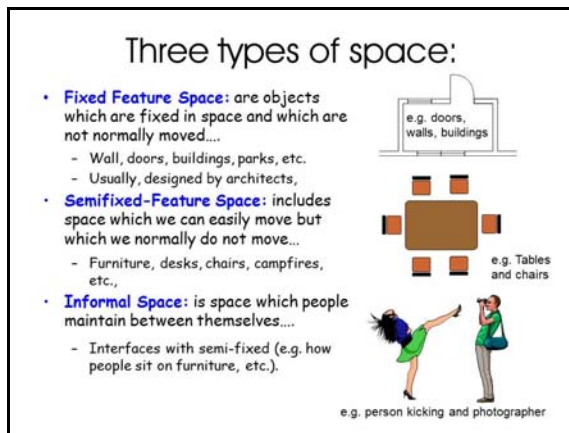


## Spatial Determinants and Systems

The major focus of this book is on the design of fixed-feature space (e.g. immovable objects such as buildings and parks). However, the design of *fixed-feature space* is predicated on *informal* (distance between people) and *semi-fixed feature space* (furniture, chairs and desks) (figure 2.1). Since they all affect each other, it is important to have an understanding of how all three spaces affect behavior or the experience. This chapter builds upon the research of Hall, E, (1990a), Hall, E, (1990b), Nierenberg and Calero, (1971), and Sommers, (1969). In addition, it provides the conceptual foundation of spatial determinants of behavior.



**Figure 2.1 – Three types of space** – [file:\fig0201-Slide4.JPG.jpg] – Caption: There are three types of space: Informal, Semi-fixed feature space, and fixed feature space. – Source: Hall, (1990)



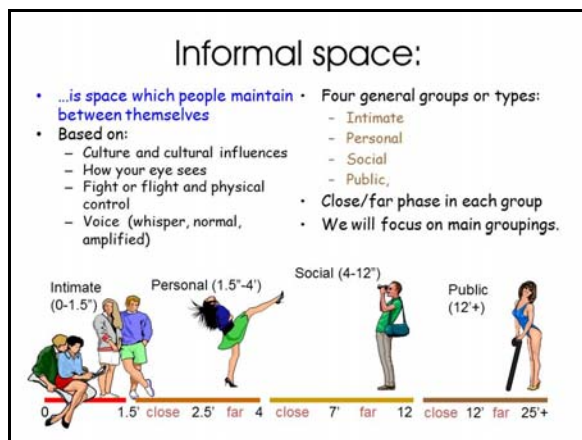
**Figure 2.2 Three types of space** – [file:\fig0202-Centennialpk008.jpg] – Caption: The park and buildings in the background are examples of fixed-feature space. Although most people won't move them, the park benches are an example of semi-fixed feature space, and the distances maintained between the people sitting on the park benches exemplify informal space. Centennial Park, Atlanta, Georgia. – Source: author

The three types of space are displayed in the picture of Centennial Park in Atlanta (figure 2.2). The park and buildings in the background are examples of fixed-feature space. The park benches are an example of semi-fixed feature space even though most people won't move them. The distances maintained between the people sitting on the park benches exemplify informal space.

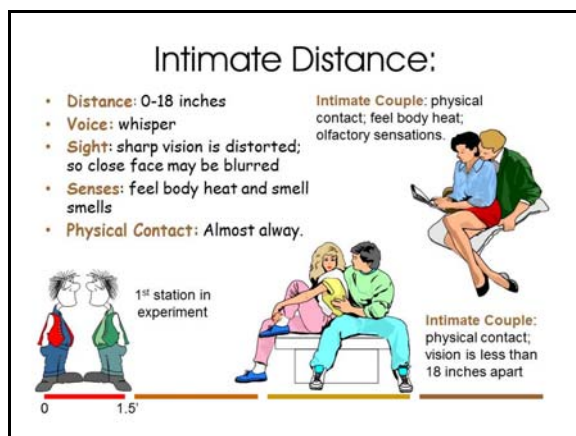
### Informal Space

Informal space is divided into four phases: Intimate, personal, social, and public (figure 2.3). Each of the phases is divided into a close and far phase. Intimate distance is from zero to 1.5 feet apart. Personal distance is 1.5 to four feet away with the division being between the close and far phases occurring at 2.5 feet. Social distance is four to 12 feet away with the division being between the close and far phases occurring at seven feet. Public distance is over 12 feet away with the far phase beginning at 25 feet. Each of the phases is discussed in the following sections.

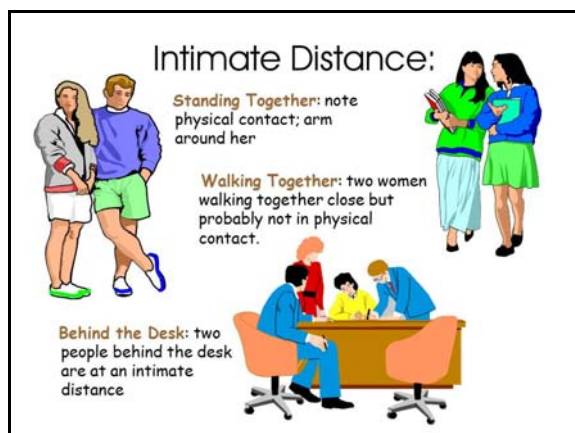
The design of space is predicated on the senses (figure 2.4). People are sensory beings in that they obtain and interact with the environment around them through their senses. For most people sight is the primary input source. It accounts for roughly 60% of people's information input. This is followed by hearing or auditory inputs. For example, how far does a whisper carry? What is the distance separating two people before the person speaking needs to raise



**Figure 2.3 – Informal Space** – [file:\fig0203-Slide5.jpg] – Caption: This slide shows intimate, personal, social and public distances. – Source: Hall, E., (1990)



**Figure 2.5 – Intimate Distance** – [file:\fig0205-Slide8.jpg] – Caption: Touching to 18 inches separation. – Source: Hall, E., (1990)



**Figure 2.6 – Intimate Examples** – [file:\fig0206-Slide9.jpg] – Caption: Standing together, walking together, behind the desk, and sitting on the couch in close proximity. – Source: Hall, E., (1990)

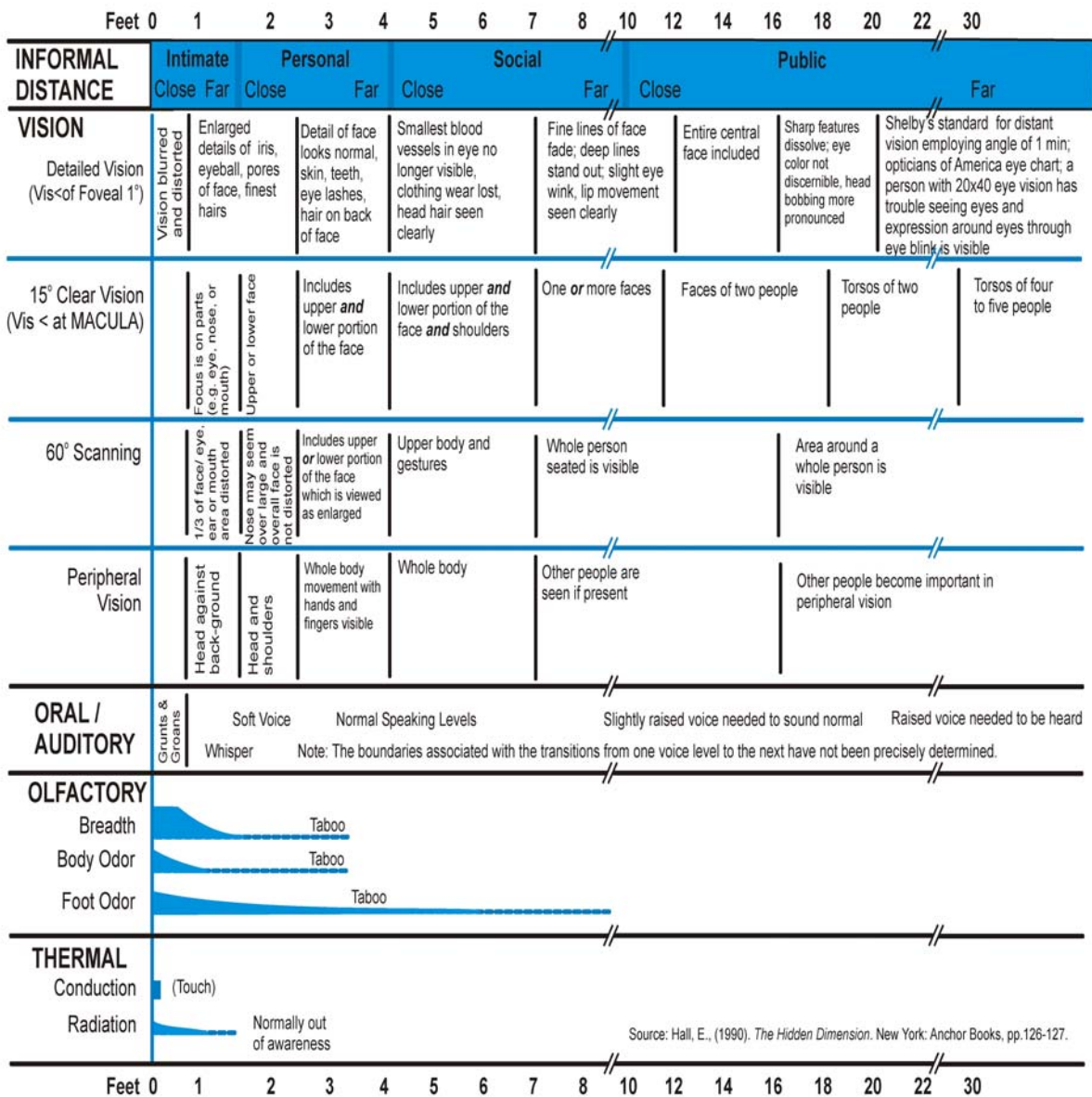
her voice to be heard in a normal tone? Or the fight or flight phenomena enters into the determination of spatial distances. Subconsciously, people calculate this distance. When does a person come within the grasp and hence control of another person? It is psychological as well as physical phenomenon.

The anatomy of the eye influences how people see and hence spatiality. Different parts of the eye have different sensitivities to light and detail. The *macula lutea* is the small, yellowish central portion of the retina. It provides the clearest vision. The *fovea centralis* or simply the *fovea* is located in the center of the macula lutea. Consisting of all cones and no rods, the fovea has the sharpest vision but it has no ability to see at night (rods). The remaining retina provides peripheral vision. These three zones influence spatiality discussed later in this section.

<b>Intimate Distance.</b> Intimate distance is a touching distance and extends up to 18 inches away (figure 2.5 and figure 2.6). Physiologically, there are several important features associated with this closeness. Vision is distorted. Looking at the other person's face is also distorted. In addition, a person needs to turn his head in order to take in the full features of the other person's face. In most instances there is physical contact between the two people. Body heat and smell are significant sensory inputs.

<b>Personal Distance.</b> Personal distance is 1.5 to four feet away with the division being between the close and far phases occurring at 2.5 feet (figure 2.7). It is a distance for normal conversation (figure 2.8). People can speak in a normal tone and without raising their voice. A person within this distance is still within the other person's grasp where they can reach out and physically restrain them. Also, powerful smell such as powerful colognes can be smelled and someone's breadth can still be smelled (see figure 2.4). People on the other side of small desks are sitting close to the far limit also (figure 2.8).

## Relationship between Sensory Inputs and Informal Distance



Source: Hall, E., (1990). *The Hidden Dimension*. New York: Anchor Books, pp.126-127.



Visually, a person viewed in the far phase of personal distance (18" to 2.5 feet) is seen with considerable detail although it can be difficult to fully embrace all of their features. The 60 degree scanning of the eye will tend to include the upper and lower portion of the face which is viewed as enlarged. At this distance, the macula portion of the eye will include the upper and lower portions of the face, and the detailed vision of the fovea will include details of the face including seeing the iris, eyeball, pores of the face and the finest of facial hair (see figure 2.4).

Distance combined with body language can easily combine to send signals to bystanders. Figure 2.9 shows two different situations. In the upper diagram, the two women are at an intimate distance apart of less than 18 inches. There is physical touching and they are whispering to each other. Their body language displays crossed legs and folded arms suggesting defensiveness. Most people would think twice before interrupting their conversation.

In contrast, the lower diagram suggests a different picture (figure 2.9). The two women have maintained a spatial distance of roughly two feet. They are sitting slightly askance to each other. Their crossed legs suggest mild defensiveness which is normal even in normal conversation. Their arms are open and not crossed suggesting openness. Most people might hesitate but would interrupt and join into this conversation.

<b>Social Distance</b> (close phase). Social distance is four to 12 feet away. The close phase of social distance occurs between four to seven feet (figure 2.10). In terms of fight or flight, a person begins to have a choice whether to fight or flee. People's voices are still normal at this distance. Except for very strong smells, the impact of smells tends to begin to diminish at this distance. The changes in sight are significant. The finest details of the face, such as the capillaries in the eyes are no longer observable with the detailed vision provided by the fovea. Visually, the macular portion of the eye will provide a clear vision of the face and shoulders. The 60 degree scanning vision will easily include the upper body and gestures. The texture of the skin, hair, condition of the teeth are all readably visible. The condition of the clothes worn may be difficult to determine (see figure 2.4).

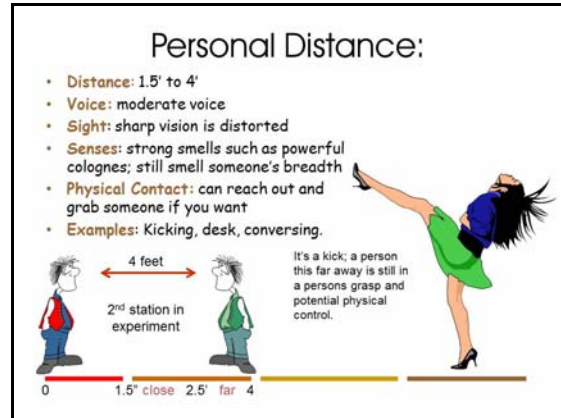


Figure 2.7 – Personal Distance – [file:\fig0207-Slide11.jpg] – Caption: Personal distance is between 1.5 to 4 feet apart. – Source: Hall, E., (1990)

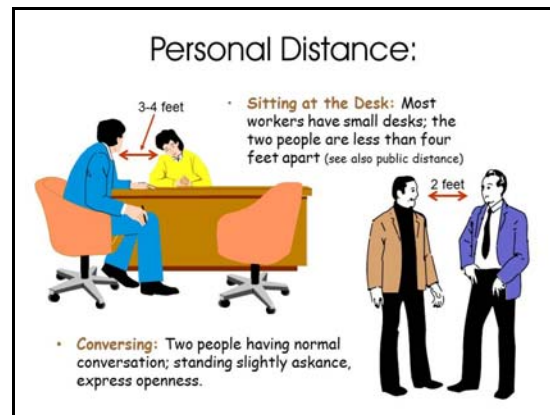


Figure 2.8 – Personal Examples – [file:\fig0208-Slide12.jpg] – Caption: Sitting across the desk or a casual conversation. – Source: Hall, E., (1990)

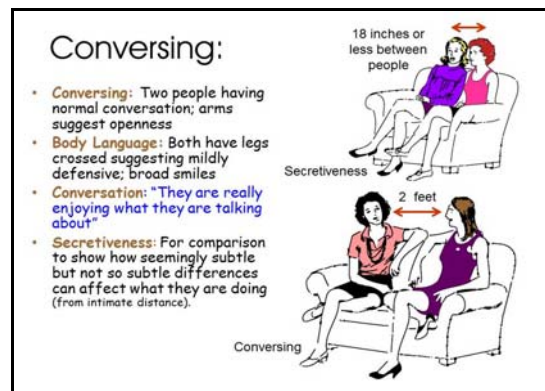


Figure 2.9 – Two women on couches – Part A and B – [file:\fig0209-Slide13.jpg] – Caption: Part A: Sitting less than 18 inches apart along with their other body cues suggests that these two women are having an intimate discussion. Part B: Sitting askance roughly two feet these two women demonstrate a conversing situation. – Source: Nierenberg, G., and Calero, H., (1971)

In contrast to sitting behind a small desk, sitting behind a large desk will often result in a four to five foot separation between people (figure 2.11). Also, if either person moves their chair backward, they can increase the distance separating themselves from the other person.

<b>Social Distance (far phase). The far phase of social distance is from seven to 12 feet separation (figure 2.12). At this distance, people will need to slightly raise their voice to be heard. Smell for the most part at this distance subsides to only the strongest of body odors. Visually with the fovea vision, the lines of the face begin to fade although the deep lines still stand out. Lip movement is seen clearly. With the macula vision, one or more faces can be seen, and the 60 degree scanning can see a whole person seated (see figure 2.4).

Figure 2.13 shows a typical instructional situation that a teacher, interpreter, or tour guide will experience. If the people are kept within a 90 degree angle of vision, the group can easily become seven to ten feet away from the instructor, or at a social distance. This is why it becomes important for the leader to project their voice.

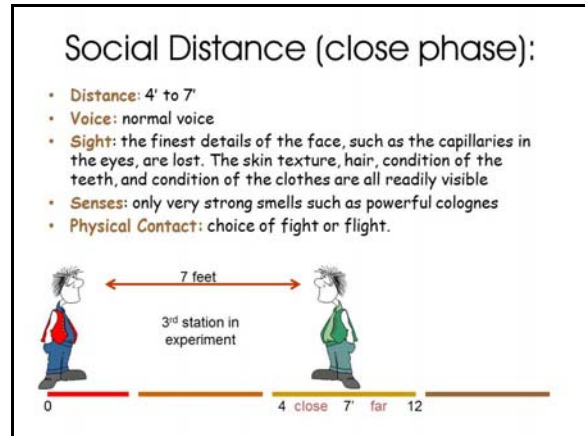


Figure 2.10 – Social (Close) Distances – [file:\fig0210-Slide14.jpg] – Caption: Close Phase: Roughly four to seven feet apart. – Source: Hall, E., (1990)

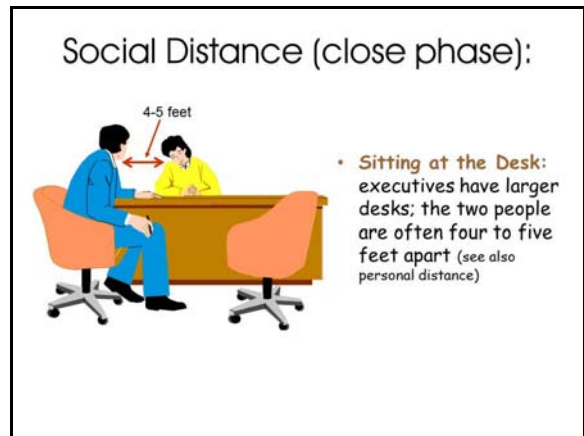


Figure 2.11 – Social (Close) Example – [file:\fig0211-Slide15.jpg] – Caption: Close Phase: Sitting across from a large desk. – Source: Hall, E., (1990)

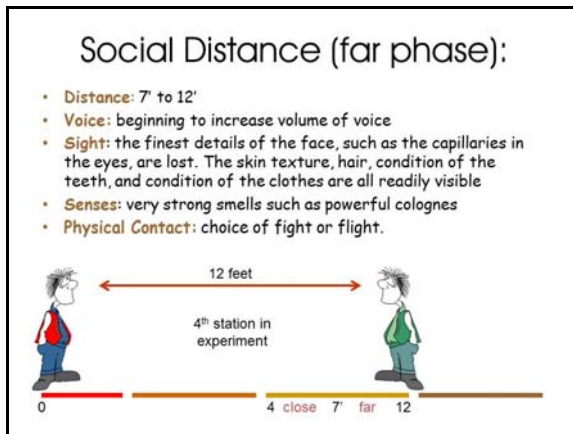


Figure 2.12 – Social (Far) – [file:\fig0212-Slide16.jpg] – Caption: Far Phase: Roughly seven to 12 feet apart. – Source: Hall, E., (1990)

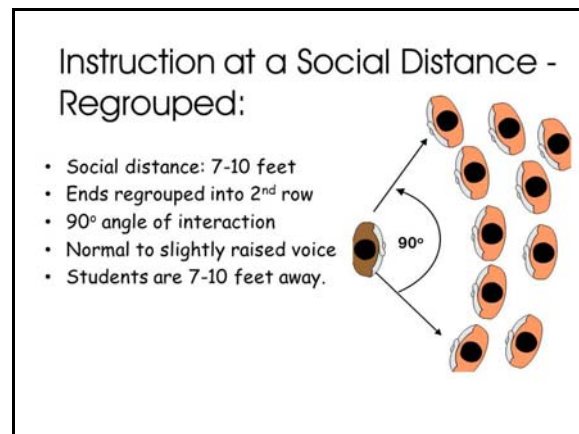
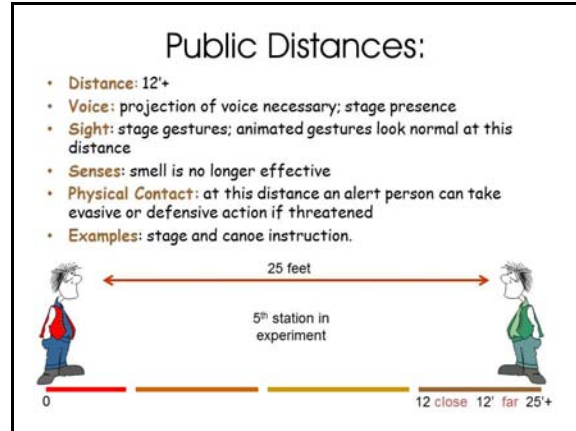


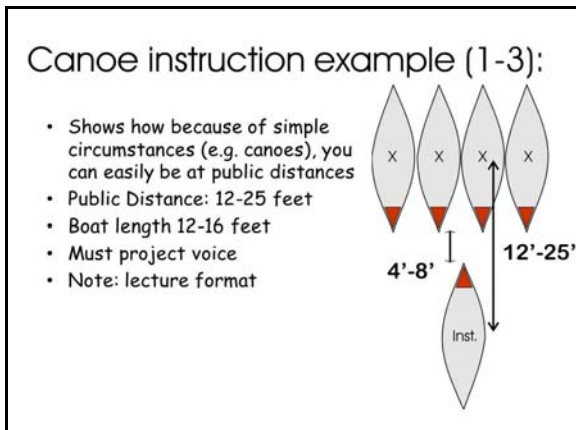
Figure 2.13 – Social (Far) Example (Teacher) – [file:\fig0213-Slide21.jpg] – Caption: Far Phase: Instructional situation with small group. It could be an interpreter or school group. – Source: Hall, E., (1990)

<b>Public Distance. Public distance is over 12 feet away with the far phase beginning at 25 feet (figure 2.14). At this distance people need to project their voice to be heard. Visually, at the close phase, a person's entire face is now included in the detailed vision of the fovea. The faces of two or more people are seen with the 15 degree clear vision of the macula portion of the eye. The 60 degree scanning vision scans the area around the whole person (see figure 2.4).

Instructional situations can easily move into a public distance between two people. Figure 2.15 shows a typical canoe instructional situation. Boat lengths can easily range from 12 to 16 feet in length. With the instructor's boat and a modest four to eight feet difference between the instructor and students results in a public distance of over 12 feet separation between the students and the instructor. If the instructor demonstrates the stroke this distance can easily increase.



**Figure 2.14 – Public Distances** – [file:\fig0214-Slide19.jpg] – Caption: Over 12 feet apart. – Source: Hall, E., (1990)



**Figure 2.15 – Public Distance Example (Canoe)** – [file:\fig0215-Slide21.jpg] – Caption: As this canoe instruction situation demonstrates, activity leaders can easily find themselves teaching students at a public distance. The instructor teaching the stroke can easily be 16-20 feet from the students. – Source: author

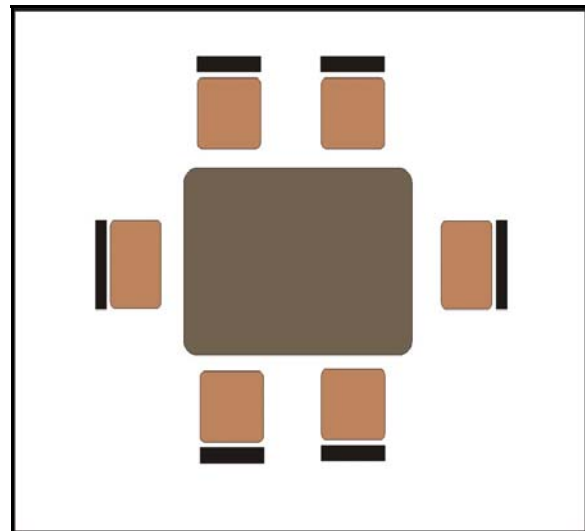
## Semi-fixed Feature Space

Semi-fixed feature space includes space which can easily be moved but which people don't normally move. The purpose of this section is to demonstrate how the furniture in a room is arranged affects behavior. When designing a building there are rooms and places where people congregate. Chairs, tables, and other furniture fill these spaces. In one dimension, their placement and arrangement are an extension of informal space. For example, two people sitting in close proximity across the table are most likely conversing. Add a little distance, and they become competing. Add more separation and they become co-acting.

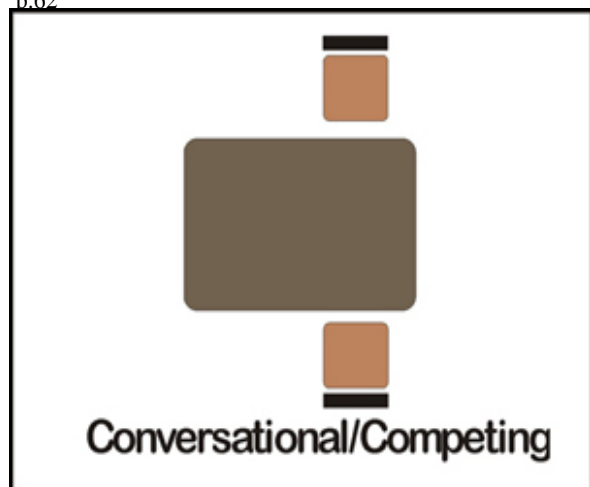
In a second dimension, seating arrangements affect behavior. This section provides a sampling or a primer. It does not address all permutations. Its purpose is to demonstrate that seating arrangements affect behavior and this section is a primer. The following analysis utilizes a rectangular table rather than circular tables (figure 2.16). Most of the principles delineated for rectangular tables hold true for circular tables although less so.

For the purposes of this discussion and based on Sommer's (1969) analysis, there are four typical behaviors associated with seating arrangements. *Competing* occurs when two people generally oppose each other or are in competition with each other. The table offers a barrier separating the two people in opposition with each other. As its name suggests, *conversing* occurs when two people seek to have a conversation with each other. Conversing involves interaction among friends in a friendly situation. *Cooperation* implies allies who are the same side. However, unless the people change their position, there isn't a lot of conversing, usually because they don't need to have much conversation. In contrast, *co-acting* is a seating position where both people seek to diminish the interaction between the parties. They seek not to interact with each other. It is a position of avoidance.

<b>Competing. In the typical competing seating arrangement, the opposing parties normally sit directly across from or in opposition to each other (figure 2.17). The distance of separation will determine whether the behavior is conversing, competing, or co-acting. Normally, people sitting in a competing situation, sit four to seven feet apart or social distance – close phase. A shorter distance and the people will most likely be conversing. Often two people conversing will be seen leaning over the table



**Figure 2.16 – Seats around a rectangular table** – [file:\fig0216-Hall-tbl03a.jpg] – Caption: Proximity and distance around a rectangular table affects whether the people are conversing, cooperating, co-acting, or competing with each other. – Source: Sommer, R., (1969), p.62

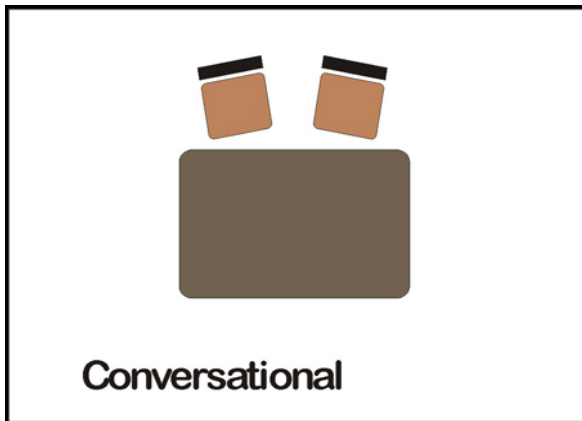


**Figure 2.17 – Conversational/Competition** – [file:\fig0218-Hall-tbl03c.jpg] – Caption: Sitting across from the other person is generally considered a competing situation with the other person. As the people move closer together, the relationship becomes more conversational (see also figure 2.17). – Source: Sommer, R., (1969), p.62

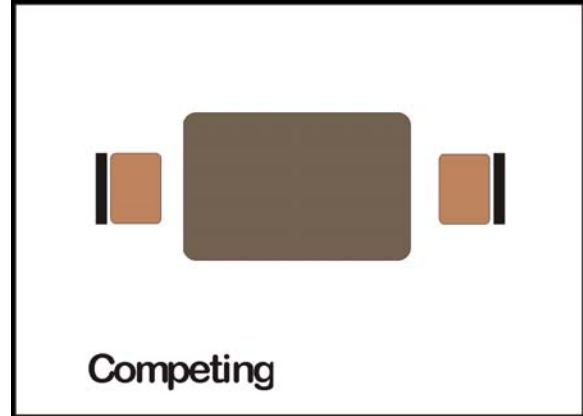


to shorten the distance so that they can converse. As the distance of separation increases, the relationship increasingly becomes one of co-acting (figure 2.18). In addition, communications between opposing parties becomes more difficult also.

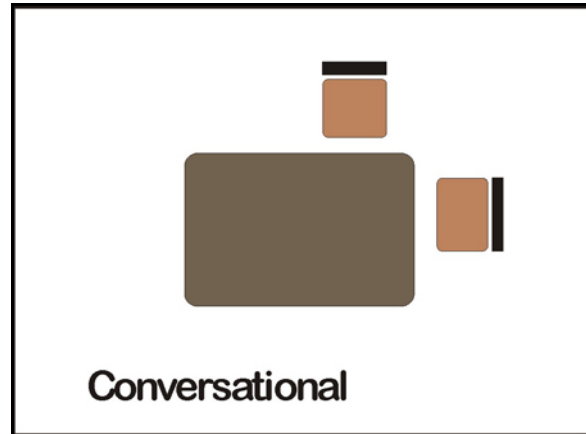
<b>Conversing. As its name suggests, *conversing* occurs when two people seek to have a conversation with each other. People choose a seating arrangement that facilitates conversation. Review the two women conversing on the couch in figure 2.9. It shows the basic principles. Normally, people like to be able to see face to face the person they are conversing with while at the same time they like to be able to survey their surroundings. Figure 2.19 shows a typical seating arrangement that facilitates conversation. An alternative arrangement is depicted in figure 2.20. Essentially, it is taking the cooperating seating arrangement and moving the chairs slightly askance that duplicates a similar seating arrangement found on the couch in figure 2.9.



**Figure 2.20 – Conversing** – [file:\fig0220-Hall-tbl03h.jpg] – Caption: Moving the chairs at a slight angle can easily change a cooperative (see figure 2.21) seating arrangement into a conversing arrangement. – Source: Sommer, R., (1969), p.62



**Figure 2.18 – Competition** – [file:\fig0217-Hall-tbl03i.jpg] – Caption: Sitting across from the other person is generally considered a competing situation with the other person. As the people move closer together, the relationship becomes more conversational (see also figure 2.18). – Source: Sommer, R., (1969), p.62



**Figure 2.19 – Conversing** – [file:\fig0219-Hall-tbl03b.jpg] – Caption: Normally sitting askance allows people to chat with each other while allowing them to scan the area in front of them (see also figure 2.09). – Source: Sommer, R., (1969), p.62



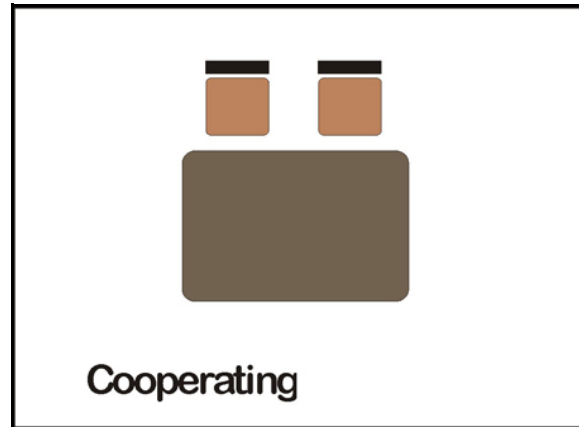
<b>**Cooperating.** Cooperation implies allies who are the same side. The seating arrangement in figure 2.21 depicts a typical cooperating seating arrangement. Normally, people don't need to discuss a lot. They present a unified front and a wall of support. Note that a slight change in the seats can quickly result in a conversing situation (see figure 2.20).

<b>**Co-acting.** Co-acting is a seating position where both people seek to diminish the interaction between the parties (figure 2.22). They seek not to interact with each other. It is a position of avoidance. In library studies where there are large numbers of tables, initially, people will sit one person per table, unless of course they seek they purpose desire to converse with someone else. When the tables are full or nearly full, people will begin to seat in a co-acting position depicted in figure 2.22.

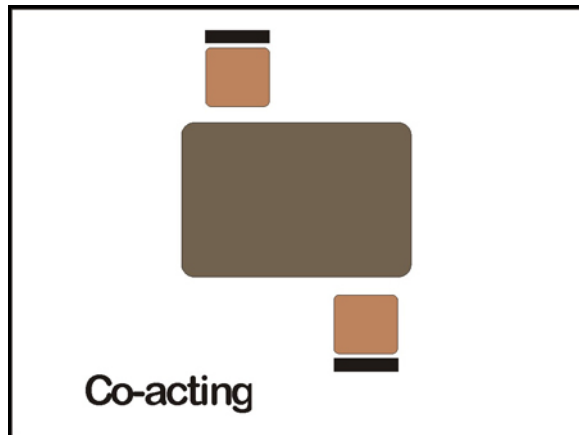
<b>**Examples of Designing Semi-fixed Feature Space.** – Three examples and an additional example that builds off of the previous section are discussed. The three examples are a lounge area, a cubical and a dual purpose office. The example that builds off the previous section is the example of the board meeting.

<c>**The Board Meeting.** The seating at a typical board meeting or conference table illustrates the principles discussed in the previous section. It should be noted that the previous diagrams show only two people sitting at a table and the dynamics will change if there are additional people sitting at the table. Assume a board meeting as depicted in figure 2.16 with all the chairs occupied by people. Although there are usually more people sitting around the table, the diagram will still illustrate the basic principles.

Normally, the chair of the meeting will sit at one end of the conference table. Unless, the other end is normally reserved for the secretary or vice chair, the person who sits at the other end of the table is generally someone who is the competition with the chair. The allies of the chair will sit to the right of the chair and those who disagree with or who don't necessarily consider themselves the chair's ally will normally sit on the chair's left. The same is true for the person sitting at the other end of the table. The two people sitting on the right are cooperating with each other and competing with the two people on the opposite side. Remember, this is all a tendency and a generality. If an ally of the chair is the last to arrive and the only seat remaining is on the left, the ally will have little choice but to sit there. Also, a person who is in disfavor with the chair may come early to the meeting and purposely sit on the chair's right side to disrupt the normal spatial relationships.



**Figure 2.21 – Cooperating** – [file:\fig0221-Hall-tbl03e.jpg] – Caption: Since they don't have to actively communicate with each other, they can sit parallel to each other. Together, they form a protective wall. – Source: Sommer, R., (1969), p.62

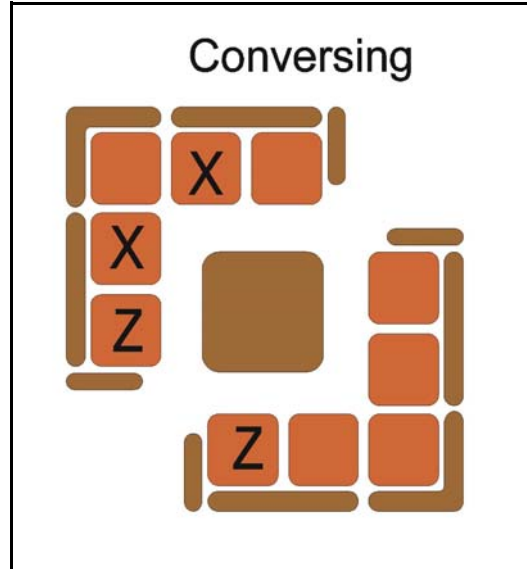


**Figure 2.22 – Co-acting** – [file:\fig0222-Hall-tbl03d.jpg] – Caption: Since they don't have to actively communicate with each other, they can sit parallel to each other. Together, they form a protective wall. – Source: Sommer, R., (1969), p.62

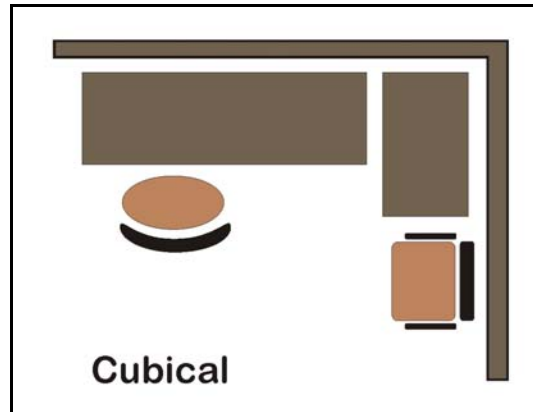
<c>**Lounge Area Example.** Figure 2.23 is an example of a typical lounge area. It provides opportunities for both conversing and co-acting. For people who want to converse, the double Xs or double Zs typically provide these opportunities. To sit in a co-acting situation, the two people will normally sit as far apart as possible (e.g. X,Z).

<c>**Office Example.** Three typical spatial layouts are presented. Figure 2.11 present the traditional layout where the subordinate is situated on the other side of the desk. Many employees have a small cubical for their office space that aren't designed to provide the protected interaction of sitting behind the desk (figure 2.24). Depending on the size of the cubical, the separation between the two people can be a far personal distance (2.5 - 4 feet) or a close social distance (4 - 7 feet).

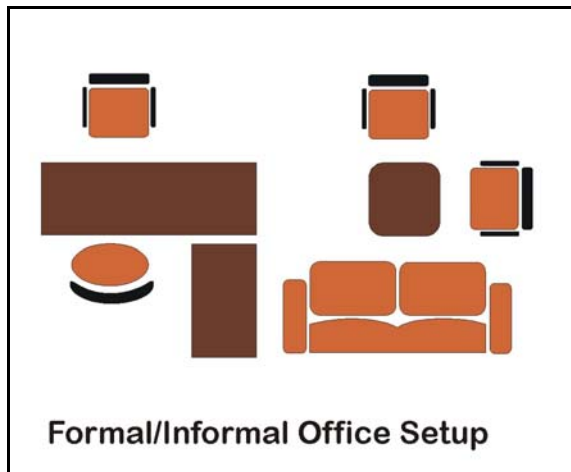
Figure 2.25 shows an office with a little more room setup with both a formal and informal setting. The employer has the option of sitting behind the desk with the subordinate in the more formal setting. Or, if desired, they can move their activities to the more informal lounge area where they can they can converse.



**Figure 2.23 – Lounge area** – [file:\fig0223-Slide31.jpg] – Caption: Typical seating layout for a lounge area to facilitate interaction between people. Contrast this seating arrangement with the institutional seating along the wall in <fc>Figure 2.14. – Source: author

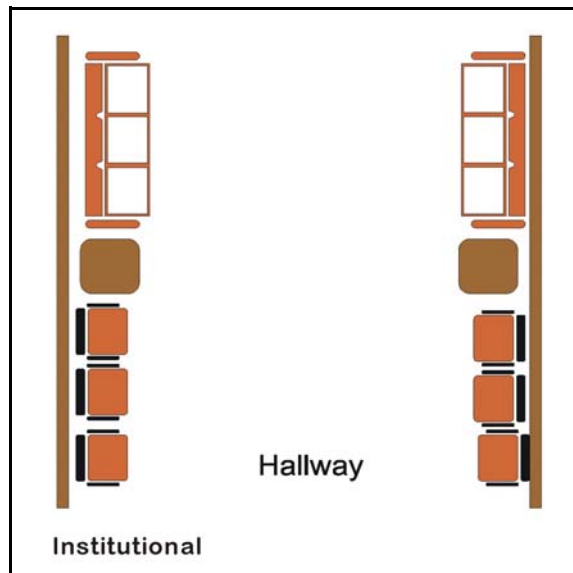


**Figure 2.24 – Cubical** – [file:\fig0224-grp14.jpg] – Caption: Not only does a small desk suggest lower status, it places the person on the other side of the desk at a social close social distance. – Source: author

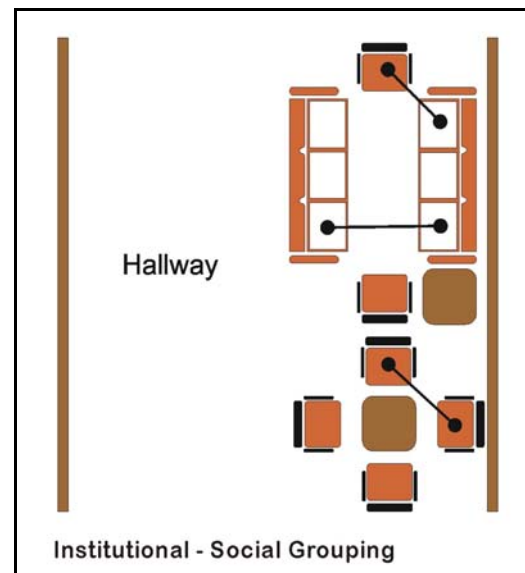


**Figure 2.25 – Dual purpose office** – [file:\fig0225-grp17.jpg] – Caption: This office is setup to provide both formality with the person sitting across the desk and informality with a lounge type setting. – Source: author

<c>**Institutional Seating Example.** Figure 2.26 and figure 2.27 illustrate how furniture can be rearranged to create an entirely different experience. Both arrangements utilize the same furniture. The only difference is their arrangement. Figure 2.26 is a typical layout where the furniture lines the side of the hallway. It is designed for maintenance. Cleaning is easy because the cleaning people have easy access underneath the chairs. Note that everyone is sitting in a cooperative seating arrangement. Regardless, the arrangement does not facilitate interaction and conversation among people.



**Figure 2.26 – Institutional** – [file:\fig0226-grp18.jpg] – Caption: This seating arrangement facilitates patients in an institution to watch people walking through the hall or for easy maintenance by the custodial staff. Contrast this with Figure 2.23 or 2.27 which facilitates interaction but requires more maintenance by the custodial staff. – Source: author



**Figure 2.27 – Institutional social groupings** – [file:\fig0227-grp19.jpg] – Caption: The same furniture in Figure 2.26 was rearranged into clusters or enclaves to facilitate interaction and socialization. – Source: author

In contrast, figure 2.27 rearranges the furniture to facilitate conversation and interaction. It is the same furniture used in figure 2.26 that is rearranged. The layout utilizes the concepts and principles discussed in informal and semi-fixed feature space. It requires more effort on the part of maintenance.

## Fixed-feature Space

Fixed-feature space includes space that is immovable. It includes buildings, walkways, and even landscaping. Usually, it is designed by architects and requires major construction to change. This is the primary focus of this text and this section is provided to be illustrative. In part, it is culturally defined. Hall (1990) notes that in China, moving a chair in a house is like taking a sledge hammer to a wall in this country. As with informal and semi-fixed feature space, fixed-feature space is influenced by informal and semi-fixed feature space. Review the park bench and the council ring in chapter 1. These examples were designed to make the point that the design of space influences behavior. Or as Churchill stated, “*We shape our buildings and they shape us.*” Not only does fixed-feature space include buildings, it includes parks and recreation areas also. A park is designed to create an experience. As noted in chapter 1,

wilderness and the Wilderness Act of 1964 are designed to create an experience. Again, the design of fixed-feature space to create an experience is the main focus of the remainder of this book. Major sections of this book include the history and principles of park design with an emphasis on the experience, principles of visual management, designing the experience, the mechanics of designing space, and designing space for the experience.

## Primer on Systems Approach

In recreation and parks, understanding the systems approach is fundamental for planning and management purposes. Utilization of a systems approach enables parks and recreation professionals to break down complex systems into more manageable and understandable subsystems. This section is delimited to this structural approach toward systems and it presents several principles that define this structural approach.

In describing several examples are used. The first is human biology because it is easily understood and most people have been exposed to its taxonomy. Second, the Disney example cited in Chapter 1 is used. In creating the Magic Kingdom experience, Disney organized the experience into five systems. As part of the master planning and site planning processes described in Chapters 17 and 18, the third example utilizes the systems approach to inventory the resource by cultural, biological, and physical resources.

The systems approach is used throughout this book. The chapters constitute subsystems. Chapter 17 on master planning uses the systems approach to inventory the resource by cultural, biological, and physical features. The master planning process itself utilizes the systems approach. The site development planning process in Chapter 18 uses the systems approach as does Chapter 19 and Chapter 20 of facility design. Each blueprint represents a subsystem.

**<b>Conceptual Background.** A review of the literature on systems reveals a plethora of somewhat different approaches toward a systems approach. Whitten et al (1998, p.37) notes that there are two types of systems, natural and fabricated. Natural systems are associated with the human body, ecosystems and the like. Fabricated systems must be built by people and they include manufacturing operations, accounting systems, information systems and the like. Some books like Ackoff and Emory (1972) apply the systems approach to human behavior and some books like Meadows (2008) apply systems as a way of thinking.

The first delimitation of this section is that the approach used here tends more to the natural systems. The emphasis is on structural arrangements. Even the Disney example and the park inventory and analysis used later in this chapter are really slight variations of the natural approach and conceptually, they are closer to the natural approach for systems than they are to some of the approaches that focus on fabricated systems.

The second delimitation of this chapter is that the presentation in this chapter does not pretend to be a complete thesis on systems. However, what it does present is the classical structural approach to systems. It shows how complex systems like park resources can be broken down into understandable subsystems that become easier to understand and manage. This approach can be utilized on both the planning and management processes. Next, it demonstrates how the system analysis can lead directly to the report that is being prepared. For this reason, it is important to understand basic systems analysis.

**<b>Definition of a System.** As previously noted, this section takes a more traditional approach toward systems that relate directly to resource management. Whitten, et al (1989, p.37) defines a system as “A



*system is a set or arrangement of interdependent things or components that are related, form a whole, and serve a common purpose.*” The key terms include “interdependent things or components that are related,” that they “form a whole,” and that they “serve a common purpose.” These terms will be developed more fully in the principles within the next section.

Meadows, (2008, p.11) advances a similar definition where “A system is an interconnected set of elements that is coherently organized in a way that achieves something.” In her definition, she notes that it contains the three components of elements, interconnections, and a function or purpose.

Human anatomy is exceeding complex. However, breaking human anatomy into its subsystems creates more manageable subsystems that can more easily be understood. The circulatory system includes the heart, arteries, veins, bone marrow, and other items. All the components are interdependent and related to each other because they relate to the circulation of blood. They serve a common purpose of circulating the blood, and they form a whole which is known as the circulation system. An anatomy book is a classic example of the systems approach.

In Chapter 1, Disney used five subsystems to deliver the Magic Kingdom experience at Disney World (see Figure 1.12). Disney utilized five systems in designing the experience in the Magic Kingdom. The photo in Figure 3.28 brings together most of Disney’s system elements into a unified whole. Along with the design of the courtyard, the trees behind the pavilion create a visual zone (design and facility layout). The color coordinated trash can is part of sanitation system (support services). The band playing music in the pavilion is a casual activity (program), and the band personnel is support people (actors).

Disney could have just as easily chosen a different set of elements that are interdependent and related. They might have chosen their elements more structural (e.g. Main Street, Adventureland, Futureland, etc), or they might have used the time sequence to organize the elements (e.g. pre-experience, experience, and post-experience). They could have easily restructured the elements within their system that they did choose to do. For example, they could have split facility and design into two separate elements. They could have eliminated the experience category or integrated it into the program category. Or rather than having a program element, rides, exhibits, and casual activities could have easily been elevated as primary elements within the system. Last, actors are considered part of the program and this element could logically be included as one of the components comprising the element of program along with rides, exhibits, casual activities, and actors. All of these variations are interrelated, serve a common purpose and relate to a larger whole.



**Figure 2.28: Disney** – Caption: Disney utilized five systems in designing the experience in the Magic Kingdom. This photo brings together most of these elements into a unified whole. Along with the design of the courtyard, the trees behind the pavilion create a visual zone (design and facility layout). The color coordinated trash can is part of sanitation system (support services). The band playing music in the pavilion is a casual activity (program), and the band personnel is support people (actors). – Source: author [file:\fig0301-DSC\_0067.JPG]

As part of the master planning process in Chapter 17 and the site planning process in Chapter 18 (see Figure 17.1), the park resource is inventoried in terms of its cultural (human), biological and physical resources (Figure 2.29). The inventory is important because the inventory of resources presents recreational opportunities for programs.

The following sections provide guidelines in using the systems approach and in developing subsystems. Their application are fundamental to understanding park systems.

**<b>Systematic and Analytical**

**Approach.** The systems approach is a systematic and analytical way to view the world. It is *systematic* in that there are rules, order, and logic behind the structure or taxonomy developed. It is *analytical* in that systems can be broken down into simpler systems called subsystems that make analysis easier to perform.

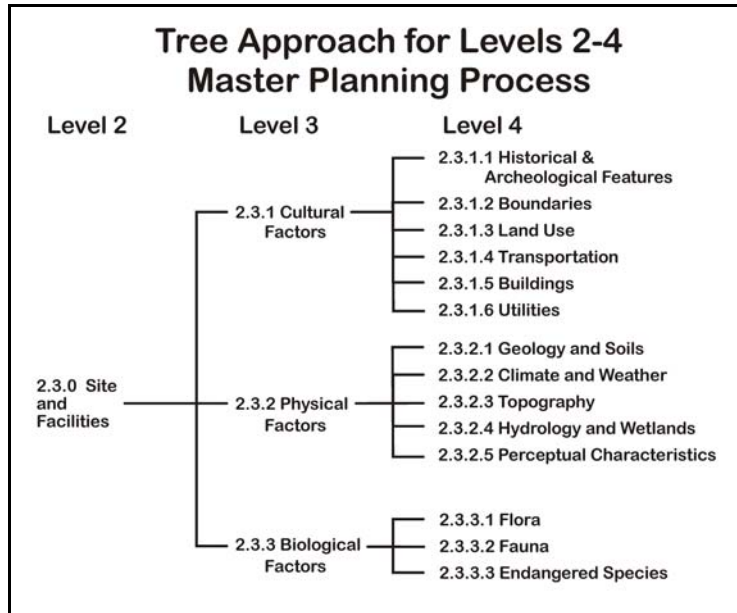


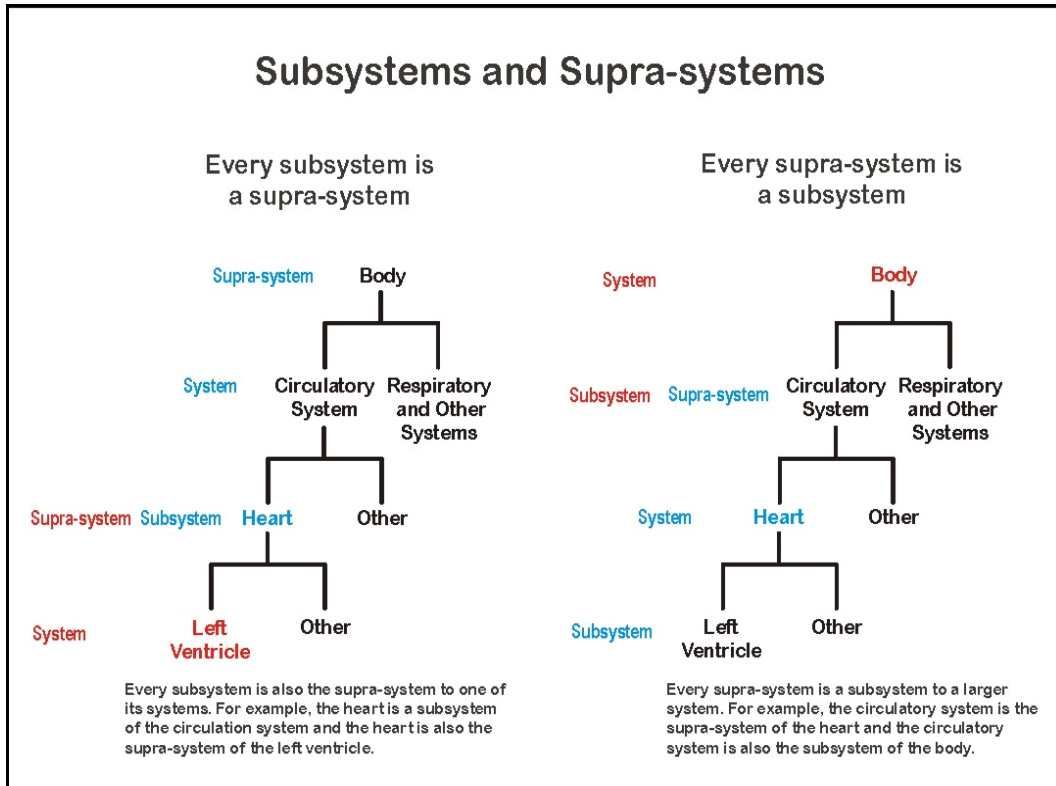
Figure 2.29: Tree Approach for Levels 2-4 Master Planning Process – Source: author – [file:\SystemTree02.jpg]

Principle #1: *The systems approach is a systematic and analytical way to view the world.*

Also, a systems approach is a structural taxonomy where the parts can be subdivided to a point where they are atomized and can't be further subdivided or they are subdivided to a level where the system is manageable and understandable. This last point is important and can easily be overlooked. Meadows (2008) suggests that the elements of the system create a structural taxonomy of the system. In addition, she notes that there are interconnections and a purpose or function. The elements or subsystems of a system form its structure or a taxonomy of how the system is organized. The following rules and principles are primarily structural in nature. Although this book emphasizes a structural approach to systems, a systems approach is normally more than simply a collection of elements. According to Meadows (2008), it consists of interconnections to create a purpose or function.

**<b>Taxonomy.** Structurally, the subsystems are the interdependent components that are related to the whole or the larger system. A taxonomy is how items are classified. This section presents several rules that define the properties of a system.

Often the purpose or function of a system is easy to determine. Often, the interconnections are somewhat more elusive. In physiology, the purpose or function of the taxonomy is provide an explanation of how the body works. The interconnections are all the interrelationships between the elements of different systems. In the circulatory system, how does the bone marrow produce hemoglobin? How does the hemoglobin carry the oxygen to the cells, and how does it transfer the oxygen from the hemoglobin to the cells. These are questions that show the complexity in the interconnections between the different subsystems, in this case in the circulatory system.



**Figure 2.30: Subsystems and Supra-systems** – Caption: The system level is relative or based on the focus of the investigator. Both the supra-system and the subsystem are relative to the system being investigated. – Source: author [file:\System7.jpg]

In the Disney example, the purpose or function was to create a Magic Kingdom that is magical. They sought to create a unique place with a unique experience. They used five systems to structurally describe how the Disney people planned for this experience to occur (Figure 1.12). Although the five systems can be analyzed and examined in isolation, it is how all the elements or systems come together and interconnect to create the experience. In Figure 2.28, the courtyard is the unified whole created by the trees behind the pavilion, the pavilion, the band, and the color coordinated trash cans. Like the body elements that can be studied independently, the elements in the courtyard can be studied independently, but they really function as a whole.

The purpose of inventorying the resource is to determine recreational opportunities present (Figure 2.29). Recreational opportunities or the lack of them helps to determine programs. The foundation of an old farm house on the property of a nature center provides program opportunities for archeological and historical digs (e.g. 2.3.3.1 Archeological and Historical). The presence of wetlands, a stream and pond provides program opportunities for a variety of water related activities (e.g. 2.3.2.4 Hydrology and Wetlands).

<c>**Creating Subsystems.** In defining the structural principles of systems, the next principle focuses on subdivision. Breaking a system into its subsystems creates a taxonomy where all the subsystems define and operationalize the system. Operationalization is discussed in a later section. This section focuses on the principle of creating subsystems.

*Principle #2: Each system can be subdivided into subsystems, and each subsystem can be treated as a system which can also be subdivided into subsystems.*

Using the physiology example, the circulatory system is subdivided into the subsystems of the heart, arteries, veins, marrow, etc. Each of these subsystems can in turn be broken into their own subsystems (Figure 2.30). For example, the heart can be broken into its parts of the right atrium, right ventricle, superior vena cava, inferior vena cava, left ventricle, left atrium, etc. In turn each of these subsystems are comprised of subsystems themselves. Eventually, the issue becomes one of practicability or at what level of analysis is the system manageable.

In Figure 1.12, Disney subdivided the Magic Kingdom into five systems (i.e. design and facilities, experience, support services, program and actors). The category of design and facilities was subdivided into facilities, environment, visual zones and grounds and plants. Facilities could be further subdivided into its sub-elements of rides, sanitation, restaurants, shops, etc. In turn, each of these items can be in turn subdivided into subsystems, until they are viewed as manageable.

The site and facilities inventory (i.e. 2.3.0) is a subsystem of the master planning process (2.0 Inventory). In turn it is subdivided into cultural (i.e. 2.3.1), physical (i.e. 2.3.2), and biological (i.e. 2.3.3) subsystems. These three subsystems were divided into subsystems which can be divided again into subsystems.

<c>**Supra-systems.** The next structural principle of systems focuses on the principle that each system is part of a larger system. This larger system is referred to as the supra-system.

*Principle #3: Each system is part of a larger system (supra-system), which is also part of an even larger system.*

Just as each system can be subdivided into sub-elements or subsystems, each system is a sub-element or subsystem of a larger system (Figure 2.30). The circulatory, respiratory, skeletal, reproductive, etc. are all sub-elements or subsystems that comprise the human body or the human physiological systems. Most textbooks on human physiology utilize an organizational structure where the sections or chapters are organized into these subsystems. Most anatomy books end with the human system. However, the individual can be considered as part of larger systems including the family, community and nation.

Disney had the five elements or systems that comprised the Magic Kingdom experience. However, the Magic Kingdom itself is a sub-element or subsystem of the larger system, Disney World. Along with the Magic Kingdom, Disney World includes the elements or systems of Epcot Center, Disney-MGM Studios, Animal Kingdom, etc. Also, these systems form the chapter titles of Kurtti's (1996) book.

The master planning process (2.0 Inventory) is the supra-system of the site and facilities inventory (i.e. 2.3.0). In turn, site and facilities inventory is the supra-system of the cultural (i.e. 2.3.1), physical (i.e. 2.3.2), and biological (i.e. 2.3.3) systems. The cultural features were subdivided into six subsystems. Depending on the richness of the resources in the inventory process, any one of the six cultural subsystems may, in turn, be further subdivided.

<c>**Systems Have Boundaries.** In defining the structural principles of systems, it is important to identify system boundaries. Even in a natural system, the boundaries are still artificial boundaries (Whitten, et al, 1989, p.38). In Chapter 3, the playground is defined in terms of time and space. By definition, playgrounds have boundaries.



Principle #4: *All systems have a boundary that separates the system from its environment. Although arbitrary, the boundaries should be logical chosen.*

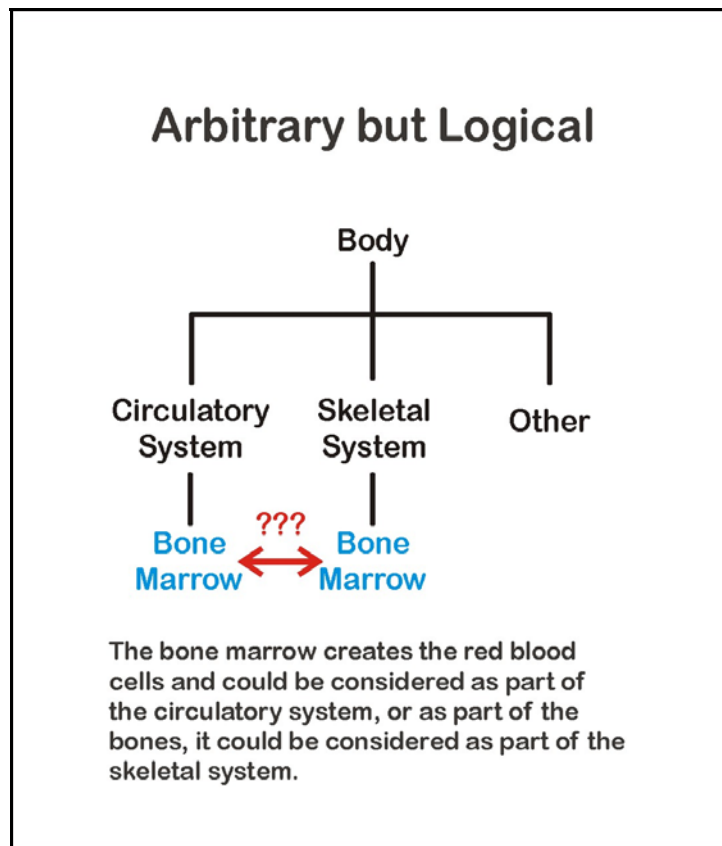
As a sidebar, one of the issues in ecology is defining an ecosystem. The unfortunate reality is that no ecosystem is a closed system. The boundaries are artificial and porous at best. This means that there is always some interaction or influence from the outside environment. Hence, it can be argued that an ecosystem is really an artificial construct and that they don't really exist other than as an analyst's construct.

Including any element in a system should be based on its interconnection with the other elements in its system (Figure 2.31). There should be a logical reason for its inclusion. In terms of physiology and the human body, the boundaries between systems are somewhat arbitrary and can lead to some confusion. For example, bone marrow can be included as part of the circulatory system or it could be included as part of the skeletal system? Structurally, the bone marrow is part of the bones and hence, the skeletal system. However, the bone marrow makes red blood cells and can just as easily be considered as part of the circulatory system. It is an issue of defining the boundary between the circulatory and skeletal systems.

In Disney's five systems and their corresponding subsystems, there is overlap between the different systems (see Figure 1.12). In a sense, many of the boundaries of the systems are skewed or blurred. For example, the program and more specifically casual activities overlap with actors and support people. In the end, they need to be view in terms of their contribution to the experience. The partitioning issue should become secondary to this issue.

Intuitively, the review of the three subsystems (i.e. cultural, physical and biological factors) is logical. It is divided into man's impact, living or biological factors, and the physical or non-living resource. Each of these subsystems is further subdivided and intuitively, the categories make sense. It should be noted that depending on the organization, park and facility, different categories may be used. And, usually these categories seem logical.

<c>**Subsystems Function Independently of Each Other.** Each system has a boundary that separates it from its environment, other systems and the supra-system. A result of this separation is that subsystems



**Figure 2.31: Arbitrary but logical** – Caption: Although the selection of the subsystems is arbitrary, the subsystems should be grouped because of their inter-connectivity and commonality with each other. – Source: author [file:\fig0303-System8.jpg]

are treated as if they act independently of each other, even though they are really part of the same system. Treating systems as if they are independent of each other helps to make them more manageable and easier to understand. The bone marrow example in Figure 2.31 illustrates this principle. Arguably, a discussion of the bone marrow can be considered as belonging to both the circulatory and skeletal systems.

*Principle #6: Even though they aren't really independent of each other, subsystems are treated as if they act independently of each other. .*

In the physiological textbook, the circulation system is treated separately from the respiratory system. Each has a boundary around it and that boundary is delineated by the contents in the chapter. Conceptually, the two systems are treated independently of each other. However, every one knows that the respiratory systems and circulation system are interconnected as are all the other systems. Also, people know that the human body doesn't work well when one system isn't included.

At first glance, the five systems in the Disney example seem fairly independent of each other. As noted in Figure 0320, all the elements in the courtyard come together to create the experience. Also underlying theme of this textbook as represented in the Designing the Experience Model (see Figure 0.1) is that the elements of the resource, facilities and activities combine to create the experience. Although the focus of this textbook is delimited to parks and facilities, it is important to remember that the activities that occur on them are an important contributor of the experience also.

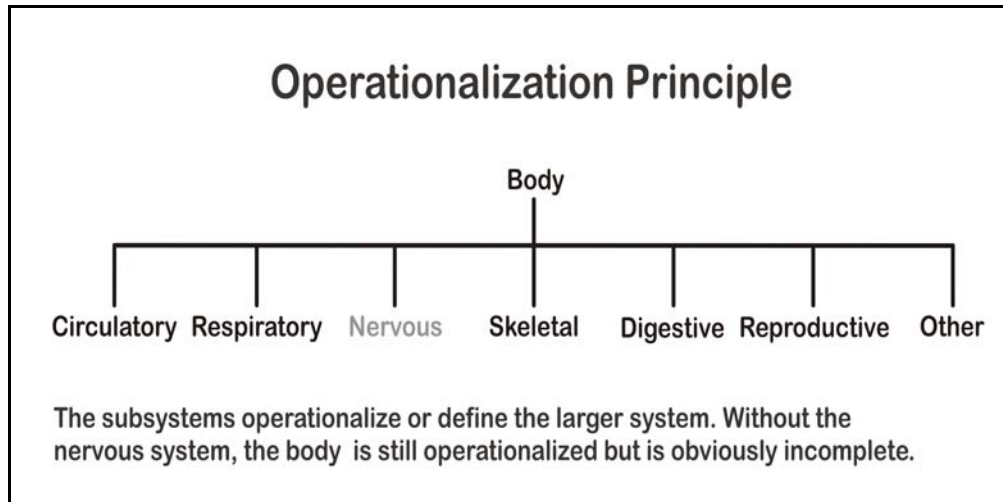
Seemingly, the cultural, physical and biological features in Figure 2.29 may seem to be operating fairly independently of each other. When conducting the inventory process, they are treated independently of each other. However, they are really interdependent. In one study, the area being inventory included both the coast plain and Piedmont land types (i.e. 2.3.2.1 Geology and Soils). The differences in soil types was sufficient to favor oaks and hardwoods on the Piedmont section of the property, and pines on the coastal plain section of the same property (i.e. 2.3.3.1 Flora) (Kauffman, and Stanton-Rich, 1988).

**<c>Operationalization.** Collectively, the subsystems define and operationalize the larger system. In research, operationalization is the process of defining how a variable is measured. Similarly, the subsystems define the system. Although the selection of the elements are somewhat arbitrary or determined by the people making the selection, it is important that the selection be logical and complete. There is always the possibility of omission.

*Principle #7: By definition, the system's subsystems operationalize and define the system.*

Open a textbook on physiology. The chapter headings form the subsystems that define the human body. They include many of the systems listed in Figure 2.32. Collectively, they define all the systems within the human body. In a real sense, they explain how the body works. Eliminate any one of the chapters (subsystems). Although incomplete, the chapters still operationalize how the body works.

Likewise, the five systems used by Disney define the operations of the Magic Kingdom. Eliminate one of the systems or subsystems and the operation is less complete, but it still defines the operations of the Magic Kingdom. The same is true for the chapters that define this textbook. The same is true for the cultural, physical and biological factors in Figure 2.29.



**Figure 2.32: Operationalization** – Collectively the subsystems define or operationalize the system above it. Even though an important subsystem is omitted in the systems tree, the system is still operationalized. It illustrates why it is important to choose the subsystems wisely so that the system is well defined by its subsystems. – Source: author [file:\System10.jpg]

<b>**Summary.**

A systems approach is fundamental to park and facility design and planning. The Recreation Opportunity Spectrum (ROS) presented in Chapter 10 and in Figure 10.7 utilizes a system’s concept. Historic preservation in Chapter 14 is subdivided into four subsystems: preservation, rehabilitation, restoration and reconstruction. Chapter 17 presents a model of master planning which constitute subsystems. As part of the master planning process, the resource is inventoried in terms of it cultural, physical and biological subsystems. All the subsystems are conveniently summarized in the next chapter on site planning (see Figure 18.4). As represented in the Site Planning Process Model, the site planning process is subdivided into three phases: the inventory (i.e. site inventory and program planning), analysis and synthesis phases (see Figure 18.1). In Chapter 19, blueprints are divided into sections or subsystems (Figure 19.1). Again in Chapter 20, the construction process is subdivided into five different stages or subsystems: research, design, tendering, construction, and occupancy.

## Methods for Diagraming Systems

Three approaches used to diagram systems are presented. These are the outline, tree, and box methods. The approaches complement each other and can be used in conjunction with each other. For example, the outline approach lends itself to report writing while either of the other two approaches lend themselves to graphic presentations.

<b>**Numbering Rules.**

Numbering systems and subsystems helps to provide order and coherence to large systems with numerous subsystems. In a sense, numbering provides a road map of the structure. Numbering is optional. It is usable with the outline, tree and box approaches as well as in report writing, file organization, and data storage. Figure 2.32 presents a simplified numbering system for the master plan planning process used in Chapter 17.

<c>**1.0 Level.** The primary system is labeled 1.0. If it is part of a larger system that is not included in this analysis or report, then it can be labeled as the level it is referred to in the larger document (e.g. 2.0, 3.0). For example, the master plan may be one of many master plans for other parks and facilities within the

agency. The larger agency is the supra-system. This would add another number to the left of the numbering rather than the right. Usually, it is not included because it adds a layer of unnecessary detail. Brookside Nature Center is one of many park and recreation facilities in Montgomery County. Its master plan may be one of numerous master plans.

<c>**Numbering Subsystems.** Each subsequent subsystem receives a new numbering beginning with one (e.g. 1.1, 1.2, etc). Zero is reserved for the larger system. The larger system 2.0 contains the subsystems 2.1, 2.2, 2.3 etc. Also, there should to be at least two subsystems numbered. If there is only one subdivision, there is no real subdivision and the content should be merged into the larger system. If there are three levels, the number begins with zero indicating the system (e.g. 2.1.0). Subsequent subsystems include 2.1.1, 2.1.2, 2.1.3, etc.

<c>**MLA Numbering** (Figure 2.33). Shaffer, D., (2013) suggests the traditional MLA approach to headings with numbering. It is a simple and straightforward approach to document writing. Simply use the numbering of the system followed by the topic heading. Conceptually, this approach is no different from the numbering approach used in the previous section. Most people will find this approach easy to use and satisfactory. The master planning process depicted in Figure 17.1 is used Figure 2.33.

<b>Figure 2.33: Typical MLA Headings with Numbering:</b> <sup>1</sup>
1.0 Determine Process 2.0 Inventory 2.1 Market 2.2 Program 2.3 Site and Facilities 2.3.1 Cultural 2.3.2 Physical Features 2.3.3 Biological Features 2.4 Operations 3.0 Implementation Plan 4.0 Review and Final Plan
<sup>1</sup> . See Figure 17.1 for a complete listing of the master planning subsystems.

<b>**Formatting Headings and Subheadings.** The outline method utilizes the APA, MLA or similar heading format to delineate the subsystems in the system (Figure 2.34 and Figure 2.35). Conceptually, the partitioning used in the APA and MLA formats parallel the system’s approach. The outline approach lends itself to report writing and it can be used in lieu of the tree or box approach. Conversely, the tree or box approaches used in the next section are directly convertible into the outline format. This aids in converting them directly into a report document.



<b>Figure 2.34: APA Formatting for Headings and Subheadings</b> <sup>1,2</sup>	
Level 1:	<b>2.0 Inventory</b> Centered, Boldface, Uppercase and Lower Case Heading
Level 2:	<b>2.1 Sites and Facilities</b> Flush Left, Boldface, Uppercase and Lowercase Heading
Level 3:	<b>2.1.1 Cultural factors.</b> Indented, boldface, lower case paragraph heading ending with a period.
Level 4:	<b>2.1.1.1 Historical and Archeological.</b> Indented, boldface, italicized, lower case paragraph heading ending with a period.
Level 5:	<b>2.1.1.1 Visitors Center.</b> Indented, italicized, lower case paragraph heading ending with a period.
<sup>1</sup> Source: Fleming, G., (2013) and APA, (2010). <sup>2</sup> For purposes of illustration, the master plan planning process was used (Figure 17.01).	

<b>Figure 2.35: MLA Formatting for Headings and Subheadings without Numbering</b> <sup>1,2</sup>	
Level 1:	<b>Inventory</b> Bold, flush left. There is no period at the end, no italics, and the text begins on the line after a blank line.
Level 2:	<i>Site and Facilities</i> Left flushed, italics, and important words are capitalized. The text begins after skipping a line. No boldface
Level 3:	<b>Cultural Features</b> Centered, boldface, and on it own separate line. Italics are not used and numbering is optional.
Level 4:	<i>Historical and Archeological</i> Centered, italics, and it is on its own separate line. Boldface is not used and numbering is optional.
Level 5:	<u>Visitors Center.</u> Underline, left justified and period at the end of the heading. There is no indenting, italicized, period at the end of subheading, and the text begins on the same line.
<sup>1</sup> Source: Shaffer, D., (2013). <sup>2</sup> For purposes of illustration, the master plan planning process was used (Figure 17.01).	

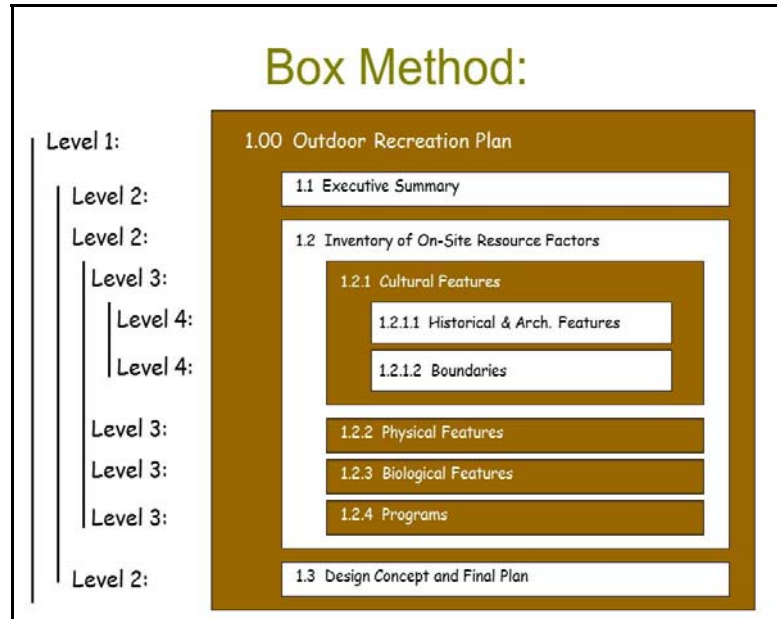
Both Fleming, G., (2013) and Shaffer, D., (2013) suggest that variations in the headings are acceptable. In addition, they also suggest that once a format is selected, it is important to be consistent with its structure. A potential problem with the MLA format is that several of the levels use centered headings. This is a difficult format to use if the report is utilizing a two-column format. Second, a centered heading tends to draw a lot of attention to the heading. This is a good idea at the first level but is potentially misleading at the lower levels.

One variation in the APA heading format is to underline and bold the level 3 heading. As a general rule, the headings should be structurally different from the remaining text. Underlining and italics creates a structure that is different and easily recognizable from the normal text. It is not the same for bolding the text used by itself. In addition, simply bolding text often becomes problematic with successive copying. On third, fourth or even second generation copies, it may become more difficult to distinguish between bolded and non-bolded text as the text tends to become bolder with the copying process. This may be in disagreement with Shaffer, D., (2013) who suggests to keep the headings simple in terms of bold, italics and underlining. As a strategy, his point is well taken and keeping the headings from being too busy is a

valid point to consider.

<b>Tree Method – In the tree approach, the subsystems are listed under their systems in an approach that is similar to the method used in an organizational chart (Figure 2.29). The spatial diagram can be presented either horizontally in Figure 2.29 or vertically like in an organizational chart.

<b>Box Method. (Figure 2.36) – The box approach and its variations are the classic approach to diagramming systems. Each subsystem is diagrammed spatially as a box. Its subsystems are diagrammed as boxes contained inside the box representing its system. The box approach clearly shows the boundaries and it clearly shows each supra-system. The master plan planning model presented in Figure 17.1 is reconfigured using the box method. Initially, the box approach is a little confusing. However, it clearly depicts the subsystems and the relationships between them. Also, the box method has fallen into disuse.



**Figure 3.16 – Box method** – Caption: An example applying the box method to an outdoor recreation plan. – Source: author [file:\fig0316-Slide27.jpg]

## Summary

This chapter lays the foundation for designing the experience with two the discussion of two key areas. The first focuses on spacial determinants. Informal space is defined as the space or distance people maintain in encounters with others. How people maintain these encounters with others determines how people organize their furniture (semi-fixed feature space) and their parks and facilities (fixed-feature space). Understanding informal space helps to lay the foundation for designing park and facility spaces to create the desired experience. It is foundational. Basic physiology determines how people interact with other people. Sensory input determines this interaction (see figure 2.4). It begins with informal space. Informal space explains these interactions in terms of sensory awareness (sight, sound, touch, smell, etc.).

Both informal and semi-fixed feature space provide the foundation for the design of fixed-feature space, the focus of this book. This foundation is important for understanding the Churchill dictum that “*We shape our building and they shape us.*” There should be little doubt that people’s behavior is determined by spatiality. To paraphrase Churchill’s dictum “*We design our parks and facilities and they shape our experiences.*” This chapter provides the underlying support for this basic thesis.

The second approach is on the systems approach. It is a systematic and analytical way to break down larger systems into smaller systems. The purpose of breaking down these larger systems into smaller systems is that generally, smaller systems are more understandable and manageable. This approach is fundamental to the structure of the master planning process, facility design, or developing a site layout. For example, chapters 17-20 on the planning process break large complex systems into smaller subsystems. Likewise, facility design can be broken down into subsystems. In addition, they need to be

broken down into smaller subsections to understand and work with them. Again, the systems approach is an underlying concept needed to understand the park design process. It is why it is included here.

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