Block 2

Environment-Behaviour Relationship

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UNIT 3 THE THEORIES OF ENVIRONMENT-BEHAVIOUR RELATIONSHIP*

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Learning Objectives

After reading this Unit, you will be able to,

- Explain the nature and functions of Environment-Behaviour Relationship
- Describe the different theoretical perspectives related to Environment-Behaviour Relationship
- Discuss how Environment-Behaviour Relationship regulates behaviour, and
- Appreciate theresearch trends in Environment Psychology across cultures

3.0 INTRODUCTION

We often refer to environmental psychology as a multi-disciplinary paradigm that finds its mention in other fields of study. The 1960s saw an emergence of this discipline as the degrading environment vexed scholars. The environment was a major factor in the development and ongoing conduct of people. Scholars took to developing scientific

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methods to examine the relationship between the physical environment and human behaviour. It also developed various models and theories. This unit will discuss the nature and functions of environmental behaviour relationship. It will also explain the theories and models of environmental behaviour.

3.1 NATURE AND FUNCTIONS OF ENVIRONMENT BEHAVIOUR RELATIONSHIP

It really should come as no surprise that the term environment lacks specificity. Among others, historians, biologists, architects, sociologists, economists, and psychologists have used the term idiosyncratic in defining variables of interest in their disciplines. Historians have sought the environmental Zeitgeist, biologists the ecological niche, architects the design features and economists the ratio of supply to demand to account for external influences on human behaviour. Whereas the term "environment" lacks specificity, it is possible to be explicit regarding the assumptions that underlie its study.

The assumptions that we see as underlying all environmental science, independently of specific orientation, are:

1) The earth is the only suitable habitat we have;
2) The earth's resources are limited;
3) The earth as a planet has been and continues to be profoundly affected by life;
4) The effects of land use by humans are cumulative;
5) Sustained life on earth is a characteristic of ecosystems and not of individual organisms or populations.

Implicit in these assumptions is a call not only for multidisciplinary but also for interdisciplinary strategies, methods, and philosophical perspectives in perceiving, understanding, and maintaining the delicate relationships that exists between humans and their environments.

1. The earth is the only suitable habitat we have, and its resources are limited. Throughout the history of the earth, various forms of life have begun, evolved, prospered, and died out, with the present dominance of humans being a very recent development. But, despite this current domination, we must face two fundamental truths:

   (a) Humans, too, will succumb to extinction either through geologic, meteorological, or interstellar cataclysm, natural biological processes, internecine quarrels, or because the earth's resources will no longer support human life in its present form.

   (b) Although there may be other habitable islands in the cosmic sea, they are spaced at such great distances throughout the universe as to be virtually irrelevant to human survival.

Notwithstanding these certainties, the earth is very important to those of us who are now living and to the coming generations. We must learn to live with the opportunities and the limitations the earth affords, with the inexorable fact that it is dynamic. And we must do so in a way that allows for continued human existence. The newly emerging

area of environmental psychology holds the promise of providing information that will allow sustained human tenure on earth.

2. The earth as life has profoundly affected the planet. Human contributions to the visual landscape of the planet are everywhere: tall skyscrapers, intricate networks of highways and electrical lines/ engineered lakes/ and the vapour trails of high-flying jet planes are constant reminders of human presence. More subtle indicators are the changing quality of the chemical composition of the atmosphere, geologic changes in the earth's crust engineering changes in hydrologic processes and chemical changes in the waters that cover the planet.

Clearing of forests, ploughing of land, black-topping of highways and parking lots not only affect the earth visually but change the amount of carbon dioxide in the atmosphere, the light reflecting and absorbing characteristics of the earth's surface and hydrologic drainage patterns. These changes influence the rate of heating and cooling and, therefore, the temperature of the earth and its atmosphere. Humans thus influenced weather and climate. A more thorough understanding of how humans influence the earth's natural processes will lead to more intelligent and life-preserving behaviours on one's part.

In environmental psychology, the term 'environment' is referred to as a tangible and imagined interpretation of the world, which includes both architectural and social surroundings. It also includes natural environments, social settings, and constructed environments as well as considers the learning and informational environment. It is an interdisciplinary field that throws light on human beings and their surroundings. It also deals with one's ability to adapt both physically and mentally to the various changes that continue to take place in our environment. Further, environmental psychology is a multi-disciplinary paradigm that draws a lot from the knowledge of people from other disciplines. It relies on the findings of geographers, economists, geologists, policymakers, psychologists, sociologists, anthropologists, educators, etc. Environmental psychology is also popular as human factor science or cognitive ergonomics, or environmental social sciences.

It explores dissimilar issues which are of great significance. Some issues are listed here:

- Common property resource management
- The effect of environmental stress on human performance
- The characteristics of restorative environments
- Human information processing
- The promotion of durable conservation behaviour.

Environmental psychology believes that we should interpret the environment as a major factor in the development and ongoing conduct of people.

1. Environmental psychology gives more attention to the environment which has focused only on micro-level stimuli and events like people's homes, neighbourhoods, and work and community settings.

2. Kurt Lewin's 'action research' orientation (1946), sets scientific goals for analysing and explaining people and environmental transactions with the more practical goal

of enhancing. It optimises and enhances peoples' relationships with their environment through effective planning.

3. Environmental psychology is a multidisciplinary approach to the study of environment and behaviour since it focuses on analysing and enhancing the quality of people's relationships with their physical environments. It also incorporates the perspectives of architecture, urban planning, psychology, anthropology, sociology, geography, and other fields.

The 'fundamental significance of environmental psychology for the design professions lies in its potential capacity to provide a body of knowledge conceptual and empirical for understanding the relationships between human behaviour and experience in the built environment.'(Horayangkura, 2012).

Check our Progress-1

1. What are the assumptions of Environmental Psychology?

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2. Describe the Environment-Behaviour Relationship

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Thus, we may define environmental psychology as the scientific study of the transactions and interrelationships between people and their physical surroundings (including built and natural environments), the use and abuse of nature and natural resources, and sustainability-related behaviour.

3.2 THEORIES IN ENVIRONMENTAL PSYCHOLOGY

On the one hand, the interdisciplinary nature of environmental psychology is laudable in that they brought various perspectives to bear on a single phenomenon, leading, it is hoped, to fewer "tunnel-vision" theories, and applicable solutions. It is this very multiplicity that leads to difficulties in the systematic application of knowledge and the development of well-articulated unifying theories.

3.2.1 Historical Influences

Theories have influenced thinking among environmental psychologists both within and outside of the discipline of psychology. Some of these theories are very broad in scope, whereas others are more focused; some are lacking in empirical basis and others are more data-based. We will review several of them to provide the context for a consideration of current theories of environment-behaviour relationships. These perspectives include:*Geographical Determinism, Ecological Biology, Behaviourism* and *Gestalt Psychology***.**

Some historians and some geographers have attempted to account for the rise and fall

of entire civilizations based on environmental characteristics. For example, Toynbee (1962) theorized that the environment (specifically, topography, climate, vegetation, availability of water, etc.) presents challenges to its inhabitants. Extreme environmental challenge leads to the destruction of a civilization, whereas too minor challenge leads to stagnation of culture. Thus, Toynbee proposed that an intermediate level of environmental challenge enhances the development of civilizations, and extremely diminished or excessive levels are debilitating. The notion of environmental challenge and behavioural response, although rooted in the thinking of such geographical determinists, appears often in one form or another in various theories in environmental psychology.

As one example, Barry, Child, and Bacon (1959) have suggested that agricultural, non-nomadic cultures seem to emphasize responsibility, obedience, and compliance in child-rearing practices, whereas nomadic cultures often emphasize independence and resourcefulness. These differences, they suggest, result from the fact that people who live and work together in organized non-mobile communities require a more structured organization and therefore stress the importance of obedience and compliance. Nomads inculcate independence and resourcefulness in preparation for meeting the changing and unpredictable demands of an environment confronted by "roaming" people. Thus, the argument goes, the environment sets the stage for the development of cultures having the best chance of surviving it.

This does not differ from saying that ghetto culture cultivates a set of skills in its inhabitants that are best suited to the ghetto. Someone not skilled in the craft of street fighting, perhaps, is not likely to survive the environment of the streets. We will see later in this Unit that some have carried this argument to the point, and other institutional environments develop in their inhabitants that are ostensibly survival certified to these environments, yet to be maladaptive in the larger environment.

The development of ecological theories, theories concerned with biological and sociological interdependence between organisms and their environment, have also significantly influenced thinking in environmental psychology. With the development of ecological science, organisms were no longer viewed to be separate from their environment but were integral to it. This notion of organism-environment reciprocity now appears in many current environment-behaviour theories. The environment and its inhabitants are still often studied as separate components, but no one doubts their interdependency. These various components constitute a total system and interactions between the components are assumed to bring the change.

3.2.2 Arousal Theories

Arousal theories have typically been concerned with the influence of arousal on performance.They maximize performance at intermediate levels of arousal but falls off as arousal is increased or decreased. This relationship sometimes referred to as an inverted-U relationship, has been shown to differ slightly depending on whether performance is measured on simple or complex tasks (see Figure 3.1) and is often referred to as the Yerkes-Dodson law. These relationships are consistent with other findings that humans seek intermediate levels of stimulation (Berlyne, 1974), and are reminiscent of Toynbee's assertion, referred to earlier, that cultures only develop in environments that provide intermediate environmental challenges.

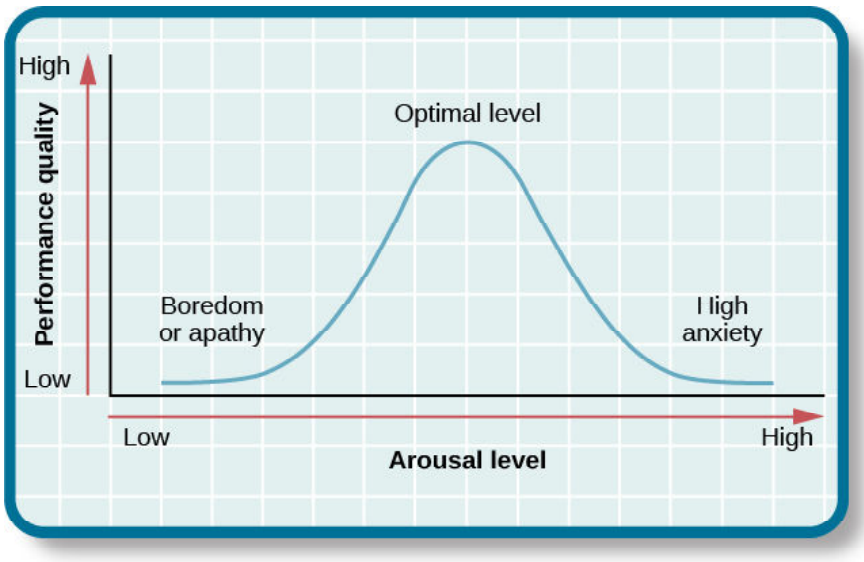

Figure 3.1 Yerkes-Dodson Law

It has also shown performance changes that are very curvilinear with temperature increases. One explanation of these findings is that increase in ambient temperature leads to increase in arousal levels.Initially, the higher arousal leads to performance enhancement, but as it increases further, over-arousal occurs, causing performance decrements. Similarly, it has been shown that personal space invasions lead to increases in arousal (Middlemist, Knowles, & Matter, 1976) and performance decrements (Evans & Howard, 1972; McBride, King, & James; 1965). Increases in noise level have been associated with changes in arousal and performance (Evans & Cohen, 1987). Thus, several variables associated with arousal changes are related to performance changes, and performance has consistently been curvilinear related to arousal.

Other theorists using an arousal perspective have featured physiological responses to environmental stimulation. Changes in heart rate, blood pressure, respiration rate, galvanic skin response, and adrenaline secretion, among others, have been shown to occur with changes in the environment.Increased ambient temperature leads to blood vessel dilation, perspiration, increased heart rate, and, in extreme conditions, lowered blood pressure and insufficient oxygen supply to the brain. It has linked personal space invasion to delayed onset and shorter duration of maturation for males. And noise exposure alters blood pressure, heart rhythm, and the flow of gastric juices to the stomach.

Neurologists, such as Hebb (1972) have linked arousal with increased activity of the reticular activating system of the brain. Still, other theorists have equated arousal with changes in motor activity or with self-report of arousal. Berlyne (1974) has, for example, characterized arousal as lying on a continuum anchored at one end by sleep and the other by excitement, and Mehrabian and Russell (1974) have identified arousal as a major component in people's affective responses to their environment.

Independent of the orientation taken concerning arousal, several consistencies are apparent:

1. Theassociated changes in arousal with changes in the environment
2. Pleasant as well as unpleasant stimulation increases arousal — that is, room temperatures above100 degrees Fahrenheit and obnoxious noises influence arousal in ways similar to a rollercoasterrides and such other stimulating situations.

3. Changes in arousal lead people to seek information about their internal states (Schacter & Singer, 1962) as well as to seek information from others (Festinger, 1954).

4. People evaluate moderate levels of arousal positively.

5. Often, great expenditures of energy are used by individuals to bring the environment to alevel of moderate stimulation.

Performance is predicted to be optimal for both simple and complex tasks at intermediate levels of arousal. Arousal above the level, leads to decrements in performance.

Factors affecting Arousal Level

Furthering the point, various researchers have tried to identify the impact of different environmental factors on the arousal level:

i. **Temperature**An increase in ambient temperatures leads to increases in arousal levels. Usually, higher arousal leads to performance enhancement, but as it increases, further over-arousal occurs, causing performance decrements.Increased ambient temperature leads to the following physiological changes: blood vessel dilation, pupil dilation, perspiration, increased heart rate. Extreme conditions also lead to lowered blood pressure and insufficient oxygen reaching to the brain.

ii. **Personal Space Invasion**An increase in personal space invasion leads to an increase in arousal and performance decrements (Middlemist, Knowels& Matter 1976).

iii. **Noise Level**An increase in noise level leads to an increase in arousal and performance decrements(Evans & Kohen 1987). It alters blood pressure, heart rhythm, and the flow of gastric juices to the stomach.

Arousal and Nervous System

It linked arousal to increased activity of the reticular activating system of the brain and the associated changes in arousal with changes in the environment. Pleasant as well as unpleasant stimulation increases arousal, i.e. room temperatures above 100 degrees Fahrenheit. Changes in arousal lead people to seek information about their internal states. People associate moderate levels of arousal positively. Individuals use great expenditure of energy to bring the environment to a moderate level of stimulation.

3.2.3 Stimulus Load Theories

Central to stimulus load theories is the notion that humans have a limited capacity to process information. When inputs exceed that capacity, people ignore some inputs and devote more attention to others (Cohen, 1978). These theories account for responses to environmental stimulation in terms of the organism's momentary capacity to attend to and deal with salient features of its milieu.The stimuli most important to the task are in the focus of attention whereas the others are in the margin.For example, while driving during heavy traffic, we invest attention in the vehicles and road signs around us, and we pay less attention to the commentator on the car radio, people in the back seat, or the clouds in the sky. If the less important stimuli interfere with the task at hand, then ignoring them will enhance performance; for instance, ignoring the

children's fighting will make you a better and safer rush-hour driver. If, however, the less important stimuli are important to the task at hand, then performance will not be optimal; for instance, ignoring the road signs because you are attending to the more important trucks, cars, etc., may lead you thirty miles out of your way in getting home.

Sometimes the organism's capacity to deal with the environment is overtaxed or even depleted. When this occurs, we attend only the most important information, with all other information filtered out.Once attentional capacities have been depleted, even small demands for attention can be draining. Thus, behavioural aftereffects, including errors in judgment, decreased tolerance for frustration, ignoring others in need of help, can be accounted for by these theories. For example, the exhausted rush-hour driver eventually might reach the point where he or she doesn't notice the traffic light turn from red to green (or worse yet, from green to yellow to red), even though this is a very important stimulus.

Decreased tolerance for frustration may lead to "laying on the horn" or "lane hopping" and motorists in the break-down lane may be ignored, if not looked upon with disdain.

Stimulus load theories can also account for behavioural effects in stimulus-deprived environments (e.g., certain behaviours occurring aboard submarines and in prisons). This approach suggests that under-stimulation can be just as aversive as overstimulation. So-called cabin fever resulting from monotonous living conditions can also be seen as the result of under-stimulation.

Check Your Progress 2

1. What are the basic assumptions of Arousal theories?

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2. Explain the basic premise of the stimulus load theories.

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Wohlwill (1966) has argued that environments should be depicted in terms of measurements applied to the dimensions of intensity, novelty, complexity, temporal variation, surprisingness, and incongruity, all of which contribute to stimulus load. Subsequent behaviours can then be related to the stimulus properties of environments in systematic and comparable ways.

3.2.4 Behaviour Constraint Theories

Behaviour constraint theories focus on the real, or perceived, limitations imposed on the organism by the environment. According to these theories, the environment can prevent, interfere with, or limit the behaviours of its inhabitants (Rodin & Baum, 1978; Stokols, 1978).

The development of the behavioural constraint model comes from Brehm's (1966) reactance theory which states that there is a basic desire among human beings to maintain their behavioural freedom. An environment is constraining when something is limiting or prevents an individual from achieving his intentions.Certain environmental conditions like noise, crowding, temperature, location or specific features such as bad

weather, barriers, objective experiences such as control may be perceived as constraining by the individual. In such a situation, the person feels as being out of his/her control. This feeling of not being able to control the situation produces psychological reactance (Brehm, 1966). Wortman and Brehm (1975) suggest that if failures or loss of control persist for a longer period of time without any chances of restoration, the individual will cease to make any instrumental efforts and thus enter into a helplessness state.

Allen and Greenberger(1980) worked extensively in this area and suggested that before entering into a state of helplessness, an individual will try to alter his/her physical environment, if the previous effects of modifying the social environment did not prove successful. For instance, while trying to teach in a noisy classroom environment, the teacher first tries to request the children to remain quiet before asking the naughty ones to move out of the class. This modification if expressed in the form of personalization or any other social change will be in a socially approved and benign manner, else could also resort to drastic causes like intentional damage to the environment. Breaking of school furniture, switchboards, vandalizing or looting of public property during riots are certain examples of these negative form of perceived control.

It has also been suggested that boundary mechanisms are crucial to an individual and one sets up certain regulatory systems to regain certain amount of control. So for instance, when someone invades our personal space during the course of a conversation, we try to regain it by moving a step further away or displaying some other behaviour like crossing our arms and the like. We may sometimes invent systems to prevent or reduce the chances of invasion. Sitting on one edge of an empty park bench or trying to get the aisle seat while travelling are examples to prevent encroachment. Very few of us will sit in the centre, or even if we do we spread out personal belongings on either side of us.

An important aspect of everyday life of an individual is having a sense of controlling the environment which induces a sense of wellbeing. When people perceive control in a noisy situation, like by putting on ear plugs (Glass & Singer, 1972); they are less aggressive (Donnerstein& Wilson, 1976; Moser & Levy-Leboyer, 1985); and they are more often helpful (Sherrod & Doves,1974). On the contrary, the perception of loss of control leads to manifestation of negative consequences on behaviour, well-being and health (Barnes, 1981).

Averill(1973) has discussed three categories of control: (a) the behavioural control which provides the subject with the opportunity to change the disturbing environmental events, (b) through cognitive control the individual adopts reappraisal technique to perceive the environment as less threatening and (c) the decision control provides the subject with an opportunity to choose the best possible alternative.

The behavioural constraint model is very effective in explaining human behaviour in terms of control component. However, this approach alone cannot explain the environment-behaviour relationship in an effective manner.

3.2.5 Adaptation-Level Theories

Adaptation level theories assume that each of us has a minimum threshold for a certain level of environmental stimulus. A slight rise or fall in this threshold is a focus of arousal, overload, under load or stress. Variations in behaviour will therefore occur if the stimulus load is outside our experienced adaptation levels.Major proponents of this position include:

Helson (1964) and Wohlwill (1974). While all environmental psychologists emphasize the interrelationship of humans to their environment, adaptation-level theorists speak specifically of two processes that make up this relationship-the processes of adaptation and change. Organisms either adapt (i.e., change their response to the environment) or they adjust (i.e., change the environment with which they are interacting). Adaptation to decreases in ambient temperature includes piloerection (hair on the body standing up or what is commonly called getting "goose pimples"), muscle rigidity, increased motor activity, vasoconstriction; adjustments include throwing another log on the fire or turning up the thermostat. Either process brings the organism back to equilibrium with its environment.

Wohlwill(1974) distinguished three categories of stimulation: sensory, social and movement; along the three dimensions of intensity, diversity and patterning. Amongst these; optimal or intermediate level of arousal or stimulation is desirable for positive responses and task performance. For instance, if aloofness and gregariousness are the two poles of a social interaction scale then either of them can be desired by a subject at some span of time depending on the level of exposure he/she is facing. The urge to spend some time alone or nowadays known as "My time" either in a quiet resort or in an aloof place by the working young generation of today is probably getting its ideas from this theory only.

Another value of this approach is that it recognizes individual differences in adaptation level (i.e., the level of stimulation/arousal that the individual has become accustomed to and expects or desires in an environment). Thus, this approach can explain the different responses of two individuals to the same environment. For example, we may perceive a boisterous party as pleasant to a person high in need for sensation, but as overwhelming for the person who prefers a low level of sensation. By the same token, some people revel in the crowded atmosphere of last-minute festival shopping, while others abhor the inconvenience of having two or more shoppers in the same store with them. These individual differences in adaptation level lead to quite different behaviours. The person high in need for sensation will seek boisterous parties, whereas the person preferring low levels of sensation would avoid them or seek havens of solitude within them. We can ascribe some differences in their behaviours to differences in their adaptation level.In yet another study, it was observed that when concentrating on important tasks, the subjects were perturbed both by the presence of a persisting noise as well as by the complete lack of it. Thus an optimal level of stimulation is desirable for an appreciable task performance. For instance some students like to hear some soothing music or mantras while studying or concentrating on important tasks.

However there may be some variations in the optimal level in different individuals depending on their experience and proximity with a given environment. For example: the heat and temperature of a bangle factory can be too overpowering for a person on entering for the first time; while the workers of the place are quite immune to it. Similarly, people of hilly areas when settled in lowlands have a high resistance to cold temperature as compared to the native residents of that place. This variation in optimal level is termed as adaptation. According to Wohlwill(1974), adaptation is a quantitative shift in the distribution of judgmental or affective responses along a stimulus continuum as a function of continued exposure to a stimulus.Dubos(1980) defines adaptation as the process which allows people to adjust to their environment, variations in the perception of the environment and coping mechanisms undertaken to overcome the problems it creates. Adaptation involves physiological as well as psychological processes. The

phenomenon of light and dark adaptation accomplished by the human eye is a classic example of physiological adaptation to intense stimuli of light. An individual previously residing in an area close to railway station may perceive his/her new house in the centre of the city as much quieter, is an example for setting a psychological benchmark of adaptation for evaluating new conditions.

The process of defensive re-appraisal or defensive re-evaluation can be very useful in dealing with stress emancipating from the extreme environmental stimuli. In this reappraisal, the environmental conditions which were once perceived as overwhelming or threatening ; over a period of time may be re-evaluated as bearable or less threatening. Defensive re-appraisals are self generated; they arise from needs within the person rather than from environmental pressures. In a study conducted on a flock of sheep, it was observed that when the paddock of the sheep was near the highway, initially the sheep used to run hither-thither on the arrival of any motor vehicle. However with the passage of time the approaching vehicles were perceived as less threatening and they used to continue with their grazing. Appraisal focused strategies occur when persons modify the way they think, for example, employing denial or distancing oneself from the problem. People may also alter the way they think about a problem by altering their goals, values such as by seeing humour in a situation. So, defensive reappraisal consists of any effort made to interpret the past more effectively or to deal with present harms and threats by viewing them in a less damaging and threateningway.

Sometimes subjects are seen to resort to behavioural adaptations. This kind of adaptation can be defined as the response a person gives to environmental stimulus and a change in that corresponding behaviour. In India, for instance, adjusting to the rituals and customs by the bride (being different from her family) after her marriage. Similarly, when an individual emigrates to a new country, he/she has to cut down on his traditions to follow the traditions of the new country.

The theory of adaptation presents an active and dynamic relation of the individual with his/her environment. However, the postulates of this theory cannot be generalized as it does not explain variation in adaptation levels across individuals, so precise prediction of behaviour with respect to environment becomes difficult.

3.2.6 Environmental Stress Theory

The environmental stress theory studies the effect of environmental factors on the biological adaptation of an individual. Stress may be defined as a change in the reaction of mind and body to any event that brings about a change. This change could be pleasant, unpleasant or boring. Stress exists when the demands posed by the environment exceeds the coping capacity of an individual. Coping is an attempt to regain control over the stressing or constraining situation. According to the psychological stress model, environmental conditions such as noise, temperature, crowding, daily hassles may provoke physiological, emotional and behavioural reactions which may induce a lot of negative outcomes (Lazarus, 1996). The situation or stimulus in the environment is the stressor and the corresponding behaviour to it is the stress response. Four general types of environmental stressors have been identified: cataclysmic events, stressful life events, daily hassles and ambient stressors (Baum, Singer & Baum, 1982; Campbell, 1983; Lazarus & Cohen, 1977). *Cataclysmic events* are sudden catastrophes that require major adaptive responses from the victims. Floods, earthquakes, eruptions, war and imprisonments are some examples of cataclysmic stressors. *Stressful life events* are major incidents in the lives of people that require personal or social adaptive

responses. These include change in family status (marriage/ divorce), economic conditions or job changes and like.*Daily hassles* are the typical life events like interpersonal problems, environmental events (noise, crowding) and the like which may cause frustration, tension or irritation. *Ambient stressors* are more continuous, relatively stable and intractable conditions of the physical environment that largely go unnoticed unless they interfere directly with some important goal or threaten health (Campbell, 1983).

Stress theories emphasize the mediating role of physiology, emotion, and cognition in the organism-environment interaction. Environmental features are impinging, through the senses, on the organism, causing a stress response to occur when environmental features exceed some optimal level. The organism then responds in such a way as to ease the stress. Part of the stress response is automatic. Initially, there is an alarm reaction to the stressor, wherein various physiological processes are altered. Resistance then follows as the organism actively attempts to cope with the stressor. Finally, as coping resources are depleted, a state of exhaustion sets in (Selye, 1956).

Increasingly, though, psychologists have concerned themselves with additional aspects of the stress response. Lazarus (1966), for example, has focused on the appraisal process. According to him, people must cognitively appraise the environment as threatening before stress occurs and behaviours are affected. Our harried rush-hour driver of a few pages back would not, by this criterion, be stressed unless this individual appraised the traffic as threatening. Confronted with a potentially stressful situation, the individual appraises the situation. Appraisals involve both assessing the situation (primary appraisal) as well as secondary appraisal i.e. evaluating the possibilities of coping with it. The term coping refers to adaptive or constructive strategies that help reduce the stress level.

Adaptation and coping models are very helpful in studying the human behaviour under stressful conditions. If the individual is able to cope with stress in a positive manner then it enhances the performance of an individual. Baum & Paulus, (1987) studied that even in stressful conditions of noise and crowding, positive coping strategies elevated the arousal level of the subjects thereby increasing their task performance. However, if the individual is not able to deal with the stress in a constructive manner, negative consequences such as performance deficits, psychosomatic complaints and psychological or physical breakdown can be seen.

On the whole, the environmental stress model helps understand the impact of stress on human performance and behaviour. It also explains the combined and individual impact of environmental stressors on human behaviour in a comprehensive manner.

3.2.7 Ecological Theories

Central to the thinking of ecological theorists (Barker, 1963, 1968) is the notion of organism-environment-fit. Environments are designed or grow to accommodate certain behaviours. Behaviour settings, as Barker termed them, are evaluated in terms of the goodness of fit between the interdependent environmental features and the behaviours that take place.

Ecological theories explain that there is a symbiotic relationship between a person and their environment i.e., they are dependent on each other. Human behaviour and responses are directly related to the environmental settings and slight alterations or modifications can lead to a change in the characteristics of the former. Ecological

perception is described as the process by which people relate to and respond to their environment. It describes organisms and their environment as mutually reciprocal. This concept suggests that the environment merely represents itself and that one's own perception permits further investigation of the environment (Clayton & Myers, 2009, pg.75).

Essentially the approach places the initial human responses to external factors in the category of instinctual responses. It stresses that every child is born with a set of instinctual responses that help it to survive. Theories about people living together in a spatial environment (territoriality, personal space, crowding) are examples of the ecological approach. According to the ecological perspective, behaviour is the function of its physical and social setting.

Barker and Wright(1955) exemplified their work on ecological theories to understand human behaviour and focused on behavioural setting. A behavioural setting is a self referenced (internally interdependent and self defined) entity that consists of one or more standing patterns of behaviour such as classroom, library, temple, recreational areas etc. Barker(1951) documented a day in the life of several young children, observing how even without prompting; their modes of expression and outward behaviour seem to change dramatically when their events were varied. It was observed that the children unconsciously manifested different coping strategies and behaviour depending on the type of events they were encountering.

For instance, we speak in a soft voice in a library in an automatic manner while our tones are on a higher note when we go for a movie or to a city mall. This has something to do with the quietude architecture of the library and the chaotic arrangement of a multiplex or mall. This theory of ecological perception from James J. Gibson (1979) and Elanor Gibson(1969,1997) states that although two individuals can be simultaneously in a particular environment, their perceptions can be widely different because each experiences a different reaction.

Barker argued that there are certain mechanisms that guide adaptive behaviour in settings and help people to predict behaviour in a setting. He named these mechanisms as circuits and divided them into four types:

(a) Programme circuits: syllabus, play programme, schedule.

(b) Goal circuits: people in a setting have certain goals so they behave in a particular way to achieve that goal.

(c) Deviation-countering circuits: these are the behaviours people do or follow to achieve the setting goals.

(d) Vetoing circuits. occur when people are excluded from the behaviour setting.

Barker's theory of behavioural setting is molar and contextual in nature. It tries to emphasize on the similarity of behaviours between people in the same setting, and describe the rules that seem to exist.

A derivative of the behavioural setting theory is the manning theory which has been used to explain human crowding. According to the theory an individual's behaviour is determined by the supply and demand of the social roles existing in a setting. An individual will experience more crowding when a setting is overmanned (i.e., when the number of occupants of the setting exceeds that required for the normal functioning of the setting)

than when it is undermanned (Hui & Bateson, 1990). Barker (1968, pg. 185) synthesizes the salient aspects of the effects of undermanned settings: in general terms, undermanned behaviour settings in comparison with optimally manned behaviour settings impose more and stronger forces on their inhabitants in more varied functions; the forces are, however, more prevailingly directed inwards and towards other inhabitants. Undermanned behavioural settings have stronger internal interdependence andcohesiveness; they are stronger things vis-à-vis their inhabitants than optimally manned behaviour settings. Manning theory, now known as staffing theory focuses on the idea that when there are fewer people available for a number of behaviour settings, the pressure on an individual to assume responsibilities heightens.

Synomorphy which is the degree of fit between a behaviour setting and the individual within it, is an important concept in staffing theory. When a place is high in synomorphy, the number of people and the types of tasks being performed match what the behaviour setting provides, and the individuals can achieve maximum productivity.

The Ecological perspective has its share of advantages and disadvantages. The theory has high external validity as it has been tested in real life behavioural settings. However, the number of extraneous variables being very high, it may be difficult to establish a precise causal relationship between various predictions and outcomes. The ecological theory has proved to be very useful in understanding human behaviour and can be applied in assessing the layout and designing of residential areas to avoid congestion and ensure safety.

Check Your Progress 3

1. Name the major proponents of adaptation level theories.

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2. Explain Brehm's idea of reactance theory.

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3. What are ambient stressors?

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4. Explain the basic premise of ecological theories.

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3.3 CRITICAL COMPARISON OF THEORIESOF THE ENVIRONMENT-BEHAVIOUR RELATIONSHIP

Each of the theoretical stance has its costs and benefits. The arousal, stimulus load, and adaptation level approaches all share the advantage of the ability to incorporate a wide variety of physical and social environmental characteristics under the rubric of

overall stimulation level. Thus, diverse factors such as noise, temperature extremes, room colour, verbal information rate, and crowding can all be conceptualized as contributing to environmental stimulation levels. Further, all three approaches are useful in predicting potential adverse responses when environmental stimulation deviates from some optimal level. The arousal approach is the most general in identifying physiological and affective mediators of the environment-behaviour relationship that is, increases or decreases in stimulation produce corresponding changes in physiological and psychological arousal, written produce predictable variations in behaviours such as task performance and aggression.

The stimulus load approach is synaptic, focusing on cognitive in information-processing abilities, and yields predictions regardingthe social/behavioural consequences of over/ unstimulating—excessive attentional demands have differential effects on performing primary versus secondary tasks and the likelihood of attending to various social stimuli.

The adaptation level approaches to the most specific, predicting that the consequences of a particular stimulation level depend on the specific level to which an individual has become adapted. The generality-specificity dimension is a theoretical trade-off. The more general theories account for aggregate responses of large numbers of people to the same environmental conditions, but in doing so gloss over some potentially important individual differences in people's responses to those conditions.

For example, while arousal theory might accurately predict worse performance, on average, in noisy compared to quiet settings, there may be some individuals who, because of their adaptation level, might even perform better in the noisy setting. The more specific theories account for some of these individual differences, but are more limited in scope, thus creating difficulties in making inferences about what are optimal environmental conditions for most people. For example, the adaptation-level theory could lead to as many predictions about performance level as there are people at the same level of noise. All three approaches have limitations regarding the reliability and validity of measures of their concepts. Thus, for example, measurements of physiological arousal (e.g., heart rate, galvanic skin response) and psychological arousal (e.g., self-reported emotional state) that are simultaneously got sometimes yield contradictory results. Also, systematic and valid measures of stimulus load and adaptation level are difficult to obtain.

As a result, all three approaches have difficulty predicting what optimal stimulation levels are and exactly when these levels deviate significantly from optimum. This limits the ability to predict behavioural responses to various stimulation levels.

The stress approach incorporates elements of all the above. We can characterize stress in terms of aim physical and social environmental conditions that deviate from some optimal level (e.g., a noisy and crowded subway) and are thus potentially disruptive to human functioning. We can also conceptualize stress in terms of physiological responses (e.g., arousal and health), affective responses (e.g., subjective discomfort), and cognitive responses (e.g., appraisal) to environmental conditions. This approach is also useful for accounting for the effects of a wide variety of environmental conditions on several important mediators of environment behaviour relationships under the general construct of stress. The approach has a further advantage of predicting behavioural coping and the consequences. Of course, this approach suffers from the same programs of measurement as those discussed above. For example, it is difficult to determine objectively which conditions are stressful, for e.g., heavy metal vs, jazz music, as well

as individual differences in response to them, for e.g., adolescents vs. their parents. However, the stress approach has been widely used in environmental psychology.

The behavioural constraint approach is the most limited of all in scope, (i.e., it is primarily useful in situations where the perception of loss of control or threats to control is present). However, when such conditions exist, the concepts of reactance and learned helplessness yield useful predictions of behavioural responses to such conditions.

The ecological approach has the broadest scope with the concept of behaviour setting and is a useful descriptive approach to understanding the behaviours of large numbers of people in different settings. However, this generality limits the approach's ability to account for individual differences in the behaviour setting. Another disadvantage is that its reliance on the field observation method does not permit causal inferences regarding the determinants of behaviour.

3.4 RESEARCH IN ENVIRONMENTAL PSYCHOLOGY

Evans (1996) in his article has recapitulated the current research trends in environmental psychology. He feels that environmental psychology has lost much of its viability as an independent field within psychology over the past decade. Much of the early enthusiasm in North America has been waned and very little collaborative ideas are forthcoming between behavioural scientists, architects and designers. However, the satisfactory aspect is that research generated in environmental psychology has been fully adopted into mainstream psychology.

"The popularity of environmental psychology can be inferred from various vantage points. For instance, the subscription rates of three major journals in the field, *Environment and Behaviour, Journal of Environmental Psychology*, and the *Journal of Architectural Planning and Research* are at all times high. The courses on environmental psychology in North America are attracting students in large numbers. A number of text-books on environmental psychology have published new editions (Baum, Fischer, Baum & Greene; Gifford); two new texts have been published in the US (McAndrew; Veitch &Arkelin) in 1990s. Furthermore, Bonnes and Secchiaroli text is published in Italy" (Evans, 1996).

In India, Tripathi (1997) has published a text-book on environmental psychology in the native Indian language. In India, the undergraduate and post-graduate courses on environmental psychology are offered and are well received by students in major universities and colleges. Books are published in major areas of environmental psychology (Jain, 1987; Nagar, 1998) and articles on environmental psychology are incorporated in many visible volumes on various branches of psychology (Jain and Palsane, 2004; Nagar, 1999; Nagar and Sharma, 2005). However, in theIndian context adding the prefix 'environment' is sometimes noticed together with a trend of compiling articles presented in seminars and proceedings in edited volumes on various general themes of environmental psychology (Agarwal & Saxena 2003; Jain, 1997). Nevertheless, all these endeavours considered together are index of the popularity and growing visibility of environmental psychology.

The Cambridge and Gower's *Ethnoscape* series on environment and behaviour have received overwhelming support from readers and each series are having several volumes in the pipeline (Evans, 1996). *The Handbook on Environmental Psychology* sold

out of press (Altman & Stokols, 1987) and is now been reissued by Krieger Publications. Evans (1996) in his article reported that the handbooks of both social and health psychology, and new handbook of psychophysiology contains chapters on environmental topics. Cognitive mapping has emerged as an important area in cognitive sciences. Various journals devoted on cognition are incorporating more and more articles on spatial memory, way finding, and computational model of environmental cognition. Furthermore, Environmental education is emerging as a major sub-area within educational curriculum. Research studies in the area of child psychology and lifespan development have started focusing on immediate and background setting and its linkages with healthy development.

The education of architects includes some exposure to human behaviour and behavioural science. The idea that features of the physical design affect users is more or less accepted by design professionals. While architects who are in practice have not accepted much of the knowledge of behavioural science. However, in some specialized fields like interior designs and landscape architects have shown considerable interest in many aspects of environmental psychology induced knowledge and have collaborated with behavioural scientists. In many countries, the new field of *Investigative Psychology* is contributing to the criminal justice system. This new field covers major areas of environmental psychology including place theory, territorial behaviour, environmental cognition, prison studies and so forth.

In United States and Europe considerable efforts are evident in understanding life in space and developing programmes for housing travellers and workers in outer space (Evans, 1996). In the field of human factor engineering health and safety issues in the workplace is attracting interest and the inputs from environmental psychology are put into use. Indoor air quality and stress in work place are topics, which are generating renewed interest.Human response to various spaces prior to their actual development is attracting researchers. The computer simulation techniques are being used and more practical applications of environmental psychology are analysed. Research on environmental stressors like crowding, noise, pollutants as well as natural and technological disasters are studied and its relationship with health and cognition are examined. During emergency situations the natural behaviour of people have provided valuable insights and leads to emergency planning policies so as to reduce harmful effects. Studies on multiple stressors, cross-situational effects from home to work place and vice-versa are also attracting researchers' attention.

Another important area is to study global environmental issues. Evans (1996) has reported that the human dimensions of global change has emerged as an important priority area in US and several environmental psychologists like Paul Stern and his associates have published a recent monograph in this area. Besides *Annual Review of Psychology*, the *Journal of Environmental Psychology* has recently published a special issue on the topic. A number of researchers are focusing their study on the relationship between global environmental changes and psychology. This area derives insights from operant paradigms and motivational theories centred around, explaining how to arrest ecologically destructive behaviours.

In the developing countries, people are living in suboptimal conditions. The substantial population is suffering from day-to-day environmental problems including substandard housing and unhygienic living conditions surrounded with dirty, and cramped atmosphere. The focus of research is to connect poverty and poor environmental quality within the framework of environmental psychology. A number of studies are conducted

on poverty in the Indian context. However, in most of the studies the role of physical environmental features is either ignored or deemphasized. This gap is realized and some modest attempts are made to study Indian villages taking the physical environmental aspects and examining their relationship with community relationships and health measures (Tripathi, 1993). Furthermore, only meagre attempts and research work on Indian slums are conduced by psychologists (Sandhu, 1987; Nagar &Misra, 2001). For instance, a study was planned to examine the impact of rehabilitation of poor slum inhabitants who were previously exposed to unfavourable environmental conditions. The focus of this study was given on environmental quality, crowding and health (Nagar, 2005). One major result of this study indicated that slum inhabitants who were provided ownership of their slum units by the government exhibited a tendency of improving the environmental quality of their individual and shared dwelling and neighbourhood environment and reported better health relative to their counterparts who were residing in the unauthorized piece of land or were not eligible for ownership of slum units. It seems that feeling of ownership of slum unit is one important factor in protecting and improving the environmental quality of the neighbourhood.

Environmental psychologists are encouraged to conduct researches on economic diversitiesand marginalised communities such as tribal villagers etc. How people have responded to process of acculturation and technological advancements introduced in present era is an important line of research. Similarly, some researches are conducted in congested inner-city areas where community groups, crowding, and environmental quality are connected with social support, tolerance and health measures (Nagar & Sharma, 2005). In addition, more systematic studies which incorporates physical environmental features like type of housing, poor environmental quality, scarcity of resource conditions and poverty dimensions particularly in rural areas, developed-underdeveloped villages, tribal-non-tribal and different ethnic groups are needed to enhance our understanding of environment-behaviour relationships in the Indian context.

Culturally specific studies are also needed to tap the traditional understanding on managing the environmental problems. For example, in traditional Indian texts have sizeable coverage of the importance of physical environments and required attitudes and behaviour on the part of human beings. In the present times, the individual has ignored such a rich tradition in order to emulate the Western concept of modern development. The popular paradigm of development necessitates the exploitation of environmental resources without any limit. Such exploitation of physical resources has already created an imbalance in the availability of environmental resources and their requirement for human population on this earth. The fact, that the current environmental problems are the result of pursuing the modern paradigm of development. To create a balance between availability of resources and the requirement, a new paradigm for development may be needed. The lifestyle of the human population is now entirely dependent on technology and sophistication but pro-environment behaviour is nonetheless most important. Obviously, this care needs proper attitudes, proper management of the available resources, proper management of the environmental resources, and eco-friendly behaviour even at the cost of little discomfort.

Hence, the responsibility of environmental psychologists is to translate the traditional ideas cultural sentiments into scientific methodologies which are both eco-friendly and can be easily adapted by common people.Current studies have emphasized on the interactions between neuroscience and architecture (Karakas &Yildiz, 2020). Developments in science and technology, including bio-informatics, artificial intelligence,

virtual realms (Picon and Ponte, 2003), and neuroscience (Eberhard, 2007, Robinson and Pallasmaa, 2015, Zeisel, 2006), and in interdisciplinary collaborations between these fields led to the emergence of new perspectives, data-collecting devices, and measurement techniques, which eventually expanded the knowledge on human–built environment interaction. The above discussionrepresents only a sample of current research trends and future direction of research in environmental psychology. It is important to undertake studies across cultures and across different ethnic lines to understand the similarities and differences in responses to various environmental provisions. The moderators and mediator variables may be identified and more precise test may be undertaken to understand the complexity of environment-behaviour relationships.

Check Your Progress 4

1. Critically compare stimulus load approach and environmental stress approach to environment-behaviour relationship.

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2. Give an account of the current researches in the field of environmental psychology.

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3.5 SUMMARY

To sum up what we have learnt in this unit, here is a quick recap:

- There are several major theoretical perspectives guide environmental psychologists, covering different aspects of human-environment relationship.
- Arousal theories assume that each task performance requires an optimal level of environmental stimulation. A variation in this level leads to arousal which has a curvilinear relationship with task performance.
- The stimulus load theories explain the relation between environmental stimulus and human behaviour. It underlines the idea that if an individual's capacity to cope with the environmental stimulus is exceeded it leads to distraction.
- The behaviour constraint approachexplains that if an individual feels that they have no control over the physical environment, a feeling of helplessness creeps in. This leads to a restriction in the normal behaviour pattern of the individual.
- The adaptation level approaches stress that if there is a variation in the individual's threshold to deal with an environmental stimulus, it would lead to stress and poor psychological well-being.
- The environmental stress approach studies the effect of various environmental conditions and factors on the physiological adaptation levels of an individual.

It clearly explains the concept of stressors and their effect on human behaviour in terms of well-being.

- The ecological theories explain that human and environment are dependent on each other and share a symbiotic relationship. That the human behaviours are directly linked to the characteristic of the physical environment is the main concept of this theory.
- Research in the area of environmental psychology has gained prominence not only in developed countries, but also in developing countries. However, there is a need of more culture-specific studies. Recent developments in the area of artificial intelligence, neuroscience, etc. as well as an interdisciplinary approach has further given new directions in research.

3.6 KEYWORDS

Arousal Theories : Concerned with the influence of arousal on performance of as well as physiological responses to environmental stimulation

Stimulus Load Theories : Refers to the limited capacity of an individual to process information. The response environmental stimulation is in terms of the individual's capacity at that moment to deal and attend the situation

Behaviour Constraint Theories : The basic assumption is that the environment can prevent and interfere or limit the behaviour of the individual

Adaptation Level Theories : The assumption is that each individual has a minimum load to adapt to an environmental stimulus. Behavioural change will occur if the stimulus load is outside the adaptation level

Environment Stress Theories : The focus is on the effect of environmental factors on the biological adaptation of an individual

Ecological Theories : The assumption is that there is an interdependent and reciprocal relationship between a person and their environment

3.7 REVIEW QUESTIONS

1. How does the arousal theory explain the human-environment relationship?
2. Citing appropriate examples, discuss the stimulus load theories to understand the effects of environment on behaviour.
3. Discuss in detail the difference between adaptation level and the ecological theories of human environment relationship.

4. What is stress? Using the concepts of environmental stress theory, explain the effects of stress on human well-being.

5. What are the main assumptions of the Control theories?

3.8 REFERENCES AND FURTHER READING

Bonnes, M., &Secchiaroli, G. (1995). *Environmental psychology: A psycho-social introduction*. Sage.

Malhotra, N. K. (2007). *Environmental Psychology: Principles and Practices*. Sumit Enterprises. New Delhi.

Moser, G. and Uzzell, DL (2003). 'Environmental Psychology', in Millon, T., & Lerner, M.J.(Eds.), *Comprehensive Handbook of Psychology*, Volume 5: Personality and Social Psychology, New York: John Wiley & Sons. pp 419 – 445.

Nagar, D. (2006). *Environmental psychology*. Concept Publishing Company. New Delhi.

Tewari, R. &Mathur , A. (2014). *Environmental Psychology*. Pointer Publishers

Steg, L. E., Van Den Berg, A. E., & De Groot, J. I. (2013). *Environmental psychology: An introduction*. BPS Blackwell.

Singh, Y.K. (2006). *Environmental Science.* New Age International (P) Ltd. New Delhi, India.

Karakas, T., &Yildiz, D. (2020). Exploring the influence of the built environment on human experience through a neuroscience approach: A systematic review. *Frontiers of Architectural Research, 9(1)*, 236-247.

3.9 ADDITIONAL ONLINE RESOURCES

- Understanding Environmental Pollution
  https://www.cambridge.org/highereducation/books/understanding-environmental-pollution/0BA79658F5B96E138BA167E41452A1ED#overview
- The Effect of Population Growth on the Environment: Evidence from European Regions - PMC (nih.gov)
- Sustainability
  http://www.mdpi.com/journal/sustainability
- Population and Environment - PMC (nih.gov)

UNIT 4 ENVIRONMENTAL PERCEPTION AND COGNITION*

Structure

4.0 Introduction

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- 4.1.2 Social psychological view

4.2 Perspectives on development of environmental perception

- 4.2.1 Ontogenetic perspectives
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  - 4.3.2.2.3 Smart environment
  - 4.3.2.2.4 Dynamic traffic information services
  - 4.3.2.2.5 Pedestrian navigation and vehicle navigation systems
  - 4.3.2.2.6 Ubiquitous computing
  - 4.3.2.2.7 Equipment for people with sensory impairments

4.4 Summary

4.5 Keywords

4.6 Review Questions

4.7 References and Further Reading

LEARNING OBJECTIVES

After having read this Unit, you will be able to:

- Explain the meaning of environmental perception and cognition

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- Summarize the different perspectives on environmental perception
- Know the developmental processes related to environmental perception
- Trace the history of cognitive mapping
- Know the different methods of studying cognitive napping
- Identify the errors that are involved in cognitive mapping, and
- Gain insight into wayfinding behaviour and types of equipment used in wayfinding

4.0 INTRODUCTION

Psychologists may engage with the environment at a macro level studying human-nature interactions, climate change, global warming and such issues, or they may engage at the socio-physical level managing social space with respect to crowding, territoriality, the physical setting of everyday life, or they may also engage at a micro level studying individual-level variables that affect human-environment interactions such as perceptual processes, spatial cognition, personality etc. In this unit we shall engage with the last approach dealing with micro-level variables and trace how the understanding of these processes have historically evolved. We shall also study limitations of this approach and understand the latest applications of environmental psychology that have emanated from this area of research on micro processes.

4.1 DEFINITION AND CHARACTERISTICS OF ENVIRONMENTAL PERCEPTION

Traditionally perception is understood as originating from a stimulus in the environment about which various informational media carry messages to the sensory organs. Further processing of stimulus features takes place in the human organism and perception is said to occur when a perceptual object that is outside in the environment is created in the observer that reflects the properties of the external world. This process when specific to apprehending the features of the environment is known as environmental perception. When apprehension of features of the environment involves questions related to identity, pattern, form and movement, they are related to environmental perception. Environmental cognition involves formulating hypotheses, making further decisions, and working on goals based on information obtained through environmental perception. An example of a question related to environmental perception would be 'Did I just hear a tyre burst? Or was this a gunshot?' Perceptual cognition would involve goal-related questions like 'Should I get out of the car and check? Should I flee as soon as possible?'

Environmental perception has immense value for human survival as well as for human social life. Historically, however, the study of environmental perception and cognition has been a somewhat marginalised topic. Most early studies have been carried out within the experimental stimulus-response model. With the growth of environmental psychology there has been increasing attention to the spatio-physical characteristics of the environment in which behaviour occurs rather than treating the environment only as an extraneous variable. There have been two main traditions of research: the psychology of perception where the environment is conceptualised in physical-perceptual terms,

and social psychological tradition which has a relatively molar stance. In the next few sections, we will give a broad overview of some major thinkers within each of these two traditions and trace the movement of theorising in environmental psychology from narrow, physical terms to broader social terms.

4.1.1 The Physical-perceptual View

The **physical-perceptual tradition** is concerned with the correspondence between psychological characteristics and physical properties of the environment and has also been called the 'inside-outside problem' (Floyd Allport,1955). **Egon Brunswik** (1947, 1957) was an early thinker in this tradition who emphasised the need to consider the objective physical characteristics of the environment rather than those of the observer. Environmental perception, according to him, is a process of making sense of cues coming from the environment. And since not all cues have equal 'ecological validity', that is, they may vary with respect to degree of correspondence with characteristics of the actual environment, cognitive processes are always probabilistic according to Brunswick, and perception is almost a feat. By highlighting the central role of the observer in making sense of the probabilistic process Brunswick provided an active role to humans which is markedly different from the passive reactive role accorded to humans in the behaviourist tradition. Thus, here we notice a shift away from stimulus-response view of environment-human relationship. In the organismic end of the perceptual process also there is a weak correlation between proximal means and distal results, between 'peripheral' and 'central' processes, according to Brunswick. The observer is thus continuously involved in hypothesis-testing about equivocal correspondences. Brunswick believes that the actor tends to verify the accuracy of the probabilistic judgement by engaging in actions in the environment which confirm the functional validity of the perceptual achievement.

According to **Gibson**'s (1950) theory of direct perception, the environment supplies all the necessary information that is required for perception and there is no role of inferential or any other higher-order cognitive processing. Sufficient contextual information exists in the environment which may be used directly. Biological adaptation processes prepare humans for picking depth and distance cues which further help them to directly perceive distance from and between objects which help us navigate the environment. Perception happens on the basis of our analysis of the stable relationships among features of objects and settings in the real world.

Ulrie Neisser (1987, 1990) distinguishes between perception which is based upon information from the environment and categorization which is based on top-down cognitive process. According to Neisser cognitive inferential processes are anchored to the socio-cultural characteristics of the context. Neisser is an exponent of the constructivist approach to cognitive phenomena.

The physical-perceptual perspective on environmental perception is valuable although specific consideration of the social and historical-cultural aspects of the environment, where both the physical-perceptual phenomena and the individual are placed is missing.

4.1.2 The Social-psychological View

In the **social-psychological perspective** on environmental perception, **Kurt Lewin's** (1951) Field Theoryis the first and also the most influential theory. Lewin was very critical of the 'objective behaviourism' of perceptual studies in Psychology and insisted

that all behaviour is a function of person as well as the environment. Lewin's field approach considers the physical characteristics of the environment as important and treats elements of the environment as psychological not as physical-objective data. Perceived reality or the psychological environment is given prominence in Lewinian tradition through the concept of 'psychological ecology'. Lewin believed that the physical and social characteristics of the environment have an explanatory role in the psychological environment. This psychosocial understanding of Lewin paved the way for action-research or socially relevant psychological research, particularly 'planned change' or 'social engineering'.

Roger Barker (1951) being a student of Lewin emphasised the role of the environment in determining individual behaviour, assigning it a role equally important to that of personal factors. He was opposed to the use of the experimental method and the use of individual-level explanatory variables like personality in explanation of human behaviour. Barker employed naturalistic observation to obtain 'specimen record' or very detailed, minute observational record of behaviour as it occurred in the 'behaviour setting' which was his unit of study. Through his studies Barker established that the place or setting of behaviour was the strongest influence on behaviour.

UrieBronfrenbenner (1979) conceptualised the relationship between person and environment in terms of systems and subsystems within the system which interact with each other. Systems And subsystems are therefore interdependent and therefore have reciprocal influence.Through his systemic perspective Bronfenbrenner critiqued the unidirectional influence models which are characteristic of hard sciences and instead aligned with the biological sciences where bidirectional effects are noticeable. It also points out how the spatio-physical features of the environment organised in a molar sense constitute both second-order and first-order effects on individual behaviour.

Thus, we see that conceptions of the human-environment interaction have become more systemic or molar with time. Stokols (1987) has raised a call for developing a nomenclature that would adequately describe the "socio-physical" environment and the ways in which socio-physical features of the environment influence individuals' development, behaviour and well-being. Researchers have been interested in whether the capacity to accurately discern the environmental situation is present at birth or if it is acquired later during development.

Check Your Progress 1

1. What is environmental perception?

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2. What are some of the key features which characterise physical-perceptual theories of environmental perception?

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3. What are some of the key ideas in the social psychological view of environmental perception?

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4. Which theory of environmental perception do you like best? Why?

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5. How does Kurt Lewin conceptualise environment in his theory?

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4.2 PERSPECTIVES ON DEVELOPMENT OF ENVIRONMENTAL PERCEPTION

4.2.1 Ontogenetic perspective

One of the earliest research in Psychology about spatial perception was by **Jean Piaget and Inhelder** (1947). According to Piaget, children's environmental knowledge is acquired through opportunities for action/ exploration which are provided during early childhood. Given an appropriate combination of a child's physical maturation and exposure to environmental stimulation, cognitive potentials including the capacity for spatial perception unfolds in a stage-appropriate manner. This is an **ontogenetic perspective**. Qualitative changes in spatial perception can be seen as the child passes through different stages of cognitive development. According to Piaget, a child reaches adult level of competence in spatial understanding only when s/he attains the age of 9 or 10 years.

Piaget used the famous *three-mountain task* to show that in early life the child's understanding of space is limited and disorganised. In the three-mountain task, a child is presented with a display of three model mountains and a doll is placed at different points around the mountain. The child is required to reorganise the display of mountains to form what they think the mountains look like from the doll's standpoint. To control for the difference that may arise between "spatial storage" and "spatial products" (Liben, 1981) Piaget and Inhelder also gave the children the option of selecting from a set of pictures the picture they think matched the doll's perspective, and also allowed the children to reposition the doll in such a way so as to create a match with viewpoint presented in a particular picture. It was found that children of around four years of age assumed that the doll sees the three mountains in exactly the same way as the child

herself sees. In other words, there was evidence of "egocentrism" or the inability to distinguish one's own view from the view of the doll.

According to Piaget in early life young children have a sensorimotor understanding as opposed to a metric understanding of the spatial world. Children hence are able to understand topological concepts: which objects are closer in proximity, which are enclosed by one another, the sequence or separation of objects, etc. However, there is no Euclidean understanding of space at an early age. According to Piaget, children begin to understand space and environment only after object permanence or the idea that objects continue to exist even if they may not be in sight - has been attained.

Following the same ontogenetic logic of Piaget, **Siegel and White** (1975) proposed a five-stage model of the development of cognitive mapping ability. With overall cognitive development the child develops capacity for symbolic abstraction and logical thinking, and parallel to this process, development of spatial perceptual skills also takes place. In the first stage the child develops (a) 'photographic knowledge' or memory of single and isolated points of reference in environmental space, that is, develops photographic memory of landmarks. In the second stage (b) the child is able to make use of the single points of space/ landmarks as references for organising routes. In the third stage (c) distinct and limited parts of the environment can be integrated to form (d) route knowledge. At this stage children learn the sequence of direction choices at intersections and are able to mentalize where in the route they have to turn left, right or go straight. The last ability that is developed is (e) the ability to coordinate routes in the area of this system to form a 'cognitive map' of the environment. This cognitive map is holistic, based on survey knowledge. It is independent of the wayfinder's own position and enables the wayfinder to develop shortcuts, find alternative routes to the destination and generally navigate the whole environment successfully.

Although there is some support from developmental psychology that landmark knowledge emerges first followed by route knowledge and survey knowledge (e.g., Hermer &Spelke, 1994; Jansen-Osmann&Wiedenbauer, 2004; Lew, Bremner, &Lefkovitch, 2000; Schmelter, Jansen-Osmann, & Heil, 2009; Tonucci&Rissotto, 2001) there is no support for the idea that adult wayfinders or travellers in a new city for example, may also be developing cognitive maps of the environment in the same fashion- in stages.

4.2.2 Nativist perspective

According to the **nativist position** children have an innate capacity for spatial perception which is independent of physical maturation as well as of learning opportunities. Along these lines nativist theorists - Landau, Gleitman, &Spelke (1981) showed that understanding of Euclidean or metric properties of space are not vision dependent, and that even at an early age of 2.5 years a visually impaired child is able to decipher distance and angular relationship among familiar paths, decipher spatial relationship between objects and make further inferences about metric properties to navigate an unfamiliar path. This finding clearly does not agree with Piaget's maturation-contingent perspective on cognitive and spatial development.

Other researchers from the nativist tradition (Hermer &Spelke, 1994, 1996) have experimentally shown that very young children are able to make use of geometric information to navigate space while not being able to make use of non-geometric information such as colour or odour. Developmental processes enable the child later in life to make use of non-geometric information. This research also clearly does not

agree with Piaget's topological assumptions about spatial understanding in early childhood.

Although the nativist theorists, through their carefully designed experimental studies, have greatly enhanced the understanding of children's spatial perceptions and have clarified several misconceptions about children's spatial understanding, the nativist theories have largely failed to pay attention to the role of environmental factors and developmental processes in helping the child attain mastery over skills which may be present in early life only in nascent form. Some researchers (Newcombe, 2002) have also raised doubts about the specific geometric modularity claim made by nativists with respect to space perception.

4.2.3 Learning Perspective

In contrast with the nativist theories the **learning theory approach** emphasises the importance of cultural guidance in spatial learning and spatial thinking. Gauvain (1993) for example described how in everyday problem-solving tasks such as giving directions, planning-executing an action sequence and wayfinding people make use of social and cultural information. Cognitive mapping therefore is influenced by the goals, communication conventions of the cultural context in which it occurs. Through empirical research Gauvain (2001) demonstrated that the understanding of representations, for example, of maps requires understanding first that the map is a depiction of the real world and second, also understanding the meaning behind the representation. Understanding this meaning is facilitated by the process of scaffolding in which experienced cultural members implicitly and explicitly guide and support the younger members through language-based communication. However, all of these processes have a tendency to go unnoticed, unacknowledged as cultural tools have a seamless presence in human cognitive interpretative processes so much so that their mediational role may be largely overlooked.

The learning theory perspective is valuable for drawing attention to sociocultural aspects of the environment. However, by stressing the importance of language, scaffolding and other cultural artefacts this perspective discounts the importance of direct feedback the children receive from their environment as they go about active exploration. The adaptive value of spatial representations and spatial thought is also largely ignored in this perspective.

4.2.4 Interactionist Perspective

A middle ground between the nativist and learning perspectives is provided by **interactionist theories** (Newcombe, 1998; Newcombe &Huttenlocher, 2000). These theories are much more comprehensive in scope and posit that ontogeny, neural maturation, environmental facilitation and cultural guidance - all combine to contribute to spatial development, and none of these can be privileged more than the other.

Check Your Progress 2

1. Describe Piaget's theory of space perception.

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2. Compare the nativist position and learning theory perspective on development of environmental perception?

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3. What is the interactionist position on development of spatial perception?

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4. Which position do you best agree with? Why?

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4.3 ENVIRONMENTAL COGNITION

Environmental cognition refers to various interpretative, decision making and goal-oriented behaviour humans engage in while navigating the physical environment. It is beyond the perceptual factors and involves processes such as cognitive mapping, environmental evaluation, environmental risk perception, perception of air/water quality, temporal pessimism, etc. In the following section we will study cognitive mapping as an example of environmental cognition.

4.3.1 Cognitive Maps

A cognitive map is a mental representation of the spatial environment along with representation of key elements of the environment, relative locations etc. which help any individual navigate the space. According to the American Psychological Association, cognitive maps are "a mental understanding of an environment, formed through trial and error as well as observation. The concept is based on the assumption that an individual seeks and collects contextual clues, such as environmental relationships, rather than acting as a passive receptor of information needed to achieve a goal. Human beings and other animals have well-developed cognitive maps that contain spatial information enabling them to orient themselves and find their way in the real world; symbolism and meaning are also contained in such maps."

4.3.1.1 History of Cognitive Mapping

Edward Tolman (1948) is famous for introducing the concept of "cognitive map" in Psychology. With this concept he challenged the stimulus-response approach or physical-perceptual approach to space that was prevalent until then.

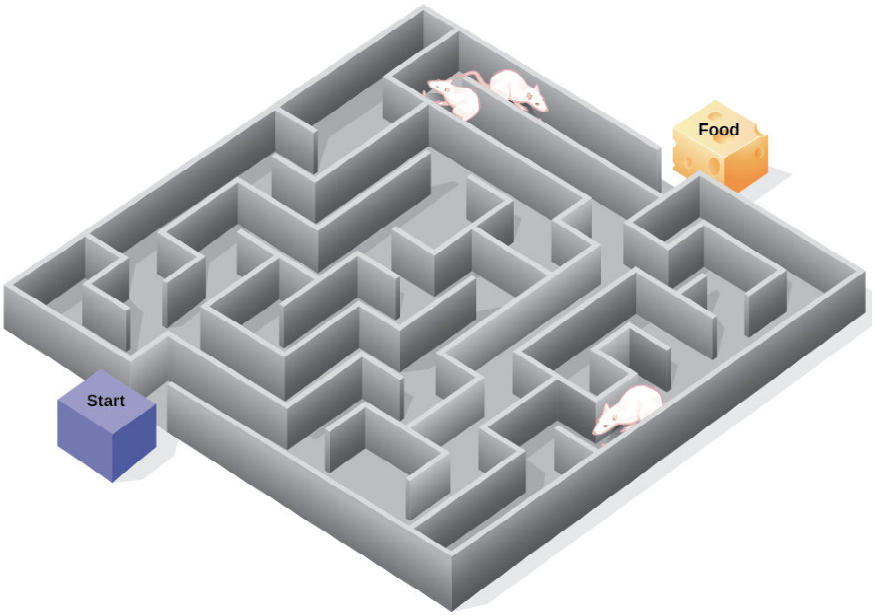

Figure 4.1 Edward Tolman found that rats use cognitive maps to navigate through the maze

Source: OpenStax Psychology, Learning, Operant Conditioning | OhioLINK (oercommons.org)

Although not a psychologist Kevin Lynch (1981) has had a huge impact on developments in environmental psychology particularly his sketch map method, and his work on structural elements of the city. The concepts of 'legibility' and' imageability' developed by Lynch have important implications for environmental psychology and urban planning given that humans tend to feel comforted when they are able to form clear cognitive maps and they are frightened when they feel lost.

Another watershed event in the history of cognitive mapping was publication of an edited book called *Image & Environment: Cognitive Mapping and Spatial Behaviour* (1973) by Downs and Stea which is a classic text consulted by researchers even today.

Two theorists who extended Lynch's work on cognitive mapping in environmental psychology were Kaplan (1978) and Donald Appleyard (1969). Kaplan and Kaplan (1978) developed a model of environmental preference in which they tried to explain why different people perceive and map the same physical environment differently. They identified four aspects of the environment which are related to emotional experience thus: coherence, legibility, complexity and mystery. According to Kaplan, elements in the environment related to coherence and legibility facilitate the observer in orienting themselves whereas elements in the environment related to complexity and mystery influence the extent to which actors feel involved with the environment.

Donald Appleyard (1969) explained that the imageability of a city is a product of two different group perceptions of ordinary planners and the planner-citizens. According to Appleyard, mental maps need to be updated or reconstructed according to changes that happen on the face of the city. For instance, if a certain landmark which forms an anchor in people's cognitive map changes or disappears due to some natural calamity or destruction, then people's mental maps lose details of spatial knowledge built over so many years in the past, and the maps themselves become imprecise and vague. Appleyard (1970, 1976) linked cognitive maps to travel and showed that travellers who drove cars possessed more coherent cognitive maps than did those who took the bus. Some of these findings have had a bearing on later developments in cognitive mapping especially post cognitive neuroscience.

4.3.1.2 Methods of Studying Cognitive Mapping

With rapid developments in technology and visualisation techniques, many new methods have been developed to study cognitive mapping. Kevin Lynch's sketch map method is one of the most popular methods that has survived the test of time. Some of the other methods that have been employed are giving distance estimates, listing elements in a particular spatial field, navigating through an environment, etc.Some of the newer methods used to study cognitive mapping are discussed here:

4.3.1.2.1 Brain Imaging Techniques Brain imaging techniques like electroencephalogram (EEG), magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI) and positron emission tomography (PET)scans are used to investigate the neural correlates of cognitive mapping and wayfinding.In research using MRI scans, Head & Isom (2010), and Etchamendy&Bohbot (2007) confirmed the finding of earlier brain lesion studies that the hippocampus is implicated in wayfinding whereas the caudate nucleus is associated with route learning. Later research, for example, Morris &Parslow (2004) demonstrated the role of extra-hippocampus structures such as the parahippocampus in Wayfinding. In an interesting study design employing PET scans Maguire et al., (1997) asked experienced taxi drivers in London to describe the shortest route from a given point A to point B. The assumption was that spatial behaviour in very familiar environments involves semantic memory. The results of the study showed that the hippocampus is involved in the processing of spatial layouts established over long time courses.

Janzen and Jansen (2010) studied the brain's ability to differentiate useful from redundant or ambiguous wayfinding information in a virtual maze using fMRI readings. This study showed that the parahippocampal gyrus has an important role in responding to navigationally relevant objects even if briefly viewed.In a recent study Sharma, Kaushal, Chandra, Singh, Mittal and Dutt (2017) used EEG techniques to study brain regions and processes that are utilised when people make use of landmarks in wayfinding in maze-like environments. They found that the left-hemispheric region, especially the parietal cortex, is involved in the integration of sensory cues and memory to encode contextual information of landmarks.

4.3.1.2.2 Virtual Reality Immersive virtual reality (VR) is often considered as representative of actual environments and virtual reality may be used to study wayfinding behaviour in simulated environments to reduce design errors. Ewart and Johnson (2021) from the University of Reading asked research participants to complete a wayfinding task in a familiar real environment and VR of the same building. The study showed a quantitative improvement in the route and time taken to complete the task. In another wayfinding study using VR Irshad, Perkis& Azam (2021) investigated the perceived experiences of users in an immersive VR environment. Participants in the control condition were exposed to the VR with no wayfinding cues, and participants in the experimental groups were exposed to VR with static and dynamic wayfinding cues. Results showed that wayfinding cues reduced tension, produced positive affect in the experimental group as compared to the control group having to navigate VR without any wayfinding cues; heart rate was significantly high in the control group. The applications of the study are that training people in high-risk emergency scenarios in immersive VR environments may improve their likelihood of survival in actual risky environments.

4.3.1.2.3 Space Syntax This method was developed in the University College London in the 1980s by Bill Hillier and his team (Hillier and Hanson 1984; Hillier et al. 1987). It links geometric attributes like line of sight, visual perception etc. with human behaviour such as movement and occupation to generate a graphical representation of space. These graphical representations can then be quantitatively analysed to determine the role of each spatial element in the configuration of the system as a whole or in its parts.Using space syntax analysis environmental psychologists study the social antecedents and consequences of physical space like integration, migration, ghettoization etc..

Haq (2003) carried out research in which volunteers performed 'open searches', in large urban hospitals to become familiar. The hospitals were analysed using space syntax measures. It was found that the depth of an entrance has an effect on wayfinding, and in the way the building is explored. Also, it was found that wayfinding and exploration was affected by lines of sight and by connectivity among spaces all of which enhance the space intelligibility. This study demonstrates the use of space syntax techniques to understand the use of cognitive maps in wayfinding and configurational analysis.

4.3.1.2.4 Geographic Information System A geographic information system (GIS) is a computer system for tagging, coding spatial information, visually representing such data and analysing them to understand patterns and their relationships. Any position on the earth's surface that has a location identifier in terms of latitude, longitude, PIN code, ZIP code or address can be fed into the GIS and may be used to later to analyse, compare and contrast different geographical locations and the sociodemographic characteristics of people inhabiting such locations.

Borst et al. (2009) found using the GIS that elderly individuals are encouraged to walk by front gardens in streets and discouraged by litter, stairs or slopes along the way. Such information obviously has relevance for designing urban spaces as well as for geriatric psychology. Specifically with respect to wayfinding Chen, Sato and Zheng (2021) investigated understanding of environmental information and wayfinding performance among travellers. They found that foreign travellers as compared to local travellers are more likely to use identifiable roads. Also, participants using paper maps were more likely to use obvious buildings as landmarks as compared to those using electronic maps. Familiarity with the navigation tool - paper/ electronic map- resulted in lower walking time.

4.3.1.3 Errors in Cognitive Mapping

The concept of cognitive mapping or mental representation of the external environment is flawed (Tversky, 1993) because cognitive maps do not work on the same principle as cartographic maps. When people are asked to construct a mental map, they draw upon disparate sets of information about a place or route which has been acquired by a person over a period of time. The diverse pieces of information may not all be in visual format, they may be based on actual experience or upon stories heard about the place, and like all constructed material are dependent upon the vagaries of memory. Several distortions may creep into the cognitive mapping process because of the mental shortcuts or heuristics used by people. Tversky lists some of the following errors in cognitive mapping which may occur in isolation or in various combinations:

First, the cognitive representation of space in memory is hierarchical whereas the representation of the environment in maps is horizontal or two-dimensional. This introduces errors in cognitive mapping. In this respect, Tversky cited a study conducted

by Hirtle and Jonides (1985) in which participants were asked to form subjective groupings of buildings in town in terms of whether they were for commercial or educational purposes. Subjects were then asked to judge the distance between pairs of buildings. It was found that the distance between commercial versus educational buildings were overestimated relative to distances within the two functional groupings. This study thus provided evidence for the hierarchical structuring of cognitive maps which leads to errors.

Second, cognitive perspective or distances between nearby landmarks appear relatively larger than distances between faraway landmarks, though it is difficult to make adequate compensation for that. A similar phenomenon occurs in making distance judgments from memory.

Third, the cognitive reference points humans have in mind when asked for direction, address etc. is usually not an exact geographical reference point. Rather people describe spatial environments in terms of places they think the audience may know. For example, if you were to ask someone of her postal address, she might say that she lives next to IGNOU campus (Delhi), whereas if any foreigner were to ask the same thing, she might give them a complex set of directions with the Saket mall or Saket metro station as the landmark reference point. This process of describing lesser-known places in terms of their distance from landmarks introduces the error of asymmetric distance in mapping.

Fourth, when two or many locations on a map are remembered relative to one another there is a heuristic tendency to align them with one another leading to errors. If superordinate units on a map (example, continents) are remembered as aligned, then the relative location of subordinate units (example, cities) will also be remembered as shifted.

Fifth, cognitive mapping may suffer from rotation errors. When the orientation of a reference frame and an object are conflicted, there is a tendency to rotate the axis of the object towards the axis of the reference frame. This leads to rotation errors.

There may be mistakes in cognitive maps because of incomplete information available for coding. A person may have no information coded for that part of the city where they have never been. Similarly idiosyncratic experiences may lead to some parts of the city to be highlighted more than others. When individual cognitive mappers use incomplete information systematic distortions may be seen on aggregate cognitive maps too.

In cognitive mapping, all irregular geographic features may be smoothened. Turns and angles may be regularised to right angles. Distance judgments are usually not based on actual measurements; approximations of distance lead to distortions creeping in. Distance is usually judged to be longer when there are barriers, turns or nodes or even clutter along the road - anything which gives more intermediate information as compared to subjective judgements of equidistant locations with less information between them (Byrne, 1979). The rule of thumb used is that routes must be longer if they have many locations along them.

Other factors such as socioeconomic status and number of years of experience living in a city, mobility etc. have implications for distortions that creep in cognitive mapping. Golledge and Spector (1978) studied cognitive maps of Columbus, Ohio using a multidimensional scaling procedure and concluded that the amount of time people had lived in the city and their familiarity with specific locations were related to distortions on their cognitive maps.

Check Your Progress 3

1. What is cognitive mapping?

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2. What are some of the watershed developments in the history of cognitive mapping?

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3. What are the different methods of studying cognitive mapping?

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4. What are the different errors in cognitive mapping?

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5. How does the Geographic Information System work?

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4.3.2 Wayfinding

Wayfinding is an application of cognitive mapping and spatial cognition. According to Passini (1996) wayfinding "includes all the mental processes which are involved in purposeful mobility". It involves moving intentionally from point A to point B, knowing when one has reached one's destination, and also being able to retrace one's way back to point A.

Although wayfinding and navigation are used interchangeably, they are not the same. Navigation of a google map for example, involves updating the actor's location and rate of travel (depending upon whether one is walking, cycling, using a two-wheeler or a four-wheeler) as the actor moves along a pathway towards a destination. Wayfinding, in contrast, involves selection of a particular path from among an existing network of routes, drawing up a relationship among the several paths as one travels, and choosing the best route depending upon one's objective/goal. According to Darken and Peterson (2002), wayfinding is "the cognitive element of navigation"; wayfinding does not involve movement whereas navigation is the combination of motion and cognitive wayfinding.

4.3.2.1 Characteristics of Wayfinding

Wayfinding is an interdisciplinary area where cognitive psychology, graphic design, landscape architecture, urban planning, organisational behaviour and many other fields converge and have contributed since the inception of the discipline. Behavioural elements involved in wayfinding that are of interest to environmental psychologists include skills, experiences, aptitude of people, as well as perceptual and cognitive processes. Behavioural skills relevant for wayfinding may be ability to read and follow signs, long-term and working memory, asking for directions, reading maps, forming a coherent sense of spatial layout etc. Both individual level variables and situational factors may come into play in wayfinding.

Weisman (1982) has suggested four wayfinding strategies or styles that are based on behavioural perceptual-cognitive elements:

First, one may visually locate one's destination and trace one's way towards it steadily. This is especially useful for outside, medium to large spaces.

Second, one may follow a "cue" towards a destination which may not be in one's visual field. For example, colour-coded footprints on the floor of metro stations may help us find our way to the desired platform. This strategy is useful for medium to large complex spaces like railway stations, hospitals etc. as having too many cues may lead to sensory overload.

Third, one may consult signages, landmarks along the way which provide direction and help the actor decide which path may lead to the desired destination, and which path may better be foregone.

Lastly, a mental representation or cognitive map of the environment may be used.

Design elements also have a very important role in ease or difficulty involved in wayfinding. For example, if the interior design elements do not have enough differentiation, it is difficult for people to tell where they are, and hence they may feel lost. Artworks, landmarks may serve as anchor points and help people find their way back. Similarly, signages, landmarks, and decision points when well lit, contribute to wayfinding ease.

4.3.2.2 Equipment used in Wayfinding

The earliest assistance humans received in wayfinding was probably by asking and receiving directions. The use of formal aids in wayfinding is traced to 300 - 200 BCE to the Chinese Han dynasty who used paper maps and naturally magnetised lodestone for wayfinding. Geographical paper map was first created by William Smith in the eighteenth century (Winchester 2001), and it is only in 1960 and 1976 that the geographic information system (GIS) and the Global Positioning Systems (GPS) which revolutionised wayfinding were respectively developed. Wayfinding technology has evolved very rapidly since then, and today we have smartphones, auditory feedback devices, optical technologies and smart environments - all of which aid wayfinding behaviour. Some of the contemporary equipments used in wayfinding are:

4.3.2.2.1 Maps Despite advances in technology, paper maps continue to be popular methods of wayfinding. It is not uncommon for travellers to get a hold of city maps in order to navigate cities they are visiting. However, with advances in digital visualisation techniques, online maps have also become extremely popular in everyday wayfinding.

Online maps allow the mapmaker and the map-reader to interact with maps actively and deal with large amounts of data.

4.3.2.2.2 Smartphones Are probably the most popular wayfinding equipment used in everyday life these days. Smartphones enable GPS-tracking, offer three-dimensional (3-D) street views virtually, and are also accompanied by ratings of different destinations by previous visitors. Smartphones may nudge the user to visit specific places by picking up information about past preferences. All of these are helpful in making wayfinding decisions. It may not be uncommon, for example, for your voice guided smartphone to suddenly say 'Bahai Temple within the next 100 metres; you may like to visit' when you may be trying to find your way towards your destination.

4.3.2.2.3 Smart environments Objects in the environment like signs, art pieces, hoardings etc are fitted with software processors which are not visible to the naked eyes unless carefully observed. These processors are used to capture and process positioning information of people in the environment.

4.3.2.2.4 Dynamic traffic information services It makes use of advanced sensing technologies using which vehicle density on road at any particular time can be detected. Vehicles travelling at slow or high speed may be identified to predict the number of vehicles which may be present at any place at any given time - all helping in recording traffic flow, identifying possible road congestion etc. GPS, Smartphones, mobile apps, Google maps may be used to induct people in this informational network and also to supply real time data that helps in wayfinding related decisions. In India a roadmap for dynamic traffic management based on real time data was developed by Kothari,Jain and Parakh (2021) in the city of Indore. The system can be clubbed with the existing traffic control system to manage traffic conditions in a better way.

4.3.2.2.5 Pedestrian Navigation Applications (PNAs) and Vehicle Navigation Systems (VNSs) These are mainly GPS enabled mobile devices used in outdoor environments. PNAs facilitate wayfinding by providing assistance in space recognition, self-localization, etc. On an online map the shortest/best pedestrian route is highlighted and audio instructions or text-based instructions guide pedestrians in reaching their destination. Additional attractions that lie alongside the route are also sometimes highlighted. For example, the attention of the pedestrian may be drawn to restaurants, rest rooms etc. by the PNA. PNAs function in a similar way like in-vehicle navigation systems but they focus more on landmarks, provide more details apart from lanes and bylanes, and provide information on larger scales - all of which are relevant to walking but not to driving. In-vehicle navigation systems are more constrained by the network of main roads, and tend to ignore peripheral information.

4.3.2.2.6 Ubiquitous computing Promotes real-time context awareness facilitated by the presence of computers in larger and larger radii of space. It facilitates human activities by way of automatic identification of real-world objects, places, and situations using digital codes. Diverse activities like monitoring of pets, operation of appliances, keeping track of books and vehicles may be carried out using this method. In India, C-DAC (Hyderabad, Chennai and Bangalore) is the implementing agency for the ubiquitous computing programme with the support of institutions of academic eminence. IIM Kolkata, for example, has developed a pollution Monitoring system, Amrita University has developed a Wireless Sensor Network for Real-Time Landslide monitoring, and a weather forecasting project is being implemented in Noida by C-DAC, Pune. All of these have implications for wayfinding decisions to be made by humans.

4.3.2.2.7 Equipment for people with sensory impairment Smart devices are sometimes tailor-made for people with impairments who may find it difficult to use smart phones, consult signages and generally pick up information from the environment. The "talking laser cane" for example may be used by people with visual impairment. Using signals emitted from retroreflective signs this device provides auditory feedback, instructional or corrective guidance about the presence of objects that may obstruct the path from up to 10 m away, and help visually impaired people in wayfinding (as cited in Giudice and Legge, 2008). Tactile grading may be used to help blind and people with low vision in wayfinding. The Delhi Metro Rail Corporation makes use of this facility.

One question that remains is how wayfinding aids have affected cognitive mapping skills of humans. Although we do not have enough research evidence to arrive at any conclusions yet, research generally seems to show that technologically enabled wayfinding equipment have not led to any significant improvements. Ishikawa et. al. (2008) for example, found that paper maps are more efficient as compared to GPS-devices. Those who used a GPS device or relied upon direct experience stopped more times and travelled greater distances relative to individuals who used a paper map. However, driving behaviour was significantly improved when using smartphone GPS than when using maps (Lee & Cheng, 2008) or on-board GPS systems (Lee &Cheng, 2010). Also, overall, the effect of technological developments on cognitive functioning remains to be seen.

Check Your Progress 4

1. What is wayfinding?

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2. What are the different characteristics of wayfinding?

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3. What are the different equipment used in wayfinding?

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4. Has the development of advanced technological equipment reduced errors in cognitive mapping?

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5. In what ways can wayfinding equipment assist people with sensory impairments?

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4.4 SUMMARY

To sum up what we have learnt in this unit, here is a quick recap:

- The process involved in apprehending the features of the environment is known as environmental perception. Environmental cognition involves formulating hypotheses, making further decisions, and working on goals based on information obtained through environmental perception.
- The emphasis of research in environmental perception has moved away from a focus on physical-perceptual characteristics of the environment to a more social psychological understanding of the environment
- Understanding of developmental processes related to environmental perception has shifted from ontogenetic, nativist, learning positions to a more integrated position which takes into account how ontogeny, neural maturation, environmental facilitation and cultural guidance - all come together to produce spatial development.
- A cognitive map is a mental representation of the spatial environment along with representation of key elements of the environment, relative locations etc. which help any individual navigate the space.
- The different methods of studying cognitive mapping are brain imaging, virtual reality, space syntax and geographic information systems.
- Various errors may creep into cognitive mapping due to hierarchical representation of space, cognitive perspective, cognitive reference point, alignment, rotation, systematic errors in memory and judgement due to gender, experience of living in a space, etc.
- Wayfinding involves moving intentionally from point A to point B, knowing when one has reached one's destination, and also being able to retrace one's way back to point A.
- The different equipment used in wayfinding are maps, smartphones, smart environments, dynamic traffic information services, pedestrian and vehicle navigation systems, ubiquitous computing and special equipment for people with sensory impairment.

4.5 KEYWORDS

Environmental Perception : The process involved in apprehending the features of the environment is known as environmental perception

Environmental Cognition : The process involved in formulating hypotheses about the environment, making further decisions, and working

on goals based on information obtained through environmental perception

Cognitive Map : A mental representation of the spatial environment along with representation of key elements of the environment, relative locations etc. which help any individual navigate the space

Wayfinding : Involves moving intentionally from point A to point B, knowing when one has reached one's destination, and also being able to retrace one's way back to point A.

4.6 REVIEW QUESTIONS

1. What is environmental perception? How is it different from perceptual processes studied in general Psychology?
2. Is cognitive mapping the same as cartographic mapping? Explain.
3. What are the different methods of studying cognitive mapping?
4. What are the different equipments for wayfinding which you are familiar with?
5. What are the different applications of environmental perception and cognition in everyday life?

4.7 REFERENCES AND FURTHER READING

Allport, F.H. (1955). Theories of Perceptions and the Concept of Structure. Wiley.

Appleyard, D. (1969). Why Buildings Are Known: A Predictive Tool for Architects and Planners. *Environment and Behavior*, *1*(2), 131–156. https://doi.org/10.1177/001391656900100202

Appleyard, D. (1970). Styles and Methods of Structuring a City. Environment and Behavior. https://doi.org/10.1177/001391657000200106

Barker, R.G. and Wright, H.F. (1951). One Boy's Day, Harper & Row..

Borst, H. C., de Vries, S. I., Graham, J. M., van Dongen, J. E., Bakker, I., &Miedema, H. M. (2009). Influence of environmental street characteristics on walking route choice of elderly people. Journal of Environmental Psychology, 29 (4), 477–484. doi:10.1016/j.jenvp.2009.08.002.

Bronfenbrenner, H. (1979), The Ecology of Human Development, Harvard University Press, Cambridge, MA.

Brunswik, E. (1947), Systematic and Representative Design of Psychological Experiments, University of California Press, Berkeley.

Brunswik, E. (1957), 'Scope and Aspects of Cognitive Problems', in J. Bruner et al. (eds). Contemporary Approaches to Cognition. Harvard University Press.

Byrne,R. W. (1979). Memory for urban geography, Quarterly Journal of Experimental Psychology, 31:1, 147-154, DOI: 10.1080/14640747908400714

Darken, R. P., & Peterson, B. (2002). Spatial orientation, wayfinding, and representation. In K. M. Stanney (Ed.), *Handbook of virtual environments: Design, implementation, and applications* (pp. 493–518). Lawrence Erlbaum Associates Publishers.

Downs, R.M. and Stea, D. (eds) (1973), Image and Environment: Cognitive Mapping and Spatial Behavior, Aldine.

Etchamendy, N., &Bohbot, V. D. (2007). Spontaneous navigational strategies and performance in the virtual town. *Hippocampus*, *17*(8), 595–599. https://doi.org/10.1002/hipo.20303

Ewart, I.J & Johnson, H. (2021). Virtual reality as a tool to investigate and predict occupant behaviour in the real world: the example of wayfinding. Journal of Information Technology in Construction (ITcon), Vol. 26, pg. 286-302, DOI: 10.36680/j.itcon.2021.016

Gauvain, M. (1993). The development of spatial thinking in everyday activity. *Developmental Review, 13*(1), 92–121. https://doi.org/10.1006/drev.1993.1004

Gauvain, M. (2001). Cultural tools, social interaction and the development of thinking. *Human Development, 44*(2-3), 126–143. https://doi.org/10.1159/000057052

Gibson, J.J. (1950), The Perception of the Visual World. Houghton-Mifflin.

Giudice, N. A., &Legge, G. E. (2008). Blind navigation and the role of technology. In S. Helal, M. Mokhtari, & B. Abdulrazak (Eds.), Engineering handbook of smart technology for ageing, disability, and independence (pp. 479–500). Wiley.

Golledge, R.G. & Spector, A.N. (1978). Comprehending the Urban Environment: Theory and Practice. https://doi.org/10.1111/j.1538-4632.1978.tb00667.x

Haq, S. (2003). Investigating the Syntax Line: Configurational Properties and Cognitive Correlates. *Environment and Planning B: Planning and Design*, *30*(6), 841–863. https://doi.org/10.1068/b2960

Head, D., & Isom, M. (2010). Age effects on wayfinding and route learning skills. *Behavioural brain research*, *209*(1), 49–58. https://doi.org/10.1016/j.bbr.2010.01.012

Hermer, L., &Spelke, E. S. (1994). A geometric process for spatial reorientation in young children. *Nature, 370*(6484), 57–59. https://doi.org/10.1038/370057a0

Hermer, L., &Spelke, E. (1996). Modularity and development: the case of spatial reorientation. *Cognition*, *61*(3), 195–232. https://doi.org/10.1016/s0010-0277(96)00714-7

Hillier, B., & Hanson, J. (1984). *The Social Logic of Space*. Cambridge: Cambridge University Press. doi:10.1017/CBO9780511597237

Hirtle, Stephen &Jonides, John. (1985). Evidence of hierarchies in cognitive maps. Memory & cognition. 13. 208-17. 10.3758/BF03197683.

Hung-Yu Chen, Kiminobu Sato & Meng-Cong Zheng (2021) Differences in wayfinding performance across types of navigation aids and understanding of environmental information among travelers, Journal of Asian Architecture and Building Engineering, 20:4, 383-397, DOI: 10.1080/13467581.2020.1799795

Irshad, S., Perkis, A. & Azam, W. (2021). Wayfinding in Virtual Reality Serious Game: An Exploratory Study in the Context of User Perceived Experiences. *Applied Sciences* 11, no. 17: 7822. https://doi.org/10.3390/app11177822

Ishikawa, T., Fujiwara, H., Imai, O., & Okabe, A. (2008). Wayfinding with a GPS-based mobile navigation system: A comparison with maps and direct experience. Journal of Environmental Psychology, 28 (1), 74–82. doi:10.1016/j.jenvp.2007.09.002.

Jansen-Osmann, P., &Wiedenbauer, G. (2004). The representation of landmarks and routes in children and adults: A study in a virtual environment. *Journal of Environmental Psychology, 24*(3), 347–357. https://doi.org/10.1016/j.jenvp.2004.08.003

Jansen, P., Schmelter, A., & Heil, M. (2010). Spatial knowledge acquisition in younger and elderly adults: A study in a virtual environment. *Experimental Psychology, 57*(1), 54–60. https://doi.org/10.1027/1618-3169/a000007

Janzen, G., & Jansen, C. (2010). A neural wayfinding mechanism adjusts for ambiguous landmark information. *NeuroImage*, *52*(1), 364–370. https://doi.org/10.1016/j.neuroimage.2010.03.083

Kaplan, R. 1978. The green experience. In Humanscape: Environments for people. S. Kaplan and R. Kaplan,(eds.)p. 186- 193. Duxbury (Div. of Wadsworth), Belmont, Calif.

Kothari, D., Jain, A., &Parakh, A. (2021). IoT-Based Dynamic Traffic Management and Control for Smart City in India. In R. Singh, A. Singh, A. Dwivedi, & P. Nagabhushan (Ed.), *Computational Methodologies for Electrical and Electronics Engineers* (pp. 127-139). IGI Global. https://doi.org/10.4018/978-1-7998-3327-7.ch010

Landau, B., Gleitman, H., &Spelke, E. (1981). Spatial knowledge and geometric representation in a child blind from birth. *Science, 213*(4513), 1275–1278. https://doi.org/10.1126/science.7268438

Lee, W.-C., & Cheng, B.-W. (2008). Effects of using a portable navigation system and paper map in real driving. Accident Analysis & Prevention, 40 (1), 303–308. doi:10.1016/j.aap.2007.06.010.

Lee, W.-C., & Cheng, B.-W. (2010). Comparison of portable and onboard navigation system for the effects in real driving. Safety Science, 48 (10), 1421–1426. doi:10.1016/j.ssci.2010.06.004.

Lew, A. R., Bremner, J. G., &Lefkovitch, L. P. (2000). The development of relational landmark use in six- to twelve-month-old infants in a spatial orientation task. *Child development*, *71*(5), 1179–1190. https://doi.org/10.1111/1467-8624.00222

Lewin, K. (1951), Field Theory in Social Science, Harper. New York.

Liben, L. S. (1981). Copying and reproducing pictures in relation to subjects' operative levels. *Developmental Psychology, 17*(3), 357–365. https://doi.org/10.1037/0012-1649.17.3.357

Lynch, K. (1984). *Reconsidering* The Image of the City. In: Rodwin, L., Hollister, R.M. (eds) Cities of the Mind. Environment, Development, and Public Policy. Springer, Boston, MA. https://doi.org/10.1007/978-1-4757-9697-1_9

Maguire, E. A., Frackowiak, R. S., & Frith, C. D. (1997). Recalling routes around london: activation of the right hippocampus in taxi drivers. *The Journal of neuroscience : the official journal of the Society for Neuroscience*, *17*(18), 7103–7110. https://doi.org/10.1523/JNEUROSCI.17-18-07103.1997

Morris, R. G., &Parslow, D. (2004). Neurocognitive Components of Spatial Memory. In G. L. Allen (Ed.), *Human spatial memory: Remembering where* (pp. 217–247). Lawrence Erlbaum Associates Publishers.

Neisser, U. (1987), 'Introduction: the Ecological and Intellectual Bases in Categorization', in U. Neisser (ed.). Concepts and Conceptual Development: Ecological and Intellectual Factors in Categorization, Cambridge University Press, Cambridge, pp. 1-23.

Neisser, U. (1990), 'The Ecological Approach to Cognitive Psychology', in ComunicazioniScientifische di PsicologiaGenerale, 1, pp. 11-22.

Newcombe, N. S. (1998). Defining the 'Radical Middle' [Review of *Rethinking Innateness: A Connectionist Perspective on Development*, by J. L. Elman, E. A. Bates, M. H. Johnson, A. Karmiloff-Smith, D. Parisi, & K. Plunkett]. *Human Development*, *41*(3), 210–214. https://www.jstor.org/stable/26763357

Newcombe N. S. (2002). The nativist-empiricist controversy in the context of recent research on spatial and quantitative development. *Psychological science*, *13*(5), 395–401. https://doi.org/10.1111/1467-9280.00471

Newcombe, N., &Huttenlocher, J. (2000). Making space: The development of spatial representation and reasoning. Cambridge, MA: The MIT Press.

Passini, R. (1996). Wayfinding design: logic, application and some thoughts on universality. Design Studies:17,319-331.

Piaget, J. &Inhelder, R. (1947). La representation de I'espace chez I'enfant, PUF, Paris.

Rodwin, L. & Hollister, R.M. (1984). Cities of the Mind: Images and themes of the city in the social sciences. Plenum Press.10.1007/978-1-4757-9697-1_9

Sharma G, Kaushal Y, Chandra S, Singh V, Mittal AP and Dutt V (2017) Influence of Landmarks on Wayfinding and Brain Connectivity in Immersive Virtual Reality Environment. *Front. Psychol.* 8:1220. doi: 10.3389/fpsyg.2017.01220

Siegel, A. W., & White, S. H. (1975). The development of spatial representations of large-scale environments. *Advances in child development and behavior*, *10*, 9–55. https://doi.org/10.1016/s0065-2407(08)60007-5

Stokols, D. (1987), 'Conceptual Strategies of Environmental Psychology', in D. Stokols and I. Altman, (eds). Handbook of Environmental Psychology, vol. 1, Wiley, New York, pp. 41 - 70.

Tolman, E. C. (1948). Cognitive maps in rats and men. *Psychological Review, 55*(4), 189–208. https://doi.org/10.1037/h0061626

Tversky, Barbara. (1993). Cognitive Maps, Cognitive Collages, and Spatial Mental Models. LNCS. 716/1993. 14-24. 10.1007/3-540-57207-4_2.

Winchester, S. (2002), *The Map That Changed the World*. Perennial Publishers.

Weisman, M. L., &Klemp, J. B. (1982). The Dependence of Numerically Simulated Convective Storms on Vertical Wind Shear and Buoyancy, *Monthly Weather Review*, *110*(6), 504-520. Retrieved May 27, 2022, from https://journals.ametsoc.org/view/journals/mwre/110/6/1520-0493_1982_110_0504_tdonsc_2_0_co_2.xml

Additional Online Resources

- The Psychological Review. Cognitive Maps in Rats and Men. 1948-Tolman-Cognitive Maps.pdf (nova.edu)
- Getting lost in buildings: Architecture can bias your cognitive map (w/ Video) http://openstaxcollege.org/l/carlsonmaps

UNIT 5 TERRITORIALITY, PERSONAL SPACE AND COMMUNITY DESIGN*

Structure

5.0 Introduction

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5.2 Classification of Territoriality

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- 5.2.2 The Lyman and Scott System
- 5.2.3 Types of Infringement
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Learning Objectives

After having read this Unit, you will be able to,

- Define territoriality and describe the meaning of territoriality
- Elucidatethe various types of territoriality
- Explain the personal, social, physical and cultural factors affecting territoriality
- Critically describe the theoretical perspectives of territoriality
- Describe various methods employed to measure territoriality
- Explain community design
- Elucidate the concept, types and factors related to personal space
- Define and classify privacy, and
- Identify the ways to measure personal space

5.0 INTRODUCTION

Territoriality is a basic concept the study of animal behaviour. It is an area to which the animal lays claim to it and defends it against its own species and in this way regulates the density by ensuring propagation of its own species (Hall, 1969). Thus, in this unit we will be dealing with territoriality and community design. We start with the concept and definition of territoriality followed by classification of territoriality. In this we will be dealing with the Altman system, the Lyman and Scott system etc. This will be followed by the types of infringement one comes across in territoriality and the various defenses one puts up to protect the concerned territory. This unit then takes up the issue of measurement of territoriality and discusses the field studies and field experiments, surveys and interviews and the naturalistic observation and how these could help in in measurement. Important factors that affect territoriality are discussed. Theories of territoriality are discussed and the role of genes and evolution are presented. Lastly, community design is explained and discussed in the light of territoriality, neighbourhood and hospitals.

5.1 DEFINITION AND CONCEPT OF TERRITORIALITY

Territoriality is an extremely widespread as well as a universal phenomenon. Indicators of human territoriality can be seen everywhere: books spread out on a library table to save a place, nameplates, fences, locks, barriers etc. Despite its pervasiveness, territoriality has not received the amount of study it deserves. Julian Edney (1974) observes that territoriality involves physical space, possession, defense, exclusiveness of use, markers, personalisation, identity, dominance, conflict, security, claim staking, arousal, and vigilance. Territoriality can he defined as a pattern of behaviour and attitudes held by un individual or group that is based on perceived, attempted, or actual control of a definable physical space, object or idea that may involve habitual occupation, defense, personalisation and marking of it. Marking means placing an object or substance in a space to indicate one's territorial intentions. For example, cafeteria diners leave

coats or books on a chair or table. Personalisation means marking in a manner that indicates one's identity. For example, employees decorate their work spaces with pictures and mementos.

5.2 CLASSIFICATION OF TERRITORIALITY

Classification of territoriality has been done in terms of a number of systems which are given below in detail.

5.2.1 The Altman System

Irwin Altman (1975) categorized territories into 3 types. Altman's typology is the degree of privacy, affiliation, or accessibility allowed by each type:

Primary territories: These are spaces owned by individuals or primary groups, controlled on a relatively permanent basis by them, and central to their daily lives. Examples include one's bedroom or a family's dwelling. The psychological importance of a primary territory to its occupant(s) is always high.

Secondary territories: They are less important to us than primary territories, but they do possess moderate significance to their occupants. For example, a person's desk at work, favorite restaurant, locker in the gym etc. Control of these territories is less essential to the current occupant and is more likely to change, rotate, or be shared with strangers.

Public territories: They are areas open to anyone in good standing with the community. Beaches, sidewalks, hotel lobbies, trains, stores etc. are public territories. Occasionally, because of discrimination or unacceptable behaviour, public territories are closed to certain individuals. In contrast to primary territories, which generally are closed to outsiders, public territories are open to all outsiders who are not specifically excluded.

Altman describes two other types of territories, although they are not universally recognized territories:

Objects: They meet some of the criteria for territories - we mark, personalize, defend and control our books, coats, bicycles, and calculators.

Ideas: They are also territories in a certain manner. We defend them through patents and copyrights. We have rules against plagiarism. Software authors try to protect ownership of their programs.

5.2.2 The Lyman and Scott System

Lyman and Scott (1976)categorised territories into the following types -

i) ***Interactional territories:*** They are areas temporarily controlled by a group of interacting individuals. For example, include a classroom, a family's picnic area etc. Little overt marking of these territories may occur, yet entry into them is perceived as interference, rudeness, or "crashing".

ii) ***Body territories:*** This is not the same as personal space because the boundary is at one's skin rather than some distance away from it. Bodies may be entered with permission (as in surgery) or without permission (as in a knife attack), but individuals mark and personalise their bodies with makeup, jewelry, tattoos, and clothing and they certainly defend and try to control access to their bodies.

iii) ***Public Territory:*** is an area that is used and can be entered by anyone but he must comply with existing norms. It has low ownership cognition, control is very difficult and residents can only see but cannot be owned and controlled exclusively by individuals or groups.

iv) ***Home territory:*** areas where the regular participants have a relative freedom of behavior and sense of intimacy and control over the area.

Hussein El-Sharkawy (1979) in Lang (1987), shows four types of territoriality that are useful in environmental design namely;

1. ***Attached territory,*** is a personal space that is owned by someone
2. ***Central territory,*** is the house, building with ownership
3. ***Supporting territory;*** semi-private and semi-public zones such as corridors, swimming pools, front gardens, back gardens
4. ***Peripheral territory;*** is a public space such as a shared sports field, and a city park.

Brower (1976) distinguishes territories into four types:

1. ***Personal territory:*** Personal territory is controlled individually or in groups.

   Group members are members who have a very close relationship such as a relationship due to marriage or relationships due to blood ties.

2. ***Community territory:*** Community territory is controlled by groups whose members sometimes change, but each member has gone through a screening process and sometimes an inauguration ceremony is held in accepting the member. This is done is to clarify the differences between group members and people outside the group.

3. ***Society territory:*** This territory is controlled by the general public and is open to the public, including public places such as a highway, and also places that are not public property such as waiting rooms in terminals, performance halls in theaters and so on. Prohibition and control are less free than previous types of ownership. This is done through rules or norms that come from the community, these regulations can be based on gender differences, age differences, or racial differences.

4. ***Free territory:*** This territory has no permanent residents, and the subject's existence is not under the prohibition or control of certain parties. The rules that guide behavior are self-determined or based on natural forces or because of moral norms. This territory is characterized by the absence of territorial signs and therefore restrictions or controls that arise are more due to the exploration and imagination of its inhabitants.

Types of Infringement

Research and experience indicates that there are several ways that a territory may be infringed upon:

Invasion: An outsider physically enters the territory, usually with the intention of taking control of it from its current owner. For example, a spouse taking over a sewing room to install the family's new computer.

Violation: It is a more temporary incursion into someone's territory. Usually, the goal is not ownership but annoyance or harm. Vandalism, hit-and-run attacks, and burglary full into this category.

Contamination: The infringer fouls someone else's territory by putting something awful in the territory. For example, a large chemical company leaving poisonous waste in the ground.

Types of Defense

Just as there are a variety of ways to infringe on territories, there are various ways to defend them. However, it should be remembered that territories are not always infringed and even when they are infringed, they are not always defended.

Mark Knapp(1978) divides defenses into three general types:

Prevention defenses: Markers such as coats, towels, signs, and fences are preventive defenses. One anticipates infringement and acts to stop it before it occurs.

Reaction defenses: They are responses to an infringement after it actually happens. For examples of slamming doors and physically striking out at the infringer etc.

Social Boundary defense: The social boundary defense consists of a ritual engaged in by hosts and visitors. For example, Bushmen groups in Africa who meet at a border exchange certain greetings before they allow outsiders into their territories. Social boundary defenses serve to separate wanted visitors from unwanted ones through social interaction.

Check Your Progress 1

1. Define Territoriality along with its various systems of classification.

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2. Discuss various types of infringement and defenses of territoriality with respect to territoriality.

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5.3 MEASUREMENT OF TERRITORIALITY

Territoriality can be measured through certain techniques which are as follows:

5.3.1 Field Studies and Field Experiments

Field experiments are attempts to exercise experimental control and random assignment of subjects in real world settings. Field experiments require unusual creativity and

perseverance to design and carry out.A study conducted by Simone, Barile and Calabrese (2018) is a rare example of territoriality and decision making. The purpose of this study was to discover whether being in one's own territory gives a person greater influence than a visitor on the outcome of a mutual decision. In addition, the researchers wanted to find out whether dominance (as a personality trait) influenced the process. They asked groups of three students to meet in a room in which one student was the resident and the other two were visitors. The group was asked to discuss a budget problem and reach a consensus.

Dominance did not affect decision making much. Instead, the final consensus reflected the territory owner's point of view in the debate much more than it reflected the visitors' point of view. The results suggest that if you want decisions to go your way you should try to get others to discuss the decision at your place. This strategy, it appears, works whether or not you have a dominating personality.

Field studies, also performed in real world settings, focus on naturally occurring correlations or differences between variables because the researcher cannot randomly assign subjects or exercise control over the variables.In a typical field study, several variables are measured but not controlled by the researcher, and there is no random assignment to the experimental conditions or settings. For example, Jason, Reichler and Rucker (1981)investigated territoriality on beaches. Sunbathers tend to mark off territories using radios, towels, and umbrellas. The results showed that females claim smaller territories than males, and those mixed sex groups and larger groups claim less space (per person) than do same sex groups and smaller groups.

5.3.2 Surveys and Interviews

Another way to study territoriality is to ask individuals about their behaviour and experiences. Self-report methods such as surveys and interviews have the disadvantage that respondents may not be able or willing to report their behaviour accurately. However, these methods usually have two advantages: The researcher's resources can be stretched to include a much larger number of individuals in the study, and the opinions, beliefs, feelings and other cognitions of respondents can be studied.

A good example of the interview approach is a study by Ali and Kodmany (2012) conducted on 185 residents of highrise buildings in Israel. Every member of 45 families, including children over age 5, was asked about his/her actual territory relevant behaviours and cognitions. For example, residents were asked,

i) where they chose to engage in specific activities in the apartment (a behaviour question), and

ii) who, in their opinion, owned various places within the apartment (a cognition question).

5.3.3 Naturalistic Observation and Unobtrusive Measures

Another strategy for studying human territoriality is to observe ongoing territoriality behaviour in a careful, structured way. For instance, the researcher may watch how children occupy and defend certain areas of a school playground. When unobtrusive measures are employed, the researcher may count the number and location of items that individuals deploy to control a space. For instance, a university's cafeteria is generally so heavily used that experienced students going to lunch first locate a vacant

seat, where they deposit their books on the table and their coat on the back of the chair, then go to the food lines.

Two typical unobtrusive measures of territoriality are marking and personalisation. If you wished to discover whether some ethnic groups express territoriality differentially, you could unobtrusively compare the amount they personalise their front yards. Berger et al. (2016) mentions that inner city Slavic Americans personalised their yards more than their non-Slavic neighbors. The Slavs landscaped their yards more, maintained their houses better, and placed more potted plants in view.

5.4 FACTORS AFFECTING TERRITORIALITY

There are many factors that affect territoriality and they are as follows:

5.4.1 Personal Factors

i. ***Sex:*** Territoriality varies with such personal characteristics as sex, age, and personality. It has been observed that males claim larger territories than females. Men still hold high status occupations more often than women, and thereby claim larger spaces at work more often. Men are also more territorial, even before they acquire higher status, that is, when both men and women are still in the student phase of their lives.

ii. ***Personality and Intelligence:*** More intelligent residents of both sexes usually mark of larger areas for themselves, residents of both sexes who come from larger homes mark off more space for themselves, and males who are more apprehensive mark off larger territories. Females who are more self- assured but less dominant mark off larger territories. The results depict that gender and personality play an intertwined role in territoriality.

iii. ***Competence:*** One's level of competence also affects territorial functioning to a great extent. Residents who require less help to get around reported being more territorial not only in public territories but also in their primary territories. Residents who were more mentally alert were more territorial in their primary territories, but those who were less mentally alert were more territorial in public territories.

5.4.2 Social Factors

i. ***Social Climate:*** The social climate of a neighbourhood appears to influence territoriality. A study conducted by Taylor, Gottfredson and Brower (1981) on 12 Baltimore districts found that congenial social climates were associated with improved territorial functioning. In more congenial neighbourhoods, residents were better able to distinguish neighbours fromintruders, experienced fewer problems of territorial control, and felt more responsibility for neighbourhood space.

ii. ***Social Class:*** Territoriality varies with the socio-economic level of a neighbourhood and its residents. In lower class neighbourhoods, a person's house serves as a primary territory, but ownership and control often end at the front door. Just beyond that door, outside the house, unwanted activities may occur. The resident often feels that control over the space outside the house is impossible and ceases attempts to control it. In middleclass neighbourhoods, a sense of territory more often extends to the yard outside and, to some extent, up and down the

neighbourhood street. In upper class neighbourhoods, territorial functioning sometimes extends to the whole neighbourhood.

iii. ***Competition for Resources:*** One more prominent factor in territoriality is competition for resources. You might expect more territorial behaviour when individuals struggle with others for resources. Everyday experience suggests that when cafeteria chairs, space in the library or any other resource is in short supply, individuals will begin to mark, personalise, claim and defend territories to preserve their share of the resource.Elizabeth Cashdan (1980) has supplied some reasoning and evidence, from her study of African Bushmen. In her view, territoriality occurs when there is competition for resources.However, different forms of defense are used when the resources are abundant than when they are scarce. Humans control their territories through social boundary defense mechanisms in which owner-groups focus on reciprocal access to territories by members of competing owner-groups.The boundary itself is no longer so important; instead, visitors to a territory must go through various permission rituals to enter an owner's territory. Once they "pay their dues," they are welcome to share in the resources of the territory.

iv. ***Legal Ownership:*** Another social factor in territoriality is legal ownership. Both the tenant and the homeowner control residential territory in the sense we have defined territoriality, but legal ownership appears to increase the home owner's territorial behaviour. Specifically, homeowners engage in more personalisation than tenants, given the greater commitment of resources made by homeowners.

v. ***Task:*** When we are in a public territory but engaged in a specific task, we may defend that territory more than if we are not doing anything particular. A study of callers at public telephones found that people continued their calls longer when someone was waiting for the phone than when no one was waiting for it (Ruback, Pape & Doriot, 1989).

5.4.3 Physical Factors

In the essay, *Approach to Safety and Securuty in Urban Neighbourhoods and City Centres,* Jane Jacobs in 1961 and forwarded by Oscar Newman in 1973 argued for defensible space theory to explain the physical factors that influence territoriality. They opined that residential crime and fear of crime are the two phenomena related to territorial invasion. The theory proposes that certain design features-such as real or symbolic barriers to separate public territory from private territory and opportunities for territory owners to observe suspicious activity in their spaces (surveillance), will increase residents' sense of security and decrease crime in the territory.

For example, one would suspect more crime in areas that offer fewer opportunities for surveillance and do not appear to be controlled by anyone. A study by Sommer (1987) reportedlocations with minimum surveillance had more stripped-down cars. Another study of crime in university residence halls showed that halls with defensible space features (e.g., more areas that residents could control and more surveillability) suffered less crime than halls on the same campus without such features (Sommer, 1987).

5.4.4 Cultural and Ethnic Factors

Territoriality is merely expressed differently in different cultures. One investigation of territoriality on French and German beaches was closely patterned on an earlier U.S.

study, so that the beach territoriality of Germans, French, and Americans could be contrasted. The three cultures were similar in some respects(Smith, 1981). For example,

i) in all three cultures, larger groups claim smaller per person spaces

ii) groups composed of males and females claim smaller per person spaces.

iii) females claim less space than males

In other respects, however, the cultures differ. The French seem less territorial. They had some difficulty with the very concept of territoriality, often saying that "the beach is for everyone."The Germans engaged in much more marking. They frequently erected sand castle barriers, signs declaring that "their" areas of the beach were "reserved" between two particular dates, and signs indicating that certain areas were reserved for certain groups.

Finally, territorial sizes were quite different among the three cultures, but the shapes of the territories were quite similar.The Germans more often claimed very large territories, but in all three cultures, individuals marked out more elliptical territories and groups marked out more circular territories.

5.5 THEORIES OF TERRITORIALITY

Some of the important theoretical perspectives are as follows:

5.5.1 The Role of Genes and Evolution

Ralph Taylor(1988) in his seminal work *Human Territorial Functioning. An Empirical, Evolutionary Perspective on Individual and Small GroupTerritorial Cognitions, Behaviours and Cognitions,* has elucidated comprehensively the evolutionary and genetic bases for human territoriality. He opined that territorial functioning is a product of our evolutionary heritage. Our ancient history as bands of hunters roaming the African savannah shaped the general nature of our present territoriality. According to Taylor, because territoriality developed in a small group context, even today it applies only to individual and small groups, not to large aggregates such as nations.Taylor maintains that the behaviour processes involved in our present territorial functioning are similar in form to those evolved long ago, even if they no longer serve quite the same purpose or have the same consequences. Finally, Taylor asserts that the evolutionary basis of territoriality does not mean that it is "hardwired" into our genes.

5.5.2 An Interaction Organiser

Julian Edney (1972) emanates that human territoriality serves to organise human behaviour so that violence, aggression, and overt domination are unnecessary. When an individual or group controls a setting, many aspects of behaviour become ordered, including choice of activities, access to resources, and behavioural customs. Many individuals who have been employed by others, dream of owning a business themselves, partly for financial reasons, but also so they can organise and control the policies and physical aspects of their workplace: For example, children want their own rooms so that their activities and decorations do not have to be negotiated with a sibling. Thus, one motivation for seeking territory is to have the opportunity to obtain these organising prerogatives.

5.5.3 Behaviour Setting Theory

Ecological psychologists view territorial behaviour from a behaviour-setting perspective. The organising function of territoriality is quite similar to concepts from the work of Roger Barker, the father of ecological psychology. In ecological psychology a program is "a prescribed sequence of interactions between people and object in the setting." Other concepts from ecological psychology explicitly incorporate the notion of control. For example, sensing mechanisms and executive mechanisms (usually a person in control, but sometimes a serve mechanism such as a thermostat) examine the setting for incorrect conditions and correct them.

Check Your Progress 2

1. Differentiate between field experiment and field study in the study of territoriality.

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2. Explain the evolutionary perspective on territoriality.

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5.6 CONCEPT OF COMMUNITY DESIGN

The origins of "community design", a term originally coined for the involvement of local people in planning and design decision-making processes that dates back to 1960s, a period of awakening and acknowledging human rights in the world (1). Community participation in planning and design, in this respect, appears to contemporary planners, designers and scholars as an extension of the ideals and systems of thought that were in the mainstream four decades ago (Sanoff, 2000). Since the start of the movement, however, the understanding of the practice of community design and the meaning behind fundamental terms such as "community design" and "participation" have shifted. While such a shift has multiple implications for practitioners of community design, the shift itself can be characterized as one from an ideological base to a pragmatic base.

Landmark studies such as Arnstein's (1969) and Wulz's (1986) exemplify this shift from late 60s to 80s, and more recent studies confirm a continuation of this trend (Toker, in press). Since 1990s, however, the shift towards a pragmatic understanding has also led the way to surprising mutations of the idea of people's involvement in planning and design decision-making. The very use of the term "participation" by popular planners / designers in the mainstream to provide leverage to the creation and promotion of new styles exemplifies this trend (Duany and PlaterZyberk, 1992).

The shift from an ideological base to a pragmatic one has contributed to the increasing popularity of community design in several ways. First, broad preference of the mild character of the pragmatic approach with its collaborative decision-making focus over the antagonistic attitudes of the 1960s (Alinsky, 1972) has made community design movement more accessible in its pragmatic era. Second, the eventual realization by many practitioners, of the significantly positive outcomes of public participation in design and planning decision-making processes has become more probable with the increasing focus on the pragmatic aspects of community design. Increasing popularity in this context

- for either reason - however, left the practice of community design open to be used as a tool in creating leverage to mutated lines of thought in planning and design. Such approaches (e.g. new urbanism) conceptualize community design in a way that turns communities into physical entities (Harvey, 1997) and focuses on design as it relates to the building facades and layouts (Sorkin, 1998).

This kind of overemphasis on spatial aspects in especially new urbanism echoes spatial determinism, which overestimates the power of architecture in shaping social dynamics (Sorkin, 1998; Talen, 1999; Hayden, 2003; Torre, 1999). Idealist or pragmatist, community design has always been about building communities and designing for communities (Sanoff, 2000), and always at odds with the proponents of spatial determinism. Therefore, community design in the context of new urbanism can only be construed as an example of pseudo-participation, which seems to be the outcome of increasing popularity of community design. As Sanoff (2000) distinguishes genuine participation from pseudo participation he claims that as long as the decision-making power is not in the hands of the participants, and they are to be presented what is planned for them, it cannot be genuine participation. For it to be genuine, the participatory process has to place participants in control of the decisions and actions taken. Today, the picture of community design reveals two main areas of practice, a picture characterized by the terms *genuine participation* and *pseudo participation* (Sanoff, 2000).

5.7 TERRITORIALITY AND COMMUNITY DESIGN

When applied to particular design situations, territoriality should be facilitated in the plans wherever it appears to serve the needs of clients. That is, based on our list of human behaviour patterns that are linked to territoriality, designs for territoriality should attempt to reduce aggression, increase control, and promote a sense of order and security. A rather bold conclusion, supported by some research and refuted by none so far reported is this: The more a design can provide primary territories for every person at home, school, and work, the better.

Of course, one important restriction on the supply of primary territories is money; space costs can be high. A second restriction is the policies of some organisations, which require that employees be under the direct surveillance of a supervisor. A third restriction is that some jobs, by their very nature, require that other employees or the general public have access to the individual holding the job. The only refuges of frontline employees are the staff room and the coffee break.

On many jobs, groups must work together in close communication most of the day. Individuals in such jobs may not perform best if each one is located in a separate primary territory. However, territories may be occupied by groups. Such work groups should have their own collective primary territory. In many home, work, and institutional settings, more could be done to provide primary or secondary territories for individuals and groups. Very often, no one has seriously considered how the lives of affected individuals would be improved by access to an owned space.

This section will examine some suggestions for territorialisingneighbourhoods and hospitals. The design recommendations were developed for these specific settings, but with a little imagination, we can conceive of design for other settings using the same principles. Changes in the design of larger settings (such as neighbourhoods) are more

difficult to implement than changes in small settings (such as our own homes). Nevertheless, whole neighbourhoods have been territorialised to varying degrees.

5.7.1 Neighbourhoods

Cities are often asked to block off streets in order to restrict traffic flow through the neighbourhood when residents believe too much traffic flows through their streets. Commuters, of course, believe the streets are there to help them get to and from work efficiently. Concerns about children's safety and traffic noise are the neighbourhood residents' explicit reasons for the barriers, but the move to territorialise the neighbourhood may have less obvious benefits,

Blocking off streets serves to give residents a sense of control and identity. The cars that now move through the streets are owned by neighbours. Because there are fewer cars, residents have a better chance of recognising strange one.This may serve to reduce crime because "different" cars are noticed by residents. Burglars who have several neighbourhoods to choose from would be better off selecting a more anonymous neighbourhood. Defensible space theory would support neighbourhood design changes that increase the residents' sense of ownership, eliminate spaceabout which no one in particular feels vigilant, and increase space that is easily watched by residents.

Changing whole neighbourhoods, unfortunately, is politically difficult. Trafficbarriers, for example, are opposed not only by commuters who are inconveniencedbut also by residents of neighbourhoods that will experience increased trafficas a result of the new barriers. Smaller-scale changes-to individual houses, forexample-are much easier politically, but some of them cost that individual homeowner more.

Of course, the problem sometimes can be solved by creating a different streetpattern either when the neighbourhood originally designed or by rearranging the street pattern in a block. One study demonstrated that residents of cul-de-sac believe that they have exclusive use of their street, can better distinguish neighbours from strangers, and have safer and better-maintained streets thanresidents of through streets.

5.7.2 Hospitals

No one likes to be hospitalised. Besides the obvious reason (that being in a hospital means illness or injury), another reason we may not enjoy our stay is the way space is managed in hospitals. Unavoidably, we go to a setting where we have no pre-established territory. Immediately, this affects our sense of control and security. Even if we are given a private room or our own bed, we are compelled to perform behaviours (such as sleeping, grooming and discussing private matters) in a secondary territory that we are used to performing in our own primary territories. If we have no lockable cupboard, for example, our usual sense that we can control our possessions is compromised.

The answer is to allow patients personalisation and control wherever possible. Lockable cupboards, viewable bulletin boards, and more table space to display photographs, books, and other meaningful possessions are some suggesteddesign changes. An even simpler rule may be to ask staff to respect the way patients arrange small objects within their reach. Some evidence that the creation of primary territories does have a beneficial effect comes from a study in aNursinghomeconducted by Walivaara et al. (2013). In double occupancy rooms, visible markers that divided the roominto two separate spaces increased residents' self-esteem and sense of adequacy.

As in most situations, however, there are strong pressures against some of these design changes. Some staff members complain that tables are cumbersome,cupboards take up valuable space, and bulletin boards are expensive. Somestaff objects to the inefficiency caused by idiosyncratic arrangements of furniture and personal possession. The issue is whether institutions primarily exist for the welfare of the patients or the staff. Surprisingly often, judging by the arrangements of hospitals and other institutions, the answer is that staff needs come first.

Staff needs, of course, are legitimate. However, too often, patient needs are undeserved because their illness, injury, and temporary status reduce their abilityto voice their needs in an effective way. Yet, although each patient is temporary, a permanent stream of similar patients with similar needs flows through the hospital.

The best solutions to the staff versus patient design dilemma will be reached when designers carefully examine both group's needs and base architectural changes on the costs and benefits to both groups. More changes favouring patientprivacy and territoriality over staff efficiency are needed because, to this point, staff needs usually have prevailed. Spatial arrangements despite some existing barriers could be improved considerably so that everyone in a building is better off. Environmental designs that creatively include territoriality can significantly improve quality of life.

5.8 RESEARCH EVIDENCE OF TERRITORIAL BEHAVIOUR

A number of studies have examined the effect of group size, culture and gender on territorial occupancy, intrusion, and defence. With the increase in occupancy time in beach territories, the same sex groups claim larger spaces while mixed-sex groups use more markers. It seems that the mixed sex groups display markers to keep their territorial boundaries intact. In contrast, the same-sex groups keep the boundaries unmarked so as to socialize outside the boundaries. Evidence exists that with the increase in group size, the average space per person decreases (Edney & Jordan-Edney, 1974), although this may be true for groups of friends, but not for strangers (Edney &Grundmann, 1979). Thus, territorial behaviour is influenced by personal and situational factors. It appears that males prefer larger territories in beaches and dormitories relative to females (Gifford, 1987).

Investigators have examined the ways in which people from different nationalities compete for beach space particularly in holidays. The result of the study conducted by Smith (1981) on Germans, French and Americans reveal that males claimed more space relative to females regardless of their nationality, and groups tended to occupy less space per person than couples or individual occupant. Furthermore, some differences were also reported which suggested that Germans engaged in more territorial marking by erecting boundaries and claimed larger spaces relative to their French and American counterparts. Finally, similarities in shapes were observed. However, the marking made by individuals were elliptical and groups marking territories where in circular shapes. With regard to sex differences the study conducted by Shafferand Sadowski (1975) reveal that male markers in a bar are intruded on fewer trials and, when intruded on, protect the territory for a longer period of time relative to females. Furthermore, in no case a lone intruder invaded the male territory. In one study Haber (1980) instructed confederates to intrude the classroom desk territories of male and

female students. The confederates were not able to complete the planned intrusion when the occupant of the territory was male. In contrast, the confederates were able to complete twice the number of intrusions. It seems that confederates were reluctant to invade the male territories. The males were more likely to say unfriendly things to the invaders when cafeteria tables were intruded (Calsyn, 1976). Other scholars found that, when invaded, both males and females were equally likely to withdraw their library seats (McAndrew, Ryckman, Horr& Solomon, 1978). Thus, territorial behaviour does show some variation between cultures and gender effects.

Perhaps in many situations like protecting seats at a game or movie theatre by markers are less effective. In such public places the occupant while temporarily vacating the seat request save seats. Sommer and Becker (1969) the next adjacent space when the duration of user's absence was moreobserved that neighbours were more likely to defend; (e.g. 15 min vs. 60 min). Likelihood of defence was less whenthe user's prior duration of occupancy (5 min vs. 20 min), degree of personalized contact with the neighbour (no contact vs. asking for time vs. chatting information, all for 5 min.). However, when neighbours were explicitly requested to defend the territory, as many as 71 per cent defended to territory by putting their own markers on the claimed territory (Hoppe et al., 1972).

5.8.1 Territorial Demarcation, Personalization, and Behaviour

Territoriality is expressed through marking and often involve personalization. According to Cassidy (1997) fences. boundaries, and other indications that territory belongs to someone, without identifying who the person or group is, are markers. Markers with the identity of the person such as name plates or which distinguish the territory in unique way (eg. house name or number) reflects attempt to personalize the territory. Public territories are self-consciously marked to reserve space. People often mark territories in public domain (e.g. seat in the library or space in the beach) so as to prevent intrusion and distress. Often when the territory in the public domain is invaded, people move their occupancy to other places. However, the invasion generates certain physiological arousal and anger (Cassidy, 1997). In contrast, it is less likely that the primary territory (e.g. home, garden) is invaded.

The effectiveness of public territory markers is dependent on many factors including duration of absence of the owner, the availability of alternative space, and the desirability of the territory (Brown & Altman, 1983). When sufficient space is available the territorial markers are effective and intrusion is prevented. However, when the alternative space decreases with increase in the population the territorial markers lose its significance and effectiveness (Sommer & Backer, 1969) Similarly the effectiveness of a marker (e.g. school newspaper on snack bar table), is reduced, if it is mistakenly perceived by the potential intruder as Litter (Arenson, 1977). However, markers such as college notebooks are not disregarded completely.

Some studies have reported that a half-empty beer mug is a more effective deterrent to intrusion of a table at a bar than a more personal marker such as sport jacket (Hoppe, Greene & Kenny, 1972). In a review Brown and Altman (1983) reasoned that prospective customers realize that patrons may forget their jacket when leaving the bar but they rarely leave half empty beer mugs in the bar because the prospective customers assume that the bartender expects the patron to return. Thus, personal markers provide more protection from intrusion than impersonal markers.

5.8.2 Territoriality,Behaviour and Aggression

Depending upon a number of situational factors, territory may serve either as instigator of aggression or as a stabilizer of aggression. The status of a particular territory affects the relationship between territoriality and aggression. When territory is unestablished or disputed, aggression is more likely. The study of Lev and Cybriwsky (1974) reveal that street gangs engaged in more inter-gang violence when territorial boundaries were ambiguous than when they were wellestablished. Furthermore, evidence exist that well-demarked territorial boundaries lend stability and reduces the probability of violence and aggression. Other studies reported that after the introduction of identifiable territories a drop in the level of aggression in the group of retarded boys was seen. Thus, it seems that well-established territories are less likely to be intruded and thus the chances of aggression are less (Aiello, 1987).

5.8.3 Architectural Features and Territorial Behaviour

In public spaces certain architectural features appear to encourage the development of territorial claims. The study of Sommer (1967) reports that students are more likely to maketerritorial claims for library seats that are close to the wall, facing away from the distractions of the main entrance, and towards the rear of the room. Passerby is more likely to use water fountain if it is shielded from the spatial proximity of others by a physical barrier (Aiello, 1987).

It is commonly observed that much of the criminal activities are centred in areas around public spaces. The offenders are more likely to position themselves in street corners or pathways in open spaces and try to avoid front garden spaces. The concept of defensive space focuses on various aspects of public space organization that helps in promoting sense of ownership to its residents (Newman, 1972). Newman (1972) conducted a study on two housing projects in New York, occupied by equal number of residents. The Brownsville project was organized in smaller blocks having residential units for five to six families and was built around courtyard.The Van Dyke project was high-rise with residential blocks, separated by large parks. The design features of the Brownsville project provided defensive space to the residents. The design features facilitated sense of community and social interaction between neighbours in Brownsville housing, which promoted security and reduced the criminal mishappenings. In contrast, the crime rate was 50 per cent higher in Van Dyke housing relative to Brownsville because the probability of social interaction was inhibited by the residential design. Thus, it seems that the strength of territorial ownership and defense seems to vary according to the characteristics of the setting, the features of architectural design, gender, cultural background and group size.

5.9 PERSONAL SPACING

5.9.1 Concept of Personal Spacing

One of the most sacred rules of social behaviour is ‘Never transgress into your neighbour’s personal space’. To put it simply, we all need a private space to just sit, think, study, sleep or relax... a special place, just to be alone, to spend some ‘me time’ in the privacy of our thoughts. Personal space is that region surrounding a person which psychologically they regard as ‘their turf’. Most people value their personal space and feel discomfort, if a stranger comes too close to you while striking a

conversation; anger, or anxiety when their personal space is invaded. Personal space thus refers to the distance you will automatically take a step backwards to restore the distance needed between people when they interact. It is the amount of room that is needed to feel safe and comfortable. It is the immediate region which surrounds us and is seen as our psychological property. If people try to enter that space, one starts feeling closed in, uncomfortable and anxious.

In 1960's Edward Hall coined the term 'Proxemics' to refer to ways in which people use physical space to regulate social interaction. His book *The Hidden Dimension* is a landmark in the field of personal space. Katz (1937) and Sommer (1969) are some other seminal researchers in the field. According to them, personal space is the invisible physical boundary that we draw in between us and other people. It decides how close we will go to that person or allow him to come close to us. So, perhaps the better term to use could be 'interpersonal distance because it only becomes relevant when we are interacting with others. We only become aware of it when somebody invades it.

The personal space is often an indicator of the kind of relationship we share with the person, our society and culture. For example, an affectionate hug from a closefriend will be perfectly alright for an individual but a hug from a stranger will be not only be uncomfortable but even offending for most. Hence, just as body movements and facial expressions can communicate a great deal of nonverbal information, so can this physical space between individuals. Edward Hall (1966) identified four zones of personal space. He then subdivided each one of them into two subcategories, 'near' and 'far'.

i. ***Intimate Distance:*** This is the smallest zone and it tends to be about 18 inches apart. As the name suggests, this space is open only for those who are very close to us. This distance often shows great comfort level and closeness that we share with the person. So, only our life-partners, children, close family members, dear friends and pets can enter this space without bothering us. Displays of affection and comforting are commonly conducted within this space. The only fluke strangers an individual typically accepts within this intimate space are health care professionals or in situations like playing a wrestling match. Hall describes' near' situations like when we have body contact, for example, hugging and "far' when we are close but not really touching like when we whisper. If a stranger tries to enter in this reserved space, we feel very uncomfortable.

ii. ***Personal Distance:*** This physical distance too is for close friends and family members. The closer we can be to the person indicates how close we are to him/her emotionally. It begins about an arm's length away. It extends from 18 inches to 4 feet. This space is used in conversations with friends, to chat with associates, and in group discussions. Such informal conversations and with friends, acquaintances are held in this space. Strangers are prohibited in this space too. The 'near' is for the couples or close friends while far' is for the acquaintances in a social setting.

iii. ***Social Distance:*** This distance ranges from 4 to 12 feet and is usually used for formal social interactions with known people, new acquaintances or even strangers. The range of distance changes according to the situation. For example, in an informal business meeting with your co-worker, you can be more physically closer than a formal business meeting with a client whom you are meeting for the first time.

iv. ***Public Distance:*** The space beyond social space is open to all and is known as public space. This space, which extends more than 12 feet, is essentially used for public speaking situations for large audiences like, speeches, lectures, presentations, performances etc. The "far' phase of this distance can be seen when a high-profile leader is addressing the gathering. The distance between him and the audience tends to be much greater. Sometimes, such categories are criticized as being too rigid but they do explain the ways in which they influence behaviour. The term is used literally or symbolically in our layman conversations. For example, if we share a good relationship with someone, we talk about being 'close"; if we no longer get along, we say, let us keep distance. Being in touch or being distant is actually talking about 'personal space'.

There are two theories to explain the concept too. Argyle and Dean (1965) tried to explain the concept of personal space by suggesting, affiliative-conflict theory. It is like the classic approach avoidance conflict that we face. We want to be close to others but at the same time, we want to keep some distance too! The idea of personal space helps us to reach a compromise so that a balance is maintained. Same can be explained with a slightly different angle by the social constructionist perspective. According to this, invasion of personal space produces physiological arousal and it also leads to the cognitive appraisal of the situation. On the basis of our evaluations, close to us, the physical proximity may turn to passion or display or affection but if he is a stranger, we may become very angry. So, the stress caused by the invasion of personal space is dependent on the context and our appraisal.

5.9.2 Privacy

Privacy, personal space, and territorial behavior affect the people's perception of environmental comfort and quality. The need for privacy, personal space, and territory is universal.These three concepts (privacy, territorial behavior,and personal space) are closely linked. Privacy refersto the management ofinformation orthe regulation of social interaction with one's surrounding (Laufer, et al, 1973 & Sundstrom 1986). It is an intentional retreat from unwanted observation, audition, distraction or interruption. There are many factors affecting privacy, such as:

- ***Mechanism of the senses:*** All 5 senses affect the way human beings perceive their surroundings and the mechanism by which they control privacy.

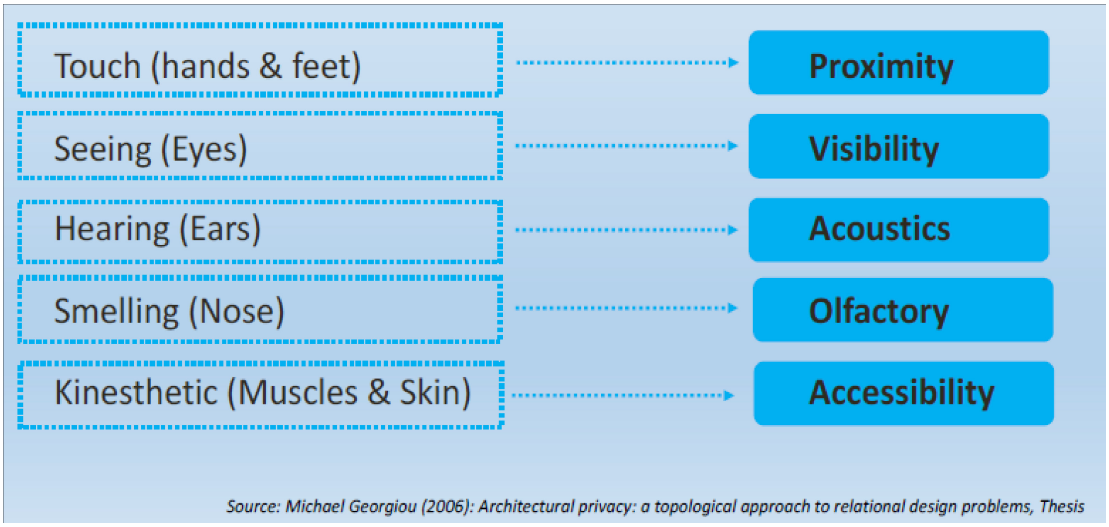

Figure 5.1 Mechanism of the Senses in Privacy

- ***Individuality:*** Sense of individuality, self-evaluation and identity(personal values, beliefs, opinion and expression), Selective and interpersonal communication (in different context) and level of interaction.
- ***Space distance:*** A set of distances (proxemic patterns) that people use to control their relationships with others. These distances change in different societies and from a culture to another.
- ***Architectural elements of a space:*** Architectural elements act as regulators of privacy, visually, acoustically and spatially. These elements are:
    - o Furniture
    - o Walls
    - o Fences
    - o Doors
    - o Furnishings
    - o Tinted glass
    - o Windows
- ***Culture:*** Culture affects the boundary of what is regarded as private. The level and degree of privacy is culturally determined in different geographies of the world. Privacy was explained as mechanisms of control interaction with others. Due to the culture North Americans leave more space between each other during interaction than the Arabic men.

There are ***several kinds of privacy***, each of which serves a different purpose. Westin (1970) identifies four types:

i. ***Solitude:*** In this type of privacy, person is alone and free from observation by others and, assuch s/he is in the most extreme condition of privacy.

ii. ***Intimacy:*** The second privacy state occurs when small group –for example a couple separate themselves from outsiders in order to be alone.

iii. ***Anonymity:*** This type of privacy occurs when a person acts freely without being recognized by the others in a crowded, public place.

iv. ***Reserve:*** This type of privacy occurs when a person develops psychological barrier against unwanted intrusions while being engaged an ongoing activity. It is a state of privacy in which we are psychologically separated from some other people.

5.9.3 Determinants of Personal Spacing

How do we develop this sense of interpersonal distance? Are there any physiological factors too or is it only a psycho-social phenomenon? Which psycho-social factors determine our personal space? Let us try to find out:

i. ***Physiological Factor:*** According to Adolphs et al. (2009), we start acquiring our individual sense of personal space by 3 or 4 years and it is fully developed by our adolescence. In the journal*Nature*, 2009, he mentioned that this peculiar

sense is constructed and monitored by the amygdala, a brain region involved in experiencing fear. It generates repulsive forces when our space is invaded. It kind of rings a warning bell if somebody comes too close, thus, it helps us to keep a minimum distance from others. But if this part of brain is damaged, then the space invasion is not registered in the brain. This was confirmed by a rare patient who had a damaged amygdala. She had no sense of personal space and was comfortable no matter how close others got to her. The same result was found when the experiment was conducted on monkeys(Amaral et al., 2003). He added that people with autism, often find it difficult to maintain normalsocial behaviour and could stay in close proximity without any emotional problem (Amaral et al., 2003).

ii. ***Cultural Factor:*** All cultures use personal space to communicate but Hall (1959) emphasized that the size of personal space that is needed to guard our comfort zone is different in different cultures. He calls some cultures as, 'Contact cultures', and for example middle eastern or Latin countries. They generally show physical intimacy, stand close to each other and thus they require less personal spacce. But if we belong to 'Non-contact culture' then we will not be touching or standing close to others while communicating. We will prefer to stand apart. Such people will naturally need more personal space between them and others. People from North America, Europe can be seen as those belonging to non-contact cultures.Hall attributed these differences to cultural norms regarding sensory modalities that are considered appropriate for communication between people. Distinct norms are there for informal talking, business, greeting etc. It is important to know them if we want to send the correct signal through our personal space. In case, we donot adhere to these norms, we may be in trouble or give the other person a culture shock. For example,the public display of affection like kissing is a common gesture of greeting in West European countries. However, this maybe not be a part of many Eastern cultures. Thus, different cultures have different concept of the 'right distance'. We must be aware of that boundary line to avoid unpleasant 'social accidents' as seen in this example.

iii. ***Population Density of the Place:*** Personal space is a highly variable concept. Just as our culture influences it, similarly, our experiences also shape it. If we live in a densely populated region like Mumbai or Japan, then we cannot afford to have a larger personal space. Increasing population cannot and has not given that luxury ever to most of its citizens, hence they have adapted to having lesser personal space around. The people from Mongolia or Canada, where lot of space is available, are used to having a larger space around them so they start needing the same to feel secure. They will be highly uncomfortable in a crowded Mumbai train while a typical Mumbai citizen may even continue reading a book!

iv. ***Individual factors:*** Age, sex, social status, anxiety, abnormality, even within a culture or a country, there would be variation in the amount of personal space that we need to feel safe. Some of the factors that may play a role are:

(a) ***Gender:*** It is found that two males need more interpersonal distance between them than two females. Gifford (1982) adds that though females prefer greater personal space, it also depends on the situation, relationship etc.

(b) Age: Our need for space grows as we grow older. Hayduk, (1983), points out that in case of children, we donot mind proximity. As the concept of sexuality is unknown to them, so no threat is perceived or registered. But as we mature, we interpret our sex roles and our need for larger personal space develops.

(c) Status: The need for personal space is also guided by our status in the society. The more affluent and financially sound we are, the more is our need for personal space. Powerful, rich people want more privacy and exclusive space. A person, who is used to travelling in a chauffeur driven car, will be at loss in a crowded public transport.

(d) Relationship Shared: As seen earlier, our emotions dominate the interpersonal distance that we share. We can be intimate and close to someone only if we bond emotionally. The more we dislike a person, greater will be the interpersonal distance.

(e) Personality: Our personal traits also influence the amount of space that we need around us. Gifford (1982) found that extroverts and friendly people need less personal space than cold and quarrelsome people. New research from University College London found that anxious people need more interpersonal space as they tend to get threatened soon. Shy, people with autistic, and people having claustrophobia also need more space. Sommer (1959) explained that people diagnosed with schizophrenia also show typical and variable personal space. When they are in a withdrawal phase, they want large distance but when they are into attention seeking phase, they want proximity. Research is also done on the distance and problem behaviour. It was found that violent criminals too like to keep large interpersonal distance.

***v. Circumstantial or Situational Factor*:** The need for personal space may vary in the same person according to the situation. As we have seen in the Unit, in crowding, one would not mind many people jostling around in a fare or an exclusive movie premier. The people sitting on both sides of your seat in a theatre may be accepted without a murmur. But if it is hardly filled, many seats are vacant and still two people talking at a distant seat may also invade into privacy. Research also suggests that we will be more comfortable to occupy those seats beside us rather than in front or back of us, we tend to suddenly feel offended if people come closer in front or behind than if they are on our sides. So, the *personal space bubble* seems to be elliptical and situational. Tedesco and Fromme (1974) reorted that requirement of interpersonal space was less during a competitive situation whereas in cooperation tasks, the requirement of personal space was more.

vi. Expectations and Social Perception: The personal space is also decided by what is our expectation about the person we are going to meet. The social perception about that person will also influence our interpersonal distance. If we have a negative view, we prefer to be at a distance and need more personal space. Skorjans (1991) examined the personal space of participants in relation to the perceived violence level of the criminal whom they were about to meet. They were told that one of them is the violent offender, the other non-violent offender and third one has not offended any law ever. The result indicated that participants kept maximum space with the violent offender and minimum

with the non-offender. Kleck (1969) and Baron(1978) also validated this finding. Thus, it is amply clear that interpersonal distance is integral in regulating our interaction with others and it is a very good indicator of the shared relationship. This makes personal space a very important aspect of behavioural studies because interaction is the base of all our social interactions in life. Whether it is our work, play, or rest, we will be more successful if we are aware of the positive and negative aspects of the interpersonal distance.

5.9.4 Methods of Studying Personal Space

There are 4 basic research methods to study personal space (Aiello, 1987).

(1) ***Simulation Method:*** In this, the person is placed in an imaginary situation and he is told to imagine the kind of interaction he would have with others in it. Sometimes dolls or miniature symbolic figures are used to project their view. Nowadays computer graphics can also be used. This is particularly useful for children but the artificial lab set up does not allow sweeping generalisation to real life.

(2) ***Quasi-Projective or Laboratory Methods:*** In this method, the person uses his own body in relation to other person under controlled laboratory conditions. The other person may be real or imagined. For example, the stop-distance method, the person may approach a person till s/he starts feeling uncomfortable. Another method under this can be interactional method where direct, unobtrusive observation of actual interactions is done in the laboratories. Though laboratory method attempts to control relevant variables to avoid confounding, the lab results are difficult to generalise in the natural environment.

(3) ***Naturalistic or Field Methods:*** In this method, distances between people are measured in the natural settings. This method has ecological validity as it is done in the natural surroundings. But this has some in built drawbacks like we may not know the kind of relationship the two share, other relevant variables can interfere besides of course the ethical issues involved in intruding into someone's privacy.

(4) ***Questionnaire:*** A questionnaire in which participants have to imagine a situation and rate whether they feel uncomfortable in the situation. An example is the Comfortable Interpersonal Distance Scale (CIDS) (Duke and Nowicki, 1972), on which participants have to rate where they feel uncomfortable in the situation, which they are imagining. But there is a possibility that a person may not comprehend the situation or s/he may lie. Thus, there are many methods of measuring personal space and each has its own plus and minus point. Since the topic is very personal and sensitive, there is no one ideal method of measurement. But they do help us to have a basic idea of what a personal space is.

Check Your Progress 4

1. Define the four zones of personal space.

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2. Explain simulation method as a method to study personal space.

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3. Explain the cultural factors in personal space.

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5.10 SUMMARY

To sum up what we have learnt in this unit, here is a quick recap:

- Territoriality in humans is a pattern of behaviour and experience related to the control (usually by nonviolent means such as occupation, law, custom, and personalisation) of physical space, objects, and ideas.
- Field experiments and studies are best for studying territorialbehaviour, but territorial cognitions are best studied by interviews and questionnaires.
- Ownership, positive social climate, resource competition, social class and task are social factors that seem to increase territoriality.
- Personalisation, marking, and status are used more often than physical aggression. Theories of territoriality focus on its organising action, behavioursetting theory, and evolution.
- Designers should incorporate knowledge about territoriality to build better homes, offices, and institutions. The overall goal is to provide individuals with territories that allow them as much control as they are capable of responsibly exercising and as the organisational context allows. Territory holders will benefit from a greater sense of self-determination, identify and perhaps even safety.
- Personal space is a region surrounding a person which psychologically he regards as his 'own'. If anyone comes too close physically then one feel uncomfortable. In 1960, Edward Hall coined the term 'Proxemics' to refer to ways in which people use physical space to regulate social interactions.
- Determinants of Personal Space includes physiological factors, cultural, population density and individual factors like gender, age, status, relationship and personality and Situational factors.
- Privacy refers to the management of information or the regulation of social interaction with one's surrounding. The main methods to study personal space are simulation method, laboratory method, naturalistic or field methods, and questionnaire.

5.11 KEYWORDS

Territoriality : Refers to the territorial status. A persistent attachment to a specific territory. It also refers to a pattern of behaviour associated with the defense of a territory.

Community Design : This is a unitary industrial or residential community design that covers a particular community. It has both unregistered and registered forms.

Personal Space : A body buffer zone that people maintain between themselves and others.

Privacy : An interpersonal boundary processes by which people regulate interaction with others.

5.12 REVIEW QUESTIONS

1. What is territoriality? What are the factors influencing it?
2. Describe the various types of territories.
3. Discuss measurement of territoriality. What are the methods available to measure territoriality?
4. Put forward the three major theories of territoriality.
5. What important factors do we keep in mind while we built up neighbourhood or hospitals?
6. Explain the concept of personal space in detail.
7. Do you think territoriality is related to aggression?
8. What is the difference between personal space and a territory?
9. Describe the various determinants of personal space.
10. How are individual factors related to personal space?

5.13 REFERENCES AND FURTHER READING

Bonnes, M., &Secchiaroli, G. (1995). *Environmental psychology: A psycho-social introduction*. Sage.

Brown, B. B. (1987): Territoriality, In D. Stokols & I. Altman (Eds.), Handbook of environmental psychology. New York: Wiley.

Gifford, R. (1997): Environmental Psychology Principle and Practice, Allyn and Bacon; MA 02194.

Malhotra, N. K. (2007). *Environmental Psychology: Principles and Practices*. Sumit Enterprises

Nagar, D. (2006). *Environmental psychology*. Concept Publishing Company.

Moser, G. and Uzzell, DL (2003). 'Environmental Psychology', in Millon, T., & Lerner, M.J.(Eds.), Comprehensive Handbook of Psychology, Volume 5: Personality and Social Psychology, New York: John Wiley & Sons. pp 419 – 445.

Steg, L. E., Van Den Berg, A. E., & De Groot, J. I. (2013). *Environmental psychology: An introduction*. BPS Blackwell.

Taylor, R. B. (1988): Human territorial functioning: An empirical, evolutionary perspective on individual and small group territorial cognitions, behaviours, and consequences, New York Cambridge University Press.

Tewari, R. & Mathur, A. (2014). *Environmental Psychology*. Pointer Publishers

Berger, E., Israel, G., Miller, C., Parkinson, B., Reeves, A., & Williams, N. (2016). World History: Cultures, States, and Societies to 1500.

Taylor, R. B., Gottfredson, S. D., & Brower, S. (1981). Territorial cognitions and social climate in urban neighborhoods. Basic and Applied Social Psychology, 2(4), 289-303.

Sommer, R. (1987). Crime and vandalism in university residence halls: A confirmation of defensible space theory. Journal of Environmental Psychology, 7(1), 1-12.

Ruback, R. B., Pape, K. D., & Doriot, P. (1989). Waiting for a phone: Intrusion on callers leads to territorial defense. Social Psychology Quarterly, 232-241.

5.14 ADDITIONAL ONLINE RESOURCES

S K Y L I N E | Prevention through Design (substack.com)
https://www.jstor.org/stable/2786718

accounts.pdf (jthomasniu.org)

Trade and reciprocity among the River Bushmen of northern Botswana on eHRAF World Cultures (yale.edu)

Newman, Oscar: Defensible Space Theory (udayton.edu)

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