenzie & Krusberg, 1996) with increased general hostility toward the organization, and people remember unpleasant experiences for a long time (Carpman & Grant, 1993). Ineffective wayfinding systems also directly affect patients' health, as spatial disorientation causes stress, discomfort, feeling of helplessness, headaches, increased blood pressure, lower heart rate, and fatigue (Carpman & Grant, 1993; Nelson-Shulman, 1983-1984, Shumaker & Reizenstein, 1982). Additional signage to reception areas seem to reduce stress levels among visitors (Carpman, Grant, & Simmons, 1984; Wener and Kaminoff, 1983).

The other reason for the effective system is staff. As people disrupt staff members by asking directions, productivity is reduced (Carpman & Grant, 1993; MacKenzie & Krusberg, 1996). Zimring (1990) estimated that more than 4,500 staff hours were wasted on giving directions in his study at a 604-bed hospital, which would be more than hours of two full time jobs per year.

East Campus Introduction

Located on Warren Road in Lansing, the East Campus of Cayuga Medical Center (CMC) provides many outpatient services. There are three major departments, Convenient Care, Imaging Center, and Surgicare. Compared to large health care complexes, there is less potential for wayfinding problems with the small number of departments in this one-story building. However, an interior wayfinding system is only one half of the overall system. The other critical half is an exterior wayfinding system that successfully guides the visitor from home to the facility. The visitor's overall trip was further divided into 5 parts (Table 1.1) for detailed observations and

Exterior Wayfinding		Interior Wayfinding		
Home ► Parking	Parking ► Main Entry (Specific Departments)	Main Entry ► Reception Area	Reception Area ► Other Amenities	One Department ► Another Department

Table 1.1. Division of visitors' trip to the East Campus of Cayuga Medical Center.

analysis. One aspect of the building to note is that each department had its own main entry, instead of having one main entry that leads to the specific departments.

With this model in mind, the East Campus was observed on three different occasions. The data from the observations was synthesized with findings from relevant literature to invent innovative changes for a more effective wayfinding system for the facility.

There are two ways to travel to the East Campus of CMC: Car/Taxi and public transportation system, TCAT bus, which makes hourly stops. To cover all necessary aspects of this division of the trip, both systems were tested.

What Needs to Change

1A. Exterior Wayfinding | Home to Parking Lot

Traveling by Car

The driver expressed that it was relatively easy to remember general directions as long as he was familiar with the overall road map of Ithaca. Route 13 and Warren Road were two of the most recognized roads among the surveyed Ithaca residents. Mr. Joe Fizgerald added that the location for this center was very deliberately chosen, being the center of the largest growth spot in Tompkins County. Both of the trips took approximately fifteen minutes from Collegetown of Cornell University.

However, there was almost no signage for the facility, except a sign with a big "H." The facility also did not have any landmark to suggest the main direction. The lack of two main elements of wayfinding caused some confusion when actually looking for the entrance to the parking lot. Visitors from out of town who are not familiar with the region can be especially frustrated from the lack of concrete guide.

What caused more confusion was the point after entering the main driveway to the East Campus. Shortly after the turn into the driveway, there was a signage on the right that listed all the departments. Nonetheless, the driver drove past without noticing it and stopped at a decision point with two paths. He made a left turn where the parking lot was immediately visible, assuming it was the right path to the assigned destination. However, the parking lot was only for Convenient Care according to the signage. The other path led to another parking lot for Imaging Center and Surgicare. However, these parking lots are not immediately visible from the main driveway, and can give the feeling of "driving into the loading dock area" (J. Kwon, personal communication, November 18, 2006) with no clear signage. This shows that drivers tend to pay more attention to what they perceive to be an easy access to their destinations than available signage (Carpman

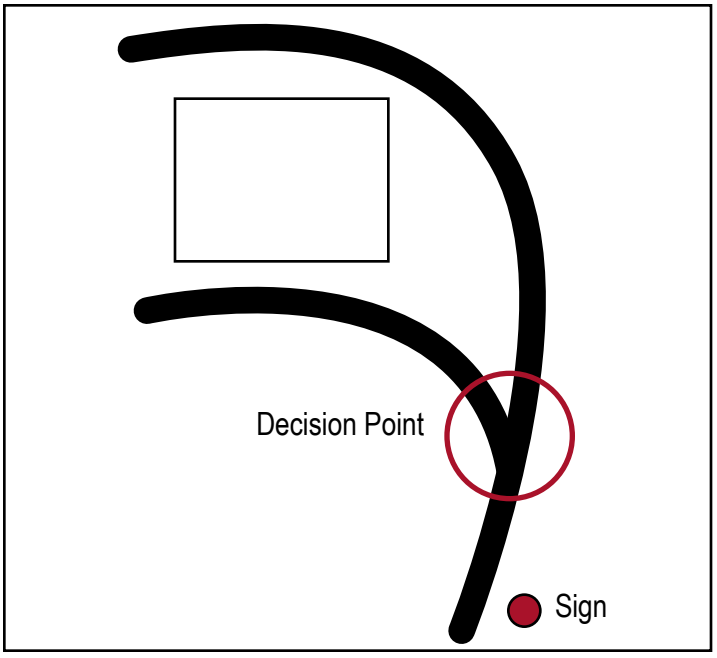

Figure 1.1. Deicision point with no signage.

Figure 1.2. Main exterior signage.

& Grant, 1995).

The inadequate design of the sign further reduces its effectiveness. Several problems include poor legibility from low contrast and inappropriate type face, and destinations that are not organized by directions. Also, the sign is invisible at night, even though Convenient Care operates until 10 p.m., with no interior/exterior illumination or reflective lettering.

Another crucial function the sign lacks is guidance of visitors to appropriate departments, especially those who are making walk-in visits for the first-time. Visitors may not recognize the services they provide just by the names of the departments, such as Convenient Care. A good example of immediately recognized terms for similar types of services is "urgent care." Confusion and stress from unnecessary wandering can be reduced if the visitor can identify the appropriate destination from signage.

Traveling by Bus

There are no concerns for driving directions when using public transportations. However, the schedule and bus stops can be confusing without clear signage. Many visitors to Convenient Care may not be frequent patients at the facility because it provides walk-in urgent care services. All bus stops that travel to a healthcare facility should be clearly marked with the schedule and approximate travel time to reduce stress and anxiety for the patient in emergency (Carpman & Grant, 1993). Also, it is critical to provide such procedural information on public transportations on websites or printed materials like brochures (Marberry, 2005). The website for the Cayuga Medical Center does not contain any information on the available transportation services, and the website of TCAT bus system does not highlight any particular routes or bus stops that travel to the facility.

While on the bus, visitors can be anxious if they are using the bus for the first time and not sure about which stop to get off. Fortunately, the bus route that serves the East Campus had auditory support that announces the name of each stop. On the other hand, this does not completely resolve the issue. There are no visual announcements for people with hearing impairments or simply who miss the recorded message. Neither does the actual bus stop at the East Campus give any cues that inform the passenger to get off. During the two visits, total of four confused passengers asked the driver if it were the right stop before they got off.

The bus stop completely lacks functionality other than the seating it provides. As shown in Figure 1.3, it cannot be identified as a bus stop. No signage is to be found, including the TCAT bus logo, schedule, and other necessary information for

Figure 1.3. Bus stop with no identification.

the passenger. The bus stop also lacks any lighting source for evening visitors. In addition, the lack of immediate adjacency between the bus stop and the East Campus only confuses the passenger further. If the facility were immediately visible, the building itself would verify the correct stop without any additional signage.

1B. Exterior Wayfinding | Parking Lot/Bus Stop to Specific Departments

Traveling by Car

Once the visitor is in the right parking lot, it is not difficult to find the main entry to the department. However, visitors in the wrong parking lot are greatly challenged to find their destinations. Once past the main signage near the entrance, there are no additional signs that guide the visitor to different departments. Each department is identified with a large exterior sign, but the signs are only visible from the correct parking lot. For instance, visitors who make the wrong turn into the Convenient Care parking lot have no guide to Surgicare or Imaging Center, which are on the opposite side of the complex. There are also no walkways that connect the two sides (Figure 1.4). Not only does this discourage wayfinding, but it is also extremely hazardous to expose pedestrians to the car traffic, in case some visitors walk around the complex.

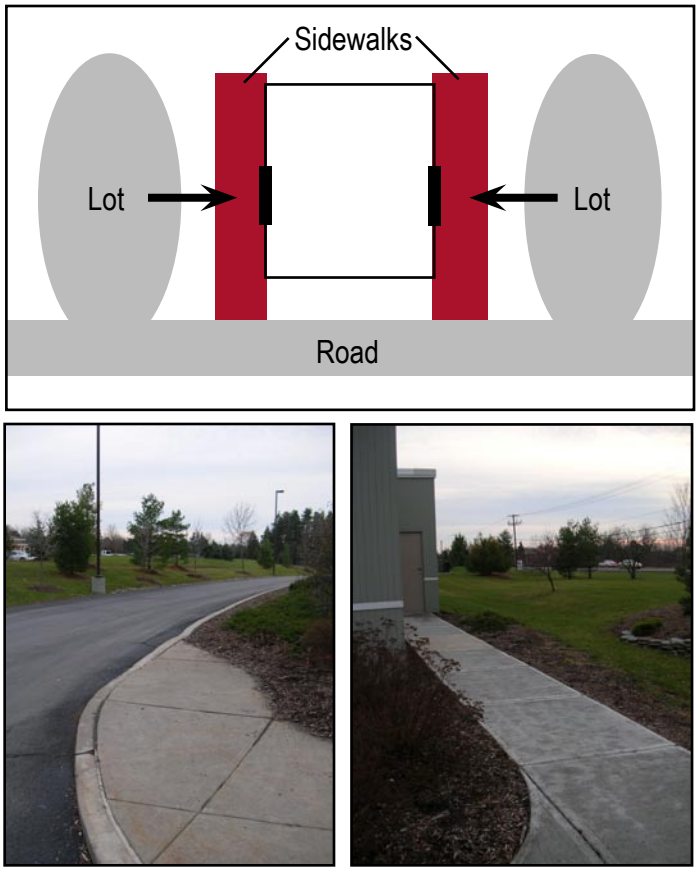

Figure 1.4. No sidewalks to travel around the complex.

Poor design of the exterior signs contributes to the wayfinding challenge, as the they do not meet any of recommended typology standards (Sanders & McCormick, 1992). The stroke width of the letters is too skinny, and the character width to height proportion is too small, greatly reducing its legibility. Also low in contrast, they are not visible at night, further hindering the wayfinding process for the evening visitors.

The lack of signage causes many visitors to walk into the wrong department. All receptionists at the three different departments confirmed that they often redirect people to the appropriate departments. As discussed earlier, wasted time of staff hours is one of the major losses due to an ineffective wayfinding system.

The disability parking spots in the parking lot all had immediate access to sidewalks, and the section of the sidewalk in front of the main entry was leveled off for greater accessibility. However, those who arrive in the wrong parking lot would have to travel on the road for vehicles, which can be a very dangerous situation.

Traveling by Bus

There is not a single signage near the bus stop to direct visitors to the East Campus of CMC. The visitors may not even recognize the facility with no visible landmarks nor noticeable architectural differences from the surrounding buildings (Figure 1.5).

In order to get to the facility, visitors have to walk on the unleveled paved path with no handrails (Figure 1.6). This path is especially dangerous during winter with heavy snow, and visitors in

Figure 1.5. The facility has no signs or other forms of identification. There are still no signs when futher proceeded.

wheelchairs have no access to such steep, uneven ground surface. They also need to cross two roads with no clear crosswalks, when it is strongly asserted to provide immediate access to sidewalks for visitors in wheelchairs (Carpman & Grant, 1993).

Once they cross the second road, they run into a major wayfinding conflict. There are no signs that indicate locations of the separate departments. The visitor approaches the building complex from the side, but all exterior signs face away the person's view. The first-time visitors must make a guess of which direction to go, without being able to confirm the decision with any signs. The lost passengers who end up making the wrong turns undergo stress and disrupt the staff in order to find their way.

Two visitors who traveled on the bus were observed for their wayfinding behavior from the bus stop to the department. Both of them had a number of signs of hesitation, each taking approximately 10 and 25 minutes, when the actual walking distance from the bus stop to any department was less than 2 minutes. The details of the observations are organized in Table 1.2.

Clearly the transition between the bus stop and the facility is managed very poorly. Again, not only is this unpleasant and stressful to the visitor, but can be very dangerous with uneven path surface and interactions with the traffic, especially for those with handicaps.

Figure 1.6. Unleveled paved path with no handrails.

Visitor 1, Female, Duration Time: 10 minutes
• Spent most of her time at the decision point with no signs. • After a couple of minutes in hesitation, she proceeded to the right and walked into the first entry she saw, which was Surgicare. Soon after she was sent back out by the receptionist and walked around the complex to get to Convenient Care.
Visitor 2, Male, Duration Time: 25 minutes
• Spent most of the time to identify the whole facility complex. • Instead of crossing the street, he walked to the adjacent building complex. After spending a few minutes looking into the doors and windows, he turned around and walked to the other way, this time, crossing the street. • He made a right turn, proceeded toward Surgicare, and looked into the windows. He moved onto Imaging Center and repeated so. • Finally walked into the doors and was soon redirected to Convenient Care.

Table 1.2. Details of observations for two visitors who arrived on the bus.

2. Interior Wayfinding

Interior wayfinding system can be divided into three components. The first two wayfinding components are within each department, and the last component is within the entire complex:

- Main entry to reception area;
- Reception area to other amenities;
- One department to another through corridors.

2A. Interior Wayfinding | Within the Department

Table 1.3 organizes specific problems to each department in details. In summary, there were a number of problems that visitors encountered. Main doors were not uniformly designed with inadequate signage, and many visitors were

CONVENIENT CARE	
Main Doors	◦ Automatic door openers are not uniform in design or easily visible (some coloring is scraped off); the openers inside are so close together that it creates confusion; two visitors were observed making a mistake; kept pushing on the wrong button, 5-6 times, until it was suggested to press the other button. ◦ Only one door is manually operated, but there is no signage: another two visitors continued to push and pull on the wrong door five times.
Main entry ► Reception Area	◦ Receptionist's desk was immediately visible from the main entry.
Reception Area ► Amenities	◦ Bathroom: whether intentional or not, through the big openings in the wall, signage was readily visible; the sign itself should be larger and higher in contrast level. ◦ Coat hangers and reading material holders were not immediately visible from the entry point and were only visible from certain parts of the reception area.
IMAGING CENTER	
Main Doors	◦ The mud mat was not completely flush with the door level, coming off when staff rolled carts by. ◦ Automatic door opener available only for entering visitors.
Main entry ► Reception Area	◦ Three main desks available at the receptionist desk: two further windows are not visible from the main entry, building up the traffic around the first desk. They also resemble office cubicles when looked at from the waiting area. ◦ No visible sign from the waiting area that identifies the reception windows. ◦ Receptionist's desk surface is too high for someone in wheelchairs.
Reception Area ► Amenities	◦ Bathroom not visible from the waiting area. Interview with a receptionist: many people ask about bathrooms; it may not be too disruptive to staff members, but may cause much hesitation and discomfort for visitors as they feel like disrupting (Carpman & Grant, 1993). ◦ Many visitors also ask about the bus system.
SURGICARE	
Main Doors	◦ Automatic door openers are not uniform in design across the facility. ◦ Only available for entering visitors as well.
Main entry ► Reception Area	◦ Receptionist's desk was immediately visible from the main entry. ◦ The desk surface is too high for someone in wheelchairs.
Reception Area ► Amenities	◦ Bathroom signage is only visible from the near front of the waiting area. ◦ Coat room and cubbies are blocked from the view by the receptionist's desk and plants. They are not labeled with signage either. Also, they are located behind the receptionist's desk with a very narrow access. Visitors may think the space is for the staff.

Table 1.3. Problems specific to each department.

observed having trouble with operating the doors both manually and automatically. The receptionist's desks were all readily visible from the main entry, compensating for the lack of clear signage for the areas. However, visitors traveling through interior corridors from the other departments do not have a good visual access to them. Receptionist's desk often serves as a major landmark in health care facilities (Passini, 1984), and it needs to be clearly visible and identifiable from the surroundings in order to enhance wayfinding performance (Scialfa, Laberge, & Ho, 2004; Weisman, 1981). Neither is access to amenities, such as bathroom and coat hangers, a smooth process in most areas, due to the lack of adequate signage and other architectural orientation cues.

Within the East Campus Building

Because simple floor plans intrinsically have fewer navigational challenges to resolve than complex ones (Corlett, Manenica, & Bishop, 1972; O'Neill, 1991), the small number of floors and departments give a great advantage to East Campus of CMC for developing a good wayfinding system. Nevertheless, the facility does not take of this advantage. Its current wayfinding system fails to fully utilize the four essential variables—landmarks, architectural differentiations, overall floor plan, and signage. The existing system is inconsistent and disjointed.

Landmarks

Landmarks are one of the most important factors for wayfinding (Carpman, Grant, & Simmons, 1985; Garling, Lindberg, & Mantyla, 1983; Scialfa, Laberge, & Ho, 2004). Visual access to the destination enhances wayfinding more than visible signage (Carpman, Grant, & Simmons, 1985). People tend to move toward spaces and through corridors with more visual access (Marberry, 2005). High visual access helps people get acquainted with the configuration much faster than low visual access (Garling, Lindberg, & Mantyla, 1983). This means that if visitors can see the receptionist's desk of Surgicare from the standing point, signage may not even be necessary. In fact, people often fail to notice visible signage and tend to look for familiar landmarks that would direct them to their destination. In the review of 400 fire incidents, less than 8% used signage to find exit (Bryan, 1982). The patient's situation usually may not be as urgent as a fire, but this shows that people in panic will more likely look for immediate visual cues instead of signage.

The departments' receptionist's desks work well as landmarks for visitors entering through their main doors as they are immediately visible. However, the visitor traveling from other departments faces a very different situation. Except from the main entrance, the desks are barely visible in other directions. As the visitor approaches the department, there are no landmarks to confirm that the person is at the right location. During the first observation period, both of the two visitors who traveled to Imaging Center from another department spent more than 10 seconds to pause and look around in confusion. They were not able to identify the receptionist's desk until a staff member got their attention. Convenient Care provides wider visual access to its receptionist's desk through the large glass windows of the office. Yet, the view is still limited from other directions than the main entry.

The interdepartmental corridors have multiple doors, often with no visual access. This may increase privacy for each department, but greatly hinders the wayfinding process by eliminating all visual access to potential landmarks.

Architectural Differentiations

Another variable to a good wayfinding system is architectural differentiations, i.e. changes in, texture, finishes, color, and lighting (Carpman, & Grant, 1993; De Jesus, 1994; Scialfa, Laberge, & Ho, 2004). Differentiating each space with these elements helps visitors identify one area

from another. The scale of the East Campus once again brings an advantage, since small healthcare facilities are most suitable for texture or coloring coding. Large, complex buildings are more likely to overwhelm the users with too many varieties of texture or color (Carpman & Grant, 1993). However, the East Campus does not implement any architectural differences among the departments to aid wayfinding, maintaining uniform looks. Surgicare emits a different atmosphere from the other two departments with a low ceiling and different color and texture scheme for the furnishings and signage. Yet, these differences are not visible beyond the reception area and do not function as wayfinding cues. In fact, the different layout and color of the signage from the rest of the facility can confuse visitors, as same destinations on multiple signs are coded differently. Coding must be used logically and consistently to be effective as a navigational cue (Rezenstein, & Vaitkus, 1981).

Overall Floor Plan

The simpler the floor plan is, the easier it is to find one's way (Bronzaft & Dobrow , 1984; Gray, Moore & Robinson; O'Neill, 1991; Weisman, 1981). Although the floor plan of the East Campus is relatively simple with only three main departments, the floor plan still can be confusing. Each department has a different layout and multiple doors are placed throughout the corridors. Trip to each department varies in the number of turns to make and number of doors to get through, when regularity and simplicity are two essential factors for an easily comprehensible floor plan for the navigator.

This inconsistency is a byproduct of emphasis on simplifying the connection between the main entry and the receptionist's desk. Each department had subunits and offices to be put into space, and they were placed toward the center of the building as reception areas were pushed out to the periphery. There was not much focus on organizing the center of the complex to simplify the walkway, and unfortunately only signage was implemented to compensate the disorganization.

Signage

The most common, crucial mistake hospitals make is to employ only signage as their main wayfinding system. Signage is often inadequate to resolve wayfinding problems without other variables in effect (De Jesus, 1994; Del Nord, 1999; Marberry, 2005). The East Campus of CMC makes the same mistake, and on top of it, the existing signage system is deficient. The signs are poorly designed, inconsistent, and inadequately located.

First of all, the main wayfinding signage (Figure 1.6) has many design problems that greatly reduce its legibility: The contrast of the background color and the letters is too subtle; letters are too small (0.85 inches tall) for the distance viewing from any further than 3 feet (Sanders & McCormick, 1992); and no brails for visitors with visual impairments (Carpman & Grant, 1993). The arrows for the main signage are minimal and insufficient as well. Without sophisticated correlation between the navigator's standing point and the destination,

Figure 1.6. Main signage system at the East Campus. It lacks contrast, is too small, and has no brails.

arrows combined with text will create more confusion (Hardin, 1995). Also, redundancy of arrows in one signage can be overwhelming (Evans, 2004).

In addition to design flaws for individual signs, the overall signage system lacks consistency. As certain spaces were changed and created, the signage system was modified or added on as well, with no uniform design scheme. Some added-on signage was not even aligned to the original, creating a major spatial disruption (Figure 1.7A, B, C, & D).

Figure 1.7A. Inconsistency in the main signage system.

Figure 1.7B. Three different types of smoke free signage in one place.

Figure 1.7C. Added on signage.

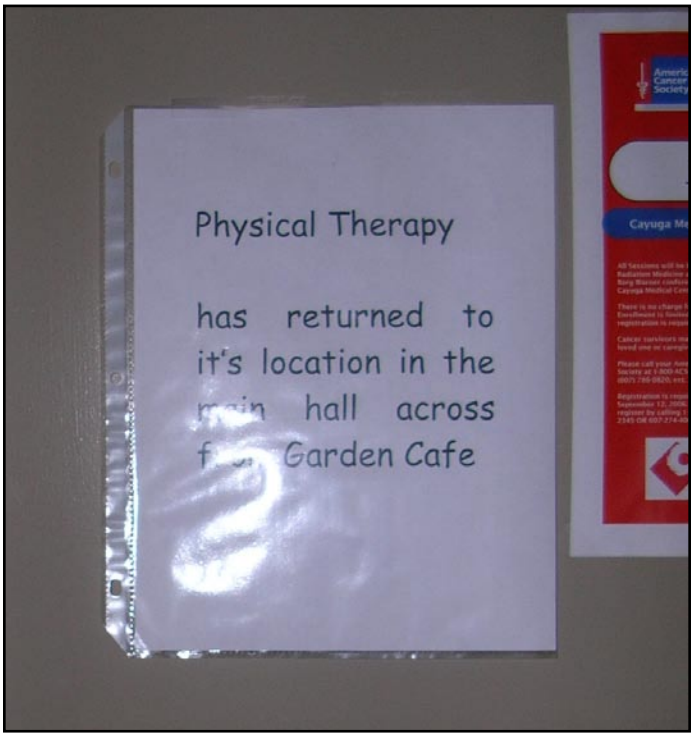

Figure 1.7D. Temporary signage implemented after renovation.

Inadequate placement of the signs contributes to the overall inefficiency. Signage is most effective when placed at major decision points (Best, 1970; Carpman & Grant, 1993; MacKenzie & Krusberg, 1996), any point with more than path. Ideally, every decision point should have a signage, with each sign providing just enough information to get to the next decision point (Best, 1970). Many intersections of the corridors at the East Campus do not have any signage, forcing the navigator to proceed without

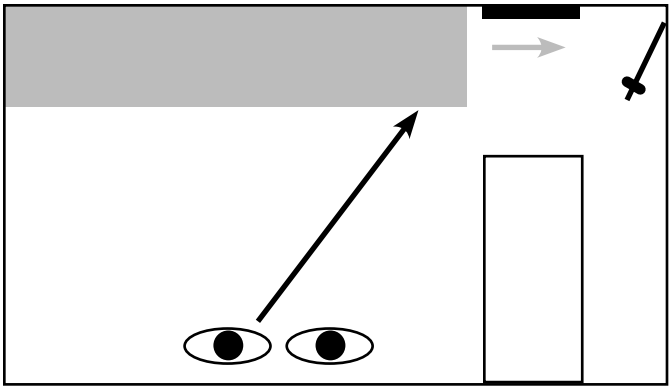

Figure 1.8. Blocked view of signage by the wall in Surgicare.

reassurance.

Current locations of the signage also have very limited visual access. For instance, at Imaging Center, columns block out its main signage from the viewpoint of the visitor at the entry point. At Surgicare, the main signage is placed on the wall receded to the side, eliminating all visual access from the reception area. Also, the door to the corridors is beyond the receptionist's desk, which makes it seem like staff area. This placement further discourages visitors from traveling in that direction.

Ease of Travel

One critical element missing is automatic door openers for corridor traveling. This option is especially important for users with disabilities, since traveling outside with no clear exterior paths can be very dangerous.

What Changes to Bring

Overall, the East Campus of CMC needs one single uniform system that smoothly connects different points of travel. Different parts of the trip require specific elements, but the entire wayfinding system should implement the following elements in general:

1. Unique and simple landmarks;
2. Logical, consistent color coding;
3. Clearer and uniform signage.

Landmarks

As discussed in depth earlier, visual access to recognized landmarks greatly facilitates wayfinding performances. In unfamiliar settings, people heavily rely on external knowledge to find their way, especially landmarks, which are external reference points (Evans, 2004). However, there are several characteristics of a good landmark to keep in mind. Scialfa, Laberge, & Ho (2004) studied wayfinding behaviors of elderly residents in the long-term care facility, and found that only certain landmarks were functional. First of all, they must be simple, unique, and easy to identify for subsequent reference. They should be located at spots with high visibility from all directions, or already existing structures that are highly visible from all directions and stand out from their surroundings should be chosen as the landmarks (Evans, 2004).

Landmarks can be even more effective with cultural or geographical significance that are recognized by the visitors (De Jesus, 1994; Evans, 2004). There are two facilities that have taken this approach and created a very successfully wayfinding system. Designer Debra Nichols implemented large animal figures as landmarks for major locations at an extensive business park in Texas (Figure 1.9). Their strong visual appeal and visitors' familiarity with

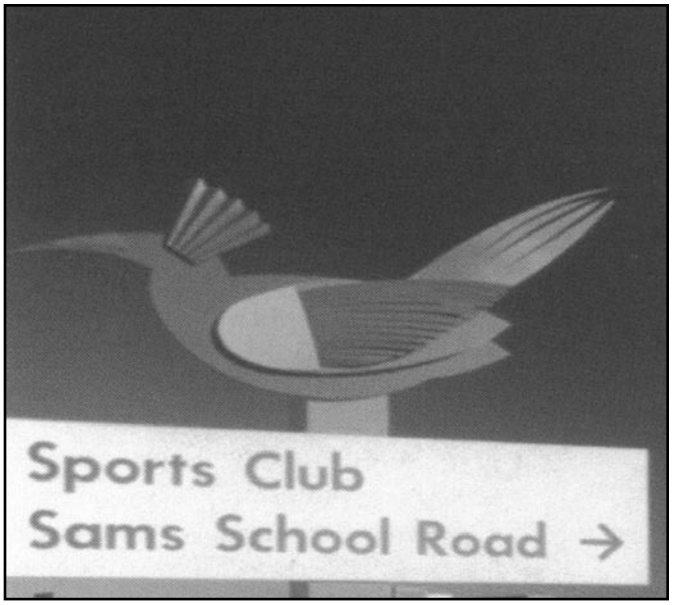

Figure 1.9. Animal landmarks for a business park in Texas. Designed by Debra Nichols.

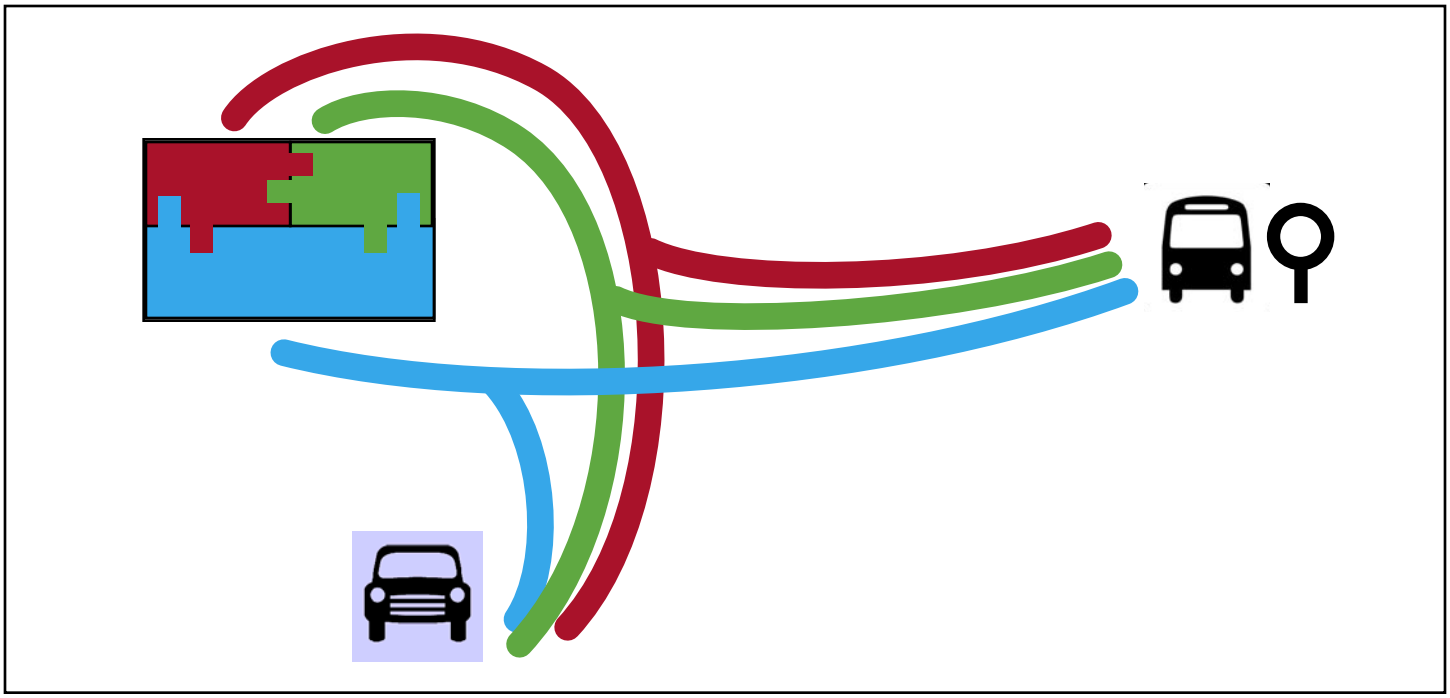

Figure 1.10. General color coding scheme for the East Campus of Cayuga Medical Center.

these native animals greatly enhanced memorization and orientation (De Jesus, 1994).

Another example is Louvre museum in Paris. The design firm Carbone Smolan employed the metaphor of Paris itself, dividing the space into neighborhoods and districts of city. Different levels were also named after historic figures. The result of this city analogy was remarkable, as the visitors were able to utilize their internal knowledge of the city's geography and quickly orient themselves in the space (De Jesus, 1994).

Color Coding

The small number of departments is adequate for color coding, where as multistory buildings with complex floor plans are not suitable (Carpman & Grant, 1993; Nicoll, 1995). Only a few colors should be used (Carpman & Grant, 1993). When choosing the colors, pick namable colors (Nicoll, 1995) such as red and blue, instead of ones that require adjectives to describe, such as "light blue" or "yellowish orange." The colors should also be highly contrasting (Carpman & Grant, 1993), and discernible for color blind individuals as well.

Once the colors are chosen, they should be used logically and consistently (Carpman & Grant, 1993; Scialfa, Laberge, & Ho, 2004). A potential problem even for smaller facilities is that colors may be used for other things, such as furnishings and decorations (Rezenstein & Vaitkus, 1981). Inconsistent use of color coding can significantly reduce its effectiveness as a wayfinding guide.

Louvre museum, in addition to labels of historic figures, also color coded the different levels of the building to enhance location recognition and individuality (De Jesus, 1994).

Signage

The facility needs a uniform signage system of easily legible signs that are located adequately. The text for each signage should be high in contrast with the background hue, its dimensions should be appropriate for the viewing distance, and it should also implement brails or any other systems for those with visual impairments. Pairs of hues that have the highest contrast level are dark gray and white or black and white (Carpman & Grant, 1993). Most appropriate dimensions of letters for a general wayfinding purpose are (Sanders & McCormick):

Stroke width to Letter Height = 1:6
Letter Width to Letter Height = 3:5

EXTERIOR WAYFINDING		
Home ► Parking	Car	◦ The exterior sign at the driveway should be relocated closer to the actual decision point; it should be redesigned for comprehensibility and legibility; it should also be visible in the dark with illumination or self-reflective feature. ◦ The directory should list the different services provided according to departments to reduce confusion. ◦ Color coding should be implemented other than the main signage to effectively guide people to the correct parking lot.
	Bus	◦ The bus stop should be clearly marked with a landmark or a sign to inform visitors to get off; it should also provide a clear schedule.
Parking ► Main Entry (Specific Departments)	Car	◦ Visitors should have safe sidewalk access to all departments from both parking lots, to protect any pedestrians from the car traffic. ◦ Employ a well-designed signage and color coding in both parking lots for clear directions to various departments.
	Bus	◦ The East Campus facility should be identifiable from the bus stop. ◦ There should be a clear signage that directs the visitor from the bus stop to the facility. ◦ Ideally, the bus stop should be immediately adjacent to the facility, with direct access to the sidewalk. ◦ The path that connects the bus stop and the facility should be safe to walk on during winter times. Also, it should be modified to support visitors with any disabilities.
INTERIOR WAYFINDING		
Main Entry ► Reception Area		◦ Doors should implement automatic openers for both ways. ◦ The automatic door openers should be in easy reach of visitors in wheelchairs. ◦ Doors locked for manual use should be clearly labled.
Reception Area ► Amenities		◦ Amenities should be high visible from anywhere in the reception area. ◦ A simple, visible signage should be implemented as necessary.
One Department ► Another Department		◦ A few contrasting colors can be effective for color coded wayfinding system. ◦ Signage should be redesigned for a greater legibility and placed at every decision point. ◦ Signage should be uniform all throughout the facility, without unnecessary redundancy that may overwhelm the visitor. ◦ Each department should have a highly visual and recognized landmark to facilitate easy navigation.

Table 1.4. Recommended changes for different points of travel.

Clear and simple layout significantly benefits the signage by increasing comprehension of the sign (Scialfa, Laberge, & Ho, 2004). A sign's comprehensibility is an serious problem. One study conducted at an airport reported that 76% of people had difficulty understanding signage (Seidel, 1983). The departments on the main signage can be organized into their directions, and simply put one larger arrow than having multiple arrows.

A signage system also benefits from the combination of words and pictures. At Perley and Rideau Veterans' Health Centre, patients found the signage much friendlier and easier to understand after pictures were added to preexisting signage with only text (De Jesus, 1994). The icons and pictures for different departments can be derived from the landmarks for the departments, further unifying the overall wayfinding system as a whole. The chosen scheme for the color coding should also be utilized directly for the signage system.

Adequate placement of the signs enhances their effectiveness even more. Identification signs, such as those for the receptionist's desk and amenities, should be clearly visible from a wide angle. Directional signs should be placed at every intersection and any other major decision points, in the view straight ahead of the navigator.

Recommended changes are summarized by different points of travel in Table 1.4.

Long Term Approach to Wayfinding

To ensure an effective wayfinding system with intrinsic spatial cues and consistency, wayfinding designers should be involved in the initial process of facility planning and development as early as possible (MacKenzie & Krusberg, 1996). There is a continuous need to change and update the wayfinding system as buildings evolve with their physical and operational changes. Maintaining the system's effectiveness becomes much more difficult when the facility itself is not built with architectural wayfinding cues in mind. If the facility has to rely on additional signage to keep visitors oriented upon any change, it ends up damaging the coherence and simplicity of the initial system.

Rather than relying on signage or color coding to fix any intrinsic problems, the building itself should provide most of navigational clues with high visual access to the landmarks of major destinations, in this case, receptionists' desks, and a simple floor plan with accessible routes of travel.

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