CONFIGURATION AND CONTEXT

A Study of Spatial Patterns in Social Encounters

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Thesis submitted for the
Degree of Doctor of Philosophy
in the
Australian National University

December 1977

Except where otherwise acknowledged in the text, this thesis represents my original research.

T.M. Ciolek.

DIAGRAMS

PLATES

ACKNOWLEDGEMENTS

The research and writing up of this thesis was carried out under the generous auspicies of a Ph.D. Scholarship from the Australian National University, which provided a truly congenial and hospitable environment for study, research and reflection. Throughout the period of my work I have been indebted to many people whose assistance I have greatly appreciated.

Firstly, I would like to thank Dr.Adam Kendon for the priviledge of being his student. I owe him deep gratitude for the guidance and supervision during my research and in the course of work on the final version of the dissertation. Without his friendship, encouragement and assistance the Configuration and Context would have never been born or completed.

Secondly, I would like to express my thanks to Rob Elzinga and Dr.Peter Sands for lengthy discussions which helped me to interprete my findings. To Dr.P.Sands I am also indebted for writing of a computer programme for simulation patterns of spatial distribution of people in a pedestrian setting. Data generated by his program enabled me to assess significance of the regularities discussed in Chapters 4, 6 and 8. My thanks are also due to Lyn Elzinga-Henry, who helped in collection of data described in Chapter 7.

For their many helpful comments on an earlier draft of this thesis, I thank Dr.John Besemeres, Peter Black, Douglas Lewis, Ritva Sands and Dr.Michael Young. Further, I want to thank in this place Ria van de Zandt for her dedication to the task of typing some of the most complicated portions of the thesis and to Irena Goltz for her help in preparation of the final copy. I take also the opportunity to thank here Michael Grace of the National Capital Development Commission for providing me with plans and technical data on my main research setting and Lillian Wittig of University's Audio-Visual Services for processing many hundreds of photographs used in this study. Others, who contributed to my work on the dissertation, I mention at appropriate points in the thesis.

Finally, I would like to express words of gratitude to Professor Sir Raymond Firth for the support and encouragement he gave me in August 1972 and to Professor Derek Freeman for taking deep interest in my coming to Canberra, and subsequently, in my research.

INTRODUCTION

It can be argued that a focussed face-to-face interaction of a small group of people may occur in virtually any setting or location. Such a hypothesis is plausible since a small gathering formed in public usually needs no special props, no furniture nor any particular surroundings. Further, it can be argued that a face-to-face interaction of a small group of people may be carried out in any way, without following any special rules for ordering physical co-presences. Such a hypothesis is plausible, one might assume, because what seems to be important is the purpose for which the people have assembled together; it is the accomplishment of such a purpose that counts and not the behaviours used for carrying out of such an exchange. These behaviours may be thought of as means for achieving a certain goal, mere tools which are fashioned to suit a given set of people and a given interpersonal situation.

However, neither of the two views just mentioned is supported either by observational data or by existing experimental and naturalistic research. From these it clearly emerges that neither the location of an encounter, nor the behaviours displayed are accidental or used ad hoc. This is not merely to say that any spontaneously established social encounter that we might observe displays patternedness and logic, but also that the patterns observed in a given social encounter are fundamentally similar to those displayed in other encounters. This can be seen both in terms of where a face-to-face interaction tends to take place, and in terms of how such an interpersonal event is negotiated and accomplished.

On the basis of works which deal with people's uses of various outdoor public places it is possible to formulate the following general statements:

1. Not all natural and man-made milieus, environments and habitats are equally attractive to people. Some of the places are more often frequented or more intensively used than others of the same category (Jacobs 1972, Deasy 1970, Gold 1972, Dee and Liebman 1970, Brown and Hunt 1969).

2. Not all parts of a particular setting are equally attractive to its users. Some locations within a place are more often occupied or are used by a greater variety of individuals or entered for longer periods of time, while other spots which at first glance may appear to be identical with the favoured ones are shunned (Lerup 1972, Thakurdesai 1972, Appleyard and Lintell 1972, Stilitz 1969, Ciolek - in press).

3. The attractiveness of a setting and that of a location is determined mainly by environmental factors operating in these places. However, the preference for certain types of spaces is also modified, though not so strongly, by individuals' social, cultural and psychological characteristics (Peterson and Neuman 1969, Shafer et al. 1969).

4. In some locations people are more likely to get engaged in specific activities, (i.e. eating, relaxing, conversing, waiting) than in other locations. This means that an environment can be seen as a set of partially adjacent, partially overlapping "niches" which are especially congenial to some type of activity and behaviour (Preiser 1972, 1973, Johnson et al. 1973, Stilitz 1969, 1970).

5. The final proposition, already implied by the previous four, is that people neither behave nor distribute themselves haphazardly within a setting; and also that they do not spread out their activities evenly all over the area. This means that the probability of finding an individual at a particular point in the area is not necessarily the same as for other points. People appear rather to be aggregated in some areas and locations leaving other spaces and other spots unused or underused. They do it in a fashion which is not necessarily obvious but which can be identified, systematised and investigated.

As far as research on people's face-to-face social and communicational behaviour is concerned, the basic observations made so far can be summarized as follows:

1. Whenever people become mutually accessible to each other's unaided senses they invariably begin to systematically relate to each other's presence and behaviour (Goffman 1963, Scheflen 1963, 1964).

2. The number of ways in which this mutual interrelatedness can be achieved is quite impressive. In their everyday face-to-face interactions people make intensive use of language, paralanguage, and

other body noise (Westcott 1966,1967), spacing and orientation, body movements and postures, as well as of touch and appearance (Scheflen 1975).

3. People appear to use these "interactional instrumentalities" in several ways. They may co-ordinate their behaviours at a level of one or two instrumentalities only, while being un-related in terms of other modes of behaviour. On the other hand they may bring into a concerted action all modes of behaviour and thus establish a complex interlock between all aspects of their own behaviour with these of their partner. Though the complexity of such an interpersonal exchange may be staggering it is, nevertheless, possible to discern and describe basic recurrent patterns. These patterns may be displayed by people within a particular mode of interrelatedness (e.g. language or appearance) as well as across them (e.g. language and appearance) (Kendon 1973b, Scheflen 1966,1975).

4. The use of various interaction instrumentalities has always two concurrent aspects. First, various behaviours can be utilized for the purpose of an exchange of messages, meanings or information between interacting parties. Secondly, the same behaviours are simultaneously utilized by people for the purpose of regulation, organization and patterning of their co-presences (Scheflen 1963, Laver and Hutcheson 1972, Kendon 1973b).

5. One of the important instrumentalities through which basic forms of co-presence patterning are negotiated is the spacing and orientation adopted relative to another person (Vine 1975). People can often be seen to form various spatial configurations through which they establish a control over each other's actions and through which they define their mutual roles relative to one another and to their joint task for the accomplishment of which they have assembled in a given place (Goffman 1963, Kendon 1976, 1977, Scheflen and Ashcraft 1976, Milgram and Toch 1969, Abercrombie 1971, Mead and Byers 1968).

Though both sets of problems appear to have received a considerable amount of attention during the past ten or fifteen years, most of the research on people's preferences for and usage of various environments was conducted separately from investigations on people's behaviour in face-to-face interaction. Thus, at present, surprisingly little is known about the way spatial patterning of social encounters is related to the spatial patterning of the interaction's immediate environment. This is mainly due to the fact that one of the tacit assumptions underlying the whole area of studies on human social and communicational behaviour is that the structure and functioning of an interactional event can be accounted for and explained entirely in terms of "internal" (intra-systemic) phenomena and factors. In other words, it was generally accepted that in order to account for regularities observed in face-to-face encounters it was sufficient to ask how one's behaviour contributed to the smooth accomplishment of the ongoing exchange and how it related to the behaviour of the co-participants. Such an approach meant that a social encounter was postulated to be a system the organization and functions of which remained entirely un-related to the properties of the external world[1]. It is the aim of this thesis to demonstrate that such a theoretical stance is not justified.

In this thesis we shall attempt to show the way in which occasions of face-to-face interaction are spatially structured, and how this spatial structuring is related to the immediate context of the gathering. A series of detailed observations of gatherings in an urban pedestrian setting will be reported and analysed from the point of view of their relationship to the physical and social features of the setting itself. These observations will lead us to propose some of the ways in which spatial configurations adopted by a gathering serve not only the requirements of the communication arrangements internal to the gathering - a topic which has received considerable attention in the literature[2], but also the requirements that the gathering has of maintaining its relationship with that of its surroundings. These "external"

[1] Puzzlingly, these views were held in spite of evidence suggesting that people do choose settings and locations for their interactions with other people, and that when asked, are able to provide clear-cut perceptions and opinions about the importance of the physical and human context to their involvement in solitary or group activities (Peterson and Neuman 1969, Sommer 1966a,1967b,1970, deLlanoy and Feyeraysen 1974).

[2] For instance, Steinzor 1950, Sommer 1959,1962,1965,1967a, Hare and Bales 1963, Hall 1964, Ward 1968, Gardin et al. 1973, Green 1975, Michelini et al. 1976, Silverstein and Stang 1976, Koneya 1976.

relationships are aimed at securing the configuration's integrity as a gathering, and so separating it off from its surroundings, while at the same time helping to keep it sufficiently alive to what is going on around it so that the encounter as a whole can adapt to its surroundings. Particular attention will be paid to the spatial relationships of gatherings to features of physical environment and to the presence of other people. As we shall see, gatherings in public settings space themselves both in relation to one another and in relation to features of the physical environment, in consistent patterns. The spacing patterns observed are suggested to facilitate the process by which participants in face-to-face encounters may attend to and adapt to the flux of events around them, as they sustain a coherent interactional event within the frame of the encounter.

This task of exploring the relationships between the spatial structure of an interpersonal event on the one hand and the spatial and social characteristics of the interaction's immediate environment on the other will be attempted in the next nine chapters.

First we shall consider in detail the nature of spatial organization in social interaction (Chapter 1) and then we shall discuss at length some of the basic features and functions of a small-scale, closely-knit arrangement in which people are assembled around a jointly controlled and protected interactional space (Chapter 2). In the final section of Chapter 2 we shall develop a notation system which may serve as a means for the identification of various types of configurations people adopt in relation to various types of contexts. This notation system has been used extensively in recording the observations we shall report.

Then in Chapter 3 we shall provide a general description of the setting selected as our main study area, and we shall describe our materials and the research techniques employed. In Chapter 4 we shall provide a detailed description of the population studied and we shall also discuss the basic patterns of people's distribution within and in the use of the study area.

The next chapter (Chapter 5) will address itself to the analysis of interrelationships between the type of spatial arrangement adopted, the type of spatial orientation of a gathering as a whole and the gathering's immediate surrounds. In this chapter a configuration of an encounter and its spatial orientation will be interpreted as means by which participants maintain an equilibrium between the integrity of their interactional space and an aliveness to their surrounds on the one hand, and the physical and social properties of the setting on the other.

Chapter 6 discusses at length another aspect of the behaviour of a stationary social encounter situated within an open pedestrian setting. In this chapter data on the patterns of spacing people adopt in relation to nearby stationary individuals and groups are analysed. It will be seen that stationary people, whenever it is possible, tend to distribute themselves uniformly in relation to one another so that a generous and equidistant spacing is achieved. This tendency will be discussed in terms of the way such a spacing may facilitate the maintenance of separate identities of separate interactional events and also in terms of the way in which this facilitates the process of monitoring events in the surrounding environments.

Chapter 7 approaches the problem of inter-personal spacing from an entirely different angle. This chapter will report the results of an analysis of interviews on the use and functions of such spacing as perceived and understood by people engaged in stationary face-to-face encounters. These people will be seen to report that they perceive certain portions of the environment as their exclusively used and controlled "domains" into which other stationary people may not enter. Further, the people interviewed will be seen to share with all stationary setting users the same set of beliefs on how people should interact spatially one with another. The important point about these data is that they will be found to complement and support the behavioural data reported in Chapter 6.

The next chapter (Chapter 8) will deal with the the spacing adopted by stationary individuals and groups in relation to fixed features of their environment. The results suggest that such spacing is non-random and that people tend to cluster in the vicinity of objects as if they were treating them as indicators of the outer perimeter of the spatial domains claimed and as a device through which the established patterns of inter-personal spacing were finally stabilized and made more explicit.

The ninth and final chapter will be concerned with two tasks. First, it will recapitulate briefly the main conclusions developed throughout the analysis of our data. Secondly, it will attempt to indicate that the way the spatial architecture of a face-to-face encounter incorporates into itself and utilizes the spatial structure of its setting ought to be studied not only in terms of control over the access to and use of a given portion of physical space, but also in terms of control and processing of information about the interaction's context.

CHAPTER 1

SPATIAL ORGANIZATION IN SOCIAL INTERACTION

1.THE CONCEPT OF SPATIAL PATTERN IN INTERACTION

One of the basic distinctions which needs to be made here is the one between spatially patterned and unpatterned social interactions. In the case of interactional events which do not display spatial structuring of co-presences no sustained and meaningful pattern of people's interrelatedness can be found in the way postures, distances and orientations are used. This is a relatively rare situation which can be seen, for example, among people in the midst of a panic, or among troops interlocked in a melee of a hand-to-hand combat. An excellent example of an interactional event where spatial, orientational and postural relationships between people (and animals) are unstable and highly unpredictable is provided by Lewis Carroll in his description of the Queens Croquet-Ground :

> Get to your places ! shouted the Queen in a voice of thunder, and people began running about in all directions, tumbling up against each other: however, they got settled down in a minute or two and the game began. Alice thought she had never seen such a curious croquet-ground in her life ... the croquet balls were live hedgehogs, and the mallets live flamingoes, and the soldiers had to double themselves up and to stand on their hands and feet to make the arches. The chief difficulty Alice found at first was in managing her flamingo ... just as she ... was going to give the hedgehog a blow with its head, it would twist itself round and look up in her face ... and when she got its head down, and was going to begin again, it was very provoking to find out that the hedgehog had unrolled itself, and was in the act of crawling away: besides all this ... the doubled-up soldiers were always getting up and walking off to the other parts of the ground, Alice soon came to the conclusion that it was a very difficult game indeed. (Carroll 1970:111-112).

As a more down to earth example of an equally chaotic and spatially unstructured event consider the following eye-witness description of the reaction of a crowd of demonstrators to the intervention of the police:

> The police approached ... and cut their way deep into the crowd. People began to flee in every direction. Many found themselves between the groups of officers and some of these fell to the ground in an apparent swoon or shock of entrapment. Others who had been passed by at first, began to move in the direction of the remaining columns of officers. But on perceiving the additional sets of police, there were many cries of dismay and bumping of people, as some stopped short and others ran into them... (Wright 1975:149).

Or again, consider such a typical and ordinary situation as, for example, walking together and having a conversation:

> In 1939 Wittgenstein used to call at my rooms frequently to get me to accompany him on walks ... A walk with [him] ... was very exhausting ... He would walk in spurts, sometimes coming to a stop while he made some emphatic remark and looking into my eyes with his piercing gaze. Then he would walk rapidly for a few yards, then slow down, then speed up or come to a halt, and so on. And this uncertain ambulation was conjoined with the most exciting conversation ! (Malcolm 1958:31, cited in Poole 1975:99-100).

Of course, in terms of other instrumentalities, the interactional events cited are still analysable insofar as people tended, nevertheless, to systematically relate their behaviour to that of other individuals. However, in circumstances described it seems that this is done primarily in terms of taking into account neighbours' movements, appearance, vocal expressions and activity and very little through the maintenance of non-random patterns of spacing or body positioning.

Spatially structured interactions, on the other hand, are characterised by the occurrence of discernable and sustained arrays and formations created by individuals and groups of people through the non-accidental use of interpersonal distance and orientation, lateral and vertical displacements of the people's bodies as well as through the use of sustained postural relationships. A good example of a complex and spatially non-random interaction is provided by Castaneda :

> The area he [Don Juan] had selected was very rugged ... The young men sat down around me in a close cluster. One of them sat with his back against mine. I felt a bit embarassed. When Don Juan returned he commended them for their carefullness and told me that the young men were sorcerer's apprentices, and that it was the rule to make a circle and have two people back to back in the center when going on hunting parties for power objects ... Don Juan sat with his back against the boulder. The fire was to his right ... I watched the young men. They sat facing Don Juan, making a perfect half circle. I noticed that Don Juan was directly facing me and two of the young men had sat to my left and the other two to my right... (1972:244).

This situation is clearly different from the spatially unstructured interactions described earlier where the space between and around people provided the space where the action occurred, but did not play any further role apart from being a mere background for people's movement. Or again, consider an example given by a perceptive observer of nineteenth-century street life:

> In one of the most popular [street games] children formed a large circle and, holding hands, moved around singing ... Then the girl named would face outside of the ring, still holding hands, while others continued to face inside. The singing and circling began again to the second verse ... [then] another child was chosen and the chorus started again. This went on until everyone was facing outwards, after which the singers snaked into a single line and hopped the length of the street, chanting: hop, hop, hop to the butcher's shop..." (Roberts 1973:154).

Thus, in spatially structured interactions placement of people's bodies and the space between and around them are used in many ways : to accomplish a particular task, to bind participants in a given event into a set of clearly defined social and interactional units, to communicate certain values and messages, to inform participants and the onlookers of the 'normal' nature of the event.

Interestingly, the views as to what behaviour inderdependencies displayed within face-to-face interaction are normal and acceptable to interacting parties change both with time and place. For example, contemporary rapidity of troop movement and deliberate avoidance of rigid spatial-orientational relationships with enemy soldiers was some 200 years ago regarded as a confusing and stressful innovation. Austrian generals defeated by the young Buonaparte during the Italian campaign complained in their correspondence with Vienna that Napoleon was not fighting according to the usual and normal rules of warfare. For instance, he was deploying his troops in misleading fashion, was not distributing them in relation to the strength of opposing forces but rather relative to their own manouverability and fire-power, and was concentrating them against key positions during the battle itself and not, as was expected by the Austrians, prior to it.

the regularity and patternedness of spatial-orientational relationships between people appears to be the first and often the most important criterion of normalcy, not only of an interactional event, but also of the states of consciousness of the people interacting. The stability and predictability of the spatial framework, human and physical, in which we all operate, and which we tend to take for granted, may be sometimes undermined or lost, especially under hallucigenic drugs, or as a result of sight disorders or mental illness. For instance, Heaton reports the following remark by a woman suffering recurrent depression:

> When I feel ill, people seem big and near to me ...The world seems to be just where I stand and everything is closed in. When I feel better, things seem further away, and ... I can act again for there is a space between me and the others[1] (1968:154).

A similar expression of concern about the loss of normally existing

[1] The underlining is ours - T.M.C.

definite spatial relationships between people and the environment surrounding them can be traced in this account of a person under the influence of lysergic acid :

> The stability of the outer world is lost. Corners lose their rectangularity; solid objects move; lines and planes bend...The walls flap in the breeze like tapestries - they run like melted wax (Heaton 1968:154-155).

These observations pose a number of important questions about how people function, and at what cost, in (objectively or subjectively) spatially unorganized situations. However, this will not be the problem we shall here examine. We shall look, instead, at more stable and spatially well delineated interactions and we shall ask what their main characteristic features are, and next, how they are related to what people do and where people are.

2.SPATIAL FORMATIONS

In general, one can say that every place and each type of social event appears to have its own repertoire of possible constellations of static and mobile people. For this reason one can talk about spatial formations of people that are typical of parties, conferences, church services, weddings, duels, street demonstrations and riots, football matches or parliamentary sessions (Mead and Byers 1968, Abercrombie 1971, Goodman 1975, Wright 1975). Though at this moment it is difficult to list and classify all of them, since the systematic study of the spatial organization of social interactions have a relatively brief history and the available information is very scant, it is nevertheless possible to discuss some of the elementary principles involved. First, it should be noted that formations can be established by people engaged in a variety of postures and types of movement. They can be used by people walking, running, swimming, sky-diving[2], riding horses[3], dancing, kneeling, sitting, lying, squatting, standing and so on[4]. Thus, no particular type of activity or posture is exclusively associated with any of the spatial patterns delineated by people's bodies.

Of course, the use of stable spatial and orientational patterns of co-presence is not exclusive to Man only. For example, Wilkinson in his study of Eskimo hunting techniques notes that

> When threatened by predators, musk oxen usually adopt a loose, semi-circular or linear formation facing the predators. The mature bulls occupy the most vulnerable positions at the front and sides. Calves are protected between the flanks ... The phalanx is maintained until the danger has passed, except for occasional threatening sallies by individuals, which are often disciplined by the dominant bull. If predators approach within the range, the musk oxen may attempt to gore them with [their] horns ... but the horns are secondary in defence to the group-formation (1975:20-21).

Wilson writes that essentially similar defensive configurations and arrays are adopted by the eland (Taurotragus oryx) and the water buffalo (Bubalus bubalis). Another type of spatial formation, known as "windrows" in which animals are spread out 'in staggered rows that present a broad front to the wind' and which are adopted for catching the scent of predators from one direction while maintaining continuous visual surveillance in nearly

[2] See for example a photograph published in the Canberra Times 23 August 1974 showing 31 paratroopers forming a near perfect circle by linking their hands, turning their heads toward the center of the formation and orienting the frontal parts of their bodies toward the earth - all being performed in a free fall at an altitude of 3,500 m over California. They all jumped from the same aircraft and completed the formation in 40 seconds.

[3] 'General Monk, writing in 1646 seems to suggest [that] the cavalry are to be drawn up to three ranks deep, with the troop or regiment formed in subdivisions of ten to twenty files each, with an interval of 20 yards between subdivisions ... charges were made in close order, knee to knee.' (Gush 1973:22).

[4] It is worth noting here, perhaps, that cars, motorcycles, chariots, tanks, canoes or sledges can also be used to create highly regular and purposeful arrays of men and machines. Among them most obvious and spectacular are battle formations adopted by warships and combat-aircraft, the latter frequently forming 3 dimensional mobile configurations.

all other directions are characteristic of the elk (Cervus canadiensis). However, red deers (C.elaphus) and killer whales (Orcinus orca) seem tu favour still another type of defensive configuration, namely rough circles in which individuals face outwards, so that all approaches are undersimultaneous control (Wilson 1975:45). Thus it can be seen that regular and stable patterns can be formed by people, animals and machines alike and that the only requirement for a formation to occur is the maintenance of a certain spatial-orientational relationship for some period of time.

However, it should also be noted that these spatial configurations are by no means rigid and immutable. On the contrary, participants do have a certain freedom of behaviour: they can be positioned closer or farther apart, be more or less directly oriented toward each other, stay at the same or at different levels, with or without some degree of lateral displacement and still sustain a given type of formation as long as the basic spatial-orientational-postural relationship pattern is adhered to.

Thus, a spatial formation can be said to exist as long as a set of rules underlying the manner of its maintenance and functioning is observed by people who take part in a given face-to-face interaction. Once it is achieved a formation will continue to exist despite changes in its location within its wider spatial context, despite turnover in participants, despite changes in their numbers, despite changes in arrangements, despite territorial intrusions by strangers and outsiders, and finally, regardless of transformations in people's line of activity or in the purpose for which the formation was brought into existence.

This continuity of formation is demonstrated in a number of investigations. Thus, that the existence of a queue as a system of spatial and orientational interrelatedness is perfectly independent of the number of participants, their identities and spatial intrusions by outsiders has been nicely documented by Stilitz (1969). He found that the interpersonal spacing between people in queues in ticket halls of the London underground was practically independent of the number of people in such formation (1969:830). Another finding was that a queue continued to exist despite frequent interference on the part of people passing through it. Thus, one of the queues formed in front of a ticket window at Oxford Circus station was seen to successfuly withstand as many as 76 people cutting through it during a single 5 minutes interval. Stilitz writes that such 'interference starts when a queue exceeds about 4.5 m in length. Beyond this point, about one person per minute passes through per metre length of a queue' (1969:30).

Some further examples are provided by observations made of people walking. Knowles (1972) in a series of field experiments on the behaviour of walking dyads, established that on average two-thirds of all two-person side-by-side mobile formations do manage to maintain the integrity of their spatial formation even when engaged in a series of manouvers aimed at detouring an oncoming pedestrian threatning to cut the space between them. Finally Kendon's (1977) observations of a small, face-to-face conversational gathering showed that though during a period of less than 4.5 minutes the formation changed the number and identity of its participants six times the stable spatial-orientational relationship between them was retained intact[5]. In addition it was demonstrated that

[5] The observed changes in the gathering were as follows : the spatial formation was formed, with A+B in it; then it changed successively to A+B+C, C+B, A+B+C, A+B, A+B+C again, and A+C, after which the group dispersed.

the formation was maintained in the face not only of changes in interpersonal orientations and distances, but also of changes in the spatial orientation of the whole group as well as in the formation's location.

3.ELEMENTARY FEATURES OF SPATIAL FORMATIONS

Typically, in this field, to paraphrase Milgram and Toch (1969), it has not been a case of WHAT has been studied, but WHERE things have been studied. Yet it appears that in order to understand people's behaviour in face-to-face interaction adequately a formation ought to be the object of systematic investigations and not merely the locus where particular kinds of behaviour are examined. In this section we shall discuss the following features in terms of which a formation may be analysed : (a) its basic shape; (b) the spatial-orientational arrangements used; (c) the type of spaces generated; (d) the degree of orientational 'polarization' of the participants; (e) the positioning of the focal points of a formation; (f) sharpness of boundaries; (g) type and degree of movement possible in a formation; and (h) the ways in which a formation may gain and lose its participants.

Let us review these eight formal aspects of the spatial structure of a face-to-face encounter. This will be done by discussing examples of real-life spatial configurations observed and recorded in various places and contexts. The spatial-orientational patterns adopted are illustrated in Diagram I and refer to the folloving interactional events:

Fig 1. A horizontal queue of people at a taxi rank (Canberra). All participants are standing. Source: a photograph in author's collection.

Fig 2. The japanese tea ceremony (ANU, Canberra). All participants are kneeling. Source: a photograph in The ANU-Reporter 24 Oct. 1975

Diagram I

SOME SPATIAL FORMS OF FACE-TO-FACE INTERACTIONS

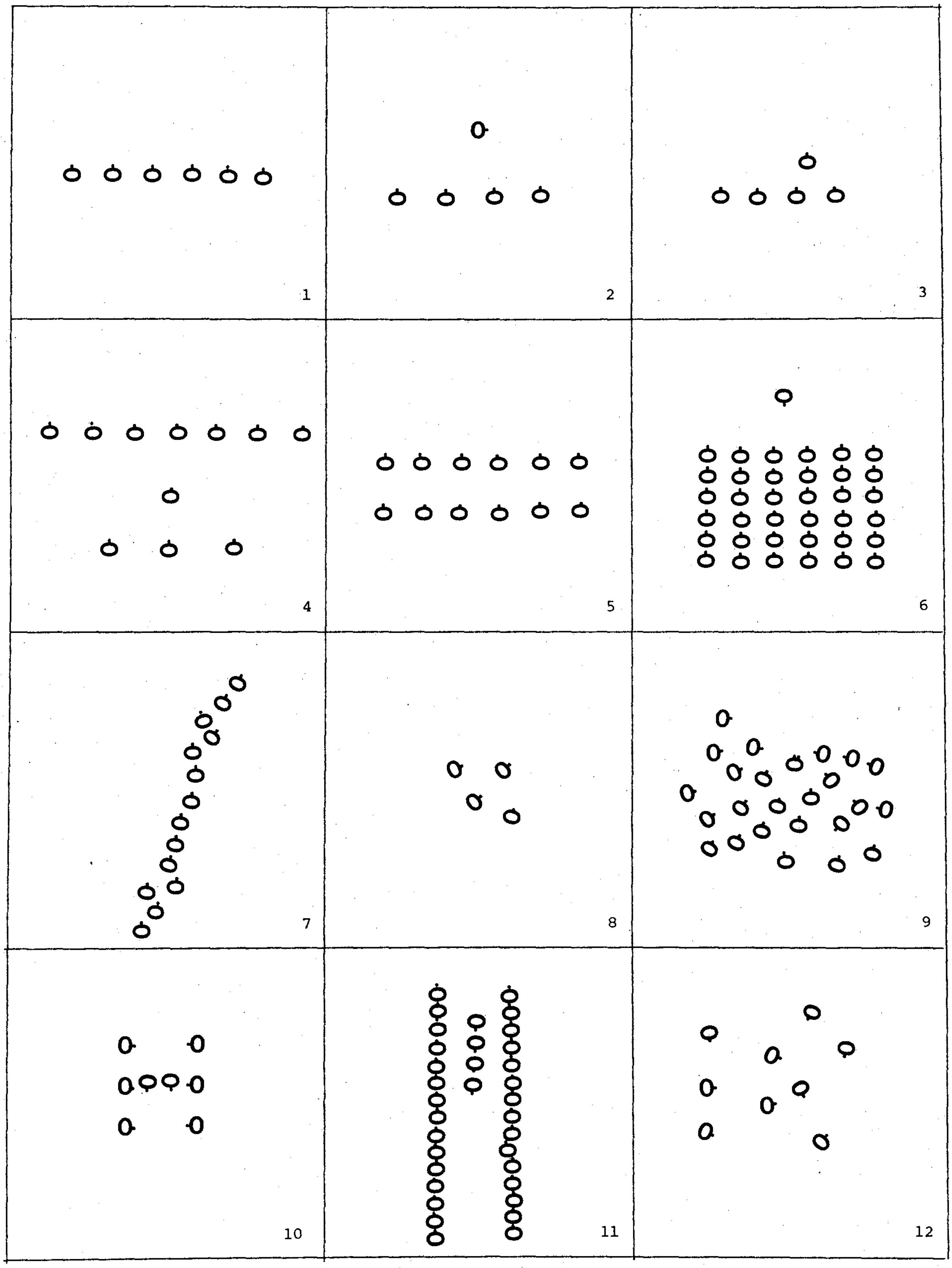


Fig 3. A mobile formation (New York). All participants strolling. Source: a photograph in Scheflen and Ashcraft (1976:102).

Fig 4. The so called "T-formation" used as an attacking formation in American football. All participants are standing. Source : a drawing in The New Encyclopeadia Brittanica 1974, Macropaedia Vol 7:514-516.

Fig 5. An arrangement of twelve persons on a firing range (Essex, England). The people in the first row are aiming their revolvers at targets. All participants are standing. Source: a photograph in The Canberra Times 2 May 1977.

Fig 6. An arrangement of people in a lecture room (ANU, Canberra). The person in the front of a gathering is standing, the rest of the people are sitting. Source : a photograph in The ANU-News April 1974.

Fig 7. A linear queue of students during a commencement ceremony (ANU, Canberra). All participants are standing. Source : a photograph in The ANU-News April 1974

Fig 8. A group of spectators in front of a painting in an exibition hall (ANU, Canberra). All people are standing. Source: a photograph in The ANU-Reporter 27 Sept. 1974.

Fig 9. A group of people assembled around the Shahanshah (marked with two dots) on his inspection tour of farms in Fars province (Iran). All participants are standing. Source: a photograph in The Iran Tribune, Feb. 1974.

Fig 10. A bride and a bridegroom leaving a chapel (Canberra) under a military guard of honour. All participants are standing. Source : a photograph in The Canberra Times, 21 Oct. 1974.

Fig 11. A religious procession (during Easter ceremonies) walking through an archway of candles held by penitents in robes and conical hoods (Sevilla, Spain). All participants are standing. Source : a photograph in The Canberra Times, 1 April 1975.

Fig 12. An informal group of people relaxing during a break in a conference (USA). All particiants are sitting on the ground. Source : a photograph in Mead and Byers (1968:104).

Fig 13. A three-person conversational cluster. All participants are sitting on the ground (Mexico). 'It was late in the afternoon. Don Juan was sitting on a flat rock facing the western mountains; Don Genaro was sitting by him on a straw mat with his face towards the north. Don Juan had told me, the first day we were there, that those were their 'positions' and that I had to sit on the ground at any place opposite to both of them. He added that while we sat in those positions I had to keep my face towards the south-east and look at them only in brief glances'. Source : Castaneda (1973:100).

Fig 14. An arrangement of girls dancing an Indonesian "welcome dance" (Canberra). All participants are kneeling. Source : a photograph in The Canberra Times 11 Nov. 1974.

Diagram I

SOME SPATIAL FORMS OF FACE-TO-FACE INTERACTIONS

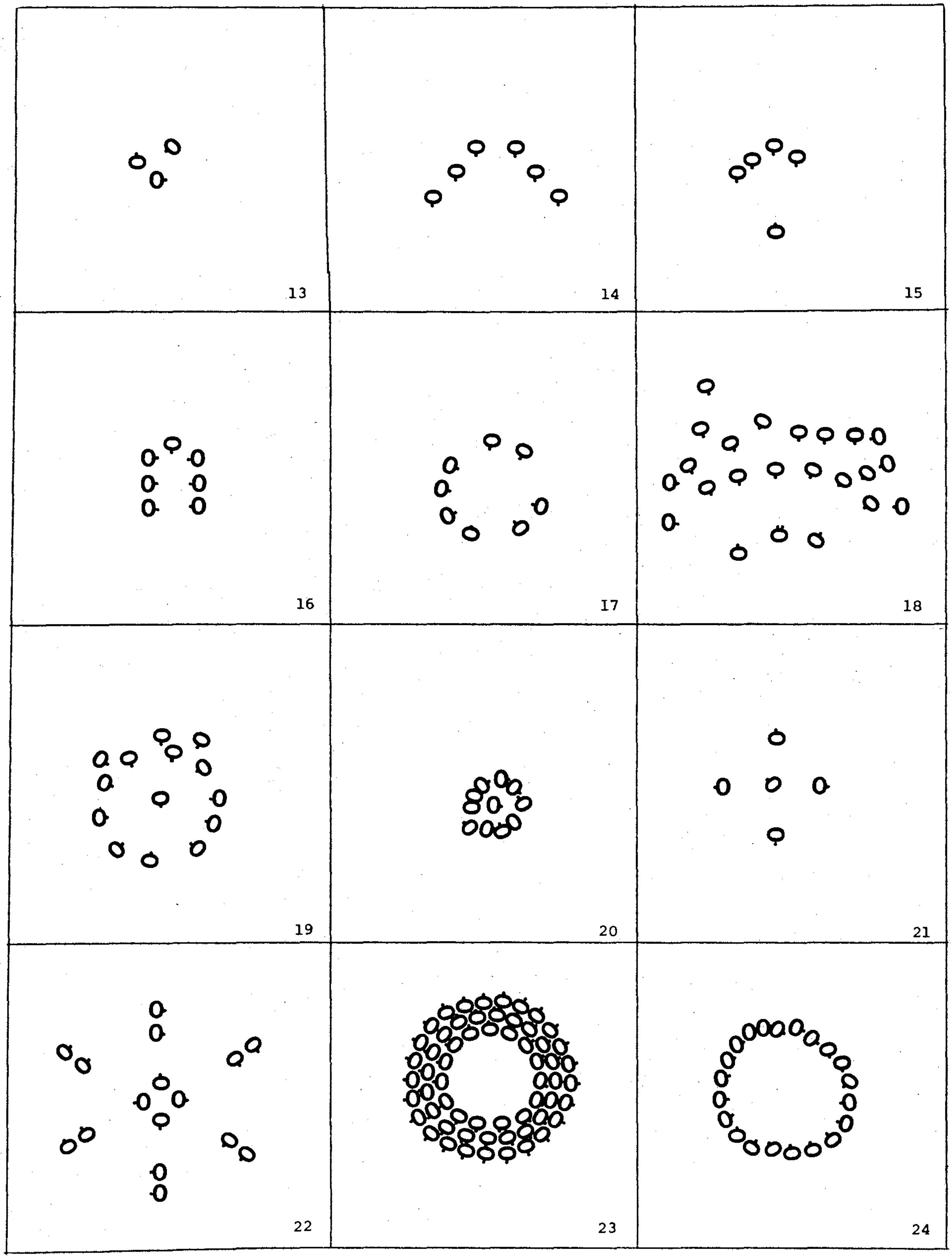


Fig 15. A group of people being photographed by a news-reporter (Canberra). All participants are standing. Source : The ANU-News Nov. 1974.

Fig 16. A colour party during a military oath swearing ceremony (Poland). The soldier marked with two dots holds a banner. Source : a photograph in author's collection.

Fig 17. An eight person conversational gathering (USA). All participants are sitting on the ground. Source : a photograph in Mead and Byers (1968:1Ø3).

Fig 18. A group of people listening to a man (marked with two dots) playing a guitar (USA). All participants are sitting on the floor or on chairs and divans. A person at the back of a gathering is standing and taking a photograph of the player. Source : a photograph in Mead and Byers (1968:1Ø2).

Fig 19. A ring of people listening to and watching a person in the centre (USA). All participants are standing. Source : a photograph in Scheflen and Ashcraft (1976:117-119). See also a photograph of several such rings at a market place in Northern Africa in Milgram and Toch (1969:519).

Fig 2Ø. Eleven bishops from dioceses throughout Australia place their hands on the head of the newly consecrated bishop. All participants are standing, apart from the person in the centre who is kneeling. Source : a photograph in The Canberra Times 21 Oct. 1974.

Fig 21. An arrangement formed by four men guarding an individual in the centre. All participants are standing, apart from the person in the centre who is standing or squatting. 'Napoleon travelled with the Guard, astride his black horse Marengo. If he had to dismount to satisfy a physical need, four cavalrymen dismounted also, formed a square around Napoleon facing outwards, and with fixed bayonets presented arms'. Source : Cronin (1976:387-388).

Fig 22. A formation used by exercising prisoners (Moscow). 'Rubashov... stood at the window with his forehead against the pane, and watched the prisoners during their round exercise. This occured in groups of twelve at a time, who circled round the yard in pairs at a distance of ten paces from each other. In the middle of the yard stood four uniformed officials who saw that the prisoners did not talk; they formed the axis of the roundabout, which turned slowly and steadily for exactly twenty minutes'. Source : Koestler (1941:1Ø7).

Fig 23. A formation used by 17th century soldiers (England). 'A standard formation for receiving cavalry seems to have been to have pikemen in close order in the centre, their pikes covering and projecting beyond two lines of musketeers, the foremost line kneeling, the second standing'. Source : a drawing and a note in Gush (1973:15).

Fig 24. A circle of dancing people, rotating clockwise (Sweden). All participants are standing. Source : a photograph in Sweden Now 1, 1975.

a.Shape

The spatial patterns illustrated in Diagram I show that people in face-to-face interaction form a whole range of arrays of different shapes and appearances. These may be lines, files, lanes, squares, circles, rings, triangles, wedges, columns, stars or semicrescents, to name just a few of them. The geometry adopted by a gathering is not haphazard or arbitrary. These forms appear to reflect the function of a given social encounter (Wright 1975:103-135, Goodman 1975). Triangular gatherings, for instance, are used when an individual or a small group of people addresses the rest of the gathering arranged in a series of rows placed one behind the other (Fig.6). The near perfect circular forms are used when people, in terms of their roles are, in relation to each other or in relation to some external individual for all practical purposes, equal. For instance, Mead and Byers observe that 'Circles are a common form of planned informality. They can be widened to embrace anyone who comes; they allow maximum visual contact among the participants, and they imply an equality of social participation' (1968:93). Lanes, as their very name indicates, are formed when the use of the space between the two opposing rows of people is required for a procession of other co-participants in the event. Amorphous clouds of people are established when the main requirement is freedom of movement, for example, when a platoon of pedestrians moves across a street crossing.

It should also be remembered that the shape of a gathering is influenced not only by the purpose for which the gathering was formed, but also by the physical context in which the gathering operates. Thus, furniture arrangement, the placement of props and of edges of rugs or the location of entrances and windows may have, and usually do have, a powerful effect on the way people will space themselves in relation to each other (Scheflen and Ashcraft 1976:135-154, Mead and Byers 1968, Sommer 1961,1966a,1967b). The establishment of long and perfectly straight lines of people, their placement at unmistakably ninety-degree angles, or in horse-shoe or circular formations, is usually accomplished by the use of such devices as railings, stalls or tables and chairs. In other words, fixed and semifixed features of environment can be seen not only as objects where people may comfortably sit, eat or write, or which influence people's activities, but also as moulds which shape the geometry of the gathering and iron out most of the irregularities and idiosyncracies in distribution of people relative to themselves and their environment (Mead and Byers 1968).

b. Spatial arrangement

Another important aspect of a gathering is the arrangement or placement of people in relation to their immediate neighbours. This placement can be described both in terms of relative distance and of the angle of interpersonal orientation. Some of the formations by their very definition require their participants to be spread apart. For instance, contemporary Western soldiers in "extended line" formation are 'constantly warned to keep five yards (4.5 m) apart at all times' (Wintrigam and Blashford-Snell 1973:253)[6]. Other formations to be established and sustained require their participants to be standing very close to each other. For example, the "ring" used by 17th century pikesmen against cavalry attacks placed men 6 inches (15 cm) apart (Purton 1973:16). Similar distances were used by columns of troops maintaining a breach and by units trying to listen to orders.

[6] In comunist military doctrine this distance is even greater and the recruits during excercises are spread out at 7-11 paces intervals (4-7 m).

As far as interpersonal orientation is concerned some formations place people side-by-side (Fig.1), and others vis-a-vis (Fig.17), or face-to-back (Fig.7). Frequently more than one type of interpersonal orientation is used. There are, for example, formations which combine side-by-side arrangements with face-to-back (Fig.5) or vis-a-vis (Fig.16) ones. There are, also, formations which do not have clearly a specified type of orientational relationship (Fig.12) and where the coordination of people's co-presence is achieved by maintaining more or less equal spatial intervals between individuals. Also, it is useful sometimes to distinguish between formations which do accentuate the need for clear-cut spatial and orientational patterns (Fig.4, 6, 10, 13, 14, 16, 22, 23) and those where individuals have some degree of freedom with respect to the use either of interaction distance (Fig.17, 19), or orientation in relation to neighbours (Fig.24) or both (Fig.18).

c. Type of spaces generated

The third criterion which may be used in description of people's spatial behaviour is related to the type of spaces generated by a given formation (Milgram and Toch 1969, Wright 1975, Kendon 1976,1977, Scheflen and Ashcraft 1976). Some of the formations are established in such way that they create an inner space which is used as a forum for subsequent activities. For example a "guard of honour" creates a space contained between two parallel lines of people (Fig.10). The inner space delineated by the bodies of the people can also be seen in a "conversational cluster" (Fig.17) where exchange of glances, gestures, cigarettes and words occurs; or in a "ring of spectators" surrounding a performer (Fig.19) (Milgram and Toch 1969). In some cases the inner space is created by people in a formation not so much for the purpose of using it themselves but rather for excluding outsiders from it, as in the case, for example, of the "hollow ring" formation (Fig.23). There are also situations in which the formations adopted do not divide inner from outer space but rather a frontal from a rear area (Fig.1)[7]. Finally there are formations which do not generate sharp distinctions between inner and outer, or front and back spaces and which only distinguish between freely available and occupied spaces (Fig.12, 22).

d.Degree of orientational polarization

The fourth criterion, which was found useful in an analysis of the properties of spatial formations is the gathering's polarization. Milgram and Toch (1969) who were first to apply this concept to a study of the macroscopic properties of crowds define it as a measure of 'mental unity' or 'commonality' which enables a researcher to specify borders of formations contained within larger agglomerations of people and to delineate subgroups within a given formation. By polarization, in operational terms, they meant a degree of coordination or co-alignement of people'spatial orientations[8]. For example, when a gathering is highly polarized, as in the case of a ring of spectators (Fig.19) or of an audience listening to a lecturer (Fig.6) people's frontal body surfaces are so oriented, that if projected forward they will overlap or join creating thus a space endowed with the maximal people's attention. There are also formations in which polarization is low due to chance (Fig.12) distribution of people's individual orientations, or due to the deliberate design (Fig.21). In the latter case people semed to be deliberately arranged in such a way that their fields of attention would be uniformly distributed all over the area surrounding the formation itself.

[7] In this case it often happens that the front space receives most of the attention or activity on the part of people in the formation while the back areas are either not of special importance or are protected from some threat situated in the front area.

e.Position of focal points

A criterion closely related to the problem of polarization is the number and spatial distribution of a formation's focal points. If every formation is established so that people can accomplish certain goals and tasks, and if the tasks to be performed require a certain amount of physical space, it is obvious that the location of the crucial and basic areas where these actions and tasks are preformed may be objectively observed and studied. There is quite a variation in the ways a formation's focal points can be distributed in relation to the gathering's shape and the established spaces and areas. In the case of people forming queues, the focal point appears to be located in the place toward which every individual slowly makes his way. In the case of a "guard of honour" (Fig.10) there is no single particular focal point, since the whole space stretching from one end of the lane to the other is treated as being of great importance. In the circle of a conversational cluster (Fig.17), the same principle can be observed: there the whole space contained in front of the bodies of the participants appears to be the place where people allocate their attention and where they carry out their interpersonal exchanges. Slightly different is the case of a "hub" or ring of onlookers (Fig.19). In this case the space delineated by the placement of the outer ring of people is merely a stage for a shifting focal point identical with the body of a person standing in the center of the hub. Triangular formation in Fig.15 is more complicated. There the accent appears to fall either on a single person facing the rest of the formation (as in the case

[8]The method they used was quite ingenious. The group's polarization was represented simply as a value obtained by dividing the number of people oriented towards a certain point of reference (i.e sharing same point of interest) by the total number of people in the formation or seen within the setting.

of a individual standing in front of a firing squad), or is associated both with the solitary person and the group of people he faces (as in the case of taking a commemorative group photograph).

f.Sharpness of boundaries

Formations may differ from each other also in terms of the clarity of their boundary definition. Formations such as those represented by Fig. 1, 5, 6, 11, 14, 17, 23 and 24 have clear-cut edges. In their case there is no ambiguity where the formation starts and ends. A less clear impression, however, is conveyed by formations of the type represented by Fig.4, 9 and 18. In these clusters of people the basic group-occupied territory can still be established but the outline of the formation's boundary is not obvious and can even be subject to conflicting interpretations. Finally there are also cases of gatherings where the boundary between the intra- and inter-formation spaces and areas is obscure indeed (Fig.12, 13, 22), and where the distinction between these two domains must be made somewhat arbitrary - for instance by linking with an imaginary line the centers of the bodies of neighbouring individuals. The clarity (or lack of it) the boundary definition may have, sometimes, important consequences for the functioning of a gathering as a whole. It may be expected that formations with clearly formulated boundaries will tend to give rise to well concerted actions by people, motivated to some extent by a heightened "we" feeling. Such feelings of "togetherness" and of "fully fledged participation" appears to be lacking in those formations which whether accidentally or by design (Fig.22), do not articulate their perimeters clearly enough. In the case of such "ill-bounded" participation units, one may expect that people will tend to interact with each other mainly through the use of some spatial-orientational instrumentality, and less often at the level of other communicational faculties.

g.Type and degree of movement

The next criterion which can be applied to the analysis of various types of formations is the type of movement used by people in a formation. This criterion is especially useful in distinguishing between formations which in terms of their geometry, arrangements, polarization or permeability are not sufficiently dissimilar. Thus, a file of people, for instance, can be used in two ways: firstly, as a static or semi-static formation such as a " linear queue" in which people are either standing stationary or occasionally moving, usually one person at a time, one or two paces forward; or secondly, if all are moving forward simultanoeusly, as the formation usually described as an "indian file". The geometrical pattern illustrated by Fig.1 can be used in a more varied manner. Firstly it can be adopted as a stationary "line" of onlookers, guards, etc. Secondly, it can be transformed into "horizontal queue" in which people are moving, usually, one at a time, to their left or right, as often can be seen among people standing along a contour in a self-service cafeteria or at a taxi-rank. Thirdly, this line of people can be transformed into a mobile formation, for example into an "extended line". The geometric pattern characteristic of Fig.5 can also be used for a variety of purposes. As a stationary formation it is a common way of arranging spectators in theatres and lecture rooms, or soldiers on parade-grounds. However, this is also a very typical marching formation, characteristically used in formal ceremonies, sport processions and military excercises. On the other hand, if not all of its participants are moving forward at the same time, but only one row of people, who upon reaching the front rank retreat individually to the back of a formation (moving in spaces between the files) and rearrange themselves there in a new rank this formation will be known as a "caracol", a very popular configuration on the battlefield in the 16th and 17th century[9].

h.Change of participants

The final issue which should be mentioned here is the way a formation may acquire or lose its members. It is a question of where, if anywhere, a newcomer may be permitted to join the formation. In some cases it is possible for such a person to occupy any location in relation to the rest of a gathering (Fig.12). In other instances a newcomer may join the formation anywhere providing, however, that he does it within the already formed ranks of participants (Fig.17,24). In other cases again, only some portions of the whole formation are accessible to a newcomer. This is nicely illustrated by cluster no 6, where a newly arrived person may stand or sit in any row or column at the base of the large triangle, but never next to the place occupied by a person standing at the apex of the whole formation. There are also instances when the formation provides only one possible place for an outsider. In the linear queue, for example, that place is situated behind the back of the last person in the formation, or, in horizontal queues, at the side of the person standing at the opposite end to the formation's focus of interest.

[9] 'As in most fields at this time, infantry tactics were undergoing a change from the older systems... to the newer Swedish methods. The older systems involved formations of nine or ten ranks deep. This was mainly dictated by the time taken to load a matchlock, and under this system musketeers would normally fire one rank at a time, then file to the rear and reload. By the time the other nine men in his file had fired, the musketeer would be back in the front rank and would have reloaded. The formation as a whole would gradually retire while performing this evolution (though with skilled troops it could be modified to a gradual advance). Gustavus Adolphus, by speeding the loading of his men, had made possible the Swedish order of only six ranks deep' (Gush 1973:14).

To recapitulate, we may analyse any spatially structured event in terms of several aspects. In this chapter we have listed the most important of these. It seems that an analysis of these formal features of face-to-face interactions may help to throw some additional light on the organization of social interactions. These various aspects of the coordination of people's co-presences can be seen as correlates of social order prevailing in a given group and given community. On the other hand they may also be viewed as matrices giving birth to this order[1Ø], or as scaffolding which sustains the social order throughout the interpersonal exchange and safeguard it against people's unpredictable or idiosyncratic actions. What is more, as we shall see in the later parts of this dissertation, the way people spatially organize and structure their co-presences can also be viewed as a means for relating the ongoing interaction to its immediate surrounds, both physical and social.

[1Ø] As Abercrombie observes, '[spatial] conventions... not only demonstrate the roles to be played by people, but support the people in their roles and make it difficult for them to adopt alternative ones' (1971:399).

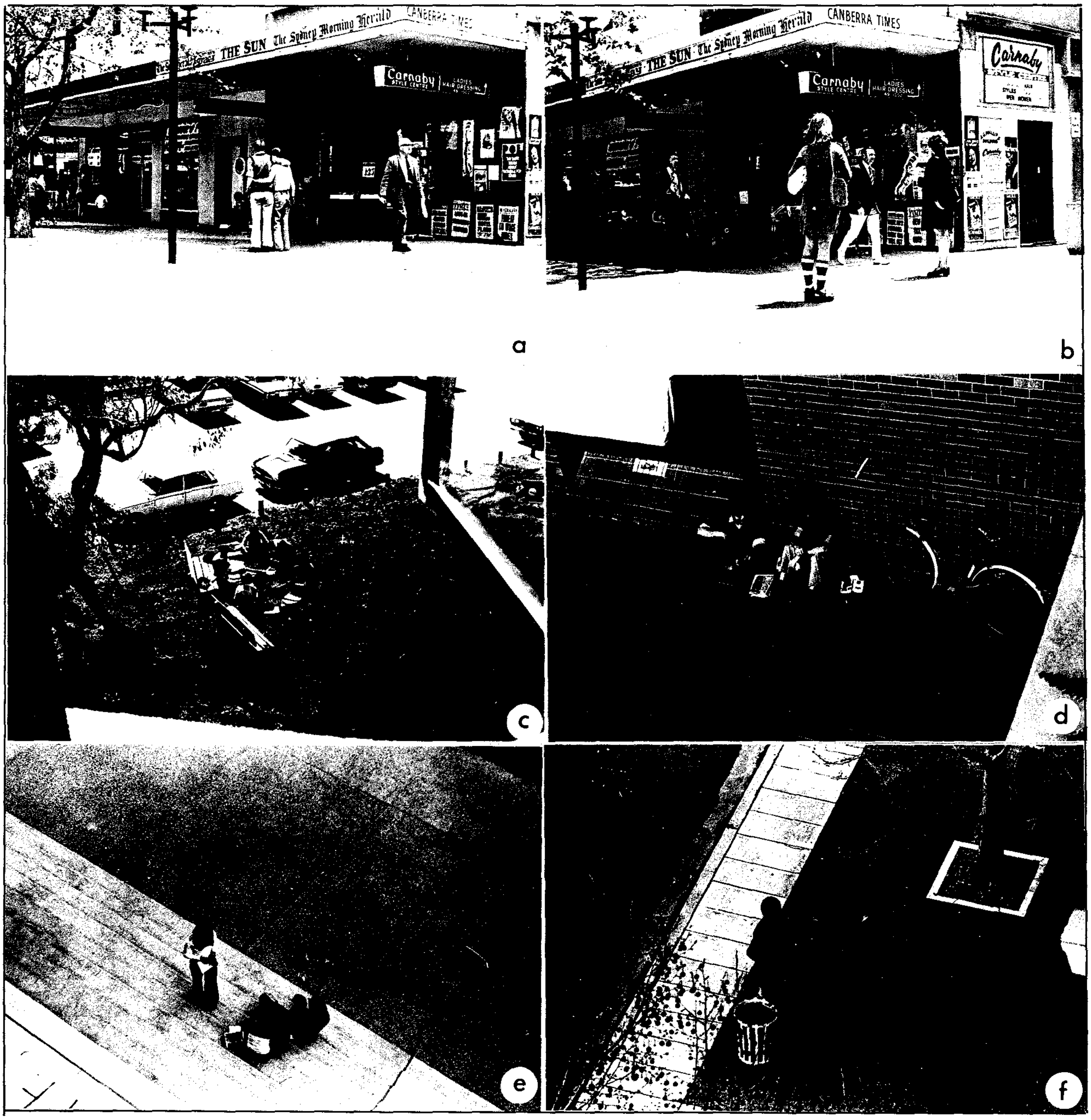
CHAPTER 2

THE PHENOMENON OF THE F-FORMATION

Having described certain characteristics of spatial formations in general we shall from now on be concerned with examination of one type of formation only, namely small-scale, usually static (non-mobile) formations, roughly circular in shape, in which people are placed at fairly small distances from each other, either side-by-side, or at more direct angles of orientation. In such a formation, the bodies of the participants form a small internal space to which all of them have easy, direct and equal access. Further, the formation in question is characterized by a high degree of polarization, a very clearly delineated boundary and even distribution of focal points along the perimeter of the internal space. Finally, it should be noted that this is a formation in which a newcomer may occupy a location only within the circular belt of members, and unless they are 'widely dispersed, this space may have to be created for him. Those already present have to move closer, or at least two of them will have to move laterally to open a place of entree. In some cases, those already engaged may refuse to do this or actually move closer together' (Scheflen 1971:448).

The participation within such a formation is usually spontaneous and the spatial pattern just described can often be seen in the cluster of a free standing conversing people or among people who have gathered to play cards or eat together. It is a formation which may be formed at almost any time and anyplace, in 'all those instances [when] ... two or more

SOME EXAMPLES OF F-FORMATIONS



participants in a situation ... [join] each other openly in maintaining a single focus of cognitive and visual attention ... a single mutual activity, entailing preferential communicational rights' (Goffman 1963:89).

This phenomenon is so widespread that it is practically a standard feature of most everyday social interactions. This kind of formation was first given systematic treatment by Kendon (1976,1977) and was termed by him an F-formation. In the ensuing account of the F-formation we shall closely follow Kendon's analysis, and his terminology. Interestingly, F-formations did not receive much attention from researchers even when other much less frequent phenomena, such as "rings of spectators", queues, psychotherapeutic groups or demonstrating crowds were already subjects to formal (Milgram and Toch 1969, Fry and Willis 1971, Wright 1975, Mann 1977), sociological (Mann 1969, 1970, 1972) and psychological (Neff 1974) analysis. Thus, the whole issue of a formation generating a joint interactional space largely remains a terra incognita, which richly deserves systematic attention and examination.

Prior, however, to embarking on any discussion of the properties of formations where people create joint interactional spaces it is necessary to provide more formal and detailed criteria for recognizing these formations and for delineating them unambiguously both in time and in space. To do this, one has to consider first the use of space not by whole groups but rather by individuals.

1.THE CONCEPT OF A TRANSACTIONAL SEGMENT

Closer observation of individuals engaged in various solitary activities reveals that people in their transactions with their environment use the available space in very selective fashion. They never

SOME EXAMPLES OF F-FORMATIONS

allocate their actions at random, nor do they use the space surrounding them evenly. The reason for such selective allocation of attention and behaviour lies in the way human organisms are built. Limbs can be used effectively only within a highly circumscribed space-bubble stretching in front and to the sides of a person's body (Dempster et al 1959). Though the field of peripheral vision is some 180 degrees wide, the zones of general vision, clear vision and detailed vision are far narrower, encompassing cones of 60, 12 and 1 degree respectively (Hall 1963, 1964, Bioastronautic Data Book 1964:322). Furthermore, the existing studies demonstrate that the speech signals generated by a person reach farther to the front then to the sides or to the back (Kryter 1972:167)[1]. It is natural then that the sector of space where an individual tends to direct the majority of his actions will occupy a relatively narrow area in front of his body. There he can have the best possible access to the external world and stimuli originating in this area may reach him most efficiently. Of course the fact that people's actions are usually limited to a rather circumscribed segment of the total environment is somewhat obscured by a simultaneous observation that various parts of the body like the eyes, head, upper trunk, hips and legs can be addressed at the same time, but separately, to different parts of the environment. Furthermore, it also can be seen that they can be used in conjunction so that a reorientation of one body part increases immensely the range of effective movement of another body part. For example the eye's total range of scanning is up to 35 degrees to each side (Woodson et al 1972:392). This range can be easily increased by a further 80 degrees by rotating the head and neck area to the left or right (Hertzberg 1972:544). In addition to these

[1] For instance, engineering handbooks recognize that 'the maximum unaided throw for a speaker's voice is 50 ft to the front and within an arc of 140 degrees' (Taylor 1967:61).

movements the rotation of the shoulder area by some 90 degrees makes it possible to scan a total field of up to 205 to each side, all without having to move the hips and legs from the original head-on positioning. This flexibility of various parts of the body enables people to attend to different portions of the space around them without having to move the whole body every time their actions are to be performed in the sector of space which are not directly in front of them[2].

Yet, it should be stressed that under usual circumstances a person can function easily, efficiently and for prolonged periods of time only when all body parts are co-oriented in such way that they are addressing no more than a limited segment of space directly in front of him. For this reason the sector of the environment in front of a person is the area where most activities can be and are located, and where people have the greatest degree of control over their environment. Accordingly, this space can be referred to as an individual's "basic use-space" or an individual"s "transactional segment" (Kendon 1976,1977).

Usually such a transactional segment is used exclusively by the person who generates it, and other people in the vicinity are not allowed to intrude into it[3]. For example, when a person is engaged in writing he does it within a small zone of space extending between himself and a writing pad and he will carefully maintain his exclusive access to this

[2] There are, of course, some exceptions. For example: 'Colonel Nai-Turs took the piece of paper and, with his habitual twitch ... of his clipped mustache, marched out of General Blokhin's office without turning his head to left or right (he could not turn it, because as the result of a wound his neck was rigid and whenever he needed to look sideways he was obliged to turn his whole body)' Bulgakov (1973:127)

[3] It should be noted here that the concept of a transactional segment seems to be analogous to that of a personal field or a social force field suggested by McBride (1971:55) in his discussion of patterns of animal spacing.

space. Other people will keep their limbs and frequently even their gaze clear of this area, so that the person has a full and unrestricted control over events occuring within his basic use-space. This applies, naturally, to all other activities. For instance, 'when he [a gallery visitor] is close to a picture, other patrons will make some effort to walk around his line of vision or excuse or minimize their momentarily blocking it' (Goffman 1971:58).

When an outsider happens not to respect one's transactional segment and intrudes into it with his body or posessions this may cause uneasiness, annoyance, withdrawal or apprehensive remarks on the part of individual intruded upon. These reactions are likely to occur even when an outsider does not interrupt or hamper activity which was allocated in the person's transactional segment. This is illustrated by the following excerpt from a novel:

> Today, when he [Professor Peter Kien] was standing in front of a bookshop on his way home, a little boy had stepped suddenly between him and the window. Kien felt affronted by the impertinence. True, there was room enough between him and the window. He always stood about three feet away from the glass ... by keeping his distance from these venal and common books he showed his contempt for them ... [furthermore] the boy was quite small, Kien exceptionally tall. He could easily see over his head. All the same he felt he had right to greater respect ... (Canetti 1965:13-14).

Obviously, people's transactional segments are not rigidly delineated and fixed[4]. Generally, they tend to vary with the body size of a

[4] Though, one has to admit, it may be the case under some special circumstances. For instance: ' ...it could be seen in the transit stations set up in 1945 for newly released prisoners of war ... [that] ... when they sat down to a meal in the canteen, some of them went so far as to draw chalk lines on the table to define the elbow room they wanted ...' (Knipe and Maclay 1973:56). Also, for some specific research purposes one may find it useful to treat people's transactional segments as if they were of a definite and constant size and shape. For example this was the approach adopted by Deutsch (in press).

person, his posture and the way he spreads his limbs and positions himself in his physical environment. Thus, when people are asleep, or stand with their face close to a wall, or when they lie down on their stomachs, their transactional segments can be said to be considerably reduced in size or even "switched-off" entirely. Furthermore, 'a man sitting over a book has a narrow, highly circumscribed transactional segment. A man sprawled on a sofa watching television has a wide transactional segment that extends at least as far as the television set' (Kendon 1976:292). A transactional segment does not have to be associated with a single, fixed spot; it can be carried around during a person's transitions through various parts of the milieu he uses or inhabits. Also, it does not have to be associated with any specific activity, for as long as an individual is sitting, standing, walking or running, - he is always creating and making use of a transactional space of some size and shape. For example, for a walking person the basic use-space stretches some 1 to 3 paces ahead (Fruin 1971:26-27). It has also been observed that 'oil-painting requires a certain distance between the artist and the picture. This can be 3 feet or more depending on the size of the picture ... so that he can see it and paint it simultaneously, moving from area to area without being held up at any particular point' (Parramon 1972:43). To recapitulate then, the transactional segment is a space which does not have any specific size and which does not exist by itself, but is always generated and sustained by a particular activity which requires the use of some area stretching in front of the actor.

2.THE PHENOMENON OF THE F-FORMATION

Having thus defined the concept of a transactional segment, it becomes easier to define the concept of an F-formation. While individuals in unfocussed interactions usually seek to avoid interfering with each other's transactional segments by staying well apart, or by orienting themselves away from nearby people[5], persons initiating a focussed face-to-face interaction tend to behave in just the opposite way. Scheflen writes, for example, that

> Whenever a group is meeting, especially if others are present who are not at that moment engaged in the group activity, the group members tend to define or delimit their immediate group by the placement of their bodies or extremities. When they are standing or have freedom to move furniture they tend to form a circle (1964:326).

It can be frequently observed that people who are engaged in a focussed interaction sit or stand in 'an eye-to-eye ecological huddle [which] tends to be carefully maintained, maximizing the opportunity for participants to monitor one another's mutual perceiving' (Goffman 1963:95). To achieve it, people will deliberately place themselves in such a way that an overlap of their transactional segments is established, enabling them to use these segments as a joint interaction space.

Naturally, not all clusters of people engaged in explicit communication exchange establish such a jointly controlled transactional space. Social encounters may also occur when people are in configurations without any overlapping of their transactional segments. Thus for instance, Castaneda (1973:10) describes an event in which three men exchange words and gestures (though admittedly glancing at one another

[5] S.Cavan in her study of drinking behaviour in public bars observes that : The solitary drinker typically minimizes the amount of space he takes up at the bar. He will sit with his forearms resting at the edge of the bar, or flat on the bar before him, his upper torso hunched slightly forward over the bar, with all of his drinking accountrements (drink, cigarettes, change, ashtray and the like) contained within the area before him. The area delimited by the inner sides of his arms defines his visual focus as well ...' (1966:51)

SOME EXAMPLES OF FORMATIONS WITHOUT A JOINT INTERACTION SPACE

only infrequently) for a prolonged period of time, yet consciously and carefully avoid creating any joint interactional space (see Fig.13, Diagram I). A similar situation can be observed in hospitals during communicational exchanges between a surgeon operating on a patient and other persons present in the room. There the common interaction space is sacrificed for sake of efficient participation by all people in their joint task-oriented activity. There are also instances where such non-F-formation interactional clusters are established as a way of providing the interacting persons with the appearance of being in an unfocussed, and thus, less conspicuous interaction. A good example is suggested by Koestler who describes a conversation between two members of a underground political organization who arranged for a meeting in a picture gallery:

> The young man ... gave a hurried look around and ... sat slightly bent forward, a couple of feet away from Rubashov, on the narrow plush sofa, his big red hands on the knees of his Sunday suit; he did not change his position once while speaking ... (1941:33-36).

Finally, it appears that formations in which people overlap their transactional segments are created mainly between people interacting in public places, or people in private settings, but who are not thoroughly familiar with each other. Unsystematic observations suggest that the more a given set of people are accustomed to each other's presence and the better they have familiarized themselves with each other's mannerisms and idiosyncracies of gaze, voice, posture or appearance, the less important it becomes to maintain a perfect overlap of their transactional segments. In other words, the formal spatial-orientational scaffolding of an interaction is used only as long as it is indispensable to the maintenance of the continuity of the interpersonal exchange.

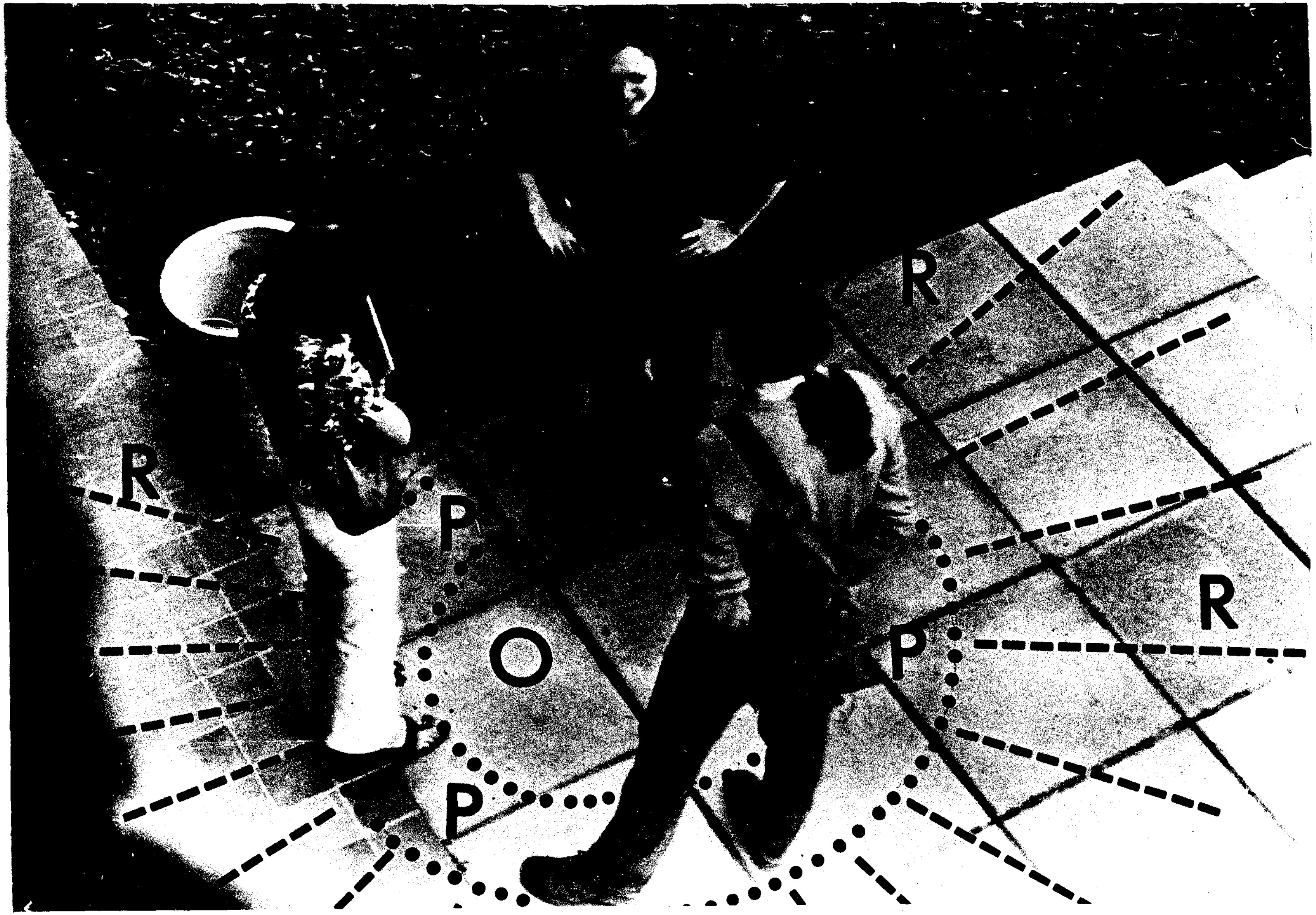
It is worth noting here, perhaps, that these situations though they can and in fact do take place, are rather the exception to the rule. Most commonly a joint interaction of a small group of people, especially if they are carrying out an informal social exchange leads to the creation of the common arena, internal interactional space, which will be called here o-space (Kendon 1976,1977) [6].

The o-space is not any space between people engaged in a focussed interaction, but that formed by a sustained overlap of the participants' transactional segments. People in a formation which establishes such an overlap often report

> ...that they are not terribly aware or concerned with what is going on behind them, whereas they are most concerned and aware with what goes on in front of them ... the group becomes aware of the space they have created and how different that space is from the rest of the room ... [even] the temperature of the space in the center seems (and very likely is, due to body warmth) warmer than the space immediately behind and in the rest of the room. (Pesso 1969:116-117).

The o-space is a nucleus of an interaction territory over which all participants excercise control and for whose maintenance and protection from internal or external disturbances all are responsible. Thus, whenever two or more individuals are placed close to each other and when they orient their bodies in such a way that each of them has an easy, direct, and equal access to every other participant's transactional segment, and when people agree to maintain such an arrangement they can be said to create an F-formation. Therefore, a system of spatial and postural behaviours by which people create and sustain an o-space will be called an F-formation system (Kendon 1976, 1977).

[6] The various spaces which are said to be generated by an F-formation are identified by lower case letters, following the practice of Scheflen and Ashcraft (1976) and Kendon (1976,1977).


R
R
R
P
O
P
P

The o-space is not the only space associated with the F-formation. At present (Kendon 1976, 1977, Scheflen and Ashcraft 1976) it is possible to postulate the existence of at least two other zones, namely p- and r-spaces. The first of these can be briefly characterized as a zone in which people gathered around an o-space position their bodies. The second space is a zone which surrounds the previous two and falls, as it were, under the F-formation's jurisdiction. These two spaces will be discussed in more detailed fashion in Chapter 6. Here we shall confine ourselves to discussion of more general issues.

F-formations are a very common feature of everyday interactions. Observations which will be reported later in this dissertation suggest that approximately 98% of two-person face-to-face stationary encounters among users of an outdoor public place take the form of an F-formation. Only in two percent of cases did people who were overtly and explicitly interacting with each other arrange themselves without creating an overlap of their transactional segments (see Table 1-2)[7]. F-formations are characteristic of people who come together to accomplish joint activity. Typically F-formations are associated with the occurrence of small conversational gatherings. It should be noted, however, that a joint interactional space plus a supporting system of spatial-orientational relationships can be established not only for the purpose of exchanging words. This is well illustrated by a set of printed instructions given to people undergoing sensitivity training sessions:

> Sit facing a partner and between you place a large, blank sheet of paper ... you and your partner look at each directly for a time until you have made contact, that on some level you know the other. Then, look at the paper between you; be aware of its spatial dimensions and realize that the space you see belongs to both of you; for now the paper represents an

[7] For three-person and larger focussed formations the percentage of interactions carried out with the aid of F-formations appears to be even higher.

environment in which you two are being together. You both draw on the sheet at the same time ... using lines, shapes and colours ... you can ... support, cross out, cover up, cooperate with, oppose, lead or follow your partner. Your possibilities for ... interaction are limitless ... The [paper] is a space where you, as a group, can create a world, the world you make here and now among yourselves' (Rhyne 1970:321-325)

Thus the overlap of transactional segments appears to be an important device through which the signalling of the situation-definition is accomplished between the participants. An F-formation system also plays another important role as is suggested by the fact that if the explicit face-to-face engagement between two people occurs without prior establishment of such a joint interactional space it may often cause uneasiness and concern among people witnessing such an exchange. They react to it in this way, because the normal definition of a face-to-face focussed interaction is distorted. Compare the following observation of E.A.Schegloff :

On one occasion two persons were observed sitting on ... a bench next to each other but in no way indicating that they were ... "with each other". Neither turned his head in the direction of the other and for a long period of time, neither spoke. At one point, one of them began speaking, without however, turning his head in the direction of the other. It was immediately observed that other passangers ... scanned the back area of the bus to find to whom that talk was addressed (1968:1088).

Therefore, it is plausible to think, that an F-formation is a device which not only signals the type and the normalcy of a given exchange but also helps to delineate sharply between the fully-fledged participants in a given encounter and those who are the outsiders. In other words, F-formations provide excellent means for establishing the interactional and therefore also the social and psychological "withness". Interestingly, this function is not performed, for example, by certain other types of spatial formations such as the ones depicted in figures 9, 12 or 18 of Diagram I, where the exact number of people partaking in a given exchange can be sometimes difficult to ascertain.

In addition to the two functions of an F-formation system already mentioned, that is signalling the normalcy of the interpersonal transaction and explicit definition of the "withness" or "togetherness" of a given set of people the system can be regarded as fulfilling other roles as well.

Firstly, F-formations provide a congenial arrangement of people for the smooth and efficient performance of a given task, be it a handshake, a psychiatric interview or buying a newspaper. In such a configuration people are at relatively close to each other and are placed at a more or less direct angle of orientation so that an immediate and preferential communication line is created. Circular and closely-knit arrangements allow maximum visual, acoustic and olfactory contact between the participants, thus making their communicational and behavioural interlock easy and natural, while simultaneously involvement with outsiders becomes difficult to establish and awkward to sustain. In other words, an F-formation system creates a congenial interaction nexus[8] which facilitates the flow of information around and across an o-space, and, importantly, within this o-space only.

Secondly, F-formations in addition to placing their members under the most favourable communication and interaction conditions seem to ensure that equality of social participation among the people is preserved. This is usually achieved by placing people in an equal relationship to (a) the interactional space between them, (b) to their two closest neighbours[9] and (c) to the external environment extending behind their backs. Therefore, under such circumstances individuals are likely to look at themselves as people endowed with the same rights and obligations toward each other and toward the formation as a whole, and (unlike people in other formations, such as lines or queues) to perceive similar sounds, sights and smells with practically the same intensity. All this can be thought to play an important role in keeping people's involvement in the ongoing interaction at more or less comparable levels.

Finally, an F-formation system can be viewed as a mechanism sheltering the content and details of the interpersonal event from being interfered with, contaminated, viewed or eavesdropped upon by outsiders who happen to be nearby. In other words, the bodies of the participants in a given exchange because of their spatial arrangement, act precisely in

[8] This general observation is supported by results from a number of experimental studies. For example, research on spatial factors affecting comprehension and comfort in verbal exchanges between people operating under various laboratory conditions has shown that the distance of 5.5 ft (168 cm) separating subjects seated vis-a-vis was the upper limit for a comfortable conversation (Sommer 1962). Further, it was found that the comprehension of speech is better if the speaker can be seen, especially if the exchange is carried out under noisy conditions (Sumby and Pollack 1954, O'Neill 1954, Neely 1956) which suggests that more direct angles of interpersonal orientation are an advantage in face-to-face communication. Other investigations indicated that at distances exceeding 6 ft (180 cm) the communicating people felt that they do not get their point across well enough (Lassen 1969). Another finding was that subjects tended to talk more to those partners who were facing them more directly (Steinzor 1950, Hearn 1957, Hare and Bales 1963, Moscovici and Plon 1966, Mehrabian and Diamond 1971) and to those who were placed closer to them than were other individuals (Sommer 1959, Hare and Bales 1963, Sommer 1965, Mehrabian and Diamond 1971, Heshka 1973). It was also established that the general style and content of a conversation were greatly affected by the way people were spatially placed relative to each other. Thus, the number of speech disturbances (Lassen 1969) and the degree of verbalization latency (Tesch et al. 1973, Schulz and Barefoot 1974) were increasing in direct proportion to the interaction distance. And it was established that during interaction between seated subjects, significantly more attention was directed toward the speech content at the medium (4-5 ft or 120-150 cm) distance than at closer (1-2 ft) or farther (14-15 ft) distances (Albert and Dabbs 1970).

[9] Pesso in a study of movement in psychotherapy observes that 'it is interesting to note that the sense of group is intensified when ... all people [in the circle are] equidistant so that there are no holes in the group. This demonstrates that no one is missing and that all the people in the group are the same and equal ... [thus, regular interpersonal distances] demonstrate or produce the sense of togetherness and equality ... They connect the people opposite with the self, maintaining the sense of group and preventing the sense of opposing lines' (1969:117).

the same way as do timber, glass and plastic shielding constructed around a public telephone. They help to screen off some of the environmental noise from the ongoing exchange, whilst simultaneously rendering such an exchange garbled or less visible and less audible to a bystander[10]. It means that people, once in the circle of an F-formation, start using their bodies differentially, very much like a deck of playing cards - the frontal part is made expressive and pregnant with meanings while the shoulders and the back conceal the behaviours both of the person himself and of the co-participant facing him. Thus, in brief, the bodies of people in an F-formation are not only deployed as a vehicle for carrying out an easy and smooth exchange but also as a scaffolding which protects that exchange from possible interruptions and as a shielding which controls the flow of information into and out of the ring of participants.

3.PREVIOUS STUDIES

Though the existence of spatial formations with a joint interactional space have been theoretically acknowledged at least since the early nineteen-sixties, the phenomenon of F-formation has been investigated in systematic fashion only in the last few years.

[10] Of course, such a 'communication barrier' may be established in a more sophisticated way, for example, by screening the F-formation system with the bodies of people who at that moment are not participating in the exchange conducted within the domain of the o-space. This is illustrated by the childhood recollections of Roberts, writing about clusters of youths on street corners of a London slum: 'One of the more articulate members might tell a story or amuse with puns, riddles or other word play ... another perform tricks with strings and matches. A happy air of concord hung over all. And in the heart of the group itself, shielded by lounging bodies, a small card school would sit contentedly gambling for halfpence'. Suddenly one hears a shriek of warning. The gang bursts into a scatter of flying figures ... The street empties, doors bang. Breathing heavily the Law retires, bearing off perhaps a "hooligan" or two to be made an example off' (1973:162).

One of the early general comments on F-formations was provided by Goffman (1963). In his treatment of "face engagements" he wrote about 'a set of persons [who are] physically close together and facially oriented to one another, their backs toward those who are not participants'. (1963:100). Such an interactional cluster Goffman suggested to be characteristic of a "state of ratified mutual participation" which can last for varying periods of time and which is established whenever a need arises to accomplish a joint task.

In similar fashion Lyman and Scott (1967) in their theoretical discussion of human territorial behaviour postulated the concept of "interactional territories". According to the authors an interactional territory arises whenever a social gathering, a group of people, is formed within a given setting. These territories were thought to be established and bounded by interacting people and were expected to be clearly distinct from the other three types of spaces distinguished, that is from public, home and body territories.

Some excellent photographic documentation of interactional gatherings displaying what we would term properties of F-formations (and which they referred to as "typical social spacing arrangements") was provided by Mead and Byers (1968). They identified some spatial arrangements of people typical of F-formations, and juxtaposed them with other types of spatial configurations which could be observed among participants of scientific meetings and conferences. They also stressed the need for a shift in theoretical perspective on human behaviour. They suggested that postures, interpersonal orientation, appearances, gestures and spacing can 'be examined in relation to room size, furniture and its placement, illumination, ooccasion , and group shape ... without reference to the emotion or thought of participants. [Similarly one] can study the pattern of interaction without reference to the content' (1968:105-108).

In their study of elementary features of crowds Milgram and Toch (1969) placed their main focus on large agglomerates of people and on such aspects of masses of people as milling, boundary permeability and sharpness, lamination, polarization, density, size and anonymity. The issue of a joint interactional space as a feature of interactional clusters of people was referred to only marginally. It was suggested that the spontaneously occurring circular formations of people in which inner spaces were also established were not accidental but served the important function of arranging individuals with maximum efficiency around a point of common interest. However, in Milgram and Toch's study such an internal space was viewed mainly as a neutral arena, which seemed to exist independently of people's spatial behaviour, and which was used as a space where a person (e.g. a speaker) or an object (e.g. a treasure chest) could be located and attended to by circular accretions of spectators.

Thus it can be seen that the spatial aspects of social encounters were initially discussed in very general and rudimentary fashion. It was not until Kendon (1973a) that an observational and systematic study of the problem was undertaken. In 1973 Kendon introduced his concept of "configuration" which he defined as 'the stable arrangement of bodies which characterizes the focussed encounter' (1973a:37)[11]. Kendon postulated that (a) people arranged in "configurations" stand or sit within a certain narrow range of distance from one another; (b) they 'orient their bodies in relation to one another in such a way that for each one, the angle through which the head would have to rotate from its orientation in the saggital plane of the body to an orientation in which

[11] The general term "configuration" has been subsequently (1976,1977) replaced by the more specialized concept of "F-formation".

it would be directly facing another participant is less than ninety degrees' (1973a:36); (c) they actively maintain their spatial position in the configuration, and finally (d) they 'mark out a region of space that may be called an interaction territory which, since it tends to be jointly defended against intruding non-participants, is also generally respected by non-participants' (1973a:37-38).

A further and more refined exposition of the phenomenon of a formation with a jointly established and sustained interactional space was provided by Kendon in later studies (1976,1977)[12]. Here Kendon not only explicitly introduces and develops the F-formation concept but also provides the first systematic account of various aspects of the phenomenon. He describes (a) some of the spatial arrangements used by people in F-formations, (b) the ways such arrangements are maintained, (c) changes in size and shape of these arrangements, (d) the continuity of the formation despite the turnover in participants, (e) the properties and functions of spatial domains genereated by F-formations, and finally (f) the position of the F-formation system in time and space. From the theoretical point of view the (1976) paper develops a number of important points. It attempts to view the formation not merely as a set of particular postural, orientational and spacing behaviours, but rather as a complex, self-regulating system of relationships between these behaviours, relationships which are established and maintained for some length of time. In other words Kendon presents the F-formation as a process through which people organize and structure the cohesiveness and integrity of their focussed face-to-face interaction. That means, then, an approach which radically breaks away from taking the spatial organization of a social encounter for a syndrome of behaviours associated with the

[12] His 1976 paper dealing with the issue was originally completed in 1974.

characteristics of a given interaction or the characteristics of its participants.

According to this new theoretical stance Kendon postulated that 'an F-formation arises whenever two or more people sustain a spatial and orientational relationship in which the space between them is one to which they have equal, direct and exclusive access' (1976:291). Furthermore Kendon suggests that 'the system of behavioural organization by which such a spatial-orientational pattern is established and sustained will be called an F-formation system' (1976:291). Thirdly, he maintains that the such a system 'is a unit of behaviour at interactional level of organization, not at the individual level' (1976:292) which means that a given F-formation system can change its participants at any time and still retain its identity and continuity. Finally it was postulated that 'an F-formation system is closely related to the other interactional systems that may be in operation within it' (1976:293) and that changes in the spatial parameters of an F-formation are frequently concurrent with changes in the organization of these other interactional systems.

An important discussion of the F-formation concept has also been provided in Scheflen and Ashcraft (1976). There, as in Kendon's 1976 and 1977 studies, the F-formation phenomenon (referred to as Face-formation) is understood in terms of the relationships between people's behaviours. In addition to a discussion of some specimens of spatial arrangements typical of F-formation systems the work examines various types of spaces generated by and associated with face-to-face interactions. This is in fact where the main thrust of the Scheflen and Ashcraft study is directed. They develop a complex system of categories for describing and coding various areas, spaces and domains and suggest that the basic logic of concentrically arranged interactional territories can be traced not only in human gatherings but also in the way people establish their built environments. In their book Scheflen and Ashcraft also discuss some other types of formations and configurations such as lines, rows, and hubs.

A further study of the F-formation has been made by Deutsch (in press). His contribution is twofold. He provides further data on the behaviour of F-formation systems[13], analysing in detail the following phenomena associated with the existence and functioning of an F- formation system : (a) the way the formation is established between people, (b) the manner its pattern of spatial-orientational relationships is maintained throughout the interaction, (c) the way newcomers become incorporated into the framework of an ongoing F-formation, (d) the maintenance of the spacing in relation to nearby stationary participation units, (e) the way people in an F-formation system prevent outsiders from entering the circle of participants, and finally (f) the way people in an F-formation terminate its existence. In all these cases conclusions are drawn on the basis of detailed analysis of one or two specimens of an illustrative film. Thus, Deutsch adds further empirical materials to our store of knowledge about the F-formation behaviours. In the second part of his work Deutsch goes on to attempt a novel theoretical account of the phenomenon. He suggests that behaviour of an F-formation system can be meaningfully interpreted in terms of Ashby's (1952,1956) concept of an ultrastable system. Thus the people in the formation have been assumed to be monitoring their immediate environment and to compensate for changes and disturbancies occurring in it through appropriate modifications and shifts in their postural, orientational and spatial behaviours. The whole process is postulated to be so orchestrated that ultimately a state of dynamic equilibrium is sustained. This in turn is thought to enable the

[13] Referred to in his paper as Face-formations.

configuration's survival in changeable and even inhospitable human contexts.

4. SPATIAL ARRANGEMENTS IN F-FORMATIONS : AN ATTEMPT AT A TAXONOMY

In the remainder of this dissertation we shall attempt to discuss the F-formation as an adaptive device relating the spatial organization of social encounters to that of their immediate environment. Because we may suspect that the shape of the configuration is as much concerned with this aim as it is with the management of the gatheringg's internal affairs, we need to be able to deal with the shapes of face-to-face encounters. To this end we shall look here at the ways in which a variety of possible configurations may be reduced to a manageable set of classes and categories.

Theoretically speaking, there is a very large number of possible arrangements between people in a formation. Many factors influence the choice of an arrangement in an interpersonal encounter[14]. Furthermore, as Kendon (1976) has noted, the type of an arrangement selected will depend also on the number of participants in an encounter. This all means that a general taxonomy of arrangements can be an advantage if one is interested in the systematic study of spatial phenomena displayed in

[14] There are operating, for example, such variables as the sex of the people (Sommer 1959, Cook 1970, Baxter 1970, Pellegrini and Empey 1970, Jones 1971, Heshka and Nelson 1972, Thomas 1973, White 1975), their age (De Long 1970, Heshka and Nelson 1972, Jones and Aiello 1973, Tennis and Dabbs 1975), cultural (Baxter 1970, Aiello and Jones 1971, Collet 1971, Hall 1974), and social background (Aiello and Jones 1971, Scherer 1974), appearance (Kleck et al. 1968, Kleck 1969, Thomas 1973, Worthington 1974), personality traits (Sommer 1959, Leipold 1963, Williams 1971), degree of acquaintanceship (Willis 1966, Newton 1971, Heshka and Nelson 1972), interpersonal attitudes (Byrne et al. 1971, Sandler 1970, Aiello and Cooper 1972), social status discrepancies (Willis 1966, Lott and Sommer 1967, Dean 1975, Jorgenson 1975), type of interaction (Sommer 1965, Norum et al. 1967, Sensenig et al. 1972) and so forth. Reviews of these studies can be found in (Lett et al. 1969, Kendon 1973a, Patterson 1974, Evans 1973).

social gatherings.

One of the first attempts to specify the gamut of spatial arrangements typical of face-to-face interactions was made by Sommer (1959) who identified some of the configurations used by people sitting and conversing at rectangular tables. He found that the probability that an interaction will occur was much greater for people sitting corner-to-corner than for those sitting in opposite, side-by-side, opposite-side or in distant-corner arrangements. Further additions to this list of seating arrangements were introduced by Sommer (1965) as a part of his studies on people's seating choices made while using round tables. This attempt to construct a category-list has proven to be very useful in work on all these situations where people's spatial relationships were pre-shaped by furniture which placed interacting neighbours in standardized angles of orientation. However, in order to cope with the analysis of less formalized configurations of free sitting or free standing people a somewhat more flexible set of descriptive categories had to be developed.

This task was accomplished by Hall in his paper on a system for the notation of proxemic behaviour (1963). There a nine category numerical taxonomy was suggested for coding spatial orientations characteristic of a dynamic, face-to-face interactions.

In Hall's scheme the code "zero" represented two individuals positioned vis-a-vis and values "one", "two" and "three" represented acute-angle, right-angle, open-angle arrangements accordingly. Number "four" designated a side-by-side configuration, while number "five" meant an open-angle arrangement in which people were oriented away from each other. Number "six" designated people standing at right angle to each other, one person facing away, and the other facing along the shoulders and the back of his partner. Number "seven" was used to describe people standing at an acute-angle to each other and facing opposite directions. Number "eight" referred to people standing wholly back-to-back.

In this way a great variety of arrangements were reduced to a managable number and were given a reference symbol enabling quick identification. This notation system was meant to be used in conjunction with a notational scheme developed for description of interpersonal distances as well as with a scale representing postures, volume of voice and tactile, visual, olfactory and thermal interpersonal involvement. However, Hall's proxemic notation system came to be used in a way which was not anticipated by the inventor. It appears that though the suggested notation system was intended as a set of numerical labels for various two-person configurations, other researchers (Watson and Graves 1966, Watson 1970, Jones 1971, Aiello and Jones 1971, Jones and Aiello 1973, Aiello and Aiello 1974, Shuter 1976) have used it as a set of values measuring spatial relationships. This has meant that arbitrarily assigned name-categories are added, multiplied and divided as if they were numbers[15].

Another corruption of Hall's (1963) notation system took the form of insouciant modifications of the labels of the nine spatial configurations distinguished. This meant that the same type of spatial arrangements were frequently given different code-numbers by different investigators. For instance, a configuration in which people face a joint space between them, and are standing at right angles to one another, in other words an L-shaped configuration, would be referred to sometimes as arrangement number 2, sometimes as number 3, 6 or 7. This naturally created considerable confusion in the whole field of investigations on spatial arrangements, and comparisons between the findings of various researchers

[15] For example one finds it earnestly claimed that Arabs' mean score on the interpersonal orientation variable is 2.57 as against 3.25 among Asians (Watson 1970:78). From the methodological point of view, this is, unfortunately, an absurd way of treating the original data.

Diagram II

Taxonomy of spatial arrangements in a two-person static gathering: a comparison of notation systems

SPATIAL ARRANGEMENT			Author and the proposed code number									
Description	Type	Symbol	Hall 1963	Watson & Graves 1966	Watson 1970	Jones 1971	Aiello & Jones 1971	Jones & Aiello 1973	Aiello & Aiello 1974	Hall 1974	Spiegel & Machotka 1974	Shuter 1976
diagonal		N	*	*	*	*	*	*	*	?	*	*
vis-a-vis		H	0	0	1	0	0	0	0	9	dia-trope	1
sharp angle		V	1	1	2	1 or 2	1	1.5	?	8	?	1 or 2
right angle		L	2	2	3	3	2	3	6	7	?	3
open angle		C	3	3	4	4 or 5	3	4.5	?	6	?	4 or 5
side by side		I	4	4	5	6	4	6	12	5	para-trope	6
		N°	*	*	*	?	*	?	?	*	?	*
face-to-back		H°	*	*	*	?	*	?	?	4	pro-trope	*
		V°	*	*	*	?	*	?	?	*	*	*
		L°	6	*	*	?	*	?	?	*	*	*
		C°	*	*	*	?	*	?	?	*	*	1 or 8
		I^{-}	*	*	*	?	*	?	?	*	*	*
		N^{-}	*	*	*	?	*	?	?	*	*	*
back-to-back		H^{-}	8	8	9	?	8(?)	?	24	0	apo-trope	12
		V^{-}	7	7	8	?	7(?)	?	?	1	*	10 or 11
		L^{-}	*	6	7	?	6(?)	?	?	2	*	9
		C^{-}	5	5	6	?	5(?)	?	?	3	*	*
		T°	*	*	*	*	*	*	*	*	amphi-trope A	*
		T^{-}	*	*	*	*	*	*	*	*	amphi-trope B	*
		Y	*	*	*	*	*	*	*	*	*	*
		Y°	*	*	*	*	*	*	*	*	*	*
		Y^{-}	*	*	*	*	*	*	*	*	*	*
		Z	*	*	*	*	*	*	*	*	*	*
		Z°	*	*	*	*	*	*	*	?	*	*
		Z^{-}	*	*	*	*	*	*	*	?	*	*
		K°	*	*	*	*	*	*	*	*	*	*

Explanation of symbols used:

* spatial arrangement is not distinguished by the author

? arrangement's code number difficult to ascertain on the basis of author's explanations were made difficult if not impossible (see Diagram II).

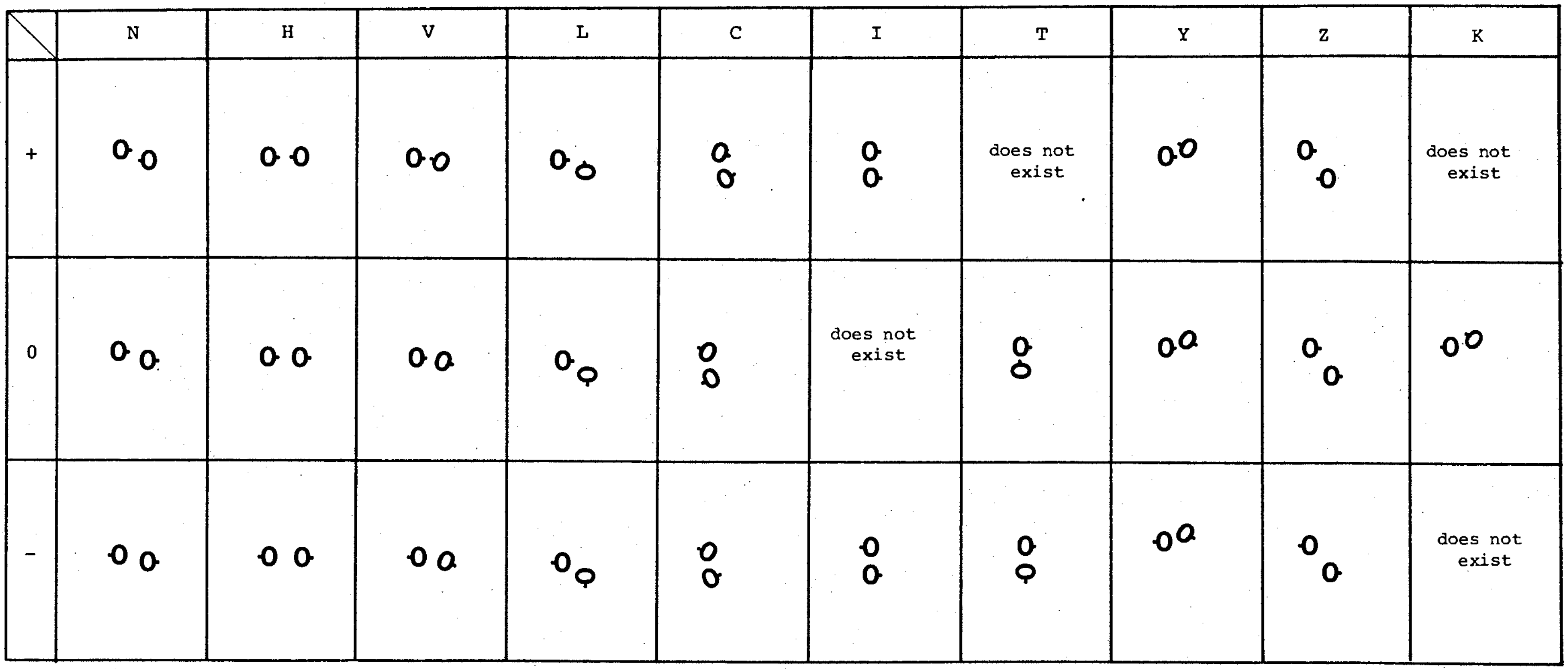
Finally, the notation systems in use were suited to the description of 2-person encounters only, ignoring the existence of larger formations. While this strategy was, to some extent, justified - James (1951, 1953) Bakeman and Beck (1974) and others suggest that approximately 60-70 percent of all social encounters take place in two-person groups - a taxonomy suitable at least for dealing with three-person F-formations (which represent approximately a further 20% of all interactions) would be an advantage.

In this section we shall attempt to develop an "improved" notation system which will avoid the shortcomings just mentioned and which can be applied to an analysis of a variety of arrangements including those characteristic of F-formation systems. This notation system should, in addition, render it possible to make instant identification of a configuration coded by a given symbol whilst at the same time being simple enough for use in both hand-writing and typing.

All these consideration suggest the desirability of a code which would assign certain letters of the alphabet to the discerned types of configurations and employ symbols whose graphic appearance would correspond to the basic shape of interpersonal arrangements. Thus, for example, arrangements in which the bodies of the participants were parallel and vis-a-vis one another could be described by the letters "H" or "N", since the vertical strokes serve to illustrate the positioning of the people's body planes. Similarly, people standing or sitting in such way that their body planes are intersecting at an acute angle can be coded with letters such as "V", "K" or "Y", whose graphic form suggests such an intersection.

Diagram III

A TAXONOMY OF TWO-PERSON STATIONARY ARRANGEMENTS



An attempt to construct such a code system is provided in Diagram III. In this diagram there are 26 two-person configurations arranged in three basic groups. In the upper (+) row are represented all those arrangements in which individuals are facing one another. The second (Ø) row provides a list of arrangements in which people have directed their frontal body surfaces in approximately the same direction and are therefore not facing each other. The third row groups all these cases (marked with a minus sign) where people are oriented in opposite directions, and are thus, again, not facing each other. Furthermore, each column groups arrangements in which the angle formed by the bodies of the participants and their lateral displacement is of approximately similar magnitude. For that reason all arrangements in the same column are given the same code-letter. For instance, all three arrangements in the fifth column are marked as being of the "C"-type ("C"; "C-zero" and "C-minus")[16].

How adequate is this taxonomy of spatial arrangements? Is the whole exercise a purely geometrical game or is it a useful tool for coding patterns of spatial behaviour? A closer look at Table 1-2[17], one which compares the use of spatial arrangements in three different cultures, suggests that the new notation-system is not merely an abstract catalogue of spatial patterns. There one sees, that some of the spatial-orientational relationships which were originally deduced on purely logical grounds (e.g. arrangements T-minus, C-zero, H-zero, V-zero) do in fact correspond to arrangements used by people in their

[16] In the case of sociopetal arrangements the plus sign can be omitted for the sake of simplicity of notation.

[17] The first number is the table number, the second number refers to the chapter where this table is examined.

everyday social exchanges. From Table 1-2 it can be seen, for example, that 2 percent of all arrangements adopted by White, urban Australians, 18 percent of those used by Enga people and 30 percent of those used by the Murngin belong to a class of configurations which was not contained in Hall's (1963) taxonomy. Therefore the alphabetic code appears to be not only handier than earlier notations in that its indicates something about the shapes of described arrangements, but also has the added advantage of covering a greater range of spatial configurations (see again Diagram II).

Furthermore, the alphabetic code can be applied to the description of three-person spatial clusters as well (See Diagram IV and Table 2-2). Since the angles between the bodies of adjacent individuals are expressed as letters of an appropriate shape (and the spatial orientations relative to each other are marked by plus, minus and zero signs) every theoretically possible spatial arrangement of three individuals can be positively identified and described with the aid of three code letters[18]. For instance an arrangement in which all three people are standing at an acute angle to each other and facing a joint interactional space between them can be referred to as "VVV" arrangement. Similarly the "CVV" arrangement represents an encounter in which two individuals are standing at an open angle to each other, while the third participant is standing in a "V" arrangement in respect of both of his neighbours (all of course are facing the center of the gathering). People standing side-by-side as in of a line of spectators can be adequately coded as bein

[18] Unfortunately formations composed of more than three participants do not yield themselves easily to identification through the code-system proposed here. They turn out to be too complex; and sometimes they resemble each other too closely to be un-ambiguously discerned with the set of code-letters. It appears that a new terminology, based on comparisons with geometrical shapes (e.g. circle, ellipse, horse-shoe, rhomboid etc.) may be an advantage here (see for example Batchelor and Goethals 1972).

ag in "III" arrangement. Finally an arrangement shown as Fig. 13 in Chapter 1 can be described as an "L-minus-VV" array (see Diagram I).

Having demonstrated the virtues of our alphabetic notation system, let us now direct our attention to arrangements typical of F-formation systems. It will be recalled from the previous discussion that an F-formation, by definition, is a configuration in which people have easy access to the joint interactional space (o-space) contained between their bodies. This means that among the many possible two-person arrangements there are only six spatial-orientational patterns, namely "N", "H", "V", "L", "C" and "I", which meet this criterion at each of them. Let us look briefly.

In "N" arrangements, (sometimes referred to as diagonal), individuals face each other and have their body planes parallel. They stand or sit slightly displaced, by approximately half a body width[19]. People in the next arrangement, the vis-a-vis, face each other directly, and when seen from above they appear to form with their body contours (and noses) an array resembling a large letter "H" [20]. The third arrangement is less direct, the participants' body planes intersecting outside[21] the formation at an angle of approximately 45 degrees.

[19] If the lateral displacement is larger so that the body silhouettes do not overlap, such an arrangement will be classified as belonging to the "Z" type.

[20] A.Scheflen postulates that: 'When people show a postural orientation vis-a-vis each other, particular types of social interaction usually occur between them ... involving an exchange of information or feeling: teaching, informing, nurturing, treating, courting, conversing, quarelling and so on' (1964:327).

[21] The point of intersection of the body planes is of great importance as it enables one to draw a distinction between arrangements of the "V" type on the one hand and "Y" and "K" arrangements on the other.

While the previous three arrangements were relatively "closed", that is arrangements in which a person could not step forward and leave the encounter without colliding with the other participant, the next three arrays belong to the category of "open arrangements". In these arrangements people have greater freedom of movement and their transactional segments are given fuller access to the formation's immediate environment. In "L" arrangements participants are standing at right angles to each other, with their body planes intersecting outside of the gathering[22]. The fifth type of spatial arrangement resembles a miniature crescent or semi-circle and is for this reason ascribed with a code letter "C". In this configuration the participants are standing at an obtuse (open) angle of approximately 135 degrees. The final and sixth arrangement used by people in F-formations is the side-by-side one in which two individuals face in the same direction but are standing close enough to still have a full access to each other's transactional segment. The code letter for this arrangement was chosen as "I"[23].

As far as three-person arrangements are concerned there appear to be ten spatial-orientational patterns which meet the criterion of overlapping transactional segments. These arrangements are : "CVN"; "CVH"; "CVV"; "LVV"; "LHH"; "LLN"; "LCV"; "VVV"; "INN" and finally "CCV" (see

[22] Arrangements in which people are standing at right angles with their body planes intersecting within the body contour of one of the participants belong to the "T" class.
[23] It has been observed that the side-by-side orientation 'characteristically involves activities in which ... [the participants] engage mutually toward some third party or object... they may share in reading, writing, building, enjoying a painting, watching television or telling a story... activities carried out in a parallel orientation are those which do not require more than one person. They are activities which can be and often are conducted by a single person' (Scheflen 1964:327).

Diagram IV

SOME FORMS OF THREE-PERSON STATIONARY ARRANGEMENTS

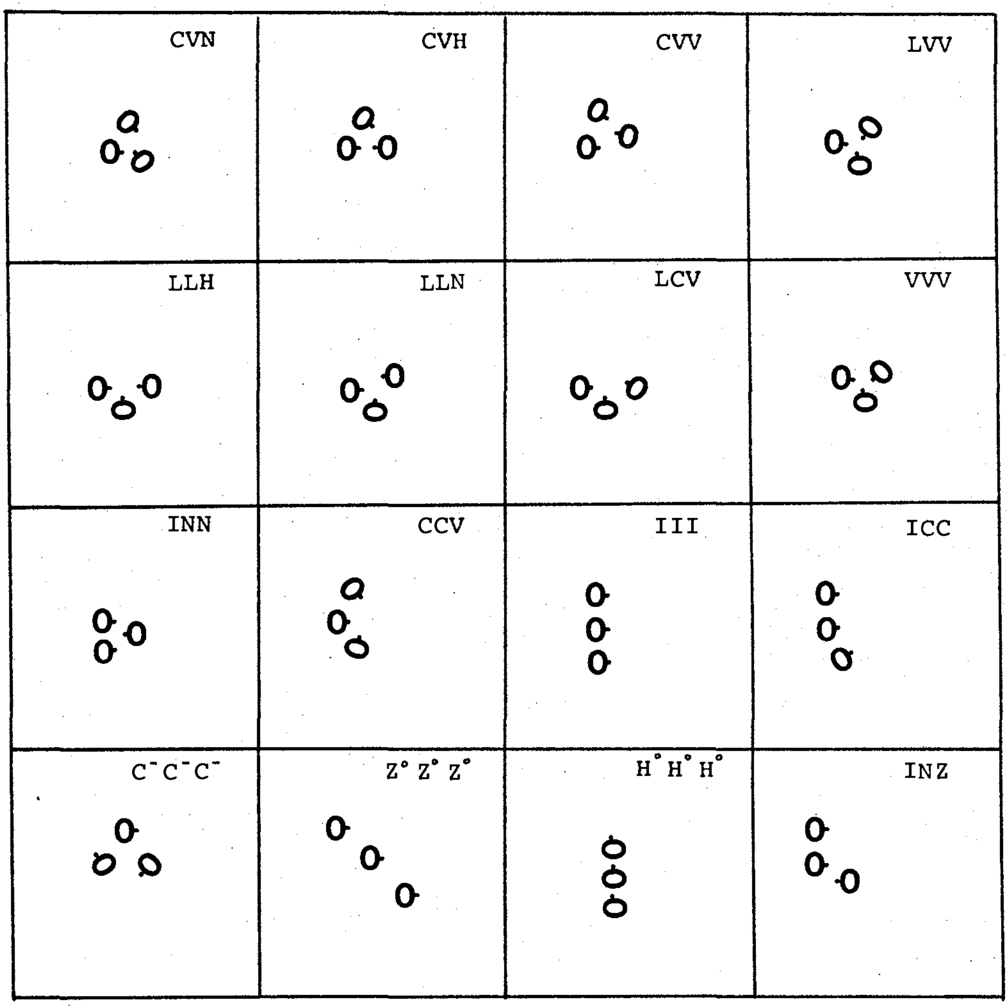


Diagram IV). There are also arrangements whose status is not entirely clear. For example, the "III" or "ICC" arrangements may, under certain circumstances, be used as F-formation arrangements. However, it should be noted that individuals standing at end positions normally do not have easy access to each other's transactional segments and all they can achieve is to overlap their transactional segments with that of the person standing in the central position. The "INZ" arrangement also cannot be regarded as a fully fledged three-person F-formation. It can best be regarded as a binary two-person F-formation in which two independent o-spaces are created and sustained. This may happen for example when Mr and Mrs. Brown accidentally run into Mr. Brown's previous wife and stop for a while, but the two ladies are not really on speaking terms.

These arrangements are not used with equal frequency (see Table 1-2 and 2-2). As already noted, the frequency with which certain types of spatial configurations are selected depends very much on what people are doing and who they are in terms of their personal and interpersonal characteristics. The data presented in the chapters to follow will show that the type of arrangement selected is inseparably linked with the physical and human context in which the given encounter happens to take place. However, before this can be discussed we need, first, to describe our research setting and the method used for the collection of field data.

CHAPTER 3

DESCRIPTION OF THE MAIN STUDY'S SETTING, TECHNIQUES AND MATERIALS

In the remainder of this dissertation, we shall report the results of a detailed study of how stationary individuals and F-formations are located within pedestrian settings. We shall examine patterns of location choice in relation to the mode of activity, and we shall, in the case of the F-formation, examine the way in which the configuration adopted varies in relation to the setting. These observations will show that there is a systematic relationship between the form assumed by the F-formation and its environment. We shall also find systematic relationships in how such stationary participation units space themselves in relation to each other and to physical features of the setting. These observations will be interpreted as showing how spatial-orientational arrangements adopted in interaction are part of the means by which participants control the boundary between their own joint project and the outer world.

Here we shall outline the nature of the setting chosen for observation from the point of view, firstly, of its fixed environmental features - its size, appearance and topography and the arrangement of various furnishing artifacts, and secondly (in Chapter 4) from the point of view of the human presences that can be considered environmental to any given gathering. A complete analysis should, of course, also consider microclimatic features such as exposure to sunshine, background noise, gusts of wind and also the presence of living creatures other than humans, but these will not be considered here.

In the second part of this chapter we shall also describe the data-gathering technique and the basic sources of information.

1.THE MAIN STUDY SETTING : PLACE

The observations reported here were carried out in a pedestrian plaza situated in one of the shopping centers of Canberra. Canberra is a relatively young and fast-growing city of approximately 200,000 inhabitants, of which 62% are under 30 years old (A.C.T. Statistical Summary 1975). The people living and working in the city are mainly government employees and their families. The city itself is spread out over a great area (298 sq km) and is a low-density[1] conglomeration of well-designed and maintained suburbs, intersected with parks, recreation areas and highways. Apart from its picturesque landscape, Canberra's characteristic feature is the lack of a city centre. Instead, in the sea of suburban houses there are solitary government offices and only in a few selected spots are there some small-scale clusters of shopping and business buildings. One of these pocket-sized centres of city life is Civic Centre of which the focal points are Garema Place and Petrie Plaza.

These two places appear to be the geographical and cultural centre of North Canberra. The presence of services and entertainments (ranging from restaurants and cinemas to a merry-go-round), combined with wide, well paved and car-free pedestrian streets results in quite intensive use of this centre. Civic is not only a focus of daily shopping, but also a promenade for people of all ages, interests and appearances. In the two areas mentioned people frequently interrupt their shopping routines to "watch the action" or to chat for a while with friends accidentally

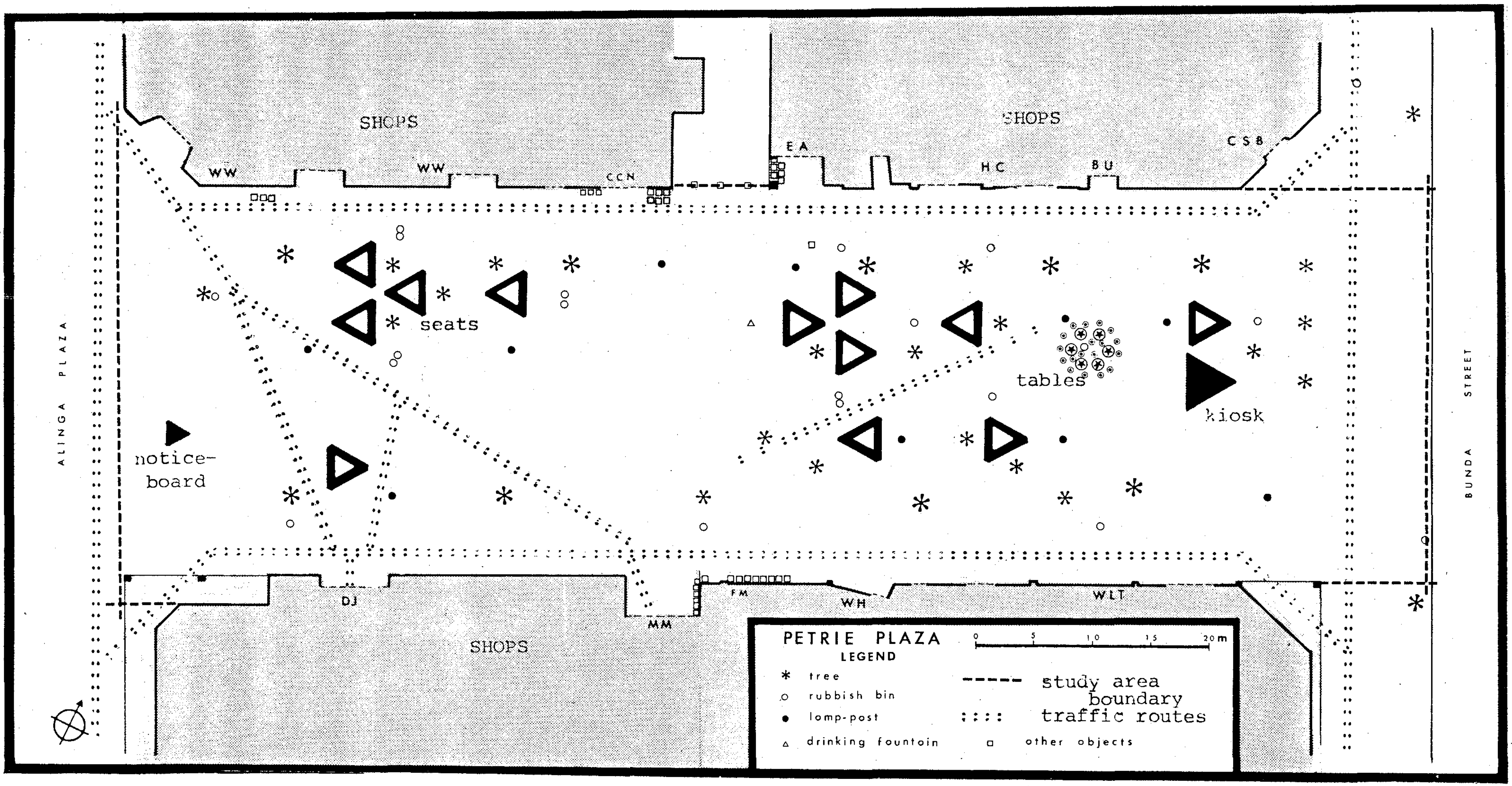
[1] For comparison : 2 persons per acre in Canberra, 43 persons per acre in London and 114 persons per acre in Paris (Milgram 1970 and A.C.T. Stat. Summary 1975).

encountered. Garema Place and Petrie Plaza are used also for other purposes. They are known as a stage for Salvation Army brass bands, street theatre performances and half-hearted political rallies as well as a venue where people sell raffle-tickets or where Hare Krishna followers or Children of God approach passers-by and tempt them with incense sticks, booklets or even offers of eternal life. In brief, it appears that these two areas of Civic are attended by enough people engaged in enough diversified activities to be a suitable place for an intensive study of people's behaviour in public places.

Petrie Plaza, selected as a primary research setting for this study, is an elongated rectangle - (120 x 35 m) in which the two longer sides are delineated by a chain of low, two-storey buildings containing shops, banks and a supermarket on the ground floor and dentists, florists and estate agents on the first floor. At the time of observation (September 1974) its western end was defined by a stack of building materials and a fence separating the plaza from a construction site where the plaza was being extended into a set of pedestrian thoroughfares. The other, eastern end is delineated by a street open to traffic which separates the plaza from a large car-park. Thus at the time of the study, the whole area was relatively small and could be easily crossed from one end to the other within a minute or so (see Diagram V).

An important feature of the plaza environment at the time of our study, were the six pedestrian traffic routes it contained. The first four of these lines extended along the four edges of the plaza rectangle. The fifth traffic route crossed the area diagonally, starting in the north-west corner and branching in three subsidiary lines leading to the two most popular entrances to the shopping mall. The sixth pedestrian route was situated in the eastern half of the plaza and led through a gap

Diagram V


SHOPS
WW
WW
CCN
EA
SHOPS
HC
BU
CSB
seats
tables
kiosk
notice-
board
ALINGA PLAZA
BUNDA STREET
DJ
MM
FM
WH
WLT
SHOPS
PETRIE PLAZA
LEGEND
tree
rubbish bin
lamp-post
drinking fountain
other objects
study area
boundary
traffic routes
0 5 10 15 20 m

between two groups of trees and benches. These lines seemed to attract the majority of pedestrian traffic so that areas situated between them or away from them were relatively devoid of people.

Petrie Plaza has been furnished with 12 identical, triangular seats built around concrete boxes. Each side of each triangle is 12 ft. long (3.6 m). In addition to the benches at one end there is a cluster of tables and chairs assocciated with a triangular (15 ft or 4.5 m) kiosk selling sandwiches and soft drinks. At the opposite end is a small free-standing triangular information board. The plaza has one small drinking fountain, a series (N=1Ø) of lamps on metal poles, some (N=9) litter-bins and several young trees among a few older trees (total no of trees = 28). On most days there are small racks of books, newspapers, some chemist's goods and coin-operated mechanical toys standing outside shops on the two longer walls of the plaza.

In brief, at the time of the study Petrie Plaza was a small-scale version of pedestrian areas of the type found in Copenhagen, Munich or Rotterdam.

2.STUDY TECHNIQUES, METHODS AND DATA BATCHES

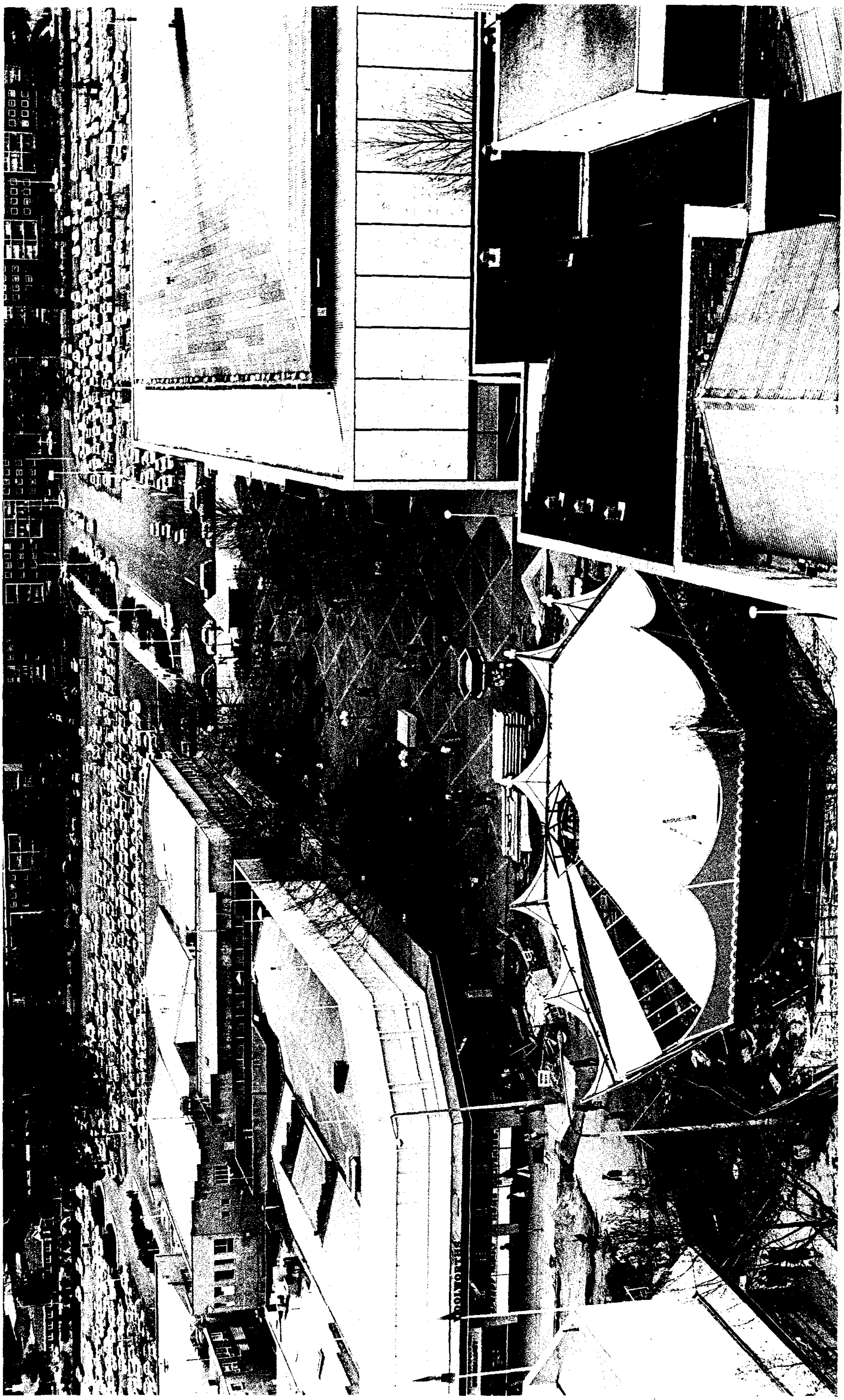
Study of the spatial and environmental context of social encounters required collection of a large amount of data on both the setting itself and on the behaviours of people present there. The main analyses to be described here are based on observations gathered according to the following techniques of data collection: (1) analysis of "aerial" photos which yielded the data batches "Pilot Study" and "Samples 1 and 2"; (2) analysis of snap-shots of people in a number of pedestrian settings, including Petrie Plaza which yielded "Sample 3"; (3) analysis of comparisons of the data derived from "Samples 2 and 3" with random figures provided by "Computer simulations 1,2 and 3" (4) analysis of a "Videotape" of people's spatial behaviour recorded at Petrie Plaza. These four sources of information will be now described in detail.

"Aerial" photographs: "Pilot Study", "Sample 1" and "Sample 2"

A major part of the data used in this dissertation was derived from the analysis of a series of "aerial" photographs of the whole of Petrie Plaza showing all people simultaneously in their variety of behaviours and locations. These photographs were used as a basic source of information which was subsequently supplemented by additional data drawn from other sources.

This set of photographs was taken from the top of a nearby eight-story office building at regular intervals of twenty minutes, ten hours daily, from 8 a.m. to 6 p.m. for seven consecutive days in the middle of September 1974. The weather at the time of the study was fairly mild, that is without excessive sunshine or wind. The average daily temperatures oscillated between +12 and +16 degrees centigrade and were typical of the Canberra's early spring. The microclimatic factors, therefore, were congenial to the occurrence of outdoor social encounters and did not seem to alter greatly the usual behaviour of pedestrians in the study setting.

The camera used in this study was a Nikkormat FT2 (with 52 mm lens), mounted on a tripod. Each day 31 photographs of the study area were taken in a manner wholly imperceptible to the plaza users. Upon completion of one week of data gathering all photographs taken (217=7 x 31) were developed and printed on large, 12 x 15 inch photographic paper. The size of the enlargement was a compromise between considerations of detail and overall cost. Though the size of the prints used seemed to be slightly



too small for comfortable analysis, it was nevertheless possible to make a reliable identification of people's stationary locations and their spatial relationship relative to other plaza users and physical objects. Also in an overwhelming majority of cases it was possible to determine their sex, age, posture and the type of interpersonal arrangement adopted. In making these prints care was taken to include the edge-numbers, so that the time at which each exposure was made could be established.

The aerial photographs were analysed twice. First of all 217 prints were studied with regard to the number of people present on Petrie Plaza at various times of the day and week. The age, sex and type of postural behaviour these people were involved in (standing, sitting, walking), the size of the gatherings and the general layout and course of pedestrian traffic lines were also determined. The results obtained during this stage of analysis constitute the data batch "Sample 1".

During the next phase of the work all 217 prints were examined once more, this time to determine the characteristics of the locations adopted by stationary gatherings. This task was completed in two steps which will be referred to as "Pilot Study" and "Sample 2".

The purpose of "Pilot Study" was twofold. Firstly, it was aimed at the development of a set of answerable research questions about variables which seemed to influence people's choice of stationary locations. Secondly, the "Pilot Study" was used for development of a formal code-book which would enable the translation of a variety of particular situations into a set of rigidly defined categories and numeric values. For this purpose a set of 50 aerial photographs was selected and coded. These photographs yielded information on 141 stationary events. A subsequent examination of the data obtained revealed a number of regularities which deserved further investigation. It also demonstrated that systematic quantitative analysis of materials on spatial distribution of people is a feasible task. Since the "Pilot Study" displayed several methodological shortcomings it was decided that the results discussed in the dissertation will be derived only from the subsequently analysed "Sample 2".

Upon completion of the pilot investigations the main bulk of 167 photographs was inspected and coded according to the code-book earlier developed. The analysis of all photographs and coding of results was done singlehanded by the author. Only photographs which contained standing gatherings suitable for coding, namely people not in queues, not interacting with those on benches, gatherings not obscured by tree branches and finally, gatherings situated within boundaries of the study setting were taken into account. Thus, the final "Sample 2" was comprised of 103 interpretable prints which yielded a total of 352 cases of static gatherings and static solitary people.

In addition to the materials derived from "Sample 2", the dissertation also makes extensive use of materials collected in other way than through taking aerial photographs of the plaza. These can be briefly characterized as follows:

"Sample 3"

This set of data was yielded by the analysis of 379 black-and-white photographs (4.5 x 3.5 inch prints) unobtrusively taken by the author in Petrie Plaza, Garema Place and in adjacent public areas, over the year 1974-76. The photographs were collected as illustrations of various interpersonal distances, orientations and arrangements used by stationary people in outdoor public settings. They were inspected in a similar way to the materials from "Sample 2" and were subsequently coded with the aid of the same code-book. Examination of the snapshots yielded information on 579 stationary events. These stationary formations and solitary individuals were scored in terms of the activity displayed in relation to (1) the type of nearby artifact, (2) distance from the artifact, (3) positioning with regard to traffic lines and finally, (4) distance to nearest stationary person. The results of this analysis are provided in Tables 5-4, 6-4, 7-4, 17-4, 18-4, 19-4, 30-6, 6-8, 13-8, 14-8, 15-8, and are discussed together with the results from "Sample 2".

While the photographs analysed in "Sample 3" were concerned mainly with the behaviour of multiperson groups so that solitary people tended to be represented in the materials less often, we are not aware of any conscious bias in the data concerned with types of activities, choice of a particular location or distance in relation to objects and people. A comparison between "Sample 2" and "Sample 3" demonstrated that the frequencies with which people were to be found (1) near various types of artifacts (Table 1-3), (2) at various distances from these artifacts (Table 2-3) and (3) in various locations in relation to traffic routes (Table 3-3) did not significantly differ one from another. The only difference recorded arose with respect to the spacing between stationary people (Table 4-3). People recorded on photographs from the "Sample 3" appeared to form their gatherings under significantly more crowded conditions than those photographed from the top of the nearby office building (i.e."Sample 2"). This difference between the two samples, however, does not seem to affect the general line of argument presented in Chapter 6.

"Computer Simulations 1 - 3"

In order to evaluate the significance of the regularities displayed by data derived from "Sample 2", an additional information on spatial behaviour was obtained with the aid of a Monte Carlo (random) simulation programme written by Dr Peter Sands of the Division of Computing Research, CSIRO, Canberra (see Appendix A). This programme simulated the placement of groups on a rectangular plaza in random positions subject to certain basic rules: (1) the centre of the group had to be within the plaza's boundaries, (2) the centre of the group had to be outside a physical object, (3) no two groups could overlap. The number of people in the group and hence its physical size, was chosen at random in accordance with the observed distribution (Table 5-3). The simulation took place in a series of steps whereby a small number of groups was first placed on the plaza, the overall configuration analysed and the plaza then cleared. At each step the number of groups deployed was in accordance with the actual distribution and this procedure was repeated until the required number of groups had been analysed. For each group the data gathered by the programme were: (a) the number of people in the group, (b) the distance to the closest physical object, (c) the type of that object, (d) the distance to the closest group, if there was one, (e) the distance to the closest walking person. In addition to these data a line-printer plot was produced showing the plaza, the location of all physical objects and of all stationary groups. This graphic printout was analysed in terms of groups placement in relation to pedestrian traffic lines exactly in the same way as were the aerial photographs of the plaza (see Appendix A).

The plaza, people and objects were constructed simply in terms of the geometrical concepts of rectangle, point, line segment and circle. All the distances were measured between the perimeters of stationary groups objects, gatherings and walking people. The physical objects were, generally, of two distinct classes: (1) 'barriers' - straight walls of zero thickness, specified by the coordinates of their end-points, (2) furnishings - approximated as circular objects representing 'seats', 'free-standing objects' and 'utility objects' and specified by their centre and radius.

The input data for the programme comprised the following sequence of items: (1) the observed frequency distribution for the number of people in a group, (2) the observed frequency distributions for the number of groups on the plaza at any instant, (3) the physical sizes (radii) of groups as a function of the number of participants (see Table 5-3), (4) the length and breadth of the plaza, and the scale (measurement units/cm) to be used when plotting the plaza, (5) the number of barrier objects on the plaza, (6) for each barrier object the (x,y) coordinates of its two-end points, (7) the number of furnishings on the plaza, (8) for each furnishing the (x,y) coordinates of its centre, its radius and its type, (9) the minimum number of groups (N=350) required in the total sample, the estimated average ratio between the number of stationary (standing) and non-stationary (walking) people on the plaza, and the initial seed for the random number generator.

The simulated data were used to investigate to what extent the original observed quantitative relationships between the placement of a stationary participation unit and its physical and human environment were the results of chance. If the presence and positioning of traffic lines, stationary people and physical objects does have a significant effect on the spatial distribution of stationary people, the observed pattern should differ significantly from that produced in the random or Monte Carlo simulation. To this end the following simulations were performed:

"Simulation 1" was based on the assumption that 350 stationary participation units were distributed in two halves of the plaza with the same average density as in real life. Thus, the western part of the plaza was occupied by 80% of stationary people, while the remaining 20% were distributed in the eastern half of the plaza. Comparison between "Simulation 1" and field data showed that the observed distribution of static groups of people on the plaza was not uniformly random; rather it appeared to be dictated by the existence of definite pedestrian traffic lines across the plaza. The discussion of this comparison is provided in Chapter 4.

In "Simulation 2", groups were placed on the plaza in accordance with the observed distribution relative to the traffic lines. Thus, 87.5% of groups were allocated to traffic areas (which included central, side, and protected locations) and 12.5% of groups to non-traffic areas ("away" locations). This enabled the attention to be focussed on the spatial relationships between stationary people and nearby physical objects as well as other groups present on the plaza. The results of comparisons between the simulated and observed spatial distributions are discussed in Chapters 6 and 8.

"Simulation 3" : the previous two simulations ignored the presence of walking groups of people. The programme was now modified so that a study of spacing between walking and stationary people could be carried out. It was assumed that for every stationary person seen on the plaza at any instant there were 5 to 6 individuals walking. The pedestrians were also assumed to observe the same pattern of spatial distribution relative to traffic lines as did the stationary groups. It was also assumed that the frequency distribution of walking groups of various size, as well as the physical size of these mobile groups was identical with that of stationary gatherings. Results of the comparison between the simulated and observed patterns of spacing between walking and standing people are discussed in Chapter 6.

3.ADDITIONAL INFORMATION SOURCES

"Videotape"

In the course of analysing "Sample 2" the question arose whether the observed preferences for certain locations within the plaza boundaries are systematically linked with the amount of time people spend on their stationary activities. In order to examine this issue a long (70 minutes) videotape was taken in Petrie Plaza. The videotape was made unobtrusively from the same vantage point as the one used for securing the "aerial" photographs. This provided a record of all the spatial, postural and orientational behaviours of all people present within the boundaries of the plaza[2]. The videotape was made with the aid of a battery operated, portable Sony videotaperecorder, mounted on a tripod and supplied with a standard telephoto lens. The videotape was made on a cool but windless and sunny day (Friday) in the beginning of June 1977. The weather, thus, was typical of Canberra's early winter, and roughly comparable with the weather conditions prevailing during the time when the "aerial" photographs were taken. Recording began at 12 noon and was completed at 1.10 pm. and thus covered the period of the lunch hour break during which the plaza was most fully used by people engaged in shopping, relaxing and socializing. In the course of subsequent analysis of the videotape (on a 14 inch monitor screen) it was found that the overall quality of the

[2] I would like here to express my deep gratitude to Mr Timothy Asch for his help with setting up the apparatus and his cheerful company during the recording.

recording was too low for more detailed observation of the spatial features of stationary F-formations. It was, however, sufficient for assessing the number of people in a gathering, the manner in which a given formation was established and its placement in relation to pedestrian traffic lines.

All 70 minutes of the tape yielded data on the duration in position of 100 stationary solitary individuals and 134 F-formations. The data on other formations present in the plaza such as queues or formations of walking people were not included in the analysis. The collected data were subsequently arranged in five tables (8-4,9-4,10-4,11-4 and 13-4 discussed in Chapter 4).

"Enga" Sample

The data on Enga (listed in Table 1-2) were obtained by analysis of two reels (30 min each) of 16 mm black-and-white research film, ELA-1 and ELA-2, which are on file at the Human Ethology Laboratory, Dept.of Anthropology, RSPacS, ANU. This document was recorded by Dr A.Kendon in December 1975 in Laiagama village which is an administrative center for a subdistrict of Enga Province, P.N.G. The films were made unobtrusively at a local market which attracted approx. 2 - 3 thousand people from nearby settlements. The analysis was concerned with the spatial arrangements adopted by villagers standing in 103 gatherings of various size and sex-composition. People in these little informal gatherings appeared to be preoccupied with such activities as conversing, smoking and watching other people nearby.

"Murngin" Sample

The data (listed in Table 1-2) on types of spatial arrangements used in two-person free-standing static formations among Murngin (Yolngu) people are based on analysis of over 300 photographs taken by Mr Ian Keen during his fieldwork in 1974-1976 in Milingimbi, Northern Territory, approx 300 km east of Darwin. The photographs depicted mortuary ceremonies (purification rituals) and circumcision. The data extracted refer to the behaviour of 23 all-male and 10 all-female duets seen among onlookers of these ceremonies and show arrangements used by people who were not directly taking part in ceremonial tasks but were engaged in conversation while watching the events and in self- as well as other-directed manipulation.

"Films" Sample

The data (listed in Table 2-2) on the frequency of occurrence and average duration of stationary arrangements in three-person F-formations are derived from research documents H.E.L.0001 - 0014 on file at the Human Ethology Laboratory, Dept.of Anthropology, RSPacS, ANU. These documents are 16 mm black-and-white films made by Dr A.Kendon and T.M.Ciolek in a number of public pedestrian settings in Canberra in the years 1974-1975. All films were taken unobtrusively and on several occasions unknowing to the filmed people. Thus the data gathered appear to be representative of unselfconscious unstaged behaviour by people engaged in spontaneously occuring face-to-face conversational exchanges. The data on the behaviour of three-person F-formations was obtained from frame-by-frame analysis of 6 complete events, 18 openings, 10 middle-games and 7 closings of these F-formations.

Other information sources used in the dissertation such as "Observations no 1 through 5", "Interviews 1 and 2" as well as "Questionnaire Study" will be discussed where these sources are made use of.

4.VARIABLES REFERRED TO IN THE DISSERTATION

In what follows we shall describe briefly some basic notions and variables which have been applied during the analysis of our data.

Participation unit and its size

It has been observed that 'individuals navigate streets and shops and attend social occasions ... either in a "single" or in a "with". These are interactional units, not social-structural ones. They pertain entirely to the management of co-presence ... [and they are found to be] fundamental units of public life ... A single is a party of one, a person who has come alone, a person "by himself", even though they may be other individuals near him ... A with is a party of more than one whose members are perceived to be "together"' (Goffman 1971:40-41). The size of participation units in public varies quite considerably (see Chapter 4). It was found, however, that groups composed of more than 4 participants occurred at the studied setting extremely seldom.

For the purpose of our work a participant was defined as not a child, a person who had full access to the formation's o-space. This last criterion meant that in some cases a person who was accompanying an F-formation but not fully contributing his transactional segment to the formation's o-space (but standing nearby in a half-participant/ half-outsider position), was excluded from a count[3].

[3] The phenomenon of the so called "regional associate" has been discussed in Kendon 1976, McMillan 1974 and Scheflen and Ashcraft 1976.

Sex composition of a participation unit

The sex-composition variable refers to the ratio of males to females in a given gathering. Three broad categories of multiperson gatherings were distinguished: male-dominated, female-dominated and sex-balanced groups.

Spatial arrangements

The next feature, the type of spatial arrangement adopted refers to the spatial layout used by a two-person gathering. Eight basic types of arrangements could be distinguished in the field material (see Table 1-2). The first six types comprised a hexad (N;H;V;L;C;I) characteristic of F-formations. These arrangements were subsequently found to represent 116 out of 118 (that is approx. 98% of all the two-person configurations recorded at the plaza). The remaining two percent of the configurations comprised one case of a T-minus arrangement and a single case of N-zero arrangement. Since the "T" and "N" arrangements represented only a marginal number of configurations, all subsequent cross-tabulations were confined to the F-formation arrangements.

Categories of physical objects furnishing the setting

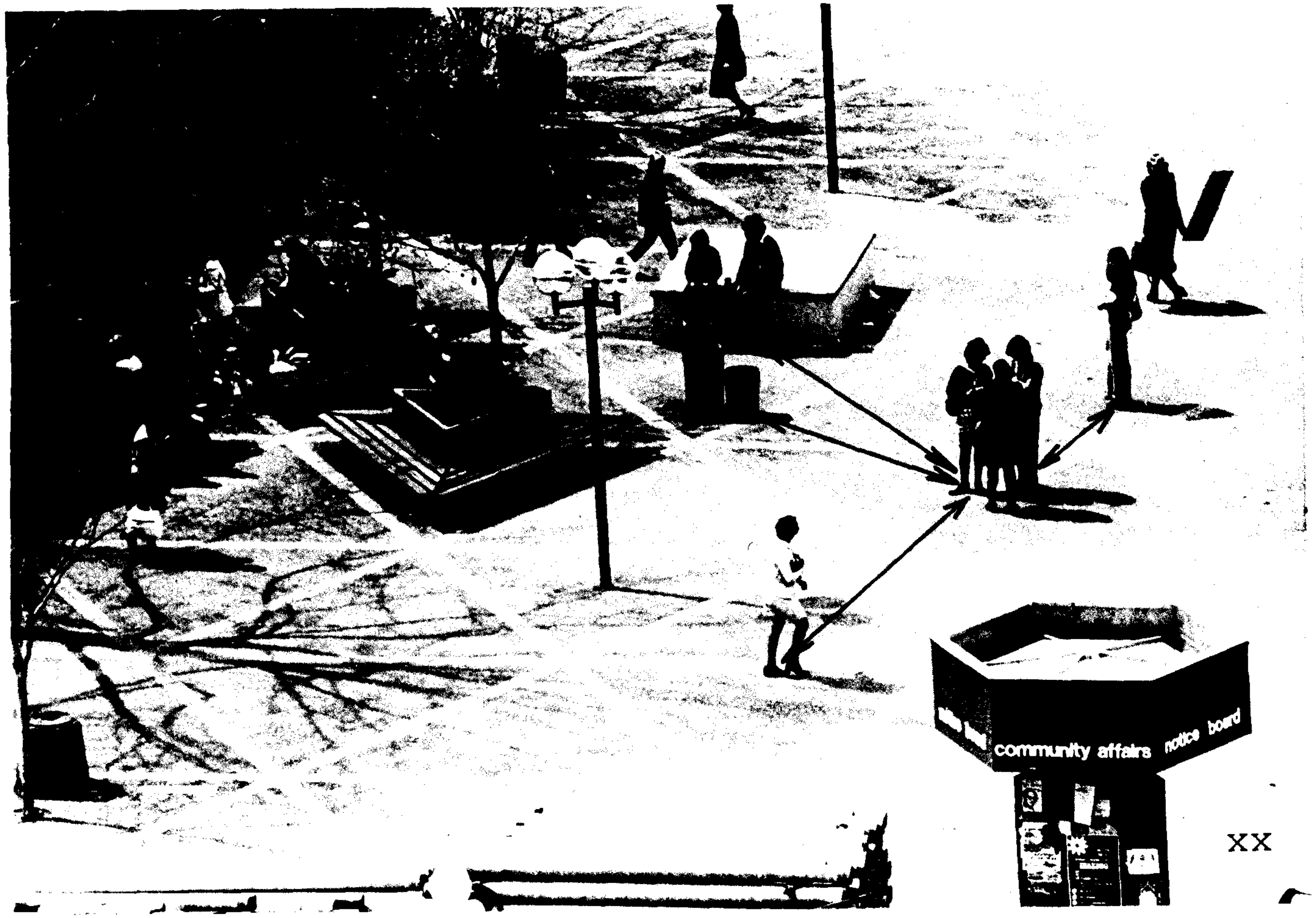
As far as the fourth variable is concerned it is sometimes useful to assume that the floor space of a pedestrian setting is defined by a number of physical objects which give the environment unique shape, size and quality. The whole issue of space and the objects defining it (often referred to as space-establishing elements) is a difficult and complex one (Thiel 1970). In the case of this study four classes or types of artifacts were distinguished as performing this role: barriers, free-standing objects, utility objects and seats. The class of barrier elements was composed of those objects which are not crossable or penetrable to a pedestrian under normal circumstances. In the case of Petrie Plaza this class included walls of buildings, a kiosk, a fence and a stack of building material. The next class of elements, free-standing objects, included such items as trees, litter-bins, lamp-posts and pillars. The third class of artifacts, utility-objects, included a drinking fountain, mechanical toys, display racks and a notice-board. The objects in this category may be used by an individual for some short or occasionally prolonged time (manipulating, playing with, studying etc.). The fourth and final class of things distinguished, seats, comprised both benches and chairs.

Distance to the nearest object

The next variable, the distance between the target group and the closest element, was expressed in paces[4]. The estimates of distances were made fairly accurately by comparing the size of a pace taken by people walking in the vicinity of a target group, with the distance from this group to the artifact[5]. The distance measured in paces refers to the distance between the person closest to an object and surface of the object itself. The estimates were coded in values rounded to the nearest full unit. Where a participant was in direct bodily contact with an artifact, leaning or placing a hand on it, for example, distances have been expressed as equal to zero paces. On the other hand, people at distances greater than 6 paces were coded under the blanket category of

[4] One pace as used in this study is equal to approximately 2 feet, or 60 cm - which is the average distance covered in one pace by an average pedestrian (Fruin 1971).

[5] Of course in the future more ambitious investigations may benefit from the use of photogrametric techniques (Scherer 1974) yielding much more precise and reliable measurements.



PLACEMENT OF A STATIONARY GROUP IN RELATION TO OBJECTS AND PEOPLE:
Distance to the nearest object and nearest standing, sitting and walking person

"six paces plus" However, analysis of the material has shown that only a very small percentage (6%) of people scored at Petrie Plaza were ever this far from any object. It has to be remembered that the Plaza is a small place quite densly packed with artifacts.

Distances to the nearest walking, standing and sitting persons

The location of a gathering was also scored in terms of its distance from the nearest bystander or passer-by. This distance was expressed again in multiples of paces and referred to the space separating the target group from each of the three categories of other people present within the setting : nearest standing, nearest sitting and nearest walking person. The separation distance was estimated from the body surface of the stranger closest to the target group to that of the group member closest to him[6]. Unlike in the previous case, the distances were estimated in units up to 12 paces. For larger distances the blanket category "12 paces +" was used. In situations where a positive estimate could not be establish, the category "missing data" has been employed.

Placement in relation to traffic lines

The ninth variable used was that of the participation unit's spatial relation to pedestrian traffic routes. Before discussing this relation, however, it is necessary to introduce the concept of a traffic route itself. It is often observed that the trajectories people choose while navigating through an environment follow certain paths and routes. These routes can be regarded as the most convenient lines of communication

[6] Similarly as in the case of the group-size variable, regional associates were excluded from measurement. It has to be noted, however, that "regional associates" of one stationary gathering could be "stationary strangers" in relation to other people, and as such could be taken into consideration when the spacing between the other group and its respective nearest stranger was estimated.

within a given setting, ones which link its most important nodal points. Normally the course of the traffic routes is evident from the network of paved walking surfaces (Burke 1976:108-110), stairs and ramps. However, in such places as courtyards, car-parks, plazas or lawns where all floor area is smooth and equally well suited for pedestrian movement, the web of traffic lines can be identified by the characteristic wear of floor surfaces (Webb et al. 1966:35-36), occasional accretions of mud, wet footmarks or by depletion of vegetation.

Most typically the traffic routes are situated close to and parallel with the line of buildings forming the sides of a street or a town-square[7]. Sometimes, it can be observed that pedestrian routes not only stretch along sidewalks at the edge of a setting but may also criss-cross the space so that they link, for example, all four street corners with entrances to major shops and buildings. Usually the lines used for navigation are the shortest routes joining one part of a setting with another[8].

Regardless of the particular configuration of traffic routes it seems that in all cases their course and layout display the same basic regularity. They are arranged in such fashion that in using them people can navigate the setting with a minimum of conscious decision-making, and

[7] J.Jacobs notes, for instance, that even in entirely pedestrian settings, from which cars and other vehicles are excluded, people 'do not sally out in the middle and glory in being kings of the road at last. They stay to the sides... except where something interesting to see has been deliberately placed out in the "street". It takes tremendous numbers of pedestrians to populate the whole width of a road bed, even in scatterings...' (1972:360-361).

[8] There are,however, some exceptions to this rule, as is indicated by observations of pedestrian traffic moving across a large, open space (e.g. St. Mark's Square, Venice). Hass noted, for instance, that 'many people did not cross the square by the shortest route (i.e diagonally) but steered first for a lamppost which was somewhat out of the direct line and then for another before making the complete crossing.'(1973:74).

PLACEMENT OF A STATIONARY GROUP IN RELATION TO A TRAFFIC LINE

Side ; Central

Protected

Away

yet without colliding with objects furnishing the space or without changing trajectory too often or too rapidly (Ciolek 1976).

As far as the placement of stationary gatherings with regard to traffic lines is concerned it is useful to discern four basic possibilities. These are: "away", "side", "central" and finally, "protected" locations.

In the case of "away" locations a target group is standing clear of regularly and heavily used traffic routes. These locations are spaces that are relatively free of pedestrians, and their occupants are not exposed to the pressure of moving crowds. Though a target group may be bypassed on all sides, accidental passers-by do not usually approach it very closly. Generally speaking, the "away" locations can be found 3 to 5 (and more, of course) paces from the edge of a traffic line and can be found, most typically, in the centre of large, spacious settings such as halls, town-squares or lawns. The second category of interaction sites, that is the "side" locations, occur, as their name indicates, at the edges of traffic routes. People who occupy these spots remain in close proximity to people walking past and are, normally, bypassed by them mainly on one side. Other sides of a stationary gathering are protected from the flow of people either by an expanse of the abovementioned "away" space, or by a wall of a building, a kerb or other similar barrier.

In addition to the people in "away" and "side" locations there are always a number of pedestrians who stop right in the middle of a stream of walking people. In such "central" locations stationary groups are enveloped by traffic from all sides. The "central" locations of course, tend to be the spots where both the tacit and overt interactions of a passerby and stationary persons occur most frequently, where the pressure of the crowd is the greatest and where the impact of a static group on the trajectories of mobile people is the most noticeable. Finally, static groups are often formed in "dead" spaces, that is, ones created behind, in front of or between objects or other traffic obstacles dividing and deflecting the flow of people. These locations are usually the small niches and lees created by the configuration of walls, street furniture, rain puddles, trees and telephone kiosks. In "protected" locations stationary people are bypassed by pedestrians moving from all directions, but nevertheless they would always remain screened from the direct pressure of the flow.

Activity of a participation unit

If we focus our attention exclusively on those individuals and "withs" standing by themselves away from queues and sitting people, we notice that their activities, though quite diversified, fall into five basic categories.

In the first category, we have people waiting for somebody or something (e.g. waiting for a friend, for the opening of a bank, for a change of lights at a street crossing) as well as people observing and watching other plaza users (e.g watching somebody at work, at play etc.). The second category includes people gathering information (e.g. reading newspapers, studying the noticeboard or looking at window displays). The third category of stationary behaviours embraces different forms of manipulation. This activity can be directed toward objects (e.g.locking a bicycle, adjusting shopping bags or rearranging things in a pram) as well as towards oneself or other persons (e.g.doing up shoelaces, washing a child at a fountain, putting a child into a pusher, taking off a raincoat etc.). The fourth type of activities were conversational: talking, greeting and parting, asking the way and so on. Finally, there was a residual category of "other activities" which included such tasks and behaviours as drinking, eating, taking notes or taking photographs.

The above list of behavioural-categories was built on the basis of the analysis of photographic material in "Sample 3". Activities discerned were categorized on the basis of a number of visible clues displayed by the people photographed. Naturally, the task of identification of these behaviours was a difficult one and thus approximately 12% of all stationary behaviours seen on the photographs could not be positively identified.

...

Though at first glance the listed variables may seem to be too simple to describe the variety of situations which occur every day in an open pedestrian setting it is our contention that in this exploratory study the use of more elaborate variables would make investigations prematurely complex and difficult. Since our choice of variables was dictated by both the nature of the basic data-gathering technique used (unobtrusive, naturalistic observation) and the reliability with which the photographic material could be interpreted, we have limited ourselves to factors which were relatively easy to determine either during direct observation or on still photographs. It is not being suggested, however, that future investigations should be limited to the exploration of only these ten factors. More ambitious approaches are certainly needed.

Having thus defined the basic variables it was possible to proceed with the analysis of the photographic materials. Each of the 352 gatherings derived from "Sample 2" was described in terms of the 9 variables of (1) group size, (2) sex-composition, (3) type of physical object nearby, (4) the distance to this object, (5,6,7) the distance to the nearest person within the setting (nearest standing, nearest sitting, nearest walking), (8) positioning in relation to pedestrian traffic lines and (9) type of spatial arrangement adopted.

Stationary participation units recorded in "Sample 3" were described in terms of the following characteristics : (1) size of the participation unit, (2) its sex-composition, (3) the type of nearest object, (4) distance to the nearest object, (5) distance to the nearest standing person, (6) placement with respect to traffic lines, and finally (7) activity of the participants.

Then the whole set of data, coded on punch-cards, was run through a computer utilizing an SPSS programme (Nie et al. 1970). This statistical analysis produced the basic frequency counts as well as the cross-tabulations between variables. These data were subsequently expressed in terms of absolute values, means and percentages. Cross-tabulations, whenever applicable, were evaluated with the aid of the Chi-square test. The choice of this test was dictated by the nature of the analysed data (i.e.the analysis utilized a mixture of both interval and nominal scales, the tables being partially of a dichotomous and partially of a multiple-category type).

The results of these analyses are provided in Chapters 4, 6 and 8.

CHAPTER 4

DESCRIPTION OF THE POPULATION IN THE MAIN STUDY SETTING[1]

1.THE NUMBER OF PLAZA USERS

Petrie Plaza functions as a "city heart" only during limited hours, namely during the business hours of the shops and nearby offices. This means that during weekdays the plaza empties after 5 p.m. (on Fridays after 9 p.m.). On Saturday mornings the area swarms with pedestrians, but again after 12.30 p.m. and on Sundays it is practically deserted, except for sporadic groups of teenagers and occasional tourists (see Table 1-4). However, when the plaza is in use, people are constantly there in relatively large numbers. At any time during business hours there are, on average 30 - 50 people present, and this number increases during lunch hour to approximately 120 - 130. The number of people present on working days is fairly constant. It may be important, perhaps, to note here that this pattern of use is in line with observations made in other similar urban settings (Jacobs 1972, Deasy 1970, Lerup 1972). These studies suggest that the number of users of a given pedestrian setting tends to be controlled by a positive feedback mechanism. In other words, the presence of people in a place is apparently the most important attraction to potential users of the setting. By the same token, empty urban settings tend to remain empty because for this very reason they are avoided by passers-by. City spaces differ[2] in this respect from other public

[1] The figures provided in this chapter come, unless indicated otherwise, from the data batch "Sample 1"

spaces such as beaches or wilderness areas, where it has been found that an entirely opposite mechanism tends to operate, and the presence of even a few people is rather discouraging to other potential users (Peterson and Neuman 1969, Carls 1974).

Generally speaking, the population using the plaza can be divided into three large categories according to the main activity involved: walking, standing and sitting. On average nearly 70% of all people present at any time within the boundaries of Petrie Plaza are walking, 12% are standing and the remaining 18% are sitting on a bench or chair. These figures are based on daily averages; of course at some times of the day the percentages standing, sitting or walking differ from those just given. In the lunch hour there are more people standing (up to 20% of the total population), more sitting (up to 30%) and a corresponding smaller proportion walking (see also Table 2-4).

Interestingly, the type of behaviour adopted was found to be significantly (p less 0.001) associated with the sex of the people (see Table 3-4). If we exclude children and people whose sex could not be satisfactorily ascertained from the photographs, we find that though the majority of the people each category of behaviour were males (54% of all plaza users), there was nevertheless a clear-cut tendency for females to be more frequently walking, while males were more frequently standing or sitting. This may perhaps be interpreted in terms of the idea that in Australian cities, outdoor public places are still regarded as a predominantly male domain in which females are expected not to hang around

[2] C.M.Deasy in his discussion of the attractiveness of various pedestrian settings remarks that 'Of the various elements in a park that attract peple, the strongest drawing card (overwhelmingly) is other people. Next to people as an attraction, a very poor second, are birds and animals' (1970).

in leisurely fashion nor to socialize with other people but rather to be occupied with some "legitimate" and goal-directed task such as walking to another place, or shopping. It is also posssible that men have simply more time to sit around (in Australia as elsewhere) both in public and in private.

Since this work is almost exclusively focussed on standing people it is worthwhile describing this sub-population in some detail. Observations suggest that those standing (N=930) fall into three basic categories. First, 33% were queuing at the kiosk. Second, there were those who were "attached" to a bench and were engaged in a focused interaction with individuals sitting there (11%). The third and largest category, comprising 56% the total were people standing apart from such fixed points of orientation. Only this category of plaza users whose choice of stationary location was not determined by the positioning of the kiosk or by their interaction with people sitting on a bench will be discussed in this study. In this way it will be possible to deal more directly with subtle factors which seem to affect and control the patterns of spatial distribution of people in urban settings.

2. THE SIZE AND ACTIVITIES OF STATIONARY PARTICIPATION UNITS

The data suggest that the size of such free-standing participation units can vary quite considerably[3]. In Petrie Plaza most locations are taken up by people who are in the company of other individuals. Thus 55.4% of all locations were occupied by people in free standing participation units, while the remaining 44.6% were selected by solitary

[3] It is interesting to note here that though males form stationary clusters much more frequently than do females, no sex-linked effect is found operating in relation to the size of a gathering.

individuals. These results closely correspond with the data obtained on the ratio of solitary to non-solitary walking people in streets and urban parks in America, Europe and Asia (Berkowitz 1971). The Petrie Plaza materials are also in agreement with the pattern found for stationary people by Preiser (1972). On the other hand, the percentage of solitary individuals in our setting was much higher than the percentage of solitary walking people (20.9%- Bakeman and Beck 1974; 27.9% - Preiser 1973) observed in a number of shopping centers in the USA. At the same time it is much smaller than the average value of 65.5% obtained by James (1953) in a variety of public settings.

Though the ratio of solitary people to those in gatherings seems to be context-specific, there is a surprising uniformity in the frequency distribution of sizes of social gatherings (see Table 4-4). This table indicates clearly that according to all five studies, between 84 and 90% of all focusssed interactions observed in public settings takes place within groups comprising no more than 3 participants. The comparison suggests that the point stressed by Bakeman and Beck, namely that "distributions of group size and mean group size are remarkably unaffected by context" (1974:381) is indeed valid for human gatherings.

The stationary people using Petrie Plaza were found to be engaged in a great number of activities. The data on the relative frequency of occurrence of these activities, both in the context of Petrie Plaza and in other parts of Canberra, are provided in Table 5-4. It can be seen there that approximately two thirds of all stationary participation units present within the boundaries of the study setting were engaged in conversing (60%) one fifth, in watching and waiting (19%) and one eighth (13%), in self-, other- and object-directed manipulation.

The next two tables (Table 6-4 and 7-4) demonstrate that the frequency with which different activities were engaged in by people varied significantly both according to sex and the size of the participation unit. Males tend to be engaged in conversations significantly more often than females. The females appear to opt relatively more often for non-conversational activities. The sex-balanced groups, on the other hand, seem to behave in an intermediate manner. The majority of M/F groups are engaged in conversations (80.6%) while the rest (19.4%) of these gatherings are involved in task-oriented. non-conversational activities. Another regularity was associated with the size of a standing group (see Table 7-4). Solitary people seem to be engaged significantly more often in waiting and observing than were people standing in the company of other individuals who appeared to favour information gathering, manipulation and other activities more than was to be expected by chance alone.

The last two tables are of special interest to us, since further examination of the field data (Chapters 6 and 8) reveals repeatedly that the placement of a stationary unit within the context of a plaza has been found to be frequently correlated with sex and the size of the group as well as the type of its activity.

3.THE LIFE-TIME OF STATIONARY PARTICIPATION UNITS[4]

The duration of these stationary activities was found to be quite short. Table 8-4 shows that an overwhelming majority of F-formations on Petrie Plaza had relatively short lives. The results obtained are comparable with those of Baxter (1970:447-448). It has been found that four fifth lasted less than one minute and none of the 134 configurations observed existed longer than 6 minutes. Table 9-4 shows that a great majority of those formations which lasted less than one minute lasted also less than 20 seconds. This is an important finding as it confirms that the phenomena being currently observed by students of human spatial behaviour are in fact very fragile, and many of them escape detection and recording simply because they are so ephemeral. This is also an important point to remember when studying people's placement in relation to walking and stationary users of a setting. It means that the maintenance of regular and ample spacing between stationary F-formations (see Chapter 6) is in fact an investment in an event which, for the same set of participants, seldom lasts longer than 60 seconds.

But the regularities observed in the behaviour of Petrie Plaza users are highly instructive despite the fact that they refer to F-formations of relatively short duration. What we would like to stress here is the fact that once an F-formation system is brought into existence it displays the whole gamut of characteristic properties and functions; and that these are independent of the lifetime of a given social encounter. In brief, the spatial logic and patternedness of a ten-second event are the same as these of an event lasting for a quarter of an hour, and therefore, deserve very careful attention.

[4] The length of time each stationary person and each F-formation remained in position was measured with a stopwatch. The points at which the stopwatch was put on and off were the moment the last person in an F-formation came to a full halt and the moment the first person started performing a manoeuver leading to the termination of the o-space, or, in the case of solitary people, leading to the abandonment of the chosen location. Such procedure meant that an event in which A+B were walking together, made a stopover, stood in an F-formation for 25 seconds, disassembled the overlap of their transactional segments, moved away a couple of paces, and established another F-formation for another 25 seconds and then finally dispersed each taking his own direction was scored as an event consisting of two F-formations. In other words the focus of our study was the continuity of the o-space and not of the co-presence understood in more general terms.

The next Table (10-4) shows that the likely duration of a gathering with a joint interactional space appears to be directly affected by the manner such an o-space has been formed[5]. Thus, formations established through stop-overs were found to last half the time that formations established via meetings do. This is a not un-expected result. Even if we assume that the task for which an F-formation was brought into an existence is identical in the case of stop-overs and meetings, it is obvious that people who are already in each other's presence are more likely to accomplish such a task more smoothly than those who have to start an encounter from the very beginning. Those who enter each other's presence after some period of separation are expected to dedicate the first few seconds of their focused encounter to complete negotiations concerning how to deal with each other's presence, and only then do they turn to an exchange of goods, services or information.

Table 11-4 illustrates the next finding. It shows that solitary standing people remain stationary in a given location much less time than do people in two-person F-formations, which in turn are less durable than three-person and larger participation units. It appears that the larger interactional cluster the longer it takes to establish its unity, proceed with a task and finally disassemble and disperse from the stopping point. Obviously, the more participants there are in an encounter, the more time is needed for them all to partake in the encounter in a generally satisfactory way.

[5] The mode of establishment of the F-formation referred to the three ways F-formations occurring in the study were established. These three ways were: stopovers, meetings and rearrangements. In the stopover the walking people would come to a halt and form an o-space. In the course of meetings two or more initially separate walking people would converge on a point (or approach an already stationary solitary person) and establish a joint interactional space. In rearrangements the seated people would stand up and then establish an F-formation.

4.SPATIAL DISTRIBUTION OF PEOPLE WITHIN THE SETTING: GENERAL PATTERNS

Analysis of "Sample no 2" yielded a number of interesting regularities and trends. It was found that a majority of people tended to select their sites for social interaction not just anywhere within the boundaries of the plaza but in places which were closely associated with the flow of pedestrians. The general trend was for stationary participation units to position themselves either right on or very close to the traffic lines intersecting the plaza. Relatively few people formed their gatherings "away" from the spaces used for navigation. This finding, therefore, confirms the general observations of Preiser (1972, 1973), who also noted that open, barren spaces, situated "away" from the major flow of people are empty. The relative frequencies observed (Table 12-4) at Petrie Plaza were as follows (N=351 cases): 12.5% were "away" from the traffic routes, 28.8% were close to the sides of the routes, 46.2% were in the middle of the stream of pedestrian flow, and finally, a further 12.5% took place in lees "protected" from the flow of people. This also finding is in line with observations of Preiser (1972) who noted that in the pedestrian setting studied by him stationary and mobile people tended to coincide in the same, usually restricted, areas and that they caused spatial interference while leaving other parts of the plaza "dead" and unfilled with activity.

In order to obtain a set of data which could be compared with the observed regularities, a computer simulation ("Simulation No 1") of randomly determined spatial distributions of 352 stationary gatherings was undertaken. A graphic printout of randomly distributed people within a scale plan of the study setting was produced, so that the placements of people could be identified and analysed in exactly the same way as was done with the "aerial" photographs. The comparison of these two sets of results (see Table 12-4) turned out to be both statistically (p less Ø.ØØ1) and generally highly significant.

Firstly it emerged that there is little difference between the observed and expected frequency with which "central" and "side" locations are used. People do not appear to avoid or seek these spaces deliberately. They seem to use them in a purely accidental, haphazard way as if it does not matter to them how much of the pedestrian flow will bypass them. Secondly, the data suggest that the observed percentage of people using "away" locations is significantly lower (12.5%) than would be their number (23.Ø%) if people were to spread themselves randomly all over the setting. Thirdly, the observed frequency of use of "protected" locations is markedly higher (12.5%) than would be the case if people situated themselves haphazardly (7.1%).

Thus the comparison between the observed and simulated situations suggested that the positioning of groups in relation to traffic lines seems to be governed by the principle of least effort. In a situation where the majority of people flow along a few clearly defined traffic routes, the majority of static gatherings are formed there. Secondly, people definately opt for spaces defined by the presence of an object or "protected" by some kind obstacle. They shun locations situated in the middle of open space (positioned in "away" areas) and display no particular preference one way or the other toward using intermediate, semi-defined/semi-exposed places like our "central" and "side" locations. These results are comparable to those obtained by other researchers. For example, Stilitz (1969, 197Ø) observed in crowded ticket halls of the London underground that though linear queues were mainly situated on and along pedestrian traffic routes, solitary waiting individuals usually avoided standing right in the middle of heavy traffic tending rather 'to stand where there is some physical "protection" such as a pillar or a ticket machine, from the passing flow' (1970:66) or in locations in which they did not affect the passage of pedestrians. These observations have been subsequently supported by data collected in theatre foyers. In the foyers people also opted for "protected" locations close to walls or in places where 'some physical barrier splits up a flow [and] the two halves of the flow do not merge immediately beyond the obstruction but leave a "dead" area' (1970:67). It was also found that solitary individuals were more likely to seek protection from traffic flow than were small conversational clusters.

Tendency to seek protected locations is also reported by Jacobs who observed that stationary activities and pedestrian traffic usually do not co-occur on narrow pavements, since static people are crowded out by moving pedestrians. On the other hand, if both sets of people co-occur in the same sidewalk it is either a spacious one (30-35 ft wide) or there are minor irregularities present in building line : 'an immense amount of both loitering and play goes on in shallow sidewalk niches out of the line of moving pedestrian feet' (1972:97).

Though the majority of stationary participation units might be found to be formed in "central" and "side" locations, it could be expected that the average duration of a stationary activity or an interpersonal exchange would not be the same in every type of location. It was plausible to assume that the less a given set of participation units was exposed to the pressure of the traffic flow, the greater the likelihood that their interaction would continue to exist within a chosen spot.

This hypothesis finds some confirmation in the data provided in Table 13-4. This table suggests that each of the four types of locations distinguished with respect to pedestrian traffic routes appears to provide different conditions for the F-formation's survival. The least hospitable is the center of a traffic route, where by definition the pressure of walking people is the greatest. This is also the place where an F-formation could be expected to be attending most fully to its immediate environment, and for that reason the accomplishment of the task for which the F-formation was established could be judged to be more difficult and more strained than elsewhere in the setting. Not surprisingly, F-formations lasted there a much shorter time (on average 27.2 sec) than they did in other parts of the plaza. In the less demanding locations such as the side ones, where the major flow of pedestrian traffic largely bypasses the stationary participants an F-formation lasted, on average, 34.6 seconds. Thirdly, formations established away from the traffic line are removed from the immediate presence of mobile people and are subjected to only occasional intrusions. With away locations the average life-time of F-formations was found to be 46.6 seconds. Finally, groups settled in the protected niches, screened from the flow of people by a configuration of objects such as trees, waste-baskets and irregularities in the line of building facades seem to be situated most congenially. In these spots the outer perimeter of a group is not only protected from direct intrusion into the participants' personal spaces, but the whole domain is also clearly bounded and attached to a non-ambiguous space. In these contexts the F-formation's average life-time was twice as long (56.9 sec) as that of a formation in the middle of pedestrian traffic. These findings, therefore, suggest that in the examination of the data from "Samples 2 and 3" (Chapters 6 and 8) attention should be paid not only to the internal characteristics of gatherings but also to the features of the location where they are found to occur. The ecology of a social encounter seems to affect the overall life-time of an interaction, and is thus likely to be intimately related to the other properties of F-formation systems formed in public spaces.

5.PATTERNS OF SPATIAL DISTRIBUTION : EFFECTS OF THE PARTICIPATION UNIT'S CHARACTERISTICS

Further examination of the ways people distribute themselves within the setting indicated that the foregoing regularities were not displayed uniformly by all users of the setting. It was found that certain categories of stationary users tended to behave in their own unique way. There were at least three factors which seemed to significantly affect people's placement within the context of the plaza. These factors were found to be the sex-composition of a participation unit, its size, and finally, its main line of activity.

As far as the sex composition of a participation unit is concerned, the groups differed not only with respect to the frequencies of their occurrence in the plaza, but also in their use of various parts of the setting. An examination of the figures provided in Table 14-4 indicates three regularities. Firstly, the male dominated groups appear to avoid "central" locations and definitely favour "protected" and "away" spaces, where they amount to 75 and 68 percent of users respectively. The second regularity is associated with the way groups containing an equal or predominant number of females tend to distribute themselves. The female-dominated formations as well as the M/F gatherings tend to be overrepresented in "central" locations. Both females and M/F groups occupy 33% of the "central" locations each, and seem to avoid standing in spaces which are not exposed to the flow of people. This can be seen in the relatively low frequency with which they contribute to the pool of stationary gatherings formed in "protected" and "away" spaces. The third regularity discerned here refers to the relative lack of preferences or avoidances with respect to "side" locations. There appears to be very little difference in the patterns of occupancy of the edges of traffic routes by groups of various sex-composition. The deviations from the theoretically expected occupancy patterns generally stay within values which can be explained by the operation of a chance factor.

The abovementioned sex-linked regularities find further confirmation (p less Ø.Ø1) in the materials referring to the patterns of spatial distribution of solitary individuals (see Table 15-4). Similarly as in the case of F-formations, the solitary males tended to be underrepresented in "central" locations and overrepresented in "away" and "protected" spaces, while the opposite was true for solitary females. It could be seen also that, as in the case of F-formations, solitary people of both sexes did not display any sex-linked bias towards using or avoiding the edges of traffic lines. The frequency with which they were operating there did not markedly deviate from their overall frequency of occurrence.

The next finding was that the choice of a location seemed to depend on the size of the group (see Table 16-4). In the case of "central" locations solitary people appear to be greatly underrepresented (32% of location occupants), while groups of two and three tended to be overrepresented. An entirely opposite trend is apparent in the case of "side" locations. There, at the edge of the traffic line a majority of standing people were solitary individuals (57% of all solos). This tendency was repeated in the next two categories of locations, namely in "protected" and "away" areas, which tends to confirm the earlier observations of Stilitz (1969, 197Ø). All these differences were found to be statistically significant (p less 0.01).

The third factor which was found to be significantly correlated with patterns of spatial distribution of stationary participation units was the type of activity being conducted. If we examine Table 17-4 we can see that the spaces selected as interaction sites for a conversational gathering are different from those adopted for non-conversational group activities. Conversations take place, basically, in "central" spots. Approximately 52% of all verbal exchanges carried out in the plaza were located there. Non-conversational activities, on the other hand, seem to occur mainly in "side" locations (45% of cases). A closer analysis of the figures in Table 17-4 reveals, however, that beneath these surface regularities there are some other, less obvious ones. If one compares the percentage of users of a given location with the percentage of users of the whole plaza, one sees that people who are "conversing" tend to be over-represented in "central" and "protected" locations, and under-represented in "side" and "away" spaces. The non-conversational static clusters tend, on the other hand, to adopt an opposite strategy. These differences were found to be statistically significant (p less 0.001).

Table 18-4, which shows how various types of locations are occupied by groups engaged in various activities indicates, additionally, that the overall drive of non-conversational gatherings toward "side" and "away" spaces is not typical of all kinds of interactional exchanges. Thus, it can be seen that "waiting and observing" is more evenly spread out all over the plaza than the other non-conversational behaviours. Activities such as "information gathering", object- or self manipulation" as well as the class of behaviours coded as "other activities" (e.g.taking photographs) turned out to be primarily occurring in places at the edge of traffic lines.

The regularities discussed above refer of course to the activities carried out by multiperson participation units. It is interesting, then, to observe that a different set of preferences is displayed by individual plaza users (see Table 19-4). This table shows that pedestrians who are standing by themselves tend, primarily, to use "central" and "side" locations as their favourite waiting spots. This tendency has been noticed in other contexts. For example, Stilitz observed that the center of foyer area was often used by persons who were waiting for other people because ' they wanted to be easily able to see, and be seen, by those for whom they were waiting' (1970:67). Similarly Cavan in her study of people's behaviour in bars and night-spots notices that 'B-girls and prostitutes...(as opposed to females who are merely visiting given establishment)... customarily sit at the far end of the bar, where the door and the entire premises are easily and obviously visible to them and they are easily and obviously visible to all who are there or about to be there' (1966:182). However, "side" locations appear to be used primarily (50% of cases) by people who are reading newspapers, studying posters, looking at window displays or engaged in other kinds of information gathering. Finally, table 19-4 indicates that self-, other- and object-directed manipulations were found to be typical mainly of people placed in "central" and in "side" locations.

This analysis of the data referring to the size, sex-composition and type of activity undertaken by stationary participation units demonstrates that the general statements about the ways people distribute themselves in an outdoor setting listed in the <u>Introduction</u>, do indeed find support in the empirical observation. It seems to be the case that people in outdoor spaces really do tend to distribute themselves unevenly over the setting and that their positionings are far from being haphazard. Furthermore, it is confirmed that a public setting is not a homogeneous and uniform stage where actors can carry out any activity anywhere. On the contrary, by taking into account a single aspect of a setting, such as the presence of pedestrian traffic lines, we are able to observe how selective people can be. Though each of the persons entering an outdoor public place is theoretically free to choose what he will do, where and with whom, the data collected suggest that these choices are effectively limited and highly structured.

CHAPTER 5

THE F-FORMATION SYSTEM AND ITS SPATIAL AND HUMAN CONTEXT

1. INTRODUCTION

Goffman, Lyman and Scott, Mead and Byers, Kendon, Scheflen and Deutsch all stress that an F-formation system is a device constructed by people with their bodies and maintained by them through a subtle system of compensatory movements so that the following five objectives are achieved:

(1) definition of the type and "normalcy" of interpersonal exchange, (2) delineation of the number of participants having access to the ongoing exchange, (3) creation of a congenial communication nexus, (4) maintenance of equality in participation, (5) creating a communication boundary between the o-space and the rest of the environment.

However, in the light of the data collected, we shall postulate the existence of further functions, this time related mainly to the fact that a given configuration is situated within a wider context, both spatial and human. Thus what we would like to do is to suggest that an F-formation system can be viewed as an adaptive mechanism which enhances people's chances for smooth and undisturbed engagment in and completion of their social encounter under the external circumstances and conditions. It appears that the very fact that people in their interpersonal dealings organize themselves in a small-scale, well-bounded configuration maintained by their own spatial and postural manoeuvers and adjustments provides them with an important differentiation between the inner world of their interaction and the outer world of excludable events, and, at the same time, a visual control over their immediate surrounds. Let us look more closely at the data which seem to suggest that this is so.

2.SPATIAL ARRANGEMENT OF AN F-FORMATION : THE INFLUENCE OF THE CONTEXT

Which arrangement is adopted during the lifetime of an F-formation depends on a number of different factors. It was noted in Chapter 2, that the culture of the people and their personal and interpersonal characteristics may be of importance here. The type of arrangement adopted depends also on the number of participants in the gathering. Thus the shape and layout of a particular F-formation are influenced by factors which are internal to the formation in question. But social encounters do not occur in a vacuum; they always take place somewhere, in some human and physical context. Anecdotal observations suggest that this context may sometimes shape the formation quite powerfully.

Yet the view widely accepted at present is that the arrangement of a free-standing interactional gathering is not significantly affected by the operation of ecological factors, and that if people distribute themselves in space in a certain way this is an effect of person- or interaction-specific variables only. Such a view, for instance, underlies the research of Jones (1971), Hall (1974) or Shuter (1976), who conducted series of naturalistic observations in order to determine the extent to which the spatial-orientational patterns displayed by free-standing two-person F-formations are related to the people's cultural or sub-cultural background. These observations were carried out in a number of outdoor, public locations "outside of taverns, on street corners, and around mail boxes" (Hall 1974:71) and in "parks, shopping facilities, and street corners" (Shuter 1976:49). The validity of their findings rested on an assumption that people's behaviour in these places was, for all practical purposes, constant. However, this assumption is precisely the point which needs to be questioned. My own experience and unsystematic observations would rather suggest that the way people organise their co-presences tends to vary from one location to another. Similarly, the simulations of Little (1965), the naturalistic observations of Baxter (1970), Cook (1970) and the laboratory data of Daves and Swaffer (1971) and White (1975) tend to indicate that the spatial relationships established between people in a focussed encounter systematically vary according to the immediate spatial environment. Moreover, a similar conclusion can be drawn from Kryter's (1972) discussion of the effects of the level of ambient noise on the interaction distance assumed to achieve a successful communicational exchange.

"Observations no 1"

In order to determine to what extent the generalizations of Jones (1971) Hall (1974) and Shuter (1976) were justified, a series of naturalistic and systematic observations of spatial arrangements adopted by dyadic F-formations was undertaken. These observations, which will be referred to as "Observations no 1" were conducted in four different but not entirely dissimilar contexts. These were:

(i) Locations at the side of a sidewalk situated at the edge of a pedestrian plaza. The locations discerned were within a narrow belt (up to 1.5 paces wide) stretching along and close to the walls of buildings This space was observed to be devoid of intensive pedestrain traffic and was mainly occupied by stationary people, individuals and groups. Generally speaking locations in this area could be characterised as being at the edge of a larger pedestrian setting, protected from the adverse influence of weather, and bounded on one side by a solid object (the wall of a building) while being open and accessible from the other side.

(ii) Locations in the middle of a barren, open pedestrian space, situated well away (6 - 10 paces) from walls or benches. People standing in these spots were not subjected to the pressure of pedestrian traffic and were occasionaly bypased on all sides by pedestrians crossing the area in various directions. Thus, these locations could be generally characterised as being situated in the center of an open space, away from the edges, accessible from all directions and exposed to the sunshine and wind.

(iii) Locations in the middle of a sidewalk. These were situated some 2 - 6 paces away from the nearest wall. People standing in these locations were placed in the middle of an elongated, busy walking area which was frequently crossed by pedestrians, walking alone or in groups, who were moving primarily along the sidewalk's longer axis, though sometimes at an acute or a right angle to it as well. Such locations could be generally described as being placed in a semi-open area, with ill-defined boundaries, subjected to the direct pressure of the pedestrian flow and only partially sheltered from excessive sunshine or wind.

(iv) Locations in the middle of narrow (2-3 paces wide) paved or gravel paths leading across a lawn. People standing in these locations were observed to occupy nearly the full width of the path and thus presented a potential obstacle to the sporadic, usually solitary, passers-by. Pedestrians walking on such paths tended nearly always to walk along and on the route and seldom would step off the gravel in order to make a detour around the stationary F-formation. They tended to bypass it at a very close range. Locations on the path could be briefly described as situated on a narrow ribbon of a bi-directional pedestrian traffic route transecting a large, spacious setting devoid of people. Persons standing there were situated in a fully open space, and were exposed totally to the elements.

Fieldnotes on spatial behaviour in these contexts were collected over a one month period in two research settings. The data on the use of paths were gathered at the ANU campus [1], while the observations on the other three types of locations were conducted in the main (Petrie Plaza) research setting. Observations at the campus were carried out four times a day, while the author was walking across it to and from work and during the lunchbreak, on the way to and from a student union bistro. This routine was found to be the most efficient way of collecting data on phenomena whose exact time and place of occurrence could never be determined, but which were occurring frequently enough for anybody walking along pedestrian paths across university lawns to be able to observe them and take necessary notes. Thus, any dyadic F-formation which happened to be formed when the author was on his way across the campus, if noted and positively identified, was entered into a notebook. By the end of the

[1] Quite famous for its vast, spotless and well maintained lawns.

fourth week of observation (July 1974) all entries were assembled in the form of a table showing the frequency distribution of arrangements of various types, so that a comparison with the data collected in Petrie Plaza could be made.

Observations of the spatial behaviour of stationary F-formations in the remaining three types of locations were conducted for one week in August 1974, during lunch hours, when the frequency of occurrence of stationary groups of people at the plaza was at its peak. The data were being collected during two three-hour observation periods in each location.

Discussion of the findings

Analysis of the results (see Table 1-5) confirmed the initial hypothesis that the frequency of occurrence of various types of spatial arrangements is context-specific. It was found that each of the four types of locations discerned had its own repertoire of arrangements. Thus, dyadic F-formations established near walls tended to avoid using closed arrangements (type N+H+V); these were found in only 8% of the cases observed. People in these locations showed a preference for the use of open-angled and side-by-side spatial forms (55% of all cases). The L-arrangement was found in 37% of the cases which indicates that this arrangement was neither preferred nor avoided. An entirely opposite tendency was displayed by people in F-formations established in the middle of open, empty spaces. There closed, sociopetal arrangements (N+H+V) were used more often (42% of choices) than could be due to chance. Participants neither favoured nor shunned L-arrangements (42% of choices) and definitely kept avoiding the use of open, that is "C" and "I" arrangements (16% of choices).

People who formed their F-formations in the middle of a sidewalk tended to use sociopetal (N+H+V) arrangements less frequently than could be expected by chance alone (27%), the right angle (L) arrangement was found to be used more often (46% of choices) than would occur by chance, while the use of open-angle and side-by-side arrangements (27% of choices) was not favoured or eschewed to any significant extent. Finally, Table 1-5 demonstrates that in 68% of cases people on paths opted for close arrangements, most typically for vis-a-vis ones, while significantly less often for L-arrangements (24%) and open-angled and side-by-side forms (8%). The differences between the displayed preferences and avoidances were found to be statistically significant (p less Ø.ØØ1).

These results could be, therefore, summmarised as follows: the closed arrangements, ones which focus tightly around the perimeter of the o-space seemed to be used mainly in places which were open and spacious and at the same time not heavily used by pedestrians. The L-shaped formations, which are intermediate between open and closed spatial arrangements, were found to be used in spaces which were semi-open and where the flow of pedestrians was intensive. Finally the open-angled and side-by-side arrangements were used most frequently in areas delineated by the presence of a large, solid and impenetrable object and in places devoid of pedestrian movement. This would suggest a more general hypothesis that the degree of openess of spatial arrangement in a two-person F-formation is a function of two simultaneously operating factors. Firstly, the lack of intensive pedestrian flow facilitates the occurrence of either fully open or fully closed arrangements, while the intermediate, L-shaped spatial-orientational forms are used in the presence of heavy pedestrian traffic. Secondly, the degree of closeness or compactness of an F-formation is inversely correlated with the degree of closeness or definiteness of a given place. It looks as if people in an open and barren place tend to lock themselves around the interactional space, whereas a sense of well-defined enclosure enables them to use a more open spatial arrangement. It is as if the definiteness of the location stabilised the sense of distinctiviness and boundedness of their o-space. Kendon (personal communication) has suggested that

> In order to carry out any activity one must have a domain, a bounded world, within which one can be sure of the pattern of events, within which one can comprehend the relationships between actions one takes and the consequences of these actions.

Likewise, Goffman has described how 'An engaging activity acts as a boundary around the participants, sealing them off from many potential worlds of meaning and actions. Without this encircling barricade , presumably, participants would be immobilized by inundation of bases of action' (1972:24). We would suggest here that the arrangement of bodies that is established in an F-formation serves just this bounding function and allows the participants to engage in coherent sequencies of activity despite the fact that technically they are still in the middle of a public place and in the immediate presence of strangers. Indeed, it can be seen that the jointly controlled o-space is the very antithesis of the areas from which such an o-space has been distinguished and formed[2].

If we accept the view that the spatial arrangement adopted is one of the ways by which people jointly delineate boundaries around their activity, a way of anchoring their words, gestures and thoughts within a

[2] The space stretching behind the backs of the participants is, on the whole, vast, unbounded, public, accessible to any behaviour by anybody, unpredictable, anonymous and difficult to encompass. On the other hand, the o-space created by an "eye-to-eye ecological huddle" of people can be characterized as being small-scale, well delineated, private, accessible to some types of behaviours by a select few, predictable, personalized and manageable. It could be suggested, therefore, that an F-formation carves out a certain chunk of the common environment and redefines it so it may become an appropriate and safe platform or arena for truly inter-personal behaviour.

limited physical space, it is plausible to expect that being placed in smaller or better defined locations enables them to relax their grip on the o-space. It should be possible for them to maintain, for example, greater interpersonal distances simply because some of the task of unambiguously defining the "hereness" of their exchange is taken over by the physical features of the place in which they are standing.

Such a hypothesis is in line with the observation we have just reported, namely that the degree of openness of an F-formation arrangement is inversely related to the degree of openness of the setting. It is also to be noted that the observations of Little (1965), Tennis and Dabbs (1975), Daves and Swaffer (1971) and White (1975) are in line with this idea. Little has conducted three sets of experiments, all with very similar results. In the first experiment subjects were asked to position miniature cardboard human figures in such a way that they were "conversing with each other" and were placed against scale backgrounds of three different settings: the center of a living room, an office and the middle of a sidewalk some 20 ft from a corner. In the second experiment another group of subjects was asked to position profile-silhouette photographs of people against a blank background and were asked to imagine four settings: a street corner, the lobby of a public building, an office waiting room and an indefinite location called "on the campus". A third study involved subjects who were made to arrange a conversational gathering in a room 4 x 10 ft using two live persons while following instructions similar to those used in Experiment 2. The results of all three studies were surprisingly uniform : subjects tended to place two interacting people much closer to each other if they were expected to be operating on a sidewalk or in a similar open air setting, and farther apart if they were supposedly interacting in an indoor setting. A similar conclusion was reached by

Tennis and Dabbs (1975), who found that adolescents and adults (though not very young children) preferred greater interaction distances (in a paper-and-pencil experiment) when they were told to imagine an interaction in a corner of a room while choosing smaller interaction distances when the simulated interaction was placed in the centre of a large room.

These observations are also congruent with the findings of Daves and Swaffer (1971) and White (1975). Daves and Swaffer in an experiment involving 37 subjects standing and conversing with a confederate found that the interaction distance between the people tended to be in inverse proportion to the distance measured from their sides (opening in their configuration) to the nearest wall. A similar conclusion was reached by White who in a study on the effects of room size on conversation distance among 89 seated subjects found that the spacing adopted was significantly shorter when people interacted in a large, spacious room, and it was larger in smaller rooms.

Of course, the task of establishing the distinction between an inner space used for focused interaction and an outer space, used mainly for unfocussed ones, is greatly facilitated if people have the chance to occupy a location which is marked out from the rest of the environment. Under such conditions it seems to be easier to negotiate the most convenient spacing and orientation between participants without losing the sense of boundedness and separateness of their o-space. In consequence, F-formations situated in well-defined spaces can be run more smoothly and more easily, for the burden of providing of the sense of Here-and-Now as opposed to There-and-Then is born by a handy placement of furniture, by a configuration of lamps, trees and walls or by differences in the textures and colouring of walking surfaces. The existing data seem to support such a view.

As will be recalled from Chapter 4, people in the main research setting displayed a marked and deliberate avoidance of "away locations", i.e. open spaces or areas positioned away from traffic lines and typically lacking "definition". At the same time F-formations as well as solitary individuals tended to be over-represented in areas protected from traffic, that is in locations with a clear-cut configuration of physical features screening the stationary unit from the flow of pedestrians. Furthermore, it was found that F-formations established in "protected", spatially bounded locations tended, on average, to last longer than those positioned in "away" locations. Moreover, as the results of data analysed in Chapters 6 and 8 indicate, people tended to affiliate their stationary activities with physical objects, staying near them and avoiding standing in the middle of nowhere. This same phenomenon is confirmed in a group of studies by architects and town-planners concerned with the evaluation of various architectural designs and projects (Jacobs 1972, Fruin 1971, Lerup 1972, Burke 1976). These studies indicate that the tendency to enter and occupy spaces with clearly defined spatial boundaries is displayed at two levels simultaneously: in the choice of the general setting and in the choice of a location. In both cases clear-cut preference is given to areas which are distinct from the rest of an environment[3].

Thus, it looks as if people were more willing to engage in solitary or group activities when these could be carried out in a triple set of Chinese boxes: first, within a well defined setting, second, within a spatially distinct sub-area of such a place, and finally, within the spatial-orientational frame of an individual's transactional segment or in

[3] For example, Jacobs writes about urban settings: 'Far from being attracted by indefinite leftovers of land oozing around buildings, people behave as if repelled by them. They even cross streets as they meet up with them...' (1972:116).

the embrace of an F-formation system.

On the other hand it was noted above that an F-formation established in a crowded area also tended to be more open in arrangement. One might expect that if the arrangement adopted served only the bounding functions we have just put forward, F-formations in crowded settings, like the ones in less defined settings, would tend to be more closed because the participants would be attempting to protect their interactional space against the intrusions of the people around them. However, when in the presence of others, participants in an interaction cannot be engaged in one another to the exclusion of their concern with others. It is important that they be always at the ready to adapt themselves to those around them (Goffman 1963). Thus we may expect that the arrangement adopted by an F-formation will not only be the one best suited to the maintenance of a coherent boundary around the interaction but also to enable the participants to monitor the environment around them to the extent necessary for adapting to any change in circumstances that might jeopardize their ability to sustain their interaction. If this is the case it is to be expected that more open arrangements will be adopted in crowded settings (see sub-section (iv), Chapter 6).

As we shall see in the next section of this chapter, further observation concerning the orientation of the F-formation in relation to environmental features and to the predominant direction of flow of pedestrian traffic tends to confirm this notion.

3.SPATIAL ORIENTATION OF AN F-FORMATION : THE INFLUENCE OF THE CONTEXT

The observations reported in the previous section ("Observations no 1") were also interesting for another reason. During the time data were gathered on the types of spatial arrangements used on paths it was noted not only that certain types of arrangements were favoured, but also that there was a preference for certain ways of orienting the whole F-formation relative to the axis of the paths as well. Most typically people would try to position themselves in such a way that their elbows would point towards the two ends of the path and their body planes would be parallel to the path's edges. For instance, H-shaped arrangements were seen (N=37 cases) in 62% of cases (standing with backs the parallel to the edges of the path), in 24% of cases participants were would be standing obliquely to the path's axis, and in 14% of cases only they positioned themselves perpendicularly across the path. This result suggests that apart from the frequency with which certain arrangements are adopted in certain types of locations, there may also be another way people can respond to the characterisics of their contexts. This second possible mechanism would be the overall spatial orientation of the F-formation in relation to such points of reference as the basic axis of a given space or the direction of the major flow of pedestrian traffic. This obviously posed the necessity for another set of observations in a place endowed with both these characteristics. Since the frequency of occurrence of stationary F-formations on paths was relatively low, it was decided that "Observations no 2" should be conducted on a busy sidewalk of Petrie Plaza.

"Observation no 2"

The main task was to determine how often various spatial orientations of various types of arrangements would be used in relation to the main axis of the pedestrian traffic flow. Observations were conducted during three lunch-hours in August 1974 and data gathered on stationary F-formations formed by adult people standing on the sidewalk some 2 - 6 paces away from the building wall and street furniture. The type of arrangement was noted and the orientation of the body plane of the person at the left-hand side of the formation was scored as being either parallel, oblique or perpendicular to the axis of pedestrian flow. A slightly different system was applied to those L-shaped arrangements in which one individual standing parallel to the traffic line was automatically causing the other person to stand at right angles to it. In the case of such arrangements two possibilities only were distinguished: parallel/perpendicular and oblique orientations of L-shaped F-formation. The results of "Observation no 2" are provided in Table 2-5.

It will be seen (Table 2-5) that the way people orient their F-formations in relation to the main axis of pedestrian movement is not haphazard (p less 0.001). A number of regularities were observed. The closed arrangements (N+H+V) tended to be used in oblique orientation more often (60% of choices) than could be due to chance, while the parallel orientations were selected less often (20% of choices) than might be expected on the basis of chance alone. Perpendicular placements (18% of choices) were neither favoured nor avoided. As far as the choice of orientations in open angled and side-by-side arrangements is concerned, the displayed pattern of preferences was quite different. No clear-cut tendency to prefer or avoid perpendicular placements were displayed. Though used the least frequently, they were not used less often than expected on the basis of chance. A preference, however, was shown for parallel orientations (58% of choices) while oblique orientations (24%) were definitely not so popular. The L-shaped arrangements tended to favour the parallel/perpendicular placements (72%) while oblique orientations seemed to be less popular (28% of choices). Thus 5 of the 17 oblique arrangements faced out of the elongated space of the sidewalk, while the remaining 12 placed the participants in such a way that they could face along the main axis of the sidewalk.

These results, though interesting, seemed difficult to interpret satisfactorily, and it was felt that further data were needed to fit the jigsaw-puzzle together. It was obvious that people teded to orient themselves in a non-random fashion with respect to the flow of pedestrians. The question which remained unanswered was what was the underlying logic of these various spatial orientations used in conjunction with various spatial arrangements of F-formations. In order to throw some more light on the issue, a further series of 6 lunch-hour observations were atempted.

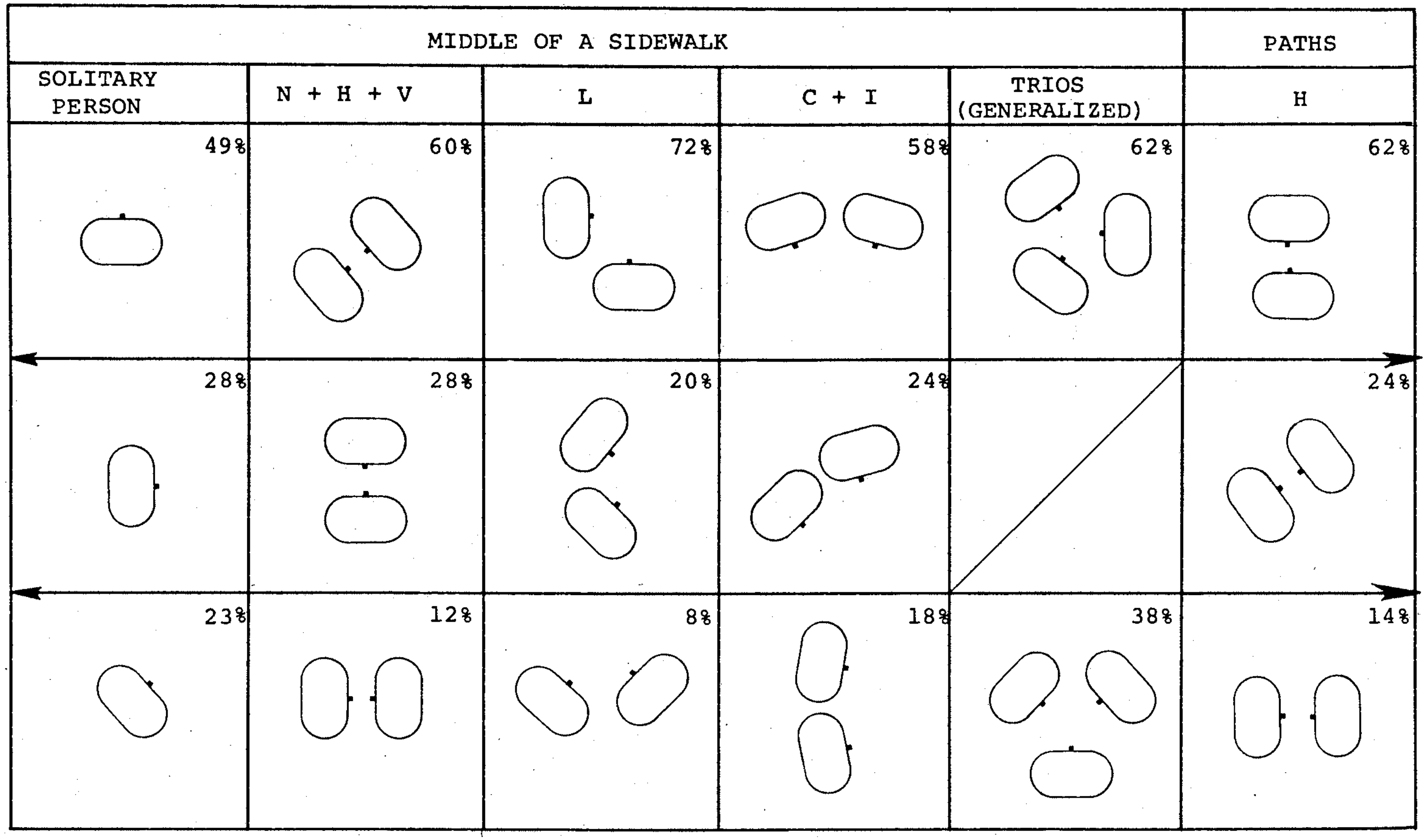
"Observation no 3"

The attention during the "Observation no 3" was directed at the way solitary individuals and three-person F-formations orient themselves in space. In the case of three-person F-formations, two distinct possibilities were discerned. First, an orientation in which one of the three participants stood with his body plane perpendicular to the flow of pedestrians, and the second in which one stood parallel to the flow of people. Cases in which people in an F-formation stood with one person in the first orientation and another person in the second, (this might happen sometimes with arrangements of the type LLH, LVV, LNN, LCV) were a priori excluded from the count. No attempt was made to distinguish between particular types of triadic spatial arrangements; instead, all results refer to an abstract, generalized three-person F-formation.

The scoring of individuals' spatial orientations was very simple. A person could be standing with his body plane parallel, perpendicular or oblique to the flow of people passing-by. Also, during "Observation no 3", data were gathered additionally on changes in spatial orientation as

Diagram VI

TYPES AND FREQUENCIES OF SPATIAL ORIENTATIONS FOUND FOR STATIONARY PARTICIPATION UNITS IN RELATION TO THE FLOW OF PEDESTRIANS



Direction of the pedestrian traffic

affected by choice of location on the sidewalk - (a) close to a wall or (b) in the centre of the sidewalk. The results of "Observation no 3" are provided in Tables 3-5 and 4-5.

Table 3-5 shows two interesting regularities. First, it can be seen that orientations perpendicular to traffic flow are avoided by three-person F-formations when people are standing next to a wall, but are favoured in the middle of the sidewalk. The opposite was found to be true in the case of the parallel spatial orientation. These results were found to be statistically significant (p less Ø.Ø1). Secondly, in the middle of the sidewalk, participants seemed to favour orientations in which the body plane of at least one of them was positioned at right angles to the flow of people (62%), and not along it (38%).

The results provided in Table 4-5 refer to the behaviour of a stationary individual. They were found to favour positions parallel to the traffic flow and used the perpendicular and oblique orientations less often. These decisions, however, were found to be independent of the exact placement relative to the flow of pedestrians. Whether a stationary person was positioned in the middle of a sidewalk or at the side of it, next to a wall, the preferences displayed tended to remain surprsingly constant.

Discussion of the findings

The results of "Observations no 2 and 3", as well as the earlier observation on the orientations of H-shaped arrangements on paths are summarised in Diagram VI. There three rows show the order of frequencies of use of certain spatial orientations in the middle of a sidewalk used intensively by pedestrian traffic. How are we to account for these patterns of spatial behaviour? Before answering this question, one must to establish what it means to an F-formation system to be situated in the middle of a busy traffic route and oriented at this or that angle to the main line of pedestrian traffic.

A moment's reflection suggests, that if people entered a system of spatial-orientational relationships leading to the establishment of an F-formation at all, they are indeed interested in preserving these relationships for as long as they need them to accomplish a particular task or interpersonal exchange. The middle of a sidewalk is a place which is frequently and continuously crisscrossed by people walking in both directions[4], solitary or in company with speeds varying from one to three paces per second (Fruin 1971:39-58). In other words, stationary individuals and F-formations can be seen as vessels or "interaction-capsules" which are anchored to a location and which are continuously pressed on by the stream of mobile participation units. Thirdly, since the centre of such a "river of people" is not the most peaceful and undemanding of environments it is plausible to think that people in such a stationary F-formation do take precautions so that they are not interrupted, bumped into, brushed against, pushed away, walked through or otherwise interfered with by those walking past[5]. In brief, the walkers can be perceived as a source of potential threat to the integrity and continuity of a stationary face-to-face exchange and as such they are likely to be monitored and responded to. The conclusion is obvious then, that stationary individuals and F-formations, are likely to

[4] As we shall see in the next chapter (in Table 3-6) approximately 40 percent of stationary groups formed in the center of a traffic line are bypassed by people walking at a distance of 1 to 2 paces.
[5] According to field experiments of Effran and Cheyne approximately 4 percent of pedestrians using given traffic line walked through an o-space of a two-person H-shaped F-formation positioned in the middle of such a line. The remaining 96 percent of pedestrians made an efford to avoid such an intrusion and walked around a gathering (1973:208).

take precautionary measures in order to deal with the demands made upon them by the very environment in which they occur. Now the question is what could these measures be and how are they related to the way an F-formation orients itself in a given location.

It appears that two sets of partially complementary explanations can be offered here. The first one is based on the assumption that the orientation of an F-formation in relation to the flow of people is a strategy aimed at preservation of the interactional unit's integrity by utilizing the gaze and the participant's transactional segments to manipulate and control the flow of pedestrians. This would be a strategy in line with the findings on the use of the stare as a threatening or arousing device which may exert a significant influence on the spatial behaviour of strangers (Argyle and Dean 1965, Ellsworth et al. 1972, McBride et al. 1965, Nichols and Champness 1971). The other line of explanation assumes that an entirely different strategy is adopted, namely that instead of undertaking active control of outsiders' behaviour, people in F-formations adapt it to the ecological properties of the location in which they are going to carry on their interpersonal exchange.

Thus the second hypothesis would revolve around the concept of the "passive defense system" which 'fits' the shape and orientation of an F-formation into the context of a stream of walking people. It then becomes interesting to determine which of the two defensive strategies appears to be given the priority by people in an outdoor urban setting. If the "active defense system" (the value and uses of which are suggested by observations of Lindeskold et al. 1976, Knowles et al. 1976) is of prime importance a simple field experiment should demonstrate that F-formations in which participants are facing the passing pedestrians should enjoy a greater amount of space free of "intruders" than would be the case with formations which face away from passers-by.

"Observation no 4": Testing the Active Defense Strategy

In order to establish experimentally the answer to this problem, the following experiment, called here "Observation no 4", was carried out in December 1975. Its purpose was to determine the extent of the effect the group's orientation in relation to an adjacent traffic line might have on pedestrian's trajectories in the vicinity of the target group.

During this experiment two confederates (a male and a female) were asked to stand engaged in a quiet conversation and adopt an L-shaped arrangement at the side of a busy and crowded sidewalk on a street adjacent to the Petrie Plaza area. They were placed at a distance of one pace from the wall of a building in such way that for a 5-minute period the group's open side was directed towards bypassers, while during the next 5 minute period gathering was oriented toward the wall. The dependent variable, that is the number of people passing at various distances (1-90, 90-180, 180-270, 270-360 cm) from the group was scored by the author who was unobtrusively placed on the opposite side of the pavement, some 7 paces away from the target group. The number of people scored for each zone (marked lightly with a chalk mark on the pavement) referred to males and females of any age walking in any direction, by themselves or in a mobile group who bypassed the target gathering at one of the discerned distances. Observation was maintained for 50 minutes, with experimental conditions alternating every 5 minutes. The results obtained were subsequently compared with the control set of data collected at the same location (during a 20 minute observation period) when no stationary group was standing at or near the observed site[6].

The results of this experiment are provided in Table 5-5. From it one can see that the placement of a dyadic F-formation has displaced from the part of the pavement closest to the building line some 27% of all pedestrians and packed them into the next three adjacent pavement zones (zones b,c,d). However, it can also be seen that the spatial orientation of the F-formation had no significant effect on the number of people passing by it in zone b. Approximately the same percentage of people walked close to an L-shaped arrangement when the participants were facing

[6] The help of Miss G.Nazca and Mr.J.Pakulski in staging the experiment is here gratefully acknowledged.

towards and away from the pedestrian flow. In other words, the experiment failed to demonstrate that the primary function of an F-formation situated in the middle of pedestrians is to manipulate the number of those who pass close by. Interestingly, this result is in line with the findings of Dabbs and Stokes (1975) who also established that the spatial orientation of a solitary, stationary person standing at the edge of a sidewalk did not affect the trajectories of passers-by irrespective of 'whether the confederate faced toward or away from them' (1975:555).

Testing the Passive Defense Strategy : An Analysis of Diagram VII

We shall now examine the validity of the "passive defense system" hypothesis. A moment's reflection suggests that there might be a number of objectives an F-formation would be interested to accomplish, if it is trying to preserve its continuity and enhance its survival chances in a dynamic, unpredictable and, as was demonstrated, uncontrollable environment of pedestrians. These objectives might be listed as follows:

(a) Placement in relation to the walking persons in such a way, that the stationary person or persons "streamline" themselves, or reduce that part of the perimeter of their bodies exposed to the direct pressure of the traffic flow. For instance a solitary person oriented parallel to the traffic "fits" the environment "better" and represents a slightly smaller obstacle to walking people than a person standing with his body across the axis of their movement.

(b) Placement in relation to the environment in such a way that stationary people can easily see the major portion of the environment surrounding them. For example, a person standing parallel to the traffic can embrace the whole length of the sidewalk, from one street corner to another, with his 180-degree field of vision. A person standing perpendicular to the sidewalk axis, however, sees only a relatively narrow area used by walking people while the rest of his 180-degree field of vision is filled with less relevant information on the appearance of the walls of the building on one side, and on the space lying on the other side of the sidewalk boundary.

(c) Placement in relation to the flow of people in such a way as to minimize the chance for an accidental intrusions and violations of one's transactional segment or o-space. For example, a person standing parallel to the traffic flow is more likely to have his transactional segment accidentally crossed by a pedestrian that would be the case with an individual standing across the traffic line so that his basic use-space is

Diagram VII

POINTS FOR 'ADAPTIVENESS' SCORED BY PARTICIPATION UNITS IN RELATION TO THE FLOW OF PEDESTRIANS:

COMPARISON OF LEAST AND MOST FREQUENTLY ADOPTED ORIENTATIONS

	Criterion of "Stream-lining"	Criterion of good "Visual control"	Criterion of "O-space protection"	Criterion of "protection of the back"	Total Score
Solitary Individual	2 / 3	2 / 3	2 / 1	2 / 3	8 / 10
Arrangements of N + H + V type	1 / 2	1 / 2	3 / 3	1 / 2	6 / 9
Arrangements of L type	3 / 2	2 / 2	2 / 2	2 / 2	9 / 8
Arrangements of C + I type	1 / 3	1 / 3	3 / 1	1 / 3	6 / 10
Triadic Arrangements	? / ?	2.3 / 1.7	1 / 3	2.3 / 1.7	5.4 / 6.4
Arrangements of H type (standing on a path)	1 / 3	1 / 3	3 / 1	1 / 3	6 / 10

Scores of the most popular orientation

Scores of the least popular orientation

Scores: 1 = Low
2 = Medium
3 = High

screened from the incursions of walking people by the width of his body.

(d) Placement in relation to the flow of people in such a way as to minimize the chances of being accidentally bumped into by an absent-minded or irresponsible pedestrian[7]. It appears that an individual who stands parallel to the flow of pedestrians is better protected from an accidental collision from behind than the person who stands with his body positioned across the flow of traffic with his back exposed to its direct pressure.

With these four criteria we are now better equipped for an analysis of the Diagram VI. Each of the arrangements and orientations adopted can be given points on each of the four scales. If, for example, for the sake of convenience, one compares the most and least frequently chosen types of spatial orientations by rating each choice from 1 to 3[8], and if the final ranking is calculated by ascribing points to the orientation of every person in a formation and the average value for a whole formation is found we obtain the set of results shown in Diagram VII.

From this diagram it can be seen that the orientations most frequently adopted by solitary people scored 10 points versus the 8 points ascribed to the least popular orientations. The scores ascribed to the most popular orientations in arrangements of the types (N+H+V); L; (C+I) were 9, 8 and 10 points - as contrasted with the scores collected by the

[7] Compare, for example, the following scene : 'Benjamin ... pushed his hands down to his pockets and cleared his throat, then walked away from the tree and toward Elaine ... [she] stopped suddenly and stood staring at him. Benjamin looked down at the pavement. For several seconds he cleared his throat. "Well" he said finally. "Elaine". She didn't say anything ... A student passingby bumped him from behind. Benjamin turned to smile and nod at him. Then he cleared his throat again and looked back ... She was still standing with her arms wrapped around the books and staring at him ... He turned around and looked up at the large clock on a tower beyond several buildings. "Yes" he said. "Well I've got to go now. Goodbye". He turned away from her ... [and] walked two blocks without stopping, then turned around ... and stopped in the center of the sidewalk to stare a moment at the passing traffic. Then he felt someone knock against him and he walked to a large wall at the edge of the sidewalk and slowly raised his hands up to cover his face' (Webb 1968:122-123).

[8] Orientations ranking low on a given scale receive 1 point, while those ranking high receive 3 points.

least popular orientations: 6, 9, and 6 points respectively. The three-person F-formations in the most frequently adopted orientation scored 6.4 points, while the less frequent spatial orientations earned 5.4. Finally, the points ascribed to H-shaped arrangements situated on paths were 10 versus 6 points respectively. Therefore the diagram illustrates that in nearly every case, the most frequently adopted orientation scored higher in terms of combined points received for (a) avoidance of traffic pressure, (b) extent of visual control of the environment, (c) protection of the o-space and (d) protection of the back than was the least frequently used orientation. Thus it appears that the use of the "passive defense system" among stationary participation units placed in the middle of a traffic line is generally preferred. This finding, in turn, reinforces our ealier observation that a study of people's spatial behaviour cannot be conducted in terms of intra-formation phenomena and factors alone. The immediate environment of people's activities and behaviours appears to be a powerful factor shaping the spatial patterning of a face-to-face encounter, a factor the existence of which cannot be overlooked any longer.

4.SUMMARY OF THE RESULTS

The results of our four sets of observations can be recapitulated as follows:

1. The degree of closure and compactness of a spatial arrangement was found to be inversly related to the degree of closure and spatial definiteness of the place in which the F-formation is established. More open-angled and more loosely structured arrangements tended to be formed in the context of spaces with greater spatial definiteness.

2. A stationary F-formation situated in the middle or at the side of a traffic line is subject to a considerable "pressure" from pedestrians. Approximately 75% of all people bypassing the formation do it at a fairly close range, that is within 180 cm (3 paces or 6 ft). Passers-by do not seem to deliberately avoid the close proximity of a stationary gathering, though they appear to make an effort to avoid physical contact.

3. The changes in spatial orientation of an F-formation adopted relative to pedestrians did not seem to exert any significant effect on the distance at which the gathering was bypassed by the pedestrians. This would suggest that the direction a stationary participation unit faces is related to the way a given unit tends to relate itself to its surroundings, and not to any efforts to influence the spatial behaviour of the passers-by.

4. The type of spatial orientation adopted by an F-formation relative to pedestrians is systematically related to the type of spatial arrangement adopted. The probable reasons for which a given combination of arrangement and orientation is adopted in a given place are the protection of the integrity of the stationary participation unit's p- and o-spaces and provision of a sense of security and good visual control over the approach lines.

The more general conclusion which can be drawn on the basis of the observations is that both the configuration and spatial orientation of an F-formation vary with the setting in a way which suggests that people in face-to-face social encounters establish systematic spatial-orientational relationships with one another and with the external world. Thus, the way a social encounter is spatially structured should be viewed as something more than just a scaffolding established for the purpose of enveloping and supporting a given communicational exchange. The view suggested here is that an F-formation system is a "device" which enables its participants to operate under various environmental conditions and which adopts or adjusts the spatial structure of an interaction to its immmediate milieu in such a way that participants can achieve an overall sense of security and preserve, at the same time, the boundedness and integrity of their interactional space. The assumption that the spatial behaviour of two-person f-formations can be meaningfully discussed without taking into account the characteristics of the immediate spatial context of the place of their occurrence is not supported by the data.

CHAPTER 6

SPACING OF STATIONARY PARTICIPATION UNITS

While the previous chapter discussed ways stationary F-formations were arranged and oriented in relation to the environment in which they occurred this chapter is going to deal with another question. We shall attempt here to examine patterns of spacing adopted by stationary participation units in relation to each other and to people walking.

1.PREVIOUS WORK ON SPACING OF PARTICIPATION UNITS: THE CONCEPT OF THE R-SPACE

Kendon suggested in his observations on F-formation systems (1976,1977) that they generate three concentric rings of spatial domains. The innermost space, the o-space, some 1.5 to 2 feet wide (in case of a dyadic F-formation) is created by an overlap of the participants' transactional segments. It is the space into which people project their voices and gazes, which they use for gesticulation, and where they exchange handshakes, play chess, pass on cigarettes, or drink toasts to the health of each other. In other words, it is a small scale interactional arena where overt and explicit actions are located so that everybody within the circle of participants can have an easy and direct access to the ongoing exchange.

The second spatial domain, the so called p-space (Kendon 1976, Scheflen and Ashcraft 1976), which can be seen in every F-formation is a narrow zone where the bodies and personal belongings of people interlocked in F-formations are placed. Thus, for instance, Scheflen observes that in a dyadic F-formation 'each partner will use a space of about two feet for planting his feet in a standing conversation... He will then sway or lean back and forth from this base. In crowded situations the two-feet may be all of the space available to each face-to-face partner. If there is more space, each partner may shift laterally from time to time and use an area of four feet' (1971:442). The p-space can also be used for other purposes than parking of the participants' bodies. For example, this is the space in which people allocate their minor behaviours which are not an explicit part of the interactional exchange. Thus in the p-space people sneeze, scratch themselves, shiver, adjust clothes, shift the weight of the body from one leg onto another, as well as hold hands with the beloved ones, exchange secret signs and messages and make "off the record" comments on the interaction itself. The width of the p-space depends on many factors, such as the type of posture adopted (e.g. standing, sitting, squatting, lying), kind of clothes worn, physical build of the participants' and the number and kind of props and artifacts (e.g. umbrellas, walking sticks, crutches, rucksacks, suitcases and bicycles) used. However, in case of the majority of standing gatherings it can be accepted that the width of the p-space is, equal to the width of an individual's body, or some 1.5 - 2 feet (45-65 cm) (Fruin 1971:19-20).

The third zone of space intimately associated with the occurrence of F-formations is thought to be less clearly defined (Kendon 1976). It stretches behind the backs of the F-formation participants and envelopes the whole encounter so that people inside it are bound into a clear-cut participation unit which is distinct from the rest of the environment. This is the area where the acoustic signals projected into the o-space dissipate rapidly, where the olfactory and thermal output of the interacting individuals fades away, and where the people in an F-formation keep their possessions and props not needed during the current stage of interactional exchange. (For example, a dumb-waiter or a supply of fresh cutlery needed only during the later part of a dinner may be positioned within such a space). Finally, the zone surrounding a stationary F-formation is also a place where people dispose things which are thought to be contaminating their o- and p-spaces (see also Table 31-6). This area is known as r-space and is regarded as a space which "comes under the influence of the F-formation system" directly (Kendon 1976:21). This influence is understood to be an ability to prevent other people from occupying this space as well as to affect the visible behaviour of people who, for some reason, have entered it. Kendon lists here a number of phenomena which seem to demonstrate the point.

The evidence Kendon presents for the existence of r-space is fivefold: first, adjacent formations, including F-formations observe clear-cut inter-system spacing under most conditions, except for extreme crowding. Second, there is a marked change in the locomotory, postural and gestural behaviour of people who are entering or leaving the p-space of an ongoing F-formation system. Third, the passers-by tend to give more berth to an F-formation that would be required for merely making a pass without touching the bodies of the F-formation participants. Furthermore, if such a detour is not undertaken for some reason and the pedestrian passes the F-formation at a close distance he tends to engage in a characteristic behaviour such as a head dip, or looking away, or self-manipulation (for example, adjusting hair, touching face region etc.)[1]. Finally, people who are not participants of the F-formation and yet have a status of an "associate" tend to be placed within the narrow zone of space which could be delineated on the basis of the already mentioned phenomena.

The notion of the r-space seems to be supported by the existing observational and experimental studies. At present there are two large sets of work which throw light on the issue of a space enveloping a stationary F-formation, recognized and tacitly respected by the outsiders. As far as the spatial behaviour of walking people in relation to stationary people is concerned the evidence is provided by Wolff (1973), Dabbs and Stokes (1975), Gordon and Duke (1975), Lindeskold et al. (1976), Knowles et al (1976) and Knowles and Bassett (1976). Their findings were as follows:

Wolff (1973), in the course of his study on traffic rules among pedestrians in New York, filmed people's responses to a two-person group positioned in the middle of a sidewalk. He found that the people generally 'veered off their line-of-walk at a distance of about 16 and a half feet. Although this distance could vary widely as a function of changes in several factors (for example, density and pace), this result is considerably different from the (non-stationary) encounter data, where the detour distance for low-intensity conditions was considerably longer and that for high density conditions was considerably shorter' (1973:39). His study, unfortunately, did not state the number of the observations on which the conclusions were based nor did he offer any information on the

[1] Mitchell in his paper on directing attention to one's body surface as a substitute for "fight or flight" observes that: 'displacement activity is most likely to occur when neighbours confront each other at the border of their respective territories' (1968:962). Compare also observations of Efran and Cheyne (1974) on behaviour of a person bypassing an F-formation at an unconfortably close range.

separation distance maintained between people at the moment of passing.

In a field experiment carried out on sidewalks, Dabbs and Stokes (1975) found that manouvering usually started at a distance of 20-25 ft in front of a stationary person standing at the edge of a pavement, and involved deviation from the original line of walking by approximately 2 ft. The extent of this deflection was found to bear a systematic relationship to the characteristics of the confederate, though not of the passers-by. Thus, males were given a larger berth than females, and an attractively dressed and groomed woman was approached less closely than the same person dressed in ill-fitting clothes and wearing no make-up. The third finding was that solitary individuals deflected trajectories of the passers-by to a lesser extent than did two-person conversational gatherings.

In a paper-and-pencil simulation experiment on the amount of space given to a group positioned in a hallway, Gordon and Duke (1975, cited in Knowles et al. 1976) found that there was a significant difference in distances maintained from different categories of "stationary people" (teachers,policemen,peers). However, no difference was found in spacing in relation to two-person and four-person groups.

Lindeskold et al. (1976) in a field experiment on spatial responses of passers-by to a four-person static gathering engaged in a variety of activities observed that 92% of persons walking around the gathering made a detour behind the target group and not in front of it.

A similar observation was made by Knowles et al. (1976) who in a paper-and-pencil experiment study found that the buffer zone kept during the passing was significantly smaller when people walked behind "conversing group" than in front of it. In real-life experiment the same authors established that an empty bench was bypassed at significantly closer range than the same bench with a solitary person occupying it (1.6 ft and 2.6 ft respectively). It was also found that the distance kept from a solitary person (2.6 ft) was considerably shorter than the distance kept from a two-person conversational group (berth 3.1 feet wide). Finally it was established that the larger the stationary group the greater the average deflection in pedestrians' trajectories.

In the course of an analysis of the behaviour displayed by pedestrians in response to a stationary group additional regularities were found (Knowles and Bassett 1976). First, the width of a buffer zone given to an object (a doorstep) was considerably smaller than that given to a similarly positioned group of people. Second, a conversational gathering deflected trajectories of passers-by much more strongly than did a non-conversational gathering. No relationship was found, however, between the separation distance and the size of a target gathering. The study also found that pedestrians avoided looking toward a conversational cluster significantly more strongly than they did when bypassing a non-conversational gathering.

Further light is cast on the phenomenon of r-space by studies dealing with the spacing between stationary participation units. The observations on the issue are provided by Lee (1973), Edney and Jordan-Edney (1974), Getis and Merk (1973, 1976 - personal communication), Greist (1975) as well as by Batchelor and Goethals (1972). The findings of their studies can be reviewed as follows:

Lee (1973, cited in Greist 1975) looked for the patterns of inter-group spacing among users of outdoor public places. He found that people tended to choose different parks or different areas of a park in accordance with their race, age or type of activity. However, he found that variation in typical intergroup distance in areas occupied by groups of a given type was very small. Stationary gatherings were spaced uniformily all over the area so that the inter-group distances were maximized. His further observations carried out on a public beach revealed that people there would also distribute themselves in non-random fashion as if trying to maintain equidistant spacing between the neighbouring gatherings.

Similar regularities were uncovered by Edney and Jordan-Edney (1974), who in a study of people's spatial behaviour on a public beach found that an average (N=50 cases) inter-group spacing between neighbouring gatherings was 12.9 ft (6.4 paces), and that though gatherings varied in respect to the extent of "strangers free territory" they would like to claim for themselves, and though the average density was frequently greater near concession stands and changing rooms, people nevertheless tended to distribute themselves evenly over a given portion of the beach.

Another study of people's spacing on a beach (Getis and Merk 1973, 1976 - personal communication) established that the average spacing between neighbouring gatherings (measured between the centers of the groups), was 11.5 ft (5.4 paces) and statistical analysis of the data[2] suggested the occurrence of very even (uniform) distribution of people all over the study area.

Finally, Greist (1975) in an observational study of spacing patterns in outdoor public settings, found that in such uniform areas as beaches groups of users tend to distribute themselves in a non-random way leaving

[2] Carried out with the aid of r-statistics, developed by Clark and Evans (1954).

equal distance between gatherings. It was found, however, that the presence of some focal points (attractants) in a given area may cause people not to be distributed uniformly but rather to cluster in the vicinity of these points.

All these observations point out that in case of groups of strangers making use of some public and relatively homogeneous space, they tend to maximize inter-group distance and achieve it by positioning their gatherings uniformly all over a given area. These observations are also reinforced by findings on spatial behaviour of individuals whilst in an unfocussed interaction. Thus, Batchelor and Goethals (1972) in a laboratory experiment on spatial arrangements in focused and unfocused gatherings of people found that persons who were expected to make individual decisions and were able to place their chairs anywhere within a large room tended to maintain uniform inter-personal distances. The average distance to a nearest person ranged from 2.6 ft to 7.3 ft, the mean being 4.5 ft.(2.3 paces). The results obtained suggested that though the subjects did not have a set distance of separation, nevertheless the amount of separation distance established in the course of a given experiment tended to be constant.

2.ANALYSIS OF OBSERVATIONS

Let us now examine our own data relevant to the issue of the r-space, the space stretching outside the physical boundaries of the F-formation and yet being under its influence and control. Since in Chapter 5 it was established that the spatial behaviour of the F-formations remains to some extent affected by the formation's proximate environment, it seems interesting and important to determine to what extent the formation itself may exert influence on the space surrounding it. This will be done through examination of how participation units space themselves in relation to one another.

First we shall examine the results of the analysis of "Sample no 2" related to the patterns of spatial distribution of walking people relative to stationary participation units. Then we shall look at the findings obtained by the naked eye, paper-and-pencil observations ("Observation no 5") carried out on the spacing maintained by stationary participation units. Finally, in the third part of the data examination we shall discuss the findings derived from the analysis of "Sample no 2" on further patterns of spacing of stationary participation units. An attempt to account for uncovered regularities will be provided in the final section of this chapter.

(i) Spacing of walking people relative to a stationary participation unit: general pattern

Analysis of "Sample no 2" shows that in the majority of cases a casual, face-to-face social interaction is carried out inclose proximity to mobile co-users of a pedestrian setting (see Table 1-6). Approximately 80% of all stationary groups and individuals observed within the boundaries of the plaza were found to occupy locations situated no farther than 12 paces (25 ft) away from a walking person. What is more, nearly two thirds of all passers-by were within 6 paces from a stationary unit and were separated from it by a "buffer zone" of 3.4 paces (6.8 feet) on the average.

This is an important finding. It was noted in Chapter 5 that existing research on human communicational behaviour is based on the assumption that an interpersonal exchange is adequately described and explained when by relating people's behaviour to their social or psychological characteristics or to the events which take place within a given interactional cluster. This theoretical approach makes practically no allowance for any influence of external human or physical factors. It is interesting, therefore, to observe that outside laboratories an overhwelming majority of spontaneously occurring stationary and non-stationary social interaction is carried out in the direct and immediate presence of outsiders, frequently at ranges which are regarded as "personal" and "social consultive" ones (Hall 1968).

This tendency of passers-by to walk close and very close to stationary units, or rather to not avoid them was found to be statistically significant (see Table 1-6). A comparison between the observed and expected spatial distributions of walking people on Petrie Plaza indicates that on the average people tend to pass by closer than could be expected on chance basis alone. The figures (Table 2-6) show that while there is no significant difference between random and real-life distribution of pedestrians within the first 6 paces from a stationary group, the passers-by in Petrie Plaza tend to use over 6 pace separation distance significantly less often.

This last finding is probably due to the fact mentioned earlier (Chapter 4, Table 12-4) that the majority of stationary people tend to form their interaction units in the middle or in the vicinity of traffic lines. However, we should note in particular that in our observations mobile people do not appear to bypass such stationary units in a way that would support the findings reviewed earlier. This may be because our methods of measurement were not sensitive enough to detect the effect of the r-space on mobile people. However, as we shall see later, we have other evidence to suggest that stationary participation units behave differently towards each other than they do towards to mobile pedestrians.

These two findings are based on analysis of general patterns displayed by "Sample no 2". The next two sections will examine more specific questions, namely the possible effects that the physical setting of a stationary gathering and its characteristics, such as size or sex composition, may have on spatial behaviour of mobile outsiders.

(ii) Spacing of walking people relative to a stationary participation unit: effect of the physical setting

Examination of data on the distances of passers-by to stationary gatherings suggests that one of the most important factors determining the distance which separates the two sets of plaza users is, as it could be expected, the gathering's placement relative to pedestrian traffic lines (see Table 3-6). This table demonstrates that each of the four types of locations offered a different degree of freedom to people standing there. Those standing in central and side locations tended to be approached by mobile users of the setting most closely. Of these groups 41% and 35% respectively were approached very closely, that is 1-2 paces. The remaining two types of locations offered greater protection from the immediate physical presence of pedestrians. Persons standing in "protected" spots were approached at a distance 5-6 paces in 50% of cases, while people in spaces away from the traffic lines were approached at this range in approximately two thirds (67%) of all instances.

This trend is further confirmed by a comparison (Table 3-6) of the average separation distance maintained from people in these four types of space. People in central locations were approached more closely (3.1 paces) than were people in side locations (3.4 paces), who in turn were approached more closely than persons in protected (4.4 p) and away spaces

(4.7 paces). Thus it can be seen that the placement of a stationary gathering relative to pedestrian traffic lines determines not only the form of exposure to the bypassing traffic flow (i.e.on all sides, on one side only etc.) but also how closely a stationary person can expect to be approached by a passer-by.

The next table (Table 4-6) deals with the effect the unit's spacing relative to physical objects had on the distance separating it from the nearest passer-by. The reason for looking into this possible interrelationship was that the data which will be examined in Chapter 8 indicate that people in the studied setting displayed a marked tendency toward clustering around and in the vicinity of objects furnishing the plaza. It was interesting to examine whether the two factors have any systematic relationship. The figures provided in Table 4-6 indicate, however, that though there was some slight tendency for a passer-by to use more ample separation distance in relation to persons who were standing very close to objects the trend was found to be a non-significant one. Thus it appears that the distance of a stationary participation unit from an object did not alter very much the way mobile outsiders would pass it by.

The distance between stationary and non-stationary people was found, however, to be significantly influenced by the choice of a location relative to the various categories of objects furnishing the plaza. This is documented in Table 5-6. In the case of people standing near "barriers", the most frequent distance at which they were approached by passers-by was 2 paces (32% of cases), while the approach distance observed in case of people standing near "objects" was most typically (26%) 4 paces. As far as the people standing near "utility-objects" are concerned, the number of observations is unfortunately too small (N=13 cases) to allow us to reach any conclusions. Finally, groups situated in vicinity of "seats" were bypassed at various distances ranging from 2 to 6 paces. These differences between widths of buffer zones given to people standing in vicinity of the four different types of objects were statistically significant ($p=0.005$). The average values calculated for buffer zones in each case were as follows: "barriers" = 2.7 paces, "objects" = 3.5 paces, "seats" = 3.7 paces and "utility objects" = 3.9 paces. These results indicate that people standing in vicinity of free standing objects are, on the whole, given a wider berth than those in vicinity of barriers. This would suggest that a group's decision as to where to carry out its activity (i.e.the choice of the type of closest object) may have some important effect on the extent of the interference on the part of the passers-by.

<u>(iii) Spacing of walking people relative to a stationary participation unit: effect of unit's characteristics</u>

Apart from the effects of the placement of a gathering relative to traffic lines and artifacts, it seems that the distance separating walking people from stationary people is also related to some factors associated with the stationary people themselves. One such factor which was established to be a significant one, is the sex-composition of a stationary group. Examination of the data (Table 6-6) shows that there are considerable differences in the size of a buffer zone given to groups with different compositions. The female dominated gatherings were approached mainly at the 1-2 and 3-4 pace range, and the average size of their pedestrian free zone was 2.9 paces. A similar pattern is displayed by M/F gatherings. They were also approached most often at 1-2 and 3-4 pace range, and the average berth given to them was 3.0 paces. A different pattern is associated with the male dominated formations. They were bypassed considerably less often at close range and the average width of their buffer zone was 3.7 paces.

Table 7-6 shows that also among solitary individuals their sex has an effect on the distance at which they are bypassed by mobile strangers. The table demonstrates that males, again, had larger buffer zones (3.5 paces) than females (3.3 paces), and that they were approached by pedestrians in a significantly different manner than were the solitary women. In the case of solitary standing males the width of the buffer zone appears to be random - it varied from 1 to 6 paces. In the case of solitary standing women mainly one range of separation distances (3-4 paces) was used.

While in Table 6-6 buffer zones of all multiperson gatherings, irrespective of their particular size were compared, Table 7-6 provides also some complementary information on the effect of sex-composition among two-person groups only. In keeping with the pattern uncovered earlier, Table 7-6 shows that all-male duets had larger buffer zones than did M/F duets, which in turn had larger buffer zones than all-female duets. Thus, this pattern agrees with earlier observations on the average approach distances made by Dabbs and Stokes (1975). Therefore, it can be argued that a certain consistent pattern can be traced both in the Petrie Plaza materials and in observations carried out by other researchers. It seems that in all cases the presence of a male tends to increase the group's buffer zone, or conversely, the presence of a female tends to reduce the width of the space-bubble free from passers-by.

The tendency of pedestrians to use smaller distance with respect to females appears to be un-affected by the stationary person's placement in relation to traffic lines. It cannot be argued that since the majority of females tend to be standing in these traffic exposed areas it is normal that they will automatically have narrower buffer zones than males, who were found to choose away spaces relatively more often than central locations (see Chapter 4, Table 14-4). A closer look into the issue reveales that even in central locations, for example, solitary men (N=19) were approached less closely (3.3 paces) than were solitary females (N=15, x=2.9p). Similarly male dominated groups (N=24) situated in central locations had larger buffer zones (x=3.1 paces) than female dominated formations (N=24, x=2.8 paces). Therefore, it seems that one should accept that in some cases the sex of the people may play a considerable role in determining the width of the buffer zone already affected by placement in relation to traffic routes. Thus a more appropriate question to ask is not which of the two factors is more important, but rather under what circumstances one of them will start to play a more dominant and influential role.

Examination of "Sample no 2" in terms of the size of a stationary unit having a possible effect on the width of the buffer zone has yielded a negative result. Apparently there is no significant correlation between these two variables (see Table 8-6). Though solitary people tend to be bypassed in less random fashion than are people in multiperson groups this difference does not reach 0.05 level of significance. The average separation distance assumed by a passer-by toward solitary plaza users was 3.4 paces and was identical to that used toward multiperson gatherings. This lack of difference is surprising since groups of different size were found to opt for markedly different placements in relation to the flow of pedestrians (see Chapter 4, Table 16-4). Furthermore, this finding is in contrast to the results obtained by Dabbs and Stokes (1975) and Knowles et al. (1976). On the other hand, it is in keeping with findings of Knowles and Bassett (1976) and of Gordon and Duke (1975). Thus it appears that the question is far from being definitely resolved and that further research, possibly using more precise measurements, is needed here.

(iv) Spacing of walking people: effect of spatial arrangement

Another issue which was investigated was the relationship between the spatial architecture of an F-formation and the distance separating it from nearby walking people. The data presented in Table 9-6 indicate that, strictly speaking, there is no significant correlation between the type of the adopted interpersonal arrangement and the separation distance measured to the closest passer-by. This clear-cut result, however, is somewhat weakened by the fact that some types of arrangements appear to occur in "crowded" contexts relatively more frequently than in "uncrowded" ones. For instance, it can be seen that closed arrangements (type N, H, V) seem to occur mainly when a passer-by is at a greater distance (average 3.7 paces) while open arrangements (type L, C, I) occur when a passer-by is within a closer range (average 3.0 paces) - see Table 10-6. Interestingly, although this relationship again appears to be a non-significant one, noted regularity is displayed with regard to standing and sitting people. Thus, in all three cases people formed arrangements where they were directly facing each other at generally greater distances from a stranger, and were less directly facing each other when a strange person (walking, standing or sitting) was present at a closer range. Although the Chi-square values did not reach the 0.05 level of significance in any of these cases, the uncovered trend nevertheless looks quite suggestive. It seems that stationary people were more likely to focus their entire attention on each other when operating in relative solitude than when being "crowded". In the latter case they appear to be more concerned with monitoring their immediate environment. However, as the earlier observations suggest (Chapter 5), the fact that people engage in monitoring their immediate environment seems to have no or only very little effect on how closely they will be approached by the outsiders.

Of course, the need for visual control of the immediate environment is not the only possible reason why people in close proximity to outsiders seem to avoid using "closed" arrangements. It is also plausible that the maintenance of a certain level of readiness to cooperate with others, present nearby, may play an important role here, and that it might be a specific reflection of the norm of reciprocity[3]. Simply, to be wholly engrossed in our own activity while being in close proximity to other users of a public place makes them, unfairly, solely responsible for incorporating us into a framework of an ongoing unfocussed interaction. On the other hand, to be only partly engrossed in our activity and to indicate (for instance, by the use of "open" arrangement) that we pay attention also to others around automatically makes their movement and interaction between themselves easier to accomplish since they know that we are ready to co-operate with them should the need arise (cf.Goffman 1963).

The results of the first part of our examination of data from "Sample no 2" can be summarized as follows:

1. The observed spatial distribution of passers-by relative to stationary people does not indicate that the walking people observe the existence of an r-space around the stationary participation units. The distances they adopt in general are not significantly different from the ones which could be expected on chance basis.

2. Though the passers-by do not seem to behave as if the stationary participation units were enveloped by a space which falls under jurisdiction of a given unit, it was observed that the distance at which stationary people were bypassed was significantly affected by their placement relative to traffic lines as well as their placement

[3] This possibility was suggested to me by A.Kendon

in relation to various categories of objects furnishing the plaza. This suggests that people's positioning in relation to the plaza layout and configuration of street furniture can be seen as a mechanism controlling the extent of the average approach distance by the mobile plaza users.

3. The stationary unit's distance to the nearest object was not found to affect significantly the amount of space given to it by a passer-by.

4. The size of a stationary participation unit was not found to affect significantly the amount of space given to it by a passer-by. Multiperson groups and solitary people were given roughly the same amount of space.

5. The sex composition of a stationary unit turned out to be a surprisingly strong factor influencing the spatial behaviour of the passers-by. Female dominated units, regardless of their placement relation to traffic lines, were found to be bypassed by mobile people at much closer range than was the case with males and male dominated groups.

6. The type of spatial arrangement adopted was found to be related, though not very strongly, to the distance separating a given F-formation from the nearest walking, standing or sitting stranger. The more open arrangements were likely to be used when the outsiders were at relatively close range from a given F-formation.

The sixth regularity is of particular interest to us here, as it draws attention to another phenomenon of differential spatial behaviour relative to the nearest walking, standing or sitting outsider. This will be looked at in the next section.

(v) Spacing of participation units: effect of their basic activity line

When the distances between a stationary gathering and various classes of nearby people are compared, one notices an interesting regularity (see Table 11-6). Close (i.e within 1-12 pace range) unfocussed encounters so common among strangers co-present in a public place, are far more frequent between a target stationary group and a mobile person (82.5% of all observed encounters) than between the group and standing or sitting people (33.7% and 43.0% of cases respectively). This difference is statistically significant (p less 0.001). Thus it appears, once more, that although static gatherings tend to be formed away from static people, the walking people did not avoid the stationary gatherings.

A similar tendency can be observed among groups which were formed closer (within 1-12 paces) to each other (see Table 12-6). The table also shows that the mean distance at which a target gathering is approached by walking people (4.4p) is smaller than the mean distance separating the closest standing (6.0p) or sitting neighbour from the group (6.7p). The same is also true if we take into account only those groups of people which were within 1-6 paces from a co-user of the plaza. Amongst these groups the respective average distances were 3.4p (walking people), 4.2 paces (standing people) and 4.2 paces (sitting people). These figures indicate that the smaller separation distance is associated with only momentary intrusions into a stationary group's immediate neighbourhood, while the longer lasting and possibly more obtrusive presence of static persons is compensated for by the increased separation distance.

(vi) Spacing of stationary participation units : effect of social relationship and spatial orientation

In this section we shall examine data on spacing observed between stationary participation units. The observations which are going to be analysed will be referred to here as "Observation no 5". They were conducted during a fortnight study period in mid March 1975. All data were gathered in an open, empty space situated away from pedestrian traffic routes intersecting Petrie Plaza. The observations were made unobtrusively and were carried out from a bench situated several paces away from the observed area, so that the presence of the author as well as his note-taking would not be influencing the behaviour of stationary people. The basic research questions asked were: what is the minimal spacing maintained between two adjacent stationary participation units, and how does the distance change in relation to the type of the social relationship of the groups and (in the case of solitary people only) to the spatial orientation adopted by a solitary person[4].

The spacing between stationary people was estimated in terms of a number of paces separating the two closest body surfaces of the target and subject participation units. The procedure adopted was as follows: upon reaching the vantage point the observation area was scanned for the occurrence of a stationary F-formation which would be composed entirely of adult, white, middle-class looking people. In order to become selected as a target participation unit an F-formation had to be established prior to the arrival of the "subject unit"[5], had to be positioned at least 12 paces away from walls of the nearby buildings, and the participants could not be using pushchairs or bicycles, have dogs on leashes, or have any

[4] As far as the type of social relationship is concerned, units are classified as un-acquainted or STRANGE if they became stationary and subsequently moved away independently of each other, and during their proximity to each other did not enter into any overt communicational exchange, nor show any explicit signs of mutual recognition. Units are classified as ACQUAINTED if, though spatially separate, they nevertheless engaged in a verbal exchange at least once, or if they walked into the observation area together or upon the termination of a stationary encounter left the scene together, or freely exchanged participants of the participation units.

A stationary person could use one of the following five SPATIAL ORIENTATIONS relative to a target F-formation: (a) fully frontal orientation, (b) oblique-frontal orientation, that is an orientation in which the person is standing at an angle to the F-formation yet still faces it, (c) side orientation or one in which he points to the F-formation with his elbow, (d) oblique-away orientation, and finally (e) away or dorsal orientation, the one in which an individual orients his back directly toward the target F-formation.

[5] The exception from this rule was made for associated (acquainted) participation units which in most cases tended to be formed and disassembled at the same time. Furthermore, for the purpose of this study it was irrelevant which of the two associated F-formations was selected as the "target" group.

other objects which could influence the spacing maintained between the target and the subject gathering. The people in a target F-formation were defined as such only if they were engaged in a casual conversational exchange or task (such as lighting a cigarette, browsing through a newspaper, etc). This means that F-formations in which participants were too deeply engrossed in each other's presence (e.g. were kissing each other, scolding a child, arguing between themselves, laughing loudly etc.) were not taken into consideration. Once the target F-formation was selected, the area within the radius of 12 paces (25 ft) around it was searched for an occurrence of a stationary person or F-formation which would meet all the criteria used for selection of the target F-formation, and which would be standing still in its location for at least 10 seconds before the estimation of the separation distance was made. The F-formations or solitary individuals who met the above criteria were called "subject" participation units and a note on the distance adopted by them relative to the target F-formation, angle of orientation (if applicable) and the type of social relationship was recorded. Each subject unit was counted once, irrespectively of the number of times it could be seen stopping within 12 paces from a target paticipation unit. When the notes were completed the observation of the behaviour of the target and subject unit was continued so that an accuracy of the initial judgement of the type of their social relationship could be checked and, if necessary, corrected. Once one of the two groups left its location, the remaining one was defined as a target group (providing it was an F-formation) and the scan of the study area for a "subject" participation unit was repeated.

In addition to these observations a control set of data were collected on the distances and orientation solitary people adopted in relation to nearby objects such as trees, lamps, wastebins or benches (without sitting people). The procedure adopted was similar to the one described above. When a solitary person was standing further than 12 paces away from the nearest F-formation, and when the was within 12 paces from an object other than he wall of a building or a utility object, (such as a drinking fountain or a noticeboard) his distance and orientation were entered into the notebook. The aim of these additional observations was to check whether solitary persons' spatial behaviour in relation to stationary people and physical objects displays any significant similarities. Results of these two sets of observations are presented in tables 13-6 through 2Ø-6.

Analysis of data from "Observation no 5" (see Table 13-6) shows that distance separating a group from its closest neighbour was significantly affected by the degree of acquaintanceship between the two groups. In case of strange co-users of the setting the most typical distance is 4 paces (adopted by 17% of strange gatherings). Among strangers a little over two thirds (68.7%) of all co-presences occurs within the 1-6 paces range. A different pattern is displayed by people who appear to know each other and overtly or tacitly display "tie signs"(Goffman 1971). In case of stationary gatherings of people who were familiar with one another, nearly two thirds (64%) of all co-presences took place at a 2 pace separation distance. This tendency toward using small separation distance is displayed even more strongly by the fact that three quarters of all such co-presences occurred within a distance of 1 to 2 paces. This difference between behaviour of strangers and acquaintances is neatly expressed by the average separation distances used. Acquainted gatherings were on average separated by a 2.3 pace zone, while unacquainted groups were seen to be separated by a 4.0 pace zone. These figures refer to groups standing within 6 paces from one another. For groups standing within 12 paces from each other the uncovered relationship-linked effect is even more strikingly accentuated (2.5 paces vs. 5.5 paces).

When one examines data on spatial behaviour of solitary persons the pattern just mentioned emerges again (see Table 14-4). As in the case of acquainted groups, a person who appears to be acquainted with a stationary gathering and remains in its vicinity for some prolonged period of time, standing as an "associate", tends to use closer distances than an accidental stranger. Average distances are 2.2 paces and 4.3 paces respectively. A person who is socially associated with a target group is standing at 1 pace distance from it in 36% of cases and at a 2 pace distance in 33% of cases. A solitary stranger stands near a target gathering at a distance of 1 pace only in 1.2% of cases and a little more often (7.1%) at a distance of 2 paces. Relationship-linked differences were found to be statistically significant (p less 0.001).

Next table (Table 15-6) demonstrates that although solitary associates tend to be standing closer to the target F-formation than associated F-formations when the participation units are acquainted, this is clearly not the case among strangers. In the situation of an un-acquainted participation unit arrives in the vicinity of a target F-formation, the number of people in such a newly arriving group is of no significance to the separation distance. The comparison between the frequencies with which various distances were used suggests that the separation distance is not a function of the size of the later arriving group. What is more, the average separation distance appear to be practically the same (4.0 paces in the case of a strange F-formation and

4.3 paces in the case of a strange solitary person). This is a finding which is in line with results obtained from an independent set of observations which will be discussed in Table 27-6.

Tables 16-6 and 17-6 provide further data on distance maintained between a target gathering and a nearby stationary person. In both tables distance is examined as a function of a person's spatial orientation toward an F-formation. There were five basic possibilities: First, a person could be frontally oriented (i.e.facing the group), second, a person could be standing in an oblique-frontal orientation. The third possibility was side-orientation, when an individual was turning one side toward a target group. The last two possibilities were oblique-dorsal and fully dorsal orientations. When the orientations adopted were compared with separation distances it was found that both in case of "regional associates" and strangers these two variables were in a remarkably regular relationship. It was found that the distance and the directness of the orientation were inversely related to each other. Close approach distances were associated with dorsal orientations while frontal orientations were associated with increased separation distances. This regularity was apparent for the 1-6 pace range, though it was more fully displayed when people within 12 paces from a F-formation were taken into consideration. It is obvious that although "acquaintances" tended to stand at considerably smaller distances from stationary groups than "strangers", the behaviour displayed in both cases seems to be governed by the same principle, which inversely relates interpersonal distance to interpersonal orientation.

The adopted orientation was found also to be systematically correlated with the degree of acquaintanceship (see Table 18-6). In this table we note that regional associates tended to use side orientations more or less with the same relative freqency as did the strangers. However, differences occur when other orientations are considered. "Regional associates" tended to use frontal and oblique-frontal orientations significantly more often than "strangers" (p less Ø.Ø1). The associates also appeared to orient themselves away from the gathering orientations less often than could be expected by chance alone. Thus, it can be seen that the difference in the way strangers and non-strangers distribute themselves spatially in relation to stationary F-formations is at least two-fold. Strangers not only appear to be twice as far from a group but they also tend to use less direct orientations.

The material provided in Table 19-6 refers to spacing maintained between solitary stationary people and the nearby physical objects furnishing the observation area. This person-to-object distance has been analysed in terms of the adopted spatial orientation. Examination of the data from Table 19-6 shows that frontal, side and dorsal orientations assumed in relation to an object were more frequent when a person was at a close (Ø-2 paces) range (p less Ø.Ø1). The oblique-frontal and oblique-dorsal orientations, on the other hand, were found to be used more frequently at larger distances from a tree, lamppost or a bench. This is a pattern which is different from the one displayed by people standing and orienting themselves relative to nearby F-formations. It suggests that stationary F-formations are not reacted to in the same ways as objects, and that stationary individuals use two different strategies when they relate themselves spatially to the two main components of their immediate environment.

This view is even more strongly reinforced if one compares the frequency distributions of separation distances in relation to objects and F-formations (see Table 2Ø-6). These establish that objects are approached much more closely than are stationary F-formations, whether acquainted or not, and that this trend is not accidental (p less 0.001). Thus not a single person was found to be in physical contact with a nearby F-formation, whereas 22% of the people were in contact with objects. Further, approximately 47% of stationary individuals were standing at 1-3 pace distance from the nearest F-formation while 74% of them would be standing at such a distance from a nearby object. Thus it looks as if people's spacing in relation to features of physcial and human environment were goverened by two opposing tendencies: the proximity of objects was tolerated or sought, while the proximity of stationary F-formations was avoided. The results of the "Observation no 5" can be recapitulated as follows:

1. Stationary F-formations were found to maintain certain amount of space which separated them from nearby F-formations.

2. The depth of this space was strongly influenced by the type of social relationships. On the average, strange formations were separated by twice as large a space cushion than acquainted F-formations.

3. Distance adopted by a stationary person in relation to the nearby F-formation depends on the person's spatial orientation toward the target group. This distance is smaller if the person is facing away from the target group and larger if the person is facing toward it.

4. Distance adopted by a stationary person in relation to the nearby F-formation depends on the type of social relationship between these two participation units. On the average, strange units were separated by twice as large a space cushion than acquainted participation units.

5. The distance between two strange participation units is not related to their size. Approximately the same space cushion is given to a target group by a two-person F-formation as by a solitary person.

6. The degree of directness of orientation of a solitary person standing near an F-formation is related to the type of social relationship between these two participation units. Direct angles of orientation are more likely to be used by people who are acquainted with the participants of a given F-formation.

7. The distance a solitary person maintains in relation to a nearby F-formation is, on the average, twice as large as the distance maintained from physical objects.

8. Spatial-orientational relationships established by solitary people with respect to stationary F-formations are significantly different than ones established in relation to physical objects furnishing the plaza.
9. Stationary solitary people tend to cluster around physical objects present within a pedestrian setting while they always tend to keep a certain distance from a nearby F-formations.

In order to place these findings in a proper context another set of data ("Sample no 2") was secured and further regularities in spacing between stationary people were looked at in detail.

(vii) Further observations on spacing of stationary participation units : general patterns

The examination of general data on distances adopted by stationary people in relation to each other uncovers (Table 21-6) a number of interesting regularities. The closest and farthest separation distances were used by people (within the first 12 paces from one another) relatively less often than was the intermediate (5-6 p) range. Thus, considering two-pace intervals from a target group the number of other stationary standing people increased to reach the maximum of 32% of units at 5-6 pace range, and then diminished. It can also be seen that half of the stationary groups recorded within 12 pace radius from a target group were found to be standing within the 5-8 pace range, 19% within the 9-12 pace range and 31% within 1-4 pace range. This frequency distribution looks as if it was an outcome of two simultaneously operating processes. It can be hypothetized that firstly some sociopetal tendency clustered nearly two thirds (64%) of the discussed population within the first six paces from each other while hypothetical sociofugal attitudes kept people apart in such a way that 13% of plaza users were standing at 1-2 pace distance from one another, 19% were separated by 3 to 4 paces and finally 32% of them were standing at 5-6 pace range.

These patterns seem to be non-accidental. This is demonstrated by another set of data on inter-group distances which was obtained in the course of the computer simulation 2. The comparison between the observed and theoretical frequencies suggests (see Table 21-6) that the described inter-group spacing cannot be attributed to a chance process. In the case of people randomly distributed all over the plaza the expected average separation distance was 7.2 paces, and therefore larger than the 6.0 paces observed in real-life situations. Furthermore, no definite tendency toward the use of certain distances could be found in the figures derived from the simulation, and the overall differences between the two sets of data were found to be highly significant (p less 0.001).

(viii) Further observations on spacing of stationary participation units: effect of physical setting

An examination of data on intergroup distances and choice of location in relation to the course of traffic lines (Table 22-6) yielded an interesting result. Unlike in the case of distances adopted by the nearest walking person it was found that placement of stationary people in various parts of the plaza had no effect on the pattern of spatial distribution of gatherings in relation to one another. People standing in the middle or near the traffic lines were at the same distance from another static gathering as were people occupying protected and away locations. The Chi-square value for Table 22-6 did not reach 0.05 level of significance and therefore the possibility of interdependence between the two discussed variables could be ruled out. This would suggest that spacing maintained by stationary participation units is relatively constant regardless the sub-area of the pedestrian setting.

While positioning in relation to traffic lines was found to be of no significance to the distances kept between stationary groups it was expected that the spacing between stationary and non-stationary people might be an influencing factor. In terms of commonsense reasoning it can be argued that in places where people are closely approached by pedestrians participants of a static gathering are also more tolerant of a close proximity of another stationary group. In order to test this assumption a comparison of intergroup distances used under various degrees of crowding by walking people was made (Table 23-6). However, negative results were obtained. The field data suggest clearly that no change in spacing between groups can be linked with the size of the space around the group which was free of walking people. Both in places where target gatherings were bypassed fairly closely and in places where the nearest pedestrian was more than 12 paces away the distance between two nearest stationary gatherings remained remarkably constant. This would suggest that any avoidance reaction of a pedestrian in relation to a static group was independent of inter-group spacing, and conversly that intergroup spacing was not related to the degree of crowding of the setting by walking people.

The next crosstabulation examined is one which describes the relationship between the group's distance to the nearest static stranger and its distance to the nearest object. Since the results of crosstabulations discussed in Chapter 8 suggest that people's placement in relation to objects is non-accidental and that there are good reasons to think that distance separating people from objects is positively correlated with the distance separating people from other stationary persons, it is important to establish whether there is any significant pattern which could be uncovered in data presented in Table 24-6. At the first glance, the results are dissappointing as no significant difference is found in inter-group spacing associated with people standing at various distances from physical objects. However, the average values computed for the inter-group distances indicate that there was some trend for people standing farther away from objects to be simultaneously positioned farther away from other stationary people. This prompted an additional inquiry, based on data gathered during the "Pilot Study". The results of this investigation are shown in Table 25-6. It can be seen that firstly, the average distance between a stationary group and other people is greater for groups standing 5-6 paces from an object than for groups Ø-2 paces from an object, and secondly, that the overall differences are statistically significant (p less Ø.Ø1). This would suggest that the view that people's placement in relation to each other and in relation to objects furnishing the plaza have some systematic relationship is a plausible one.

A negative result was obtained (see Table 26-6) when a correlation was sought between the size of intergroup distance and the type of the nearest artifact. On the whole, people standing near barriers and utility objects appeared to be approached by other stationary gatherings at smaller distances (3.8p and 3.7p) than were people standing near free standing objects (4.7p) or seats (4.Øp). These differences, however, turned out to be non-significant one, unlike in the case of distance maintained by walking people. A Chi-square value calculated for Table 26-6 did not reach the level of significance and therefore a hypothesis suggesting that the intergroup distance would be associated with the group's placement with respect to various features of environment was rejected.

(ix) Further observations on spacing of stationary participation units : effect of group's characteristics

Examination of data from "Sample no 2" for the possible effect of group size on distance maintained between a target gathering and its nearest stationary neighbour yielded negative results (see Table 27-6). It was found that the distribution of distances for solitary people and for people standing in groups were identical. These results are consistent with observations made with regard to group size and the distance to the nearest walking person (e.g.Table 8-6), as well as with earlier data on spacing maintained between non-acquainted participation units ("Observations no 5", Table 15-6). It can be accepted then that, despite the fact that the number of participants in a group significantly affects the group's placement near traffic lines (see Chapter 4) and physical objects (this is discussed in Chapter 8), it plays no role in determining the amount of space separating the gathering from either stationary or non-stationary people. Thus, regardless of changes in the size of the approaching or approached stationary unit the spacing between them is kept constant.

The sex composition of a gathering is a variable which has turned out to have a significant effect on the intergroup distance (see Table 28-6). The sex-linked effect was displayed by both solitary persons and by multiperson clusters. It was found that solitary standing males were occupying locations positioned considerably closer (3.9p) to other stationary people than was the case with solitary females (4.3p). A similar trend was revealed for F-formations (p less 0.02). Male dominated groups were found to have a smaller space around themselves free of other people (3.6p) than female dominated gatherings (4.3p) or sex-balanced groups (4.7p). A closer analysis of Table 28-6 shows that in male dominated groups 1-2 paces separation distance was used markedly often, whereas the distance 5-6 paces was relatively underused. Female dominated groups appeared to enjoy a relatively larger space free of other stationary people , mainly due to the infrequent spacing within 1-2 paces range. In the case of females the most frequently used separation distance was 3-4 paces. Finally, in relation to M/F groups distance 5-6 paces was used more often than would be expected by chance.

The effect of the next variable, namely the type of spatial arrangement adopted, was found to be ambiguous. On the one hand the sample shows no discernible pattern, and its small size precludes any statistical treatment of Table 29-6. On the other hand, reexamination of the figures shows that closed (N+H+V) formations tend to occur at larger distances from other static people than open-shaped (L+C+I) arrangements. The average distances were 4.3p and 3.5p respectively. It is possible that these differences are meaningful, since they are in line with similar observations made on spacing in relation to walking and sitting people (Tables 9-6, 10-6). Whether this is the case will become clear when a larger sample will be obtained and studied.

Finally, examination of data derived from "Sample no 3" with regard to a possible relationship between inter-group spacing and type of activity yielded further interesting results (see Table 30-6). Figures referring to the size of the space around a multiperson gathering free of other stationary people suggest that the group's activity does play a significant role here. It was found that on the average conversational gatherings enjoyed larger separation distances (3.7p) than non-conversational F-formations (3.3p). This difference was statistically significant (p less 0.05). A closer analysis of the figures shows that there is little difference in the relative numbers of stationary people standing at 1-2 pace distance from either conversational or non-conversational cluster. The differences arise only when the use of farther distances is taken into account. In the case of people standing near conversational gatherings the 3-4 pace range is underused, while distances 5-6 and 7-8 paces were used more often than would be expected by chance. Conversly, the opposite pattern was characteristic of people standing near non-conversational clusters. These differences tended to increase when a wider range of distances was taken into consideration. While within the first 6 paces around a target group the average spacing was 3.7 paces if the group was conversing, and 3.3 if otherwise, average values obtained for people distributed within 12 paces around a gathering were 5.9 paces and 4.9 paces respectively.

The results of the tables examined above can be recapitulated in the following list:

1. Spacing of stationary participation units tends to be much less crowded than could be expected on the basis of a random distribution of plaza users. The mean separation distance tends to oscillate around the value of 3-6 paces (6-12 ft), being 3.4 paces for groups within 6 paces from each other and 4.4 paces for groups within 12 paces from each other.

2. Spacing of stationary participation units is not affected by their placement in relation to traffic lines or types of objects, nor by the separation distance adopted toward stationary people by walking pedestrians.

3. There is a tendency for stationary groups which stand farther away from artifacts to be less closely approached by other stationary participation units. On the other hand, groups which are situated at a closer range from physical objects tend to be using smaller separation distances.

4. The spacing of stationary people is unaffected by the size of their participation unit. On the average a solitary person is given the same space free of other stationary people as are participants of two-person or larger gatherings.

5. The extent of this zone which is free of other people is significantly related to the sex of people in a given participation unit. Females were found to enjoy larger domains free of other people than were males or male dominated groups. This finding is entirely opposite to the regularity found with regard to spacing adopted by walking people.

6. There is some indication that the distance between two stationary participation units is correlated with the type of spatial arrangement used by a target gathering. Like in the case of arrangements adopted in relation to the nearest walking and sitting person the more open arrangements tended to be used when a stationary outsider was at a relatively close range from a given dyadic F-formation.

7. The spacing between stationary people was found to be systematically linked to the type of activity in which a given group of people was involved. Conversational interactions tended to be associated with larger and non-conversational activities with smaller inter-group distances.

This recapitulation of findings from "Sample 2 and 3" closes the data analysis part of this chapter. In what follows we shall attempt to try to account for the basic regularities uncovered.

3.DISCUSSION OF OBSERVED PATTERNS

The problem arises, how can all these various pieces of the jigsaw be assembled together to form a coherent picture of people's behaviour in public places. It seems that in attempts to do so, it is useful to start with our basic question, asked at the beginning of this chapter, namely "is there an r-space and if so, what can we say about its characteristics and functions ?" The answer to the first part of the question is an affirmative one.

Indeed, the available evidence suggests that stationary F-formations do have a certain amount of space which lies outside the arrangement of people's bodies and which is treated by the outsiders in a way that is markedly different from that associated with entry to and usage of other portions of a setting. The existence of the phenomenon of r-space is documented both by the literature reviewed and the observations we have just reported. Technical literature indicates that stationary participation units always tend to maintain a certain minimal inter-group distance, and that the general trend is toward the establishment and maintenance of more or less equal spacing between adjacent units. The literature also indicates that mobile people seem to perceive stationary people as being surrounded by a space cushion which is permeable to them but the presence of which, nevertheless, tends to influence (or deflect) the trajectory of their progress through space.

These observations are basically, in line with the conclusions we may draw from our own data:

(i) It has been observed that there is a strong tendency among stationary participation units to establish non-random and equidistant spacing between themselves as if every unit was enveloped by an un-collapsible space cushion and this space cushion could not be entered by nearby stationary people[6]. By contrast, spacing maintained between mobile and stationary persons was not found to observe this principle. This is an interesting finding. Firstly it suggests that the way our data were gathered was sensitive enough to uncover the more accentuated patterns of spacing displayed by stationary units but not suitable for detecting stationary people's effect on trajectories adopted by passers-by. Secondly, it indicates that at the level of resolution adopted in our analysis there is a marked difference in the way these two sets of plaza users tend to react to each other. Stationary people behave as if they clearly recognized each other as "members of the same species" that is participation units with which one can establish a regular and predictable system of behavioural interdependency in terms of spacing and orientation. On the other hand, observations on spacing of mobile people suggest that people who do not share the same postural-locomotory

[6] This conclusion has been anticipated by Canetti who wrote poetically that 'A man stands by himself on a secure and well defined spot, his every gesture asserting his right to keep others at a distance. He stands there like a windmill on an enormous plain, moving expressively; and there is nothing between him and the next mill... So long as they hold fast to their distances, he can never come any nearer to them' (1962:17-18).

behaviour pattern tend to perceive each other as having sufficiently different requirements for the use of a given sub-area of a setting so that they can easily tolerate each other at close, even very close distances.

(ii) The minimal separation distance established between two adjacent stationary F-formations, as well as between an F-formation and a solitary person, appears to be defined at approximately 2 paces (120 cm or 4ft). Such a minimal separation distance is established between two "associated" units. In case of strangers or "un-associated" units the width of the separation zone is doubled. This regularity suggests a possibility that the average breadth of the r-space is approximately 2 paces and that this is the minimally acceptable distance between stationary participation units that is used under most circumstances. An r-space of such width is used differently according to the type of the social relationship between neighbouring units. It may be fully overlapped with an r-space of the adjacent "asociated" unit, or it may be kept separate but adjacent to a zone of a similar width belonging to another unit. A further support to the notion of an r-space being of a well defined size equal to approximately 2 paces comes from observations on behaviour of people who dispose things which are thought by them to be "unfit" for leaving within their transactional segment or their p-space (see Table 31-6). In doing so they behave as if they were tacitly acknowledging that only a relatively narrow belt of space around them fall under their undisputed jurisdiction[7] and that space further away cannot be as freely used for disposal of "wastes" created within a given participation unit.

[7] The notion of jurisdiction or the right of a given person to the temporary yet exclusive control of resources which are not his(her) property has been first suggested by Roos (1968).

(iii) Comparison between separation distances adopted by stationary people in relation to "conspecifics" and physical objects (Tables 20-6, 21-6, 2-8) suggest that the average distance separating two stationary participation units is twice as large (4.2 paces) as the average distance (2.1 paces) relative to artifacts[8]. This finding in the context of an observation made earlier that distances between people who are standing close to objects tend to be smaller than distances between people standing farther away from artifacts seem to suggest two conclusions. First that spacing functions can be equally met either by maintenance of an ample distance between two units, or by placing a physical barrier between them. Secondly, that the hypothesis suggesting the average width of an r-space to be approaximately 2 paces is further reinforced. The reasons why people's placement in relation to objects is interpreted here in terms of the extent of a unit's r-space will be discussed in Chapter 8.

It seems plausible to suggest that a stationary unit generates around itself a region of space which "belongs" to it and as such is respected and avoided by "conspecific" (i.e.stationary) units. This space envelopes not only the bodies of the participants but the two already mentioned zones : the o- and p-spaces as well. In other words a stationary F-formation can be said to occupy an area of physical space, a domain, whose invisible yet clear-cut boundaries extend some distance away from the gathering's p-space and which can significantly influenece spatial behaviour of other conspecific units.

The collected data suggest that the width of an r-space is not unchangeable, yet at the same time it is important to note, that it is not in a state of constant flux. The evidence in our possession shows that

[8] Average distances are computed for people and objects positioned within the range of the first six paces.

there are situations under which spacing established by stationary participation units appears to be dependent on the operation of various factors, while simultaneously being clearly un-related to a number of others.

Factors which have been found to have no or little bearing on the extent of a unit's r-space were the number of participants in a given participation unit, the unit's placement in relation to the traffic lines, the degree of crowding on the part of walking people and finally the type of nearby objects.

The r-space width can also vary to some degree. For instance F-formations engaged in conversational activities tended to be approached by other stationary units less closely than were non-conversational groups. Similarly, larger distances tended to be adopted toward unfamiliar units, toward those comprising of more females than males and toward those which were situated at a farther distance from physical objects. Therefore, it is plausible to assume that the r-space bubble is dynamically organized, one which permits people to modify their inter-unit spacing according to what they do, who they are and what type of social relationship they previously established with outsiders. In other words, while it is true that spaces generated by an interactional event do pattern and organize people's spatial behaviour, it is equally true that they themselves are subject to patterning and re-structuring. For this very reason the view that observed regularities in behaviour in the course of a face-to-face interaction can be studied as artifacts or products of such an encounter, or of characteristics of participants, or of the environmental setting is limited indeed. It seems that the concept of an interactional event as a dialectic, dynamic and multilevel process through which people organize their co-presences and through which they negotiate and re-negotiate ways of accomplishing the objectives of their encounters is a more satisfactory one.

By spacing themselves stationary units maintain their separate identities. In addition, of course, through spacing stationary units keep their own interaction or solitary activity away from the interference of noisy, seductive or simply talkative neighbours. The tendency to reduce visual, acoustic and olfactory interference through spacing doubtless explains why the distance assumed in relation to a target F-formation is practically the same in the case of solitary and multiple-participant participation units. Insofar as a unit is pursuing a separate activity line, no matter how large it is, it will seek to be outside the range of "interaction noise" associated with the presence of an already established gathering.

However, as we shall see later, we have reason to suppose that the establishment of the "buffer zone" of the r-space reflects another process. In Chapter 5 we have already referred to the requirement that participation units be to some degree responsive to what is going on around them, that not only must they preserve themselves as separate units, free of outside interference, but they must also be able to monitor the external surroundings so they can be ready to adapt to it if necessary. It will be suggested later that the maintenance of a separating space between a participation unit and its neighbour may be part of a strategy which serves this monitoring process. By preserving such an "other people free zone", participants create for themselves an area which they can disattend. While more distant events may be attended to and sorted into those which may require adaptive action of some sort well before that action is actually required, the events situated within the outer rim of the unit's spatial domain are declared as "checked before" and thus treated as "safe and of little concern".

Acquainted participation units, it was found, adopted much closer distances. Such units, being associated, are already in interaction with one another, and space is maintained between them only insofar as they wish to maintain their separate identities. Because each is already taking account of the other, there is no need for them to preserve the additional space between them that would facilitate the environment monitoring process unassociated F-formations engage in.

CHAPTER 7

SPATIAL CLAIMS OF AN F-FORMATION

1. INTRODUCTION

While in the previous chapter attention was focusssed on the issue of the r-space as a space which can be delineated through studying the visible behaviour of people external to a given formation, here we shall look at the r-space as being subjectively perceived and claimed by participants of such an F-formation.

The phenomenon of space which is subjectively perceived by an individual and judged by him to be a space which "belongs" to him and which should not be entered or violated by bystanders had been pointed out in Sommer (1959). It was not, however, until the research of Horowitz et al.(1964) that the existence of such a space, as claimed by solitary subjects, was experimentally established and measured. Similar observations were also made by Kinzel (1970), Pedersen and Heaston (1972) and Newman and Pollack (1973) which brought additional data suggesting that people in interaction with each other and with their physical environment tend to set off some portion of the total area and treat it as their own personal preserve to the use of which they have temporarily exclusive and preferential rights. Further, it was also found that attempts on the part of outsiders to physically violate these preserves - frequently led to the "encroached" person's increased anxiety (McBride et al.1965), uneasiness (Evans and Howard 1972), compensatory shifts in posture (Dabbs 1972, Veno 1976), changes in motor behaviour (Coss et al.

1975) as well as an increased feelings of aggresiveness (Kinzel 1970, Dabbs 1971) or simply physical withdrawal (Felipe and Sommer 1966) or flight (Konecni et al.1975). Similarly, in a study by Tart (1974:150) subjects under hypnosis who were given suggestions making them feel that their spatial claim did not extend beyond the boundaries of their skin reported this experience as a very unpleasant one. They claimed to feel pains, a "lack of protection" and generally felt uneasy and off-balance. On the other hand, subjects who were made to think that the space bubble "belonging" to them was increased two or three times its original size reported positive feelings, a relaxation, happiness and sense of proper cushioning from the external environment.

The size of such an egocentric, portable domain, typically referred to as a "personal space bubble", was found to vary not only from one category of persons to another (e.g.Kinzel 1970, Liebman 1970, Lomranz et al.1975), but also from setting to setting (Savinar 1975) and according to the time of the day (Rodgers 1972) or the subject's body temperature (Collet 1973). The great number of observations and experiments on the size and shape of individual "space bubbles" has been recapitulated and reviewed by Lett et al.(1969), Evans and Howard (1973), Evans (1973) and Pederson and Shears (1973).

Despite the number of investigations devoted to the problem of individual space bubbles the phenomenon of group-claimed interaction territories has received surprisingly little attention. Edney and Jordan-Edney (1974) in their study of a number of stationary groups on a public beach found that the amount of space which is perceived by people within such a group is related to the number of people in the gathering (the size of the territory is positively correlated with the size of the gathering), the sex composition of the gathering (males claim larger territories), local density (smaller domains are claimed in more crowded subareas of the beach), and tended to be positively correlated with the length of time spent by a given group in a given location. The study thus demonstrated that the phenomenon of a space which surrounds and "belongs" to a stationary gathering can be clearly perceived by participants of a given group, and that the size of such a domain is not idiosyncratic to an individual group of respondents, but is comparable to that claimed by other groups of similar characteristics.

In what follows we shall examine the results of a similar study attempted among stationary users of a pedestrian setting (Petrie Plaza) who were standing either as solitary participation units or as members of F-formations.

2.R-SPACE FROM THE VIEWPOINT OF F-FORMATION PARTICIPANTS

A.INTERVIEW 1: THE PROCEDURE

It was expected that the question about the size of the spatial domains which people in the participation unit would like to keep free from other stationary users of the plaza would yield meaningful responses. It was also expected that while the existence of such group-claimed territories would be confirmed, the details of the this study might differ quite significantly, for a number of reasons, from the one conducted on the beach by Edney and Jordan-Edney (1974). Firstly, in my study (referred to as "Interview 1") standing people instead of sitting or lying were selected for approach. Secondly, the focus was on individuals interlocked in F-formations, while the Edney and Jordan-Edney investigations referred to people in what was loosely defined as "groups". Finally, it was expected that the differences in the nature of the two settings (pedestrian plaza vs. public beach), time spent by the interviewed people in their location (several seconds vs. several minutes), the nature of their activities (casual social encounters vs. sunbathing and relaxing) could prove to be important factors likely to affect the results.

The data were gathered during a series of structured field interviews with users of the plaza. The interviews were carried out during five consecutive weekdays in the end of September 1975. The weather at the time of the study was sunny. reasonably warm, with a gentle breeze and it was typical of spring weather in Canberra and as such comparable to that prevailing during collection of the "Sample no.2" data (see Chapter 3). The method adopted in this study was a slightly modified version of the procedure used by Edney and Edney-Jordan (1974). The interviews were carried out by a pair of investigators (the author and Mrs Lynn Elzinga-Henry whose invaluable help is here greatfully acknowledged) who approached a number of stationary (standing) groups of people within the boundaries of the study area. All groups had been stationary (not walking, not rearranging, not drifting) for at least 30 seconds prior to the beginning of the interview.

These groups in addition had to meet the following criteria: (a) It was placed at least 10 paces away from any shop entrances and street corners, that is, away from places which are traditionally crowded with walking people, who could influence or interfere with the interview. (b) The group to be selected had to be a free-standing one, that is, positioned at least 6 paces away from objects (trees, walls, lamp-standards etc) furnishing the plaza. (c) The group had to be at least 10 paces away from other people seated on a bench, (d) A group should appear to be engaged in a casual, social-type conversation and people in the gathering should not be laughing loudly, crying, arguing, kissing, greeting or saying good-bye to each other. In other words, the gatherings in which people were intensively engrossed in interaction were not selected for my sample. (e) The next requirement was that the people to be interviewed should be all Caucasians who spoke fluent English. Therefore people whose command of the language was defficient and who obviously were of other than white race were not interviewed. (f) The final requirement was that no group with a person or persons who happened to be interviewed on earlier occasions was approached by our team.

The interviews were initiated by Mrs Elzinga-Henry, who as an attractive young woman and as a native speaker of English was thought to be naturally suited to the role of principal interviewer. The author normally stood two paces behind her and talked with the subjects only in the second (that is, measurement) stage of each interview.

To open each interview, the investigators would introduce themselves as undergraduate students of sociology from the local university, writing a term paper on people's perception of pedestrian areas[1]. The people approached were asked if they could answer a few questions about the plaza. When the members of the group agreed, the principal interviewer asked them whether they lived in Canberra; and how often, approximately, they came to the Civic shopping center, how they liked the design of the place. Finally, they were asked whether they thought the place was, at the moment of the interview, very crowded. These questions were designed to prepare the respondents for the next (measurement) part of the interview and were not meant to be subjected to any systematic analysis. However, they enabled the author to take notes on the group size and sex composition, and to note down the placement of the target gathering in relation to other stationary people present in the area.

Next the principal interviewer mentioned to the respondents that when people come to an open public space, like the one where the gathering was situated, they often think an area surrounding them to be "their own" and that such an area should be free of other stationary users of the plaza. To get an idea of the size of this space the interviewer said that her assistant (the author) would start to walk slowly backward from the group,

[1] It was assumed that such an introduction was more likely to put the subjects at ease than a more accurate statement that the study was being conducted by an anthropologist collecting field data for his Ph.D dissertation.

and its members were asked to indicate the point at which they thought the assistant was stepping out of the space "belonging" to them.

The author then proceeded with the experiment, first walking backward from the gathering in the direction its members were facing, then again at a right angle from the first direction, away from the gathering, to one of its sides. At the time of the procedure the author was oriented directly toward the gathering with his head turned slightly away in order to avoid eye contact with the interviewed people. Meanwhile the principal interviewer measured with a tape-measure the distance between the point between the feet of the experimenter at the spot where he was told to stop, and the center of the gathering (or in case of solitary people interviewed, to the point between their feet). Since on some occasions the people in the target group would argue among themselves about the radius of the space claimed and an additional third or even fourth measurement would be taken, all collected responses (unlike in the Edney and Edney-Jordan study) were not averaged for a group but treated as separately recorded measurements. In this way a total of 101 inteviews yielded 210 measures of the radii of "other-people free territories".

After an interview was completed, the experimenters thanked the group and retreated some distance away to complete notes on the interview and to observe, inconspicuously, the subsequent behaviour of the gathering just studied.

The study provided information on the size of space claimed by one-, two-, three-, four- and five-person groups of varying sex composition. Thus the sample consisted of data on 24 solitary persons (12 M+F), 36 two-person gatherings (12 MM, 12 FM, 12 FF), 24 three-person groups (6x3M, 6x3F, 7x2M+F, 7x2F+M), 13 four-person groups (2 x male dominated gatherings, 5 x female dominated gathering, 6 x sex-balanced group) and 4 all-male, five-person gatherings.

B.GENERAL OBSERVATIONS ON PEOPLE'S SPATIAL CLAIMS

Before discussing the findings on the size of the measured subjective territories it is important for us to look briefly at some systematic observations which were made in the course of the interviews. These observations were made on: (i) the impact of the interview on the subsequent duration of a given stationary unit, (ii) the interaction between interviewers and the interviewed participation units, (iii) people's perception of crowding in the study setting, (iv) people's notion of a spatial domain which should be free of other people, (v) differences in the extent of spatial claims made by participants of the same stationary group, (vi) the effect of a unit's spatial orientation on the extent of spatial claims, (vii) the extent of spatial claims as related to a unit's behaviour, (viii) the extent of spatial claims as related to outsiders' behaviour, (ix and x) the issue of invasions into a stationary unit's o-space and r-space, (xi) people's subjective feelings associated with inappropriate spacing and orientation, (xii) observed spacing of outsiders maintained in relation to the interviewed unit.

A final observation, one on (xiii) the use of environment features and cues as aids in determining the extent of a claimed spatial domain, will be discussed in the next chapter. In what follows we shall report the regularities observed in people's spatial behaviour and in the statements they made.

<u>(i) The impact of the interview on the subsequent behaviour of the participation unit.</u>

First, it should be noted that a total number of 118 solitary individuals and F-formations were interviewed. Of this number 17 (14% of the total number of approached participation units) refused to participate in the interview[2]. Furthermore, it was noticed that upon the completion of the interview, out of 101 cases 19 groups left immediately not only their location but the plaza area as well; 6 groups changed their location (but stayed within the plaza boundaries)[3], and in two cases people in F-formations initiated farewell procedures which in the following moment or so led to the dispersal of the participants. In other words, our interview, however tactfully negotiated, caused 14% of the participation units approached to explicity avoid any face-engagement with strangers, and among those who agreed on such engagement, and even showed signs of amusement and co-operation, 27% of them (nearly every third interviewed unit) upon our departure felt sufficiently disrupted in their original activity as to abandon the initial location in the matter of seconds.

[2]People who refused said that: (a) they did not feel like answering any questions, or (b) they did not have time for any conversations, or (c) they were waiting for somebody to come and they did not want to engage in interaction with other people during the absence of this other person, or (d) they were too upset to talk to anybody (as was the case with a women who was accidentaly separated from her husband and could not find him in the crowd).

[3] For example, a man who claimed for himself a domain of 2 pace radius upon completion of the interview separated from the experimentors, walked away some 6 paces and reassumed waiting for the person he was originally waiting for.

(ii) The interviewer - interviewee interaction

It was observed that the approach and request for an interview displayed a number of reccuring regularities. Firstly, it was seen that the approach of Mrs Elzinga-Henry (who, incidentelly, was not aware that her behaviour relative to the interviewed people was also closely observed by the author) was not made from any direction but always was made from that side of a person or an F-formation which was most easily accessible to an outsider. This means that a solitary stranger was most typically approached frontally or at most at a 45 degree angle measured from the medium body plane. Similarly, the F-formations type "V", "L", "C" or "I" were approached from the opening side and never from the closed side. When a clear cut opening in an F-formation did not exist (e.g, in a three- or four-person participation units), the approach was made from the side where the gap between two adjacent participants was widest. Furthermore, it could be seen that in a situation where an N- or H-shaped F-formation screened one of its openings with a limb or a nearby object (tree, dust bin, lamp standard), or a shopping bag or a parcel placed on the pavement, the "blocked" gap between participants was not used as an approach side[4].

The other regularity observed was that any movement of the experimenters toward the stationary participation unit seemed to be perceived[5] by people in the gathering quite early, at a distance of 9 to

[4] This observation is in line with those of Scheflen who wrote that 'The boundaries of small territories are sometimes marked by postural behaviour - an arm or a foot will be blaced there. Sometimes the boundaries are marked temporarily by the placement of possesions or props... The people who own a turf will defend the boundary against some outsiders or some kinds of invasion. They will block access with their bodies or extremities for instance' (1971:431).

[5] The ability to notice in time the approach of the experimenters seemed to be related to the size of a target participation unit. Larger gatherings, ones with three, four or more participants tended to spot our approach at farther range and were less likely to be approached without them seenig it than it was the case with a solitary individuals or dyadic gatherings.

7 paces. At this range people would (a) catch the gaze of the approaching person, (b) look away, (c) look in the the region of eyes once more when the outsider was some 2 to 1 paces away from the gathering, (d) look away from the approacher once again, and (e) clearly avoid eye contact with the approaching person, until he or she announced himself (herself) to the participation unit in question.

This announcement had to be made in standardized fashion: (a) the approaching person had to be very close to the approached unit - that is no further than 1 pace away, (b) be fully oriented toward the centre of the gathering and (c) clearly and loudly verbally greet people in the F-formation. A failure to do this seemed to cause people in the approached group to ignore the interviewer's presence by avoiding eye contact and by not reacting to the uttered words of greetings. This behaviour would seem to suggest that a stationary participation unit which was unexpectedly approached by an unfamiliar individual or individuals tended to behave in a fashion which initially signalled to the approaching person that he or she is noticed and taken account of, and next ignored, as if in the hope that the approach was made accidentally and that the intruder will leave the immediate presence of the gathering.

It was also noticed that it usually took two or more verbal exchanges (a - b;a - b;a - ...) before people in a given participation unit responded posturally and spatially to Mrs Elzinga-Henry's presence by accomodating themselves so that she was given easier access to their transactional segment or o-space. People who refused to give the interview tended not to re-arrange themselves in relation to Mrs Elzinga-Henry's placement, and carried out all exchanges while talking out of their transactional segments (to the side or over their shoulder). On the other hand, persons who eventually took part in the interviews tended to give their consent to it first and than only to readjust their spacing and orientation relative to the placement of the interviewer.

The other regularity observed was that not all people in a given unit engaged in verbal interaction with the experimenters. Usually a "spokesperson" emerged who answered questions on behalf of the unit and whose comments and views were augmented and clarified by the others. The "spokesperson" tended to be either (a) the one who first established eye contact at the distance 9-7 paces with the approaching eperimenters, or (b) the person who was standing most directly (vis-a-vis) to the interviewer, or (c) the one who was originally first to be addressed by the interviewer. It was observed that the interviewer herself also displayed certain preferences with whom she was going to exchange the first bout of conversation. She tended to direct her words to the person who (a) was the tallest[6] in the gathering (probably because of the ease of establishing eye-contact during the time the interviewer was still outside of the p-space), or (b) the person who was looking most mature and "in command of the event", or (c) in the case of mixed-sex gatherings, the person who was the most mature looking male. These patterns in the selection and self-selection of the "spokesperson" would suggest that in the case of a multiperson participation unit situated in public spaces there tends to be a "dominant person" who not only appears to assume some responsibility for monitoring the unit's environment, but who is also

[6] It seems to be useful to cite here some of the observations of a perceptive psychotherapist: 'People who are tall feel as if they are above the group and see a dimension that others do not see, that is, the group circular shape from above. They also feel more separate from the group, indicating that the point of reference resides in the head and not in the feet. When these people are asked to bend their knees so that their heads are the same level as the majority of the group they may either feel more secure and more part of the group or feel as if they have lost power and are now like everyone else' (Pesso 1969:117).

recognised as such by the outsiders. This "controller" appears to be a person of relatively "higher" status, due to age (and associated experience) or due to body build.

(iii) Perception of crowdedness of the study setting

The initial parts of the interview, as it was already mentioned, were dealing with such questions as the quality of design of Petrie Plaza and the perceived crowdedness of the setting. It was a general opinion of the interviewed people that the plaza, at the time of interview, was "empty" or one which was not especially densly packed with people. Some respondents stated that a crowded place is "when it is noisy" or when "while walking you see a new person every two seconds", or when stationary groups of people are positioned 10 - 5 feet apart (5 - 2.5 paces). None of these situations was judged to be true of Petrie Plaza. On the whole, people maintained that they do not like crowded places though on some occassions its all right to be standing in the crowd of others and this is acceptable to them as long as people "do not touch each other". Some of the respondents volunteered a view that if the plaza was really crowded they would not go there at all. Interestingly, estimations of the degree of crowding of the setting at the time of interview tended to be made on the basis of spacing between stationary groups of people which were easily visible to the people in the interviewed unit. This means that the judgment whether the place is or is not crowded was formed by observing those standing in front and to the sides of the person who was making the judgements. At the same time people situated outside of the respondent's 180 degree of field of vision were not, usually, taken into account. In other words, the concept of crowdedness was applied not to the setting as a whole, but to portions which for one reason or the other were within the scope of given person's interest and attention.

(iv) The general notion of spatial domain free of other people

In the course of interviews it was established that people did, in fact, have a definite concept of a space which "belongs" to them and which should not be entered by strangers. A good example is provided here by a solitary woman who stated with deep conviction that when one is on a street or in similar public setting "it is good to have some distance between you and the other people" (especially, if the others are strange males). The extent of such separation distance was reported to range from "swinging arms' distance" to all space within "earshot" of a given set of people. As far as the latter criterion is concerned it was frequently observed that the "appropriate spacing" between one set of people and another should prevent the outsiders not so much from hearing that some conversation is under way, but rather from discerning words[7]. As it was suggested by a participant of a two-person F-formation: "a bystander should be placed far enough not to understand what we are talking about". These responses suggest that noisy and by definition - crowded places such as shopping malls or football stadiums are the places where strangers can be tolerated at much closer range because "when it is noisy you do not mind other people around you because everybody pays attention to his own business". It can also be suggested that an "appropriate" earshot distance depends very much on the way people use their voices. For

[7] Ergonomic research suggests that 'one of the most botheresome sounds in offices, particularly in private offices, is the presence of speech that intrudes through the walls from adjacent rooms' (Kryter 1970:342). It was found that when such speech is present, the occupants feel annoyed because they have good reason to believe that the privacy of their own utterances is lacking. Thus, 'it is the degree to which the intruding speech can be understood, rather than its intensity level or loudness, that destroys the feeling of office privacy' (1970:342). The need for a sense of control over the number of people actively and passively participating in a given conversational exchange provides an interesting situation where the introduction of some speech-content masking noise (sometimes known as "accoustic perfume") increases the users' satisfaction about given location or interaction domain.

example, a man of Austrian origin who was interviewed in a a five-person F-formation, commented that he just came back from Germany and that people in Munchen talked to each other very loudly (by comparison with Austrian and Australian standards) and that from one conversational gathering he could still hear the conversations of people standing some 25 or more feet away.

(v) The non-unanimity of spatial claims

Members of participation units held different opinions with regard to the amount of space which "belongs" to the gathering in question. As already observed, there tended to be one person who usually expressed views on behalf of other people in the gathering. While in several cases the spatial claims made by such a person were approved, or at least not disputed by the others, there were also occasions where more than one view or claim was offered to the experimenters. These claims could be of roughly similar magnitude, or could substantially differ from each other. For instance in a two person, all female F-formation one of the participants suggested that the radius of the group claimed territory should be approximately 6ft (3 paces), while the other woman said "I, personally, would not mind if it were closer". However, in another two-person F-formation a woman said that the radius of a space where other people should not be standing was 287 cm (4.4 paces), while the other woman insisted that a radius of 247 cm (3.8 paces) would be, from her point of view, a more suitable one. The most extreme discrepancy between the spatial claims people were making was found in a three-person F-formation in which one of the men suggested that the radius should be set at 450 cm (6.9 paces) while the remaining two men thought about a domain of a radius of only 182 cm (2.8 paces). The differences in responses suggested that in all subsequent analysis of the collected measurements the individual claims should be taken as the raw data instead of assessing a value of "average" radius of a domain claimed by a given participation unit.

(vi) The irregularity in the shape of the claimed domain

It was observed that the people interviewed frequently maintained that thay require more space "free of strangers" in front of them then they do to the sides or to the back[8]. These results suggest that while a spatial domain claimed by a stationary participation unit may, in general, be treated as circular in shape, the unit itself tends to be positioned not in the very centre of such a circle but approximately one third of the way toward the perimeter of the domain. Also, it appears, while the overall extent of the claimed space remains more or less constant, its relationship with the external environment changes with avery shift in people's orientation. In other words, the domain is not rigidly anchored within the environment, but pulsates and changes accordingly to the direction people in the participation unit are facing. It also appears that F-formations with most stable shape of spatial domains are these in which people are symetrically arranged around the o-space. On the other hand, the F-formations in which people are clustered on one side of the o-space and thus create an opening in the ring of the p-space are characterized by less stabilized shape of their

[8] For example, people in a three-person, "LLH" shaped F-formation told the interviewer that they thought an appropriate radius of their spatial domain was 190 cm (2.9 paces) measured from the centre of the o-space to the front of the gathering, and 165 cm (2.5 paces) measured to the back. They also said, as an explanation for this difference : "we would not notice you over there" (that is behind our backs). Even more obvious differences in spatial requirements as affected by the direction toward which the domain is stretching are documented in the claims made by three two-person, L-shaped, F-formations. Their radii claimed toward the front vs. back of their formations were as follows : (a) 228 cm (3.5 paces) vs. 155 cm (2.4paces) (b) 216 cm (3.3 paces) vs. 145 cm (2.2 paces), and finally (c) 310 cm (4.8 paces) vs. 200 cm (3.1 paces).

spatial domain.

(vii) The extent of the spatial claim as a function of unit's behaviour

The amount of space which is claimed by stationary people seems to depend on two aspects of interaction within a unit which makes such a claim. The first of these aspects is the topic of people's conversation. The second is the loudness of their verbal exchange. It has been suggested to the investigators that topics which are associated with the need for a larger "space cushion" enveloping that gathering are "politics, sex, religion, parents or personal problems in general". The more neutral and less self-disclosing topics such as "uni life" (i.e. University life) "holidays", "cricket", "cars" are reported to be associated with smaller spatial claims. It has been also suggested that the louder people interact verbally one with another, the more space around themselves they will claim. For example, when participants of a two-person all male F-formation were asked how much of the space around them they thought "belonged" to them, they refused to answer in general terms and insisted that first it must be specified what they are talking about; secondly, they said that the radius of the domain "depends (on) how loud we are going to talk". It was also established that interactions in which verbal exchange is of secondary importance (e.g. when people are studing a poster, or waiting for someone to arrive) the amount of space claimed is smaller than in case of interactions established for the purpose of carrying out a conversation.

Furthermore, an impression was also gained that the loudness of verbal exchange and the intimacy of the topic are (to some extent) inversely correlated. When people use higher voice registers they are rather unlikely to talk about highly personal matters, and thus a claim on the space surrounding them made with the aid of the voice loudness is compensated by the fact that strangers can be tolerated at closer distances since the loud conversation is not intimate in nature. Finally, it was suggested to the experimentors that a typical mechanism for coping with the presence of outsiders is to change the topic of the conversation, speak in softer voice[9], orient themselves away from the "intruder" or to introduce all these tactics in various combinations. The ultimate defense, however, when the outsider is too inquisitive and where the modifications in the target group behaviour do not seem to be satisfactory, is to walk away.

(viii) The extent of the spatial claim as a function of outsiders' behaviour

The interviews suggested also that the amount of space claimed by a given participation unit depends heavily on the appearance and behaviour of the person in the vicinity of a gathering in question. The characteristics of the outsiders which were reported to be influencial were (a) the outsider's identity, (b) his type of movement, (c) his spatial orientation relative to the target group, (d) direction of his gaze, (e) the activity he is currently engaged in. Thus, it was suggested to the interviewers that on average, casual looking people are tolerated at much smaller range than people who have something "unusual" about their appearance, clothes, style of walking, management of face and so on. It was also suggested to the interviewers that a person who is

[9] Compare an instantaneously hushed conversation upon the approach of an outsider: 'They had been speaking very softly, and now Hooper lowered his voice to a whisper."I don't mean tall. Is he...you know...big?"... They heard footsteps and turned to see the waitress approaching their table. "Is everything all right?" she said. "Fine", Hooper said curtly, "Everything's fine." The waitress left. Eleen whispered, "Do you think she heard?" Hooper leaned forward. "Not a chance"... [and a moment later] The waitress was approaching the table [again], so they sat back and stopped talking.' (Benchley 1975:157,160).

"profesionally" an unobtrusive one (e.g. a nun or a news-vendor) can be standing much closer to the participation unit than a person who is an authority figure representing some institutionalized power (e.g. traffic inspector, policeman)[10].

Next it was found that a walking person can be tolerated at much closer range than stationary people. In fact, walking people may pass as close as they want and it is, in the words of one of the respondents, "O.K.as long as they do not touch". Further, it was suggested, that if a passerby passes by at fairly close range without a prior change in the direction of his walking line the situation is acceptable to the stationary people. It was pointed out, however, that when a person appears to deliberately steer his line of walking so that he can pass closely to a given participation unit such behaviour was, in the eyes of the interviewed people, regarded as very annoying and provocative.

The next regularity to emerge from the interviews was an agreement between respondents that a person who is oriented away from the gathering is arousing less concern than a person standing at similar distance but facing toward the gathering or individual in question. For instance, people in a three-person F-formation said "when someone is standing with his side or back turned on us, he can be standing a little bit closer". A similar view was expressed by a woman when asked about an appropriate distance between the four-person F-formation in which she was standing and a nearby stranger. She told the interviewers that such a person "should be at least 3 ft away", and while saying these words she stepped outside of the formation's p-space and assumed a side-orientation relative to the

[10] A good example for this point is provided by a man in a three-person F-formation who explained that the distance between a group and another individual depends on who the other person is, and jokingly added : "if it were a policeman, he should stay up there, at the car-park" (approx. 200 meters away).

rest of the gathering. Finally, a similar idea is conveyed by people standing in a dyadic F-formation who said that "when people are standing back to your back you do not mind them nearby at all"[11].

The direction of the outsider's gaze was also thought to be of great importance. Not surprisingly a person who was looking toward the participation unit was judged to be more obtrusive, and hence, standing too close, than the one placed at similar distance but visually not attending the gathering or person in question. For instance, a three-person group commented that on the whole they do not mind people standing nearby, but, they added quickly that "if somebody is looking to the middle of our gathering that would be different", implying that such behaviour causes them to feel uneasy.

Another regularity found in people's comments and answers was that under most circumstances, if a stranger is some 2-6 paces away the fact that he is not looking toward the gathering is not, really, enough. It was said that a person who stops so close to another person or group, should be engaged in some clear-cut and legitimate activity which can explain "why" the outsider has to be standing in a particular place[12]. It was also said that a satisfactory distance between strangers in public depends on people's behaviour. "It depends on his actions, what he is doing" said participants of a three-person gathering referring to the

[11] It is important to note here that these observations on the relationship between orientation and closeness to the target gathering seem to fit directly with the results of the data analysis (Table 17-6) carried out in Chapter 6).

[12] This is not an unexpected conclusion. For instance, on the basis of our earlier field-work experiences it was suggested that 'The observer should behave in a most natural and casual way whenever he is doing his studies. His presence in the place of observation should be justified by his actions and appearance ... Reading newspapers, looking at the shop-windows ... or just apple-eating provide [the required] innocent appearance and sufficient explanation for others in such a place' (Ciolek 1974:11).

preferred spacing between them and a nearby stationary person. Another group of three said of the outsider that when "he is looking at the window and not at us he may stay closer", that is, closer than the suggested distance of 228 cm (3.5 paces)[13]. However, it was also thought, that such close stopovers should not last too long, no longer, let us say than 15 - 20 seconds.

(ix) The issue of the invasion of the o-space

During the interviews it happened a few times that the issue of the violations of the o-space would be mentioned either by the interviewers or by people in an interviewed participation unit. It was established that respondents were able to recall several instances of their o-space being violated by a passerby. This tended to happen, especially often, in indoor settings such as corridors, staircases or doors of the rooms. Interestingly, the intrusions into an interactional space by some third person in these circumstances did not arise any serious feelings of annoyance nor any special objections. It was generally thought that once an interactional cluster is established in a place which is relatively narrow and which is commonly used by others as a traffic line a stationary gathering should be prepared for being intruded upon and interrupted by the co-users of a given setting. This was the case especially if the interactional gathering was forming an obstacle to a free flow of people. However, an entirely different set of comments was given when talking

[13] The need for an outsider to be engaged in some specific task was also expressed in the words of people in a two-person F-formation who maintained that strangers should not be stopping closer than 4 - 5 paces away from their group. When, however, it was pointed out to them that just a moment ago an outsider had stopped quite close to them, approx. 2.5 paces away and they did not overtly react to his presence, they responded "Oh, that man ? He was all right, he was reading a poster on the noticeboard. He was all right there..." In other words, only "unjustified" stopovers at a close range seem to be alarming to people inpublic.

about encroachments on the o-space of a gathering situated in an outdoor, public place. First, it was noted that the probability that someone may walk through the space between interacting individuals was very low. Secondly, an act of such "spatial violation" was judged to be offensive and rude, "because (note the tautology in the explanation) it shows the lack of respect". Thirdly, it was suggested to the observers, that such an act can be regarded as a deliberate provocation which can sometimes cause a violent reaction[14].

(x) The issue of invasions of the r-space

Inappropriate spacing and orientation adopted in relation to a stationary participation unit are treated in more moderate fashion. It was suggested to the interviewers that in fact a stranger who is standing too close to someone else cannot be easily challenged or asked to move away, as the "crowded in" participation unit does not have sufficient grounds for pointing out to the intruder that he is breaking some tacit norm. It is generally understood that a public place is one to which everybody has access and that unless a participation unit uses some well defined section of it, such as a bench or drinking fountain, no one can easily maintain the space surrounding him exclusively for himself. If a passerby stops too close the approached group responds rather in a low-key fashion or simply walks away[15]. Thus it appears that an overt challenge

[14] As one of the students interviewed at Petrie Plaza said, if a person would do it to him while he is talking to somebody he "would kick him (the intruder) in the balls for it". Perhaps, this claim is exaggerated, nevertheless, it can be used as an indication of how seriously a violation of somebody's o-space can be treated.

[15] This is illustrated by the folowing example. When asked what would he do if someone stopped too close to his gathering a man answered "I would look at him (the intruder) and say 'hullo'". In explanation he said that if this did not work, and the other person did not get the hint that his presence was unwelcome, the simplest thing is to move one's own gathering.

arises only when the outsider seems to deliberately maintain inappropriate spacing or follows the unit which walks away in order to avoid his obtrusive presence. Only in such situations can a person be told off or ordered to "mind his own business".

(xi) Subjective feelings associated with inappropriate spacing and orientations

If, for some reason, a stranger approaches a stationary participation unit closer than "is justified" under given circumstances and in a given setting, people are likely to have some feelings of annoyance, uneasiness or concern[16]. However, these feelings are usually vague and difficult to verbalize. Typical comments, for example, were "if someone is too close I start feeling somehow funny"[17], or "I would feel embarassed if a stranger stopped too close to me" or, "when this happens, I start to feel uncomfortable". In all these cases the respondents were unable to specify what such "discomfort" or "feeling funny" means, neither were they able to explain why such uneasines and concern should arise. It was possible, nevertheless, to obtain at least a partial explanation through analysis of people's other comments on the ways people should and should

[16] Compare, for example, the findings of laboratory experiments cited in the introductory section of this chapter.

[17] It might be interesting to look here at an example drawn from fiction: 'Cranley experienced various changes concerning his diameter and exterior form ... both were ... [alterable] in a way he found alarmingly perplexing ... New clothes increased one's radius, a snowfall made one smaller ... As a rule, static bubbles were patently circumvented [by other bubbles], contact might be made at certain points, but they easily broke free again ... However, [the bubbles in a crowded place] were literally joining up with one another in the most inconciveable fashion ... they were not round but flattened out each other in geometric forms. It may have looked pretty from the outside. Inside however it was not only unpleasant but also exhausting because now it was essential to maintain pressure from within, if one did not want to loose one or several sides to the adjoining bubble. It seemed that in the twinkling of an eye one could be turned into a distorted cube or a strangely angled rhomboid' (Enzensberger 1972:65-67).

not behave in public places. It appears that in places where there is a lot of stationary gatherings close to each other the difficulty in management of one's own interaction line arises from the fact that one is "having people all around listening to what you are saying" as well from the fact that one is forced to "listen to the things the other people are saying"[18]. This suggests that the stress arises from the fact that one is unable to have control over the range of recipients of a given utterance, and from the fact that one is flooded or overloaded with information which is not related to the interaction conducted within a given an o-space. The other reason for psychological discomfort may be the fear of assault, embarassment or unsolicited sexual (homosexual) advances[19].

(xii) Observed spacing of stationary participation units

Finally, it was observed that in several cases the interviewed participation units were positioned in the vicinity of other stationary people, either solo or in F-formations. The separation distances these strangers adopted in relation to the interviewed unit are shown in Table 1-7. There one can see that the distance separating the target (interviewed) unit and the nearby people was always larger than 2 paces and, on average, was of similar magnitude as those seen during

[18] It may be useful, perhaps, to recall here the observations already discussed in subsection (iv) of this chapter.

[19] The latter point is apparent in an answer given to the interviewer by a slightly drunk teenager, standing in a four-person F-formation. First he gave his assurance that he never minds people standing near his interactional cluster or near him, and that he is never worried how close other people are standing. Then, in order to make the point of his lack of concern, he covered his buttocks with both palms and stated "you can stand as close as you wish, I am not afraid any longer (Sic)". It seems, that this behaviour could be treated as a typical freudian "slip of a hand".

"Observation no 5", Tables 13-6 and 14-6. In eight cases an interviewed group was in the company of, simultaneously, an F-formation and a solitary person standing within a distance of less than 12 paces. The average separation distances (N=8) in such a situation were 4.0 and 5.9 paces respectively. What is more, it was also noted that the spacing between these two subject units was more or less of the same magnitude as their spacing toward the target group. It looked as if stationary plaza users tended to maintain an approximately equal distances from each other.

C. ANALYSIS OF THE MEASUREMENT DATA

The analysis of the measurements gathered on the size of the radii of subjective territories claimed by stationary people yielded two basic results. These are presented in Tables 2-7 through 5-7.

First (Table 2-7) it can be seen that the size of a domain claimed by stationary people as a space which should be free from other plaza users and which was thought to be under their exclusive jurisdiction (cf.Roos 1968) tended to vary with the size of the participation unit. Thus, solitary people had territory of approx 153 cm (2.5 pace) in radius, dyadic F-formations claimed a radius of 200 cm (3.3 pace), three-person F-formations required a space with a radius of 240 cm (4.0 paces), while quartets and quintets claimed domains with radii equal to 187 and 215 cm (3.1 and 3.6 paces) respectively. Generally speaking, therefore, larger groups claimed more space. This relationship between group size and territory size was found to be statistically significant (Table 3-7). Solitary people tended to claim larger (180 cm+) (more than 3 paces) spaces less often than was expected by chance alone, while duets and trios claimed larger territories significantly more often.

The association between the radius of the subjective territory and the group size was additionally confirmed by the Pearson correlation coefficient, a weak one, but nevertheless significant (r = +.28, p less Ø.ØØ2). The reason for the weak correlation between the two variables was that three-person groups appeared to claim territories larger than did stationary quartets and quintets. This finding is in direct contrast to data obtained by Edney and Jordan-Edney, who established that in the case of people on a beach, trios claimed less space than other participation units[2Ø]. Further, data gathered among plaza users did not suggest that the local changes in users' density seemed to significantly affect the extent of people's spatial claims. The Pearson correlation coefficient between the inter-group distance (target vs. subject participation unit) and the size of the subjective territory was found to be r= -.Ø6, and was not statistically significant (p more than Ø.Ø5).

A finding in agreement with the observations of Edney and Jordan-Edney, was that though the space claimed by people in a participation unit tended to grow with the size of that unit, the amount of space per person was actually decreasing. For instance, a solitary person was found to claim, on average, a domain of 19.8 square paces in area, people in duets had 17.1 square paces per individual while the space per person in trios was 16.7 square paces. In quartets this space was equal to 7.5 square paces and people in quintets had approximately 7.4 square paces per person. It can be seen, therefore, that people in dyadic and triadic F-formations seem to conjoin their individual domains, while people in quartets and quintets appear to overlap and share their individually claimed domains, probably in order to diminish interpersonal

[2Ø] Among people on a beach the radii of stationary groups were as follows : solos=272 cm (4.5 p); duets=257 cm (4.3 p); trios=215 cm (3.6 p); quartets=3Ø6 cm (5.1 p); quintets=288 cm (4.8 p).

distances.

The next two Tables (4-7 and 5-7) show that the amount of space claimed by people is significantly affected by the sex-composition of a given participation unit. Thus, unlike in the study reported by Edney and Jordan-Edney all-male and male-dominated units claimed smaller domains than all-female or female-dominated groups. Thus, the average domain claimed by a solitary male was 2.3 paces in radius, while for solitary females the value was 2.8 paces. As far as the duets were concerned, the sex-balanced F-formations had domains with an average radius of 2.9 paces, the male dominated formations claimed territories of 3.1 paces in radius, while the female dominated formations claimed radii equal to 3.9 paces. Similar sex-linked differences were also displayed in larger participation units.

3.DISCUSSION OF THE RESULTS

The results of the observations and measurements can be recapitulated as follows:

1. People engaged in solitary and group activities make claims to the exclusive use of some portion of a physical space and this claim is larger than just the combined area of the interactional arena (or their transactional segment) and the space occupied by their bodies. In other words, people when asked, are able to indicate the amount of space they think "belongs" to them and this space corresponds roughly to the combined area of the three zones generated by an F-formation system, namely o-, p- and r-spaces.

2. The extent of this spatial claim is not fixed or rigid. Its size seems to depend on the type of interaction people conduct, degree of crowding in the setting, behaviour of outsiders' as well as on such characteristics of one's own participation unit as its size and sex-composition.

3. While the o- and p-spaces are thought, under normal circumstances, to be inaccessible to outsiders and while the use of them is an exclusive right of a participant of a given stationary unit, the status of the r-space belt is slightly different. It is a space which is thought to be a part of one's domain, but one which can be penetrated temporarily by other people. Usually, the right to a brief and unobtrusive use of a space "belonging" to a stationary unit is enjoyed by mobile people

only. Stationary person's presence within one's r-space requires justification in terms of the explicit and socially aceptable reason for the ingress into someone's domain must be mediated by the outsider's "unobtrusive" appearance, "tactful" gaze management and "undistracting" activity. If these conditions are not met the claimants to a given domain tend to feel stressed and uneasy and they tend to reastablish a domain free from outsiders by moving away from the intruder.

4. The width of the r-space zone depends on the direction of spatial orientation of a stationary participation unit. This zone tends to be narrower immediately behind people's backs and wider in the direction toward which the participation unit is facing.

5. Participants of stationary F-formations though engaged in focussed interaction are not oblivious or indifferent to the world surrounding them. They clearly perceive movement of people within a certain distance from their gathering and assess people's behaviour in terms of spacing adopted, the direction of their movement, and their orientation and appearance.

We may begin by noting that the results of "Interview no 1" supplement and reinforce conclusions drawn on the basis of behavioural observations reported in Chapter 6. Thus, it can be seen that the interview data confirm (i) the notion of an r-space enveloping stationary participation units, (ii) the observation that mobile people (as long as they do not collide with those standing) are not of great concern to people engaged in stationary activities, (iii) that members of F-formations expect others to keep their distance, and if they are close to them to orient away from them, finally they suggest that (iv) the size of a spatial domain and thus the width of the r-space are not merely a correlate of personal and interpersonal characteristics of people in a given participation unit, but are dynamically related to a number of factors, among which type of people's activity, outsiders' behaviour and type of setting seem to be of significance.

This is an important finding. It must be stressed here that the interview results tell us what people expect to find in a public place and tell us how they think a face-to-face unfocussed interaction between people unfamiliar to each other should be conducted. At the same time, behavioural observations reported in Chapter 6 tell us what people actually do in outdoor pedestrian settings and show that the parallels between these two sets of results are really striking.

Therefore, one can see that the way people establish spatial-orientational relationships with one another, actually occurs at two levels simultaneously; namely, people share expectations about their mutual conduct in public and they share responsibilities for the process of negotiating the spatial form of their co-presence. It is not only the case that we co-operate with strangers in distributing ourselves, in orienting our bodies and maintaining aliveness to the events external to our line of activity, but also that we share the same set of ideas or norms about what is appropriate and needed for the smooth management of our unfocussed face-to-face interaction. Simply, we do not start fitting our behaviour ad hoc to that of a passerby or a bystander, and he is not adjusting his behaviour ad hoc to our reaction to his presence, but we negotiate concurrent usages of the space according to a commonly adopted programme, each of us knowing all the time what is the current situation and what is the desired "end product" of our interaction. This suggests, in turn, that mutual monitoring of behaviours and actions functions not so much as an aid in planning the next step in the interpersonal exchange, but rather as means for informing the interacting parties that so far the ongoing event has developed in a "normal" and "proper" way - that is, exactly in the manner that was expected by them.

The second issue we will now discuss is the relationship between our findings and those of Edney and Jordan-Edney (1974). It will be recalled that in several respects our procedure in "Interview 1" observations was modelled on that of Edneys'. It is interesting to compare our findings with theirs. As we shall see certain differences emerge. Those differences suggest something about how space use may differ according to the setting and use of a setting.

(a) Spatial domains claimed on beaches (in Edney and Jordan-Edney observations) are larger than those claimed on Petrie Plaza;

(b) In both cases there is a sex-linked difference in the amount of space claimed by stationary people;

(c) On the beach smaller domains were claimed by females, while on Petrie Plaza smaller domains were characteristic of males.

As far as the first observation is concerned, it is obvious that the reasons for which stationary participation units were established in these two different settings, as well as the manner they did it are quite dissimilar. People go to a beach because they want to relax, sunbathe, listen to a radio or play cards. Moreover, since they adopt sitting or lying postures, they not only engage in activities which demand larger space-cushions around a given set of participants but also physically they tend to occupy more space than those who are standing and talking or standing and reading a poster. It is not surprising then that the spatial claims made in these two different settings were so different from each other.

The next two issues are less easy to account for. In both cases it was established that males and females differ in terms of their spatial claims with regard to the space surrounding them. However, the claims made by males in Petrie Plaza were in opposition to those made by males on a beach. Here one can put forward two sets of explanations, based on concepts of (i) type of attitude shown in relation to the external world, and (ii) nature of the interaction in which people were engaged in. Let us review them briefly.

One of the possible lines of reasoning is based on the assumption that differences in spatial claims people made are related to their cognitive involvement in the environment surrounding them. Edney and Jordan-Edney suggested that some of their stationary groups were "inner-oriented" that is focussed on dating, eating or excercising, while others were "outer-oriented", that is, concerned with watching other people, scanning the setting for potential sexual contacts or "assessing the competition and making similar social comparisons" (Edney and Jordan-Edney 1974:102). According to this hypothesis people engaged in inner-oriented activities were making smaller claims on space surrounding them, while those "outer-oriented" tended to demand more space for themselves as "a buffer zone oriented against other people" (1974:103). While such an approach accounts for the differences observed in the beach data in the spatial behaviour of same and different sexed gatherings, it fails to account for both the beach and Petrie Plaza observations. According to this hypothesis, males on the plaza should be engaged in inner-oriented activities (smaller domains), while females could be described as enaged in outer-oriented activities (larger domains). This is, however, hardly a convincing assumption in view of data provided in Table 6-7. This table demonstrates clearly that types of spatial arrangements used by dyadic F-formations on Petrie Plaza are systematically linked with the sex of the peple in these formations, and that females tend to use closed (N+H+V) arrangements more often than males. Thus,the view that females do claim larger territories, because they are engaged in outer-oriented activities and that at the same time they prefer interpersonal orientations which screen them off from the outside environment does not have satisfactory explanatory value.

However, there is also an hypothesis which begins with an explanation provided by the people interviewed themselves. It will be recalled from earlier parts of this chapter that it was suggested to the interviewers that an important factor which influences the amount of space around a stationary participation unit thought to belong to it is the topic of their verbal exchanges. It was reported that the so called neutral, casual or impersonal topics are associated with the need for a smaller spatial domain, while more personal or intimate topics tended to cause people to claim larger space cushions which were meant to protect them and insulate them from the external world. If we accept such a view, we can see that the notion of the "topic of a conversation" can be adopted as a useful tool in the interpretations of the observed regularities. First, in order to account for the beach data, it can be suggested that females on the beach were conducting less personal or less intimate or less "risque" types of conversations than were the males and therefore they were not in need of a large buffer zones protecting their conversation from being accidentally overheard by nearby people. Second, it seems plausible to assume that males on Petrie Plaza are less prone to carry on conversations on "large buffer zone topics" and that in outdoor, pedestrian setting their conversations are more casual ones, dealing with business or technical matters. At the same time, it can be expected that females using the stationary locations on the plaza are quite likely to carry on conversations on topics more personal in nature than it would be the case with the male-dominated participation units. The hypothetical tendency of females to engage in self- and co-participant oriented topics can be inferred from the already quoted Table 6-7.

If the suggested explanatory construction is valid, one could expect the following co-hypotheses to be confirmed:

(a) Females among themselves tend to engage more often in intimate and personal types of conversation than males;

(b) Close (N+H+V) arrangements are used more often for intimate and personal types of conversations than the open arrangements;

(c) People engaged in intimate and personal conversations claim larger spatial domains surrounding their participation unit.

These three postulated hypotheses seem to find support in the existing data. Firstly, research by Moore (1922), Landis and Burtt (1924) and Landis (1927) have convincingly demonstrated that there are significant sex differences in the way people select their topic of conversations in public. In both U.S.A and U.K. men were found to engage, when in their own company, in less intimate conversations, for example, about a business, money and sport; while women tended to talk mainly about their male and female acquaintances and about themselves. The results from all three studies were highly consistent and therefore seem to be applicable also to Petrie Plaza context.

The second assumption, namely that more intimate topics are discussed in closed (sociopetal) spatial arrangements also finds confirmation. A questionnaire (see Appendix B) study conducted among 40 subjects provided results which suggest that the type of spatial arrangement used by a two-person stationary (standing) F-formation, is systematically related to the type of a conversation people are conducting[21]. Thus, it was

[21] For this data I am indebted to Mr Rob Elzinga from the Dept. of Psychology, A.N.U who had five of his third year students carry out investigations on "non-verbal communication" and asked them to use a questionnaire (Appendix B) developed by the author. The subjects were recruited from among the friends and acquaintances of the students and were studying neither psychology nor other human-behaviour oriented disciplines. Each student carried out 8 interviews. The total sample comprised 20 males and 20 females of ages varying from 20 to 45 years.

established (Tables 7-7 and 8-7) that the more intimate the topic of the conversation the more frequently people would choose for such an encounter closed types (N+H+V) of spatial arrangement. Furthermore, it can be seen that task oriented interactions, such as business talk or discussion of some technical matter, was judged by respondents to be best conducted in a more open (L+C+I) arrangements. The results of this questionnaire study was found to be statistically significant.

Finally, there is some indirect evidence pointing to the fact that the use of smaller spatial domains which are free of stationary people tends to be associated with open spatial arrangements, which as it was said earlier, tended to be used for less intimate types of conversation. The evidence for the inverse relationship between the degree of arrangement openess and the size of the spatial domain associated with it is as follows:

(a)Data from Tables 10-6 and 29-6 suggest that there is some tendency for gatherings in which people use open arrangements to have outsiders nearby and for gatherings using closed arrangements to have outsiders relatively farther away.

(b) Data from Table 1-5 suggest that open arrangements are used more often when a dyadic F-formation is close to walls, while closed arrangements are used more often in open, spacious areas.

(c) Data from "Sample no 2" suggesting that though the separation distance from a nearby object is not significantly related to the degree of arrangement openess (Table 7-8), there is nevertheless a tendency of closed arrangement to be formed farther away from objects furnishing the plaza, and open arrangements to be formed in proximity to these objects. Thus, only 6.3% of open arrangements were found to be established more than 6 paces away from the object (N=63 cases), while 15.7% of closed arrangements were established (N=51) at such larger distances. The relevance of these data to the issue of the size of a domain will become apparent in the next chapter.

On the basis of the above data it seems plausible to infere that the use of closed arrangements (found to be adopted when people carry on more intimate types of conversation) tends to be associated with the larger spatial domains claimed by a stationary participation unit. What is more, this conclusion, in conjunction with the two made earlier, appears to indicate that that the type of verbal exchange, or more generally, the type of any kind of interpersonal exchange appears to determine the amount of space claimed by people who are engaged in a given interaction. This assumption is also in agreement with the "commonsense" view that the more private the behaviour the more apparent becomes the need to screen it from people nearby, and that such protection is best afforded by a less open spatial arrangement and by making increasingly larger claims on exclusive use of the surrounding environment. Therefore, it appears that adopted spatial arrangement and the claimed spatial domain not only remain in a systematic relationship but also are used as mechanisms through which a proper ratio of privacy to publicity of a given interpersonal exchange is established and maintained.

CHAPTER 8

SPATIAL BEHAVIOUR NEAR PHYSICAL OBJECTS[1]

1. INTRODUCTION

While the results of "Interview 1" have indicated that people in a stationary participation unit did make clear-cut claims on the environment surrounding them, it became interesting to establish to what extent their claims were overtly and consciously recognized by other users of a given setting. In other words, the question arose whether people who are not participants in a given interaction unit would, nevertheless, agree that some portion of a given setting falls under control of this unit. Furthermore, it was interesting to find out whether the extent of a spatial domain as seen from the viewpoint of the "insiders" and that of "outsiders" would remain in any systematic relationship.

In order to answer these questions another set of interviews was undertaken. These interviews, referred to as "no 2" were conducted in early 1976 among 13 subjects recruited from the friends and acquaintances of the author. Since it was obvious that their number would not be large enough to warrant a statistical analysis of the responses it was decided that an alternative should be adopted, and that each of those who agreed to take part in the interview should be questioned in depth. The persons selected as subjects were people who met two citeria: (a) were capable of

[1] Earlier version of this chapter appears in Ciolek (in press).

intelligent discusssion topics which were outside of their professional interest (i.e. human spatial behaviour), (b) were unfamiliar with of the hypotheses underlying the work carried out by the author. The procedure adopted was as follows: First, a subject was shown six photographs depicting a number of stationary F-formations placed in a variety of settings and engaged in variety of activities (see Appendix C). The person was asked to look carefully at each of the photographs and to imagine that he was in each of the depicted settings. Next the person was asked to indicate with a pencil a trajectory line he would adopt for the purpose of navigation through each of these settings, moving from one side of the photograph to another. Once this was accomplished for each photograph, and it was evident that the person did seem to treat the problem of the setting use as if he were one of the people on the photographs, the subject was asked to indicate with a pencil of another colour the place he thought was most suitable for stopping for a while, for example to light a cigarette, to tie shoelaces or, if he had been walking with another person, to have a brief conversation. Finally, each subject was asked to indicate, again with pencil lines, how much of the space surrounding the selected location as well as how much of the space around depicted stationary groups fell under their respective jurisdictions.

The procedure adopted was aimed at collecting data of two kinds. First, notes were taken on unsolicited and spontaneous comments people would provide while solving a particular task, as well as the subsequent notes on their explanations why they behaved one way or the other. Second, each of the prints with inserted pencil lines was analysed in terms of spacing adopted between participation units and in terms of the sizes of the claimed and assigned spatial domains which were meant to be free of other people. The results of "Interview 2" can be summarised as follows:

First, the subjects did confirm my earlier assumption that while using an outdoor setting people not only claim some portion of the environment for their exclusive use, but at the same time they also assign portion of the environment roughly similar in size to other stationary people present in the setting. Thus it could be seen that an individual or a group of people upon entering a pedestrian setting do not have to assert their right to a domain free of other persons but this right is nearly always tacitly granted on them by other people nearby. The second conclusion, drawn from these interviews, was that subjects tended to claim spatial domains which, on the whole, did not overlap with those of the neighbouring participation units. It could also be seen that, if possible, people tried to choose spatial locations situated at certain distance from other stationary plaza users. This separation distance (see Table 1-8) was found to be of approximately similar magnitude to those which could be seen both in "Observation no 5", "Sample 2" and "Interview 1" data. Furthermore, the radii of both the claimed and ascribed domains, also did remain similar to those observed during the real-life investigations (Table 1-8). Finally, the observations made earlier on differences of attitudes toward walking and toward stationary people were confirmed. The passersby were said to be tolerated at much closer distances than were the stationary individuals and groups and the subjects indicated with their drawing than they would approach a stationary unit much closer when walking than when choosing a stationary location (Table 1-8).

However, the main importance of "Interview 2" consists not so much that it further supports the earlier observations and conclusions, but that it has yielded a novel and unexpected material which suggested an exciting research avenue. First, in course of the interview it was noticed that in delineating the amount of space a given stationary unit was claiming for itself, people would follow a certain set of rules in determining whether that or other portion of the environment could be regarded as "belonging" to a unit in question (Discussion of these rules is provided in the final part of this chapter). Second, it was found that subjects asked where they would like to form a stationary group, within a context of depicted settings, tended to discern between (a) mere stopovers and (b) stationary activities. As far as the stopovers are concerned, it was established that these may take place practically anywhere along the trajectory adopted for walking across the setting. The characteristics of the "mere stopover locations" were of no or little importance since stopovers were by definition very brief in duration. Thus, the people would say that if they were going to stop, just for a moment and without any specific reason, they would do it in a middle of a space used for walking and at some distance from existing stationary groups. However, an entirely different pattern of response was provided when the question was asked about locations used for some prolonged periods, for instance, when people were engaged in a conversation or when they were waiting for someone for arrive to an appointment. In these cases the choice of a stopping point was made in more careful fashion. The first consideration was to position oneself away from already established stationary units, if possible, out of the field of their vision and out of the hearing range. The second regularity displayed, was the tendency to choose locations away from open and undifferentiated spaces and near well-articulated features of environment. Thus it could be seen that the subjects consistently would choose their stationary locations near the changes from one type of walking surface to another, near trees, dustbins, monuments, pillars, benches, at the crest of the slope, at a kerb or near a lamppost as if these features of the setting were intrinsicly attractive to them.

Interestingly, when asked explicitly why they thought a location near a tree or near a lamp standard was "a better one" than a location away from these objects the interviewees had difficulty in explaining their choices. The general impression gained from answers given was that people favour proximity of fixed and well-defined features of environment without overt recognition that they do so. What is more, some of the answers provided were formulated ad hoc, and they seemed to be aimed not so much at explaining the reasons for which the subjects appeared to favour the presence of physical artifacts but at producing an acceptable answer to the unexpected question. For instance, one of the subjects who selected a stopping point two paces away from a dustbin, while having a whole empty paved area at his disposal suggested that a dustbin is a convenient place "to toss the match to an ashtray" when lighting a cigarette. Curiously enough, locations near the same dustbin were also selected by people who did not smoke tabacco at all. Thus, an overhwelming impression, formed on the basis of the interviews, was that the people did not know why they made their decisions in way they did. This general lack of rational explanation for the observed preference for proximity of physical objects is nicely expressed in an answer volunteered by one of the persons who consistently kept choosing her stopping points near trees, lampposts and dustbins and who spontaneously said that she does it "just because I feel rather foolish to stop in the middle of nowhere, in the middle of nothing... but don't ask me why..."

But "why" is precisely the question considered in this chapter. It has two parts: First, whether it is really the case that people seem to choose the vicinity of objects more often than locations away from them. Second, if the answer to the first question is affirmative, what are the reasons people behave in such a manner. In order to answer these two problems a statistical analysis of the data derived from "Sample 2" was undertaken.

2.CHOICE OF A LOCATION NEAR OBJECTS : GENERAL PATTERN

At first glance, the positioning of people with respect to the physical features of the pedestrian plaza appears to be totally irregular. This impression is formed immediately one enters the main study setting and watches people and it is maintained long after all locations chosen by stationary people are photographed and cumulatively noted on a scale-plan of the area. People seemed to be standing practically everywhere, apparently in a patternless fashion. The graphic interpretation of the data, however, offered a false impression since the quantitative analysis of the field materials revealed a series of regularities and what is more, quite striking ones. The data collected suggest that the great majority of people tended to perform their stationary activities not anywhere, but in close and very close proximity to physical objects furnishing the study area. Second, it could be seen that the distance people kept with respect to objects was systematically linked to the characteristics of both groups and physical artifacts. Finally, it was found that the probability that people will select a place as their interaction site was non-accidentally influenced by the category of a nearby space-establishing element. In other words, certain classes of object appeared to be especially conducive to formation of small, casual, static interactions.

As far as the first regularity is concerned, analysis of "Sample 2" showed that, the smaller the distance separating target gathering from an artifact the greater the number of static gatherings formed. This trend was so marked that approximately 71% of all interpersonal transactions are carried out in locations within a three-pace (6 ft or 180 cm) radius from a physical object. This finding is in line with observations made by several other investigators. An observation similar to ours is made by Lerup (1972) who, for example, discussing the modes of use of a park and of a shopping mall, noticed that places typically occupied by individuals as well as by whole groups or categories (such as tourists, youths, drug pushers, older people, 'literatis', lunching office workers) coincided with some clearly defined physical objects and elements of the setting, such as benches, steps or stairs, pillars and pedestals of sculptures and monuments. A similar phenomenon was also uncovered in a questionnaire study of location preferences under conditions of crowding in various contexts such as library, dinner, classroom or restroom (Vanderveer 1973). It was found that subjects (university students) were much more likely to choose seats near architectural refuges such as walls and corners than locations situated away from such fixed features. Further, Preiser in his studies of pedestrian traffic and stationary activities (1972,1973) has observed that a majority of static events occured right on or very close to physical artifacts such as benches and trees, and that some portions of the studied settings were devoid of people because they lacked 'supportive artifacts to which people could relate spatially' (1973:289). It is of interest to note that preference for proximity to physical objects has also been observed for non-human primates. Thus Menzel (1969) who studied the social behaviour of rhesus monkeys in their natural environments found that the animals he observed tended sit or to lie close to objects such as rocks, trees, roots or bushes. They seemed to avoid being in the centre of an unstructured space. Counts were made, for example, of when animals were in relatively open areas in woods. Menzel found that 'in keeping with other observations 68 rhesus sat on an object, 10 sat touching one, and 22 sat farther than one foot away. Thus, 78 percent of the rhesus used a mere fraction of the available area' (1969:109). It has been observed that the tendency to cluster in vicinity of objects and other well-defined spots increased considerably if animals were approached by a human observer or if other disturbances occured. The same trends were found to be displayed by chimpanzees as well. Menzel in discussing his observations of a group of young chimpanzees as they progressively explored a one-acre field has observed that

> On all days the area that was entered on the largest number of time intervals contained some highly prominent vertical structure, such as a tree ... Open areas, especially those containing no objects other than grass, were rarely entered, except when the animals passed through them quickly, en route to some other place. In other words, behavioral space was always structured in terms of objects. If there were such a thing as empty, homogeneous, Euclidean space, probably no chimpanzee would enter it (1974:94)[2].

Despite these parallels, however, it was necessery to examine the data for the statistical significance of the observed regularity. Though people using the study area did seem to form their static gatherings in close proximity to objects, such a tendency could be, nevertheless, still explained as an artifact of an accidental distribution of people in the setting. Therefore, a control set of data was obtained with the aid of "Computer Simulation 2" and the differences between the observed and expected patterns of distribution (Table 2-8) were evaluated with the aid of the Chi-square test.

[2] For drawing my attention to this study I am indebted to A.Kendon.

The results of this investigation show that the placement of stationary pedestrians in relation to trees, litter bins, kiosks, walls and benches is far from accidental (p less 0.001). While in the real life situation 71% of people had their gatherings within a 3 pace distance from objects, the randomly distributed people were found to be as close to artifacts in only 52% of cases. This means that if people using the setting were distributed haphazardly the number of gatherings standing in close affinity to objects would be smaller by some 20%, and the mean separation distance would be 2.9 paces and not, as it is, 2.1 paces. The chances that such a strong affinity for objects could occur on a purely random basis are one in a thousand, and there is therefore a good reason to think that some causal principle must be operating here.

The next step in our investigations was directed toward establishing factors affecting the choice of interaction sites. These appear to be manyfold and include both the characteristics of the target gathering and those of the space-establishing elements themselves.

3.THE STATIC GATHERING AND ITS DISTANCE FROM THE NEAREST PHYSICAL OBJECT

The distance separating stationary pedestrians from artifacts was found to vary with group composition and size, as well as with group members' activity.

As far as the size of a gathering and the distance from space-establishing objects is concerned it was observed (see Table 3-8) that the average separation distance remained in systematic relation to the number of people within a participation unit. Solitary standing people were found to choose their locations at an average distance of 1.7 paces away from elements, while duets (x=2.7 p), trios (x=2.1p) and larger groups (x=2.3 p) would stop at more distant points. One can see here a basic distinction between sites selected by solitary people on the one hand, and locations adopted by two and more person groups on the other. This regularity appears to be non-accidental (see Table 3-8). The figures presented above clearly indicate that solitary standing people choose their locations much closer to an element than people in groups and that this regularity cannot be explained by any chance factor. This tendency is not unique to Petrie Plaza, since it has been reported for other pedestrian settings (Stilitz 1970, Preiser 1972), as well as for cafeterias, where customer's choices of central versus wall-tables havebeen compared (Barash 1972). The patterns reported here are also in agreement with observations made on the spatial behaviour of monkeys in their natural habitats (Menzel 1969).

The next finding was that in groups comprising two or three participants, males nearly always tended to adopt locations which were, on average, much closer to elements than would females. This is true for at least 94% of all observations, that is, in 307 cases out of 324. This trend is somewhat less clear in groups of four people and above; however, it is possible that this deviation is an artifact of the relatively small (N=17) number of observations. This difference in behaviour of males and females is additionally confirmed by the data on mixed-sex gatherings. It may be expected that such groups would choose locations positioned at intermediate distances between spots selected by all male and all female duets. The data confirm this: the 44 man-woman duets tended, on average, to choose locations at such intermediate distances (see Table 4-8). Closer analysis of these data suggess also that these sex-associated differences in behaviour are non-accidental ones. The figures in Table 5-8 illustrate this point.

In this table it is shown that the average frequency with which gatherings could be seen at various distances from objects distributed in the plaza is correlated with the sex-composition of a group. At close distances, that is Ø-2 paces away from an object, the predominant category of stationary groups were male dominated (6Ø%), which were thus markedly underrepresented at other distances. The intermediate range of 3-4 paces away was mainly used by M/F groups, which amounted to 41% of stationary people. Finally, the farthest range, between 5-6 paces, was used most frequently by female-dominated groups (36% of choices). These differences have been found to be statistically significant (p less Ø.Ø1). It can be assumed, therefore, that a sex-linked effect in spatial distribution with regard to physical objects is a real phenomenon worthy of further investigation.

The place which people took as their interaction site was also determined by the type of activity pursued by them (see Table 6-8). In the case of people who were conversing the average distance assumed with regard to artifacts was 2.3 paces. Second, in the case of people who were engaged in a multitude of activities coded here as "other behaviours" the distance separating them from objects was considerably smaller, that is, 1.6 paces. Third, an intermediate average distance (1.8p) was found to be associated with groups who were coded as being engaged in "waiting and/or observing". A further examination of Table 6-8 shows that conversational groups displayed a marked trend toward use of locations placed at 3-4 and 5-6 paces range. "Waiting" people, on the other hand, opted to stand very close to objects furnishing the plaza. In their case 77% of people were standing at a distance Ø-2 paces away from an artifact, though the average percentage of people using this range was considerably smaller (66%). Similarly, individuals and groups who were involved in "other activities" would often use the 0-2 pace distance (78% versus average 66%). Thus, in brief, though the majority of activities would be carried out in the close vicinity of space-establishing elements, there can be seen, nevertheless a non-accidental trend towards conducting conversational activities in locations less closely associated with the physical structure of a setting.

The place which people took as their interaction site seemed, however, to remain in no clear cut relationship to the spatial arrangement adopted. On one hand it was found (see Table 7-8) that the average separation distance used by people in open arrangements was not very different from that used by people in closed configurations (2.83 paces and 2.86 paces respectively). On the other hand the difference recorded is in line with observations made earlier (Chapter 5, Table 1-5), namely that closed (sociopetal) arrangements are more likely to occur in open spaces. It should also be observed (Table 7-8) that, only 6.3% of open (L+C+I) arrangements were formed at distances further than 6 paces away from a physical object (N=63), while 15.7% of closed (N+H+V) arrangements were established at such distances. It seems that the failure to detect a significant effect of object's proximity on the type of arranngement adopted can be explained by the fact that all F-formations observed on the plaza were already pretty close to artifacts and thus the postulated tendency of F-formations to vary their shape with the type of immediate surroundings could not find its full expression.

4.THE TYPE OF OBJECT AND CHOICE OF LOCATION

Another finding was that the place in which a group assumed a static activity tended also to be affected by the type of neighbouring artifact. The data show (Table 8-8) that the average distance at which people formed their gatherings was much smaller in the case of objects scored as "utility-objects" (x=1.2 p) and "seats" (x=1.7p) than it would be in the case of "barriers" (x=2.3 p) and free standing "objects" (x=2.8 p). This regularity is not an accidental one (p less Ø.ØØ1). Table 8-8 shows that although all four types of space establishing elements were approached mainly at a distance Ø-2 paces, some of them tended to be approached at certain characteristic distances more often than others. This tendency was statistically significant. Thus, a location point selected by people interacting near "barriers" would fall within a 3-4 pace range more frequently than would be expected by chance, while pedestrians stopping near "objects" displayed a definte preference for more distant locations,namely those within a 5-6 pace range. Similar tendencies, though reversed, could be observed among people who were seen in the context of "seats" and, especially, "utility-objects". In these cases, people clearly favoured the smallest possible distances,namely those within a range of Ø-2 paces from these elements. The observations, therefore, confirm a "commonsense" impression that people do show differences in how they distribute themselves in relation to various features of their environment.

The next table (Table 9-8) reveals a further regularity. If we compare the simulated choice of locations made under random conditions with choices observed in the course of real-life we can see that there is a significant difference (p less Ø.ØØ1) between these two occupancy patterns. At first glance we can see that users of Petrie Plaza formed their static gatherings most frequently near the "free standing objects" (43% of choices), followed by "barriers" (25%), "seats" (24%) and "utility objects" (8%). However, though the free standing trees, waste baskets and lamp posts were approached most frequently according to the computer simulation this class of elements would have been approached under random choice conditions by approximately 44% of plaza users anyway. Therefore it can be said that these artifacts do not have any particular valance, neither negative nor positive. A different picture, however, emerges when we compare the frequencies with which "barriers" tended to be approached. Here stationary gatherings observed at the plaza appeared to be represented much less often than was the case with the people distributed according to the computer simulation programme. This result suggests, that for reasons at present unknown, this class of space-establishing element is avoided by stationary plaza users. It was also found that people appeared to opt for spaces close to "utility-objects" and "seats". In both cases the number of stationary events recorded for real life situations exceeded the values computed for the random distribution model. While the impulse to approach objects such as noticeboard or display-racks is understandable and, in a way not surprising, the tendency toward approaching benches and chairs is rather more puzzling. It is a known fact that these objects were usually occupied by sitting men and women, and as such it could be expected that they would be avoided by standing interactional clusters.

To recapitulate patterns uncovered in Table 9-8 one can say that of all four classes of physical objects defining and furnishing a pedestrian plaza two sets of elements were found to be true attractants to stationary people, one was found to be relatively neutral in its valency, and the remaining one (barriers) was found to be a relatively unattractive feature of the urban environment. Interestingly, this observation supports further the previous finding (see Table 8-8) suggesting that objects and barriers, on average, are much less closely approached by people, than are utility-artifacts and seats.

What is important perhaps, is that the differences in behaviour seem also to be linked with the size of a group occupying a given location (see Table 10-8). The basic pattern here appears to be as follows: both solitary individuals (25%) and people in groups (26%) stop near "barriers" with more or less similar relative frequency, and no significant difference between these two can be demonstrated. A difference occurs, however, in the way solitary people and those in groups operate in the matter of taking up locations in the vicinity of other elements. And thus people in duets and larger groups are more likely to locate themselves near free standing "objects", while shunning places near "utility-objects". At the same time, solitary individuals show a definite preference for places which are adjacent to "seats" and "utility objects". This observation leads to an interesting question : whether manipulation of the number of seats in a given setting is likely to affect the number of solitary individuals or whether reduction of the number of free standing objects would decrease the number of gatherings formed on the plaza?

While the distance adopted in relation to the four categories of objects was correlated with the size of a gathering, an hypothesis that the sex-composition of such gatherings might also be relevant was not supported. The Chi-square value computed for a table "sex by type of object" (see Table 11-8) did not reach the conventional statistical levels. It was interesting to note therefore, that despite the lack of association between the sex-composition of a group and the type of object, there is nevertheless (Tables 4-8, 5-8) a significant sex-linked effect on the distance adopted with respect to elements in general.

Another negative finding was also obtained with regard to materials on the choice of location and the adopted spatial arrangement (Table 12-8). No significant correlation between various types of arrangement and the occurence of two-person gatherings in vicinity of the discerned four categories of artifacts could be found there. This observation, of course, is in line with our earlier assumption that changes in the spatial arrangement of an F-formation occur mainly to meet monitory requirements of the system and that the spatial configuration of an encounter is linked primarely to the operation of human factors characteristic of a given setting.

The choice of locus of an interaction with respect to various types of object appears, however, to be influenced by people's activity. The figures in Table 13-8 show that more than a half of conversational (53%) and a one third of non-conversational (33%) groups were formed in affinity to the free standing objects. The next most popular group of spaces were the ones near "barriers", where 22% of conversational and 49% of non-conversational groups could be seen. The third category of objects, that is "seats", were approached by respectively 19% and 8% of people. "Utility objects" were approached least frequently (6% and 10% of cases respectively). These overall figures, however, do not reveal the more fundamental trend they contain. A closer examination of the data uncovers that clustering around "free standing objects" and "barriers", as well as the relative neglect of the other two types of space-establishing elements is not characteristic of all people regardless of their activity. On the contrary, it has been found that conversational groups tend to choose locations in the vicinity of "objects" and "seats" more frequently than could be expected by chance. As far as the non-conversational groups are concerned, they, not surprisingly, tended to favour standing in affinity to "utility objects" and barriers. In these places they seemed to carry out their activities more often than could be expected by chance alone. The spaces close to "objects" and "seats", on the other hand, tended to be used significantly less often.

A more detailed information on the issue is provided in Table 14-8. In this table we can see the frequencies with which various types of non-conversational activity appeared to be associated with spaces situated close to various types of artifact. Thus, a largest portion (48%) of people described as "waiting and/or observing" was clustered near "free standing objects", while the smallest portion of them (10%) was standing near "seats". Gatherings devoted primarily to the "information gathering" were doing it mainly (76%) in the context of "barriers" and seemed to avoid standing near "utility objects" and "seats". People engaged in "manipulation" and other physically oriented activities were standing, in a great number of cases (46%) in vicinity of "barriers" though other types of locations were also in use.

When the above set of figures is compared with data on spatial distribution of solitary activities (see Table 15-8) one can notice a number of interesting similarities and differences. Thus, individuals who were engaged in "waiting and observing" tended to do it, more or less, in the same spaces where the conversational gatherings were formed. Thus 55% of them stopped near "free standing objects", 28% of them near "barriers", 13% near "seats" and 4% near "utility objects". It may be interesting, perhaps, to note, that earlier there was already a similarity established between spatial behaviours of these two categories of plaza-users (see Table 6-8). As far as such activity as "information gathering" is concerned, it can be seen that solitary plaza users were standing most often near "objects" (47%) and that they were more distributed all over the plaza more evenly than were the corresponding multiperson gatherings. Interestingly, the solitary "information gathering" people also appeared to avoid the areas in the vicinity of "seats". Finally, people who were engaged in activities described as "manipulation" were the most evenly spread out. In their case the majority of events (45%) were located near "seats" while "barriers", "objects" and "utility objects" were approached in 20%, 20% and 15% of the cases respectively.

The above mentioned data pose an interesting question. If the occurrence of conversational gatherings appears to be so intimately linked with the presence of "seats" and such objects as trees, litter bins or lampposts and if this is not the case with people engaged in other group activities, what would be the effect of a major reorganisation of an urban space? Will conversational groups still occur, though in much smaller numbers, in places where there are very few "seats" but many "utility artifacts"? Or will they observe the principle of "conservation of behaviour" (Ittelson et al. 1970) so that the frequency of formation of conversational groups stays unchanged, albeit associated with entirely different types of space establishing-elements? These and other questions should find an answer in the course of further field work.

5.DISCUSSION OF THE RESULTS

There seem to be three groups of partially competitive and partially complementary explanations for the way people distribute themselves in relation to physical objects.

The first of these can be characterised as a "horror vacui" type of approach. This is based on an assumption that people "instinctively" shun open spaces, and therefore cluster near walls and other physical artifacts. Within this line of thinking a number of hypotheses have been put forward: First, one can say that people's clustering around and in the vicinity of objects can be explained as reaction to excessive sunshine or wind. On hot summer days, for example, one can frequently see people seeking shade of the trees and nearby buildings or positioning themselves in such a way that they can keep their heads in the shade of a tall, thin lamppost. The operation of microclimatic factors, however, can not be easily demonstrated on the basis of the material reported here. As we state in Chapter 3, all observations were conducted under congenial weather conditions and neither sun nor wind could be identified as biasing factors.

The other explanation adduces man's hypothetically innate need to protect his rear. This view was advocated by Hass (1973) in his comments on spatial locations adopted by news vendors. A similar view was offered by De Jonge (1967). Although this explanation sounds plausible, the data collected do not support it. An analysis of orientations adopted by solitary people in relation to free standing objects furnishing the plaza indicates that people orient their back toward objects less frequently (10% of cases) than they orient their front (31%) or side body surfaces (26%) (see Chapter 6, Table 19-6).

One can also suggest an interpretation of the data in terms of the operation of some innate fear of surprise attack (Barash 1972), which is aggravated away from walls and lamp-poles whereas it is stilled in locations near objects reminiscent of some primeval refuge like rock, protective tree or thicket.

For example, C.N.Parkinson suggests with tongue in cheek that:

> Reluctance to occupy the central space derives from prehistoric instincts. The caveman who entered someone's else's cave was doubtful of his reception and wanted to be able to have his back to the wall and yet with some room to manouvre. In the centre of the cave he felt too vulnerable (1973:56).

This line of reasoning explains why in both cafeterias and public plazas solitary people cluster near walls more frequently than people in groups do. The hypothesis is also supported by some findings on body image and body-damage fears (Fisher 1976), which indicate that males are more anxious about possible injury than are females. This might also explain nicely why males stand closer to physical objects than do females - simply because they may be psychologically in greater need of secure refuge. However, if this is the case, futher investigations should yield two outcomes: (1) a replication of Barash's study carried out in cafeterias should indicate that solitary males tend to sit near walls more frequently than solitary females; (2) replication of studies by Fisher should indicate that people display greater body-damage anxieties when alone than they do when operating in groups. Failure to achieve these results will cast serious doubts on the validity of the body-damage and surprise-attack anxiety hypotheses.

The second set of explanations starts with an assumption that it is not the case that people avoid being in open spaces but that an entirely opposite phenomenon occurs, namely that people are attracted towards physical objects. Again, within the "object attraction" approach there are differences in the way the man-environment relationship is seen.

The first hypothesis of this set is provided by Preiser (1972,1973,1974). On the basis of his studies of a plaza in front of a student union, he assumes that 'each artifact (bench, railing, column or steps) has an observable radius or field of attraction within which specified amounts of activities take place' (1972:328). Preiser's "magnetic field" hypothesis implies that each object has a specifiable type of behaviour which occurs near it and that 'with increasing distance from an artifact its power of attraction decreases lineary to a point where no more influence is exerted upon the occuring behaviour" (1972:328). This hypothesis fails, however, to account for Preiser's own data, since only 11 out of the total of 30 columns within his research setting appear to attract any static groups of people. Therefore, in order to make sense of Preiser's observations one has to assume that objects are closely approached by people only where there is already a constant flow of pedestrians nearby. Thus the mere presence of artifacts does not lead to the occurence of static gatherings. One is led to conclude that the concept of the "field of attraction" has no explanatory power, and it should be regarded only as a metaphorical description of people's behaviour.

Another possible hypothesis begins with an assumption that people cluster near objects because they use them. This is certainly true for shop windows, notice-boards, mechanical toys and drinking fountains. One can also claim that other, non-utility objects are approached because one can lean against the walls, rest a hand on a tree or place a foot on a bench. This sort of reasoning can explain the 17% of cases where people were in direct physical contact with space-establishing elements. However, the utility value of artifacts cannot account for all previously discussed regularities. For example, it does not explain why solitary males should be more attracted to physical objects than solitary females, unless one also introduces a sex-linked hypothesis concerning the differential use of the objects. Thus, it becomes obvious that though a certain number of spatial choices made by pedestrians can be sensibly discussed in terms of people's usage of environment, some additional explanation will also be needed[3].

This leads to the third set of explanations. The hypotheses presented below make use of the concept of spatial domain claimed by a stationary participation unit. One can assume that the way people behave in a public setting is influenced by their ideas, seldom verbalized but nonetheless operative, about the amount of space they need for carrying out their transactions with the environment and other people. There is, indeed, some evidence substantiating such assumptions, as the review of literature at the beginning of Chapter 7 would seem to indicate. It was found that people, when asked how much space around their group they think "belongs" to them, give consistent and meaningful answers. The replication of some of these studies, carried out among users of Petrie Plaza (see Chapter 7, Tables 2-7 through 5-7) confirms the existence of such "subjective territories" and establishes clear-cut relationships between size of the claimed "domain" which should be free of other static people on the one hand, and the characteristics of the interviewed groups on the other.

On the basis of these observations one can hypothesize that people in their everyday behaviour do make tacit claims on space immediately surrounding them, and that they would like to have a temporary but exclusive and undisputed use of such space. It is also obvious that, since in outdoor public areas this space does not have visible form or

[3] The customs and moral assumtions of a community are surely important here: e.g. females may be expected not to hang around street corners or street lamps when alone, as it was pointed out to the writer in a recent conversation with Michael Young.

solid boundaries its extent is ambiguous. It may be subject to a variety of interpretations and even tacit disputes between the target group and a newcomer who happens to stop nearby. This danger of lack of boundary definition is especially apparent where groups are standing in the middle of open, barren spaces where they have practically nothing to indicate that the domain they are occupying is not, from their subjective point of view, like any other place five or ten paces away. It is also plausible to assume that people, when they stop to have a conversation, treat litter bins, lamps, lampstandards, trees etc. as if they are markers or indicators dividing the universe into the space which is "theirs" and the space which is "not theirs". This assumption, of course is not entirely new one. De Jonge (1967) suggests, for example, that one of the most popular spots in recreation 'areas are these "bits of ground" which "are characterized by natural boundaries on at least two sides, so the group cannot be closed in by other groups occupying adjacent parts of the area' (1967:10). Further, De Jonge observes that '... if an occupied territory has geographic boundaries on all sides and is relatively small ... visitors arriving later are inclined to select other ... [spots] ... as their temporary territory, as long as these are available (1977:10). Finally, he concludes that 'the presence of ... [features of environment] that serve as barriers facilitates the undisturbed occupation of a bit of land as a personal or group territory' (1967:10-11). Further, Menzel (1969:104) has noted that 'Monkeys do not defend an abstract concept of 'territory'; they defend where they are...' and that their first problem in any situation is, most probably, to establish for themselves where they in fact are, and that for this purpose they use the placement of various features of environment. Thus, the hypothesis suggested here holds that the distance at which people form their static gatherings in relation to the objects furnishing the public urban space is directly linked to the subjective territories they would like to claim for themselves and that artifacts and physical features of environment are treated by people as location and boundary markers.

This hypothesis is supported by the data on the size of these spaces as they were found among static users of Petrie Plaza. The first evidence comes from the fact that 70% of all "territories" would have their radius falling within the limit of 3.25 paces. This is of particular interest since , as it was noted earlier, approximatelly 70% of all groups would be no futher than 3 paces away from the nearest phisical object. The second set of evidence comes from the analysis of the changes in the territory size to the group size and its sex composition. Similarly, as in the case of distance to artifacts, the space claimed by solitary people is smaller (see Tables 2-7, 3-7) than the one claimed by people in groups. As far as the sex-composition of a participation unit is concerned, the radius of the "subjective territories" is also smaller (Tables 4-7, 5-7) for males and male-dominated gatherings than it is for females (for example, solitary man x = 2.3 paces, solitary woman x = 2.8 paces). In almost all these cases the radius of the spatial preserve slightly exceeded the respective distance to the nearest object. Furthermore, the third set of evidence comes from a series of of responses from people interviewed in course of "Interviews 1 and 2". During "Interview 1" it was found that people, when asked to indicate the amount of space they think "belongs" to them they would frequently point to the physical objects situated nearby or to some features of their immediate environment and they would use them as markers of the boundary of their spatial claim. In the course of "Interview 1" some of the verbal comments given to the experimentor in order to place him "right at the spot where the group controlled domain ends" were as follows:

"Move to the line on the pavement" - at a distance of 249 cm (4.2 paces) from the centre of the participation unit.

"To the shadow [of a tree] - at a distance of 230 cm (3.8 paces).

"Move over there, just to the gutter" - at a distance of 165 cm (2.8 paces).

"Move little bit farther, to the brick [laying on a pavement]" - at a distance of 292 cm (4.9 paces).

"Move back to the line [a crack-line on a pavement]" - at a distance of 280 cm (4.7 paces).

"Move up there to the post [a pillar of a nearby building], that will be a right distance" - at a distance of 310 cm (5.2 paces).

"Up to the lamp post" - at a distance of 216 cm (3.6 paces).

In brief, people in determining the radius of their domain, of a space into which an outsider should not remain stationary (but which could be crossed), made frequent references to the placement of nearby objects such as pillars, benches, litter bins, trees, lamps. If these prominent artifacts were not standing at "a right distance", that is were too far away or too close to an interviewed participation unit, people instead would refer to placement of kerbs, stones protruding from walking surfaces, drain pipes, splashes of white cement on the pavement, edges of rain-puddles or shadows casted by nearby objects or buildings.

As far as the results of "Interview 2 " are concerned, they remain in agreement with the findings just mentioned. Subjects seemed to avoid drawing an arbitrary boundary separating "group's" and "non-group's" spaces. This is documented by analysis of placements of 78 cases of boundaries ascribed by subjects to stationary groups depicted on photographs. It was found that in 31 cases (40%) boundaries of the spatial domains would incorporate an object such as tree, bench or a litter bin and in 29 cases (37%) the pencil lines would be drawn not with regard to these prominent artifacts but would follow the exact course of more subtle features of environment such as kerbs, cracks on pavement, changes in the texture of walking surface etc. Only in 18 cases (23%) would the boundary of a spatial domain be delineated in a more arbitrary fashion, that is, without making an explicit reference to the environmental cues.

Finally, the evidence that group's placement relative to physical objects can be interpreted as a mechanism through which a given unit attempts to determine the amount of space which should be free of other stationary people is provided in tables 24-6 and 25-6. In these tables, (already discussed in Chapter 6) it can be seen that people standing close to objects were positioned relatively close to stationary outsiders, while those who were standing farther away from objects were also found to be standing farther away from other stationary plaza users.

It can be seen, therefore, that people in a given participation unit are not oblivious to their spatial context and that they do not passively tolerate or ignore it, but that they actively relate features of their immediate environment to the needs of their face-to-face interaction with other people in the setting. Furthermore, the results of "Interviews 1 and 2" mean that not only a target group thinks about some area around itself as the space which may be claimed for its exclusive use, but also external observers, when asked, likewise assign some of the environment to a static gathering and attribute it to the group's jurisdiction. These interviews have demonstrated that in the process of deciding what portion of an environment is or is not a part of a group's interaction site, the configuration of the environment is commonly used as an explicit source of information.

On the basis of the above observations it is reasonable to suggest that the placement of a gathering in relation to trees, walls, benches, lamps and other such objects does have interactional value. These artifacts, or as Thiel (1970) calls them, space-establishing elements not only create and furnish architectural spaces, but also seem to be used for explicit, though not necessarily conscious, definition of the interactional domain claimed by people who enter public settings.

CHAPTER 9

CONFIGURATION AND CONTEXT - CONCLUDING REMARKS

Having thus completed our data analysis, let us ask ourselves to what extent the study modifies and expands our theoretical stance with regard to the patterns of spatial organization of face-to-face interaction. In my belief, the study does enable to adopt an "extended" view of both the details of the spatial architecture of face-to-face encounter and of their functions.

Firstly, in Chapters 4, 5 and 6 it was found that both the spatial arrangement adopted by people in an F-formation and the spatial orientation of the formation as a whole tend to be systematically related to the type of physical and human environment in which the social encounter in question is carried out. Thus, an interactional gathering could be seen to adjust the degree of openness of spatial arrangement to the degree of crowdedness and the extent of spatial definitiness provided by a given location. Secondly, it was established that an F-formation tends to place itself in such a way relative to the stream of people walking past and nearby objects, that accidental intrusions into the gathering's o-space and the crowd's overall impact on the bodies of the participants are greatly diminished. Thirdly, people in the F-formation were found to orient the whole configuration in a manner that would give them, if they wished, good access to information generated outside the formation's interactional space. Finally, the data have shown that the overall orientation of a F-formation is adjusted to the layout and spaciousness of a particular location. This indicates that people in an F-formation framework have greater command over the way they function within an urban pedestrian setting than is the case with people in other types of stationary formations. For example, people in linear, horizontal and bulk queues can respond to the demand of their immediate environment only by adjustments of their interpersonal distances and the degree of the body lean (e.g.Fry and Willis 1971, Nesbitt and Steven 1974). By contrast, an F-formation system can be considered as an adaptive mechanism which provides its members with security, boundedness of interactional space and an optimal "fit" into the setting in which it was formed. This, in turn, enables people to devote themselves more fully to the activity which was the original reason for establishing their F-formation system and enhances their chances of carrying on with it, without being interrupted or otherwise interfered with.

Chapters 6 and 7 demonstrated that a stationary F-formation is not totally unaided in its "struggle for survival" in outdoor public places. F-formations were found to be surrounded by a spatial zone of considerable depth which isolated them from the nearby stationary people. The r-space, it was suggested, serves several functions, among which the provision of a constant minimal separation distance and thus the maintenance of separate identity were thought to be of greatest importance. However, it was also found that this protective space-cushion could be freely penetrated by mobile individuals and groups. This seemed to suggest that the type of spatial relationships maintained between users of a public setting depends not only on who the people are (in terms of their personal and interpersonal characteristics), or where they are (in terms of the general ecology of the setting) but also on the general similarity or dissimilarity of their postural-locomotory behaviour. Thus, participation units which appeared to be "conspecifics" tended to maintain ample and regular spacing between themselves, while "non-conspecifics" were seen to tolerate each other at any distance as long as no bodily contact between them or deliberate interference occurred.

Chapters 7 and 8 established that stationary people when asked how much space around their unit they think "belongs" to them for the time they are standing in a given place, give consistent and meaningful answers which are consonant with findings based on behavioural observations. The size of the spatial domain claimed corresponded roughly to the combined area of the o-, p- and r-spaces of the F-formation system. Further, it was found that outsiders also recognized some portions of the environment as "belonging" to their stationary neighbours. Interestingly, spatial claims tended not to overlap with those made by neighbours. Thus, people appeared to co-operate in the way they mentally mapped a given public space. All proclaimed their own temporary jurisdictions over certain spatial domains and expected that similarly-sized jurisdictions over other portions of the setting would be made by the nearby "conspecifics".

It can be suggested that the establishment of an exclusively controlled spatial domain serves to provide people with a "sense of place". This is achieved by defining one's location within a setting in terms of one's placement relative to one's co-participants, to the o-space and the spatial domain as a whole. With such a well defined place among the strangers present in the vicinity, one seems to be in a better position to carry out a given line of activity and to re-initiate it even after a brief break or change in the focus of interest.

Chapter 8 provided a further important finding. In defining what portion of the environment is or is not regarded by the participants of a given F-formation system as falling under their jurisdiction, extensive and systematic use is made of physical environmental features. There are two aspects to this. First, physical objects such as trees, lampposts and the like are used as devices to mark the boundary between the outer perimeter of a given spatial domain in general, and of the r-space in particular, and the rest of the world. Secondly, these objects serve as a set of points of reference translating one's sense of place and orientation within the F-formation system into a sense of place and orientation within the context of the larger setting. Thus, stationary F-formations do not adapt themselves in a passive manner to the physical features of the environment, but relate actively to them, using them as a resource assisting their various functions, most notably that of providing stable markers for their domains of occupancy. This suggests that each time people enter each other's presence they appear to "invent" the appropriate definition, structure and function of the environment and treat their spatial and physical context in such a way that they can carry out their focussed and unfocussed interactions with minimum effort and ambiguity.

Finally, it could be observed (Chapters 6, 7 and 8) that the size and shape of the spatial domains as claimed by F-formations and respected by outsiders, tended to vary from moment to moment and from location to location. However, the main function appeared to be constant, namely providing members of a given stationary participation unit with optimal privacy and protection which could be available under given conditions yet without creating contentious situations. The spatial claims made tended to influence patterns of spatial distribution of stationary outsiders and these patterns, in turn, appeared to be used as a basis for subsequent and continuous adjustments of the originally tacitly made claims. This phenomenon throws an additional light on the role played by the features of the environment adopted as location and boundary indicators. These features and cues seem to have a similar status to that of a deck of cards - they are shuffled and dealt anew each time the number of players changes, and thus their value and meaning is not absolute but remains a function of the interpersonal situation to which they were applied.

To put it as its most general, we have been led to the conclusion that an F-formation system can be viewed as an elaborate "apparatus" for structuring and ordering the context in which an encounter takes place. However, it is suggested here that people who form an interactional space do not limit themselves to the establishment of a set of spatial and orientational relationships with one another and a domain for their interaction. They can also be seen to structure the space external to their spatial claim. They do so in order to determine more readily the importance and meaning of the events surrounding them.

This is an important issue. If the reason for which an F-formation system is established in a given place is to achieve the satisfactory and easy completion of a task, it becomes obvious that it cannot be accomplished as long as the participants are unable to determine when a given action of a passerby constitutes a threat to the existence and continuity of their interactional gathering. People who for some reason do not divide the space around their bodies or around their gatherings into various areas and differentially-treated zones lay themselves open to the danger of being distracted, disturbed and encroached upon by anyone and anything who or which appears within the limits of scanning available to the eyes, ears and nostrils. Compare, for instance, the psychological trauma associated with a lack of distinction between "near" and "far" events as portrayed in an anonymous diary:

> Stranger, when you appeared there on the horizon miles to the east, a speck silhouetted against the dawn, you stepped on my toes and bumped into me. Did you not feel the impact? Before you appeared this whole expanse was my body, and the light and the colours in it my mind. Then the collision occured. Now look at me. My body is shrunken to a midget trunk with four midget limbs. And my mind is in a skull. I felt the impact, stranger. I bid you good-morning - and heartily farewell (cited in Heaton 1968:153).

It is obvious therefore that for people in public settings it is of the utmost importance that they may differentiate between close and distant events, between important and less important ones, between behaviours requiring an immediate response and those which can be related to later on or be ignored altogether. Without being able to do it the whole task of environment monitoring becomes a sterile excercise, and any attempt to carry on with the originally initiated line of activity is futile.

What we would like to do here, is to examine how this issue applies to the case of people in an F-formation system. Before this can be done, however, it will be useful first to recall our earlier observations on spaces generated by an F-formation system.

In Chapter 6 we postulated the existence of three spatial zones characteristic of an F-formation phenomenon. Each of these zones is used in a distinct and separate way. An o-space is the space which no-one except, perhaps, for small children and dogs (Scheflen and Ashcraft 1976:112) can enter. This is the space where the interaction unfolds and develops between the participants who are gathered around it in the p-space immediately adjacent. The p-space is a zone which can be occupied only by members of an F-formation and which is inaccessible to any use on the part of outsiders. This is the space which bounds and delineates the inner one from the rest of the environment. The r-space has a different status again. It is an area which is used in a two-fold fashion. Firstly, it can be seen as the space which people who have ceased to use the p-space as well as those who have not yet managed to do so may use as a stationary location. Secondly, it is the area which may be used by outsiders only in a limited fashion, that is only for navigation through a given environment but never for stationary activities. In that sense it is a transitional space between the core of the interactional domain and the background environment. Beyond the outer perimeter of the r-space stretches "the rest" of the environment or a space which can be used by any-one (e.g. persons temporarily leaving the F-formation, newcomers, leave-takers, outsiders) and where any type of activity (solitary or group) as well as any type of locomotor-postural behaviour (standing, sitting, walking, running) may be engaged in.

Two conclusions can be drawn on the basis of the picture just outlined. First, that there is a progressive transition from the domain which is most private, exclusive and jealously guarded to the most public and most accessible one. Second, that we must postulate four types of spaces - the first three belonging to the F-formation system, and the fourth generated by the very fact of the first three being discerned. Thus in addition to the sequence o-, p-, r-, it seems plausible to postulate here the existence of a space which is a truly public one, a space which for want of better name, we shall call the b-space.

This analysis, however, is not really sufficient to explain how an F-formation can successfully survive in the presence of outsiders, especially in an outdoor setting. If the interaction contained within the o-space is to be maintained uninterrupted and well protected against external disturbances, the participants of an F-formation must make use of much more space than is embraced by the belts of the p- and r-spaces. On purely logical grounds it can be postulated that if an outsider crosses the boundary between the b-space and r-space his presence within the claimed spatial domain is perceived much too late for the people in the F-formation to adapt smoothly to his proximity. They, as Pesso (1969) would have put it, are cought unprepared and without a suitable behaviour-program for handling his presence within the r-space. Thus, if people are to maintain the integrity of their interaction they have to start monitoring outsiders at a much earlier stage, and must react to them at much greater distances. In other words, outsiders' activities in order to be accommodated must be perceived and reacted to prior to their crossing of the r- and b-space boundary. On the other hand, if the F-formation is to function at all and if the participants are to concern themselves with their prime activity instead of spending the entire time being on the lookout it becomes obvious that the field of observation must be fairly limited.

Therefore, it can be postulated that in addition to the three basic F-formation spaces, there is also a zone which can be treated as being of transitional status between the r-space and the b-space, a zone which is freely accessible[1] to outsiders but to which some degree of attention is given by the F-formation participants. In other words, we are suggesting here the presence of some area which functions as a sorting room (from the

[1] Of course, though a given c-space is usually freely accessible to all people in a setting, it may happen under some special circumstances that an individual may be formally barred from using or entering it. For instance, it was a rule in ancient Malabar (India), that the Panan (basket-weaver caste) was obliged to stay 40 paces away from a brahmin and 15 from a Nair (Walker 1968:204). A contemporary example of a similar principle was provided in 1973 by the U.S. Appeals Court which in its ruling on Galella v. Onassis declared that the "paparazzo" Galella was prohibited to approach within 25 ft (12 paces or 7.5 m) of the defendant.

point of view of the participants of an F-formation) where anybody present is perceived and classified by the participants of the F-formation system as being of potential significance to the existence and well being of their encounter. We shall term this area as the c-space.

The above scheme proposes, thus, a set of concentric zones, starting with the centre of the space around which an F-formation is established and extending in all directions. First come the three zones of an F-formation already discussed - or areas where people explicitly react to the presence of each other and of outsiders. Then comes the c-space belt, or an area where people are being monitored and consciously perceived and reacted to, though at a much subtler level. These four spaces, conjoined together constitute an area of the environment which is the optimal psychological present space (Sandstrom 1974). This area is felt as a spatial whole which is experienced as such without any effort and which is, usually, referred to as "Here". The fifth zone, the b-space is an area where events can still be seen and heard, but which is judged by participants of an F-formation system as being of no direct relevance to the o-space activities[2]. An outsider in b-space can be said to be in a 'zone in which variation in the separation distance is largely irrelevant, and attracts no attention' (McBride 1972:5). Finally, to render the whole scheme more complete, one is tempted to postulate the idea of an a-space, or area which stretches beyond the space directly accessible to unaided

[2] When during the final hour of the battle of Waterloo Napoleon was told that Blücher was advancing with his troops to attack the French, he is reported to have asked "How far away are the Prussians?" Having learned that they were some 500 meters away, he commanded to continue with a full scale attack on Wellington's positions shouting to his ADCs : "Blücher is of no concern to us, if he is five hundred meters away from the battlefield he might just as well be on the moon". In other words, in terms of the spatial structure of the ongoing combat the Prussians were within the b-space - they could be seen but could not influence the events.

human senses but which, nevertheless, is known objectively to exist[3]. The a-space does not play any role in the organization of behaviours in face-to-face interactions, though it can be thought about or referred to in the course of such encounters.

To make the distinction between r-,c- and b- spaces a little more clear let us look at the following interactional event:

> The small black hump of rock came into view far down the beach... When I came nearer I saw that Raymond's Arab had returned. He was by himself this time, lying on his back, his hands behind his head, his face shaded by the rock while the sun beat the rest of his body... [the narrator is in the b-space]
>
> ...On seeing me the Arab raised himself a little, and his hand went to his pocket. Naturally I gripped Raymond's revolver in the pocket of my coat. Then the Arab let himself sink back again, but without taking his hand from his pocket. I was some distance off, at least ten yards... [the narrator is in the c-space, he is perceived and reacted to in a preliminary fashion]
>
> It struck me that all I had to do was to turn, walk away, and think no more about it. But the whole beach, pulsing with heat, was pressing on my back. I took some steps towards the stream. The Arab didn't move. After all, there was still some distance between us. Perhaps because of the shadow on his face, he seemed to be grinning at me.
>
> I waited. The heat was beginning to scorch my cheeks, beads of sweat were gathering in my eyebrows... all the veins seemed to be bursting through the skin. I couldn't stand it any longer and I took another step forward. [At precisely this point the boundary between c- and r-space has been crossed] I knew it was a fool thing to do, I shouldn't get out of the sun by moving a yard or so. But I took that step, just one step, forward. And then the Arab drew his knife and held it up towards me, athwart the sunlight... [and] the keen blade of light flashing up from the knife [was] scarring by eyelashes, and gouging into my eyeballs (Camus 1965:34-45).

[3] It might be relevant here to note that our c- and b-spaces form together a zone which may be treated as an equivalent of the "distal space" postulated by Spiegel and Machotka (1974). They describe this space as an area stretching beyond the space controlled by the extended arms and legs of an individual to 'a line representing the outer limits of scanning available to the eyes and ears... [it is a zone which] embraces the knowable world at any moment in time' (1974:124). Further, Spiegel and Machotka's "limbic space", one which is 'imepentrable for ordinary sensory processing' may be thought to be identical with our a-space.

The existence of c-space has, until now, been postulated largely on the basis of theoretical considerations. However, it should be noted that there are already some empirical observations which suggest that people in an open public space do in fact perceive some portion of their environment as a space which, though it does not "belong" to them, is, nevertheless, intimately associated with the functioning of their face-to-face encounter. The evidence available shows that there is a spatial zone stretching beyond the r-space which plays a role of an intermediate zone positioned between the area of key importance and relevance to a given line of activity and the space which is of little interest.

The first set of data comes from three of the interviews described in Chapter 7. In these instances there was a marked discrepancy between the amount of space claimed by the participants when asked to indicate it verbally and the amount of space they claimed when this was actually measured in the second half of the interview. For example, a three-person, all male F-formation, suggested that "their territory" stretches "there to the seat" which was positioned approximately 15ft (7-8 paces) away from them. Yet the subsequent measurement of the radius of the space which should always be free of stationary outsiders (i.e. the radius of the combined o-, p- and r-spaces) revealed it to be only 145-167 cm (2.4 - 2.8 paces). In another interview people in a three-person, female dominated F-formation suggedted that their space stretches "to those ladies" on one side (i.e. to another stationary group 11 paces away) and, on the other side, "to the pole" (a pillar of a nearby building also 11 paces away from the group). However, in the course of establishing the size of the domain which should remain clear of stationary strangers, it was found that the distance from the center of the gathering to the boundary of the exlusively-used domain was 247 cm

(4.1 p). Or, in still another case, a man in a dyadic F-formation said that their space extended "to the garbage bin" situated at a distance of approximately 10 paces, whereas the radius of the domain claimed as one which should be free of stationary outsiders was between 227 and 245 cm (3.8 p - 4.1 paces)[4].

The second set of supporting evidence comes from the observations reported in sub-section (ii) of Chapter 7. As was observed there, an approach could be made toward a gathering apparently unnoticed by the participants until the experimenters were some 9-7 paces away from their F-formation (or a solitary person). At this distance the first clear-cut eye-contact was usually established. This brief period of mutual regard may serve as a signal to the outsider that his presence and movements have been noticed and from now on they will be taken into account by those standing in the F-formation cluster.

The next two sets of data tend to reinforce even more strongly our original assumption that a participation unit sets off some of the area around itself for the purpose of heightened environment monitoring and for establishing preparatory behaviour interdependencies with the outsiders. Table 1-9 shows two interesting regularities. First, that the overwhelming majority of salutations exchanged between a stationary F-formation and people who pass by tend to fall within the region of 2 to 4 paces from the gathering. In the light of the data presented in Tables 13-6 and 14-6, this observation seems to suggest that such salutational exchanges are usually engaged in when the outsider is more or less

[4] The explicit use of the features of an external environment for the definition of the extent of one's spatial domain (Chapter 8) and one's c-space just observed is clearly in line with a theoretical observation provided by Lynch and Rivkin. They wrote : 'the individual must perceive his environment as an ordered pattern, and is constantly trying to inject order into his surroundings, so that all the relevant perceptions are joined one to the other. Certain physical complexes facilitate this process through their own form and are seen as ordered wholes by native and newcomer alike' (1959:33).

crossing the boundary between the r- and c-space. The other observation one can make here is that approximately 96% of all such salutations take place within a range of 10 paces from the F-formation. Only in two cases (4%) did people in an F-formation establish an overt verbal or gestural exchange with somebody passing by at a greater distance. This observation would suggest that beyond the range of 10 paces the intensity with which the environment is scanned and the interest felt in the identity and behaviour of outsiders are greatly reduced.

Table 2-9 seems to support this conclusions. An examination of the distances over which people entering and leaving an F-formation system tended to exchange salutations with those in the formation suggests that, most typically, once an individual is farther than 12 paces away from the gathering he is treated is if he were not "present" in terms of the reference system of the stationary interactional cluster.

The meaning of the picture emerging from the above observations becomes clear. What we seem to be dealing with is an ingenious system through which people in an F-formation cope with the presence of other users of a setting. By setting up a sequence of concentrically nested spaces they become able to sort and assess the events taking place outside of the o-space domain without running the risk of sensory or information overload[5]. The universe in which they operate is attended to in a

[5] The notion of the information overload as an explanatory concept accounting for a certain style of interpersonal behaviour evolved in big contemporary cities has been offered by Milgram (1970). Milgram suggests operation of a number of adaptive responses to such an overload, namely : (a) allocation less time to processing of each input, (b) differentiation between relevant and irrelevant inputs, (c) shifting part of the burden of interaction management on the other party in face-to-face encounter, (d) blocking off the input prior its entrance into a system, (e) superficial involvement in a given situation or interaction. Of course, in this chapter we are dealing primarely with the second of the aforementioned responses to the experience of living in the large-scale, populous and heterogeneous environments.

highly discriminating fashion. It means that not everything and not everyone is paid an identical amount of attention, but that some things and happenings are a priori decided to be more important than others. Further, it means that not every single event is attended to separately but rather that whole classes of people are lumped together and dealt with as phenomena occurring in a zone or space of a pre-established meaning. Compare for instance the description below of an encounter in the wilderness of nineteenth-century Mexico. Though the borderline between the r-and c-space is moved quite far away from the stationary participation unit due to differences in the physical context and the possibility of the use of firearms, the interpretational frame providing meaning to the behaviour of "outsiders" according to the spatial zone they enter remains practically unchanged:

> The first rider saw them [our heroes] at the same moment of mutual surprise and shouted: and seven more swept into a view ... They came forward, drawing slowly into irregular line. Two hundreds yards, the line of demarkation for honest men; from this point one honest man would advance while others waited. But they come on, one hundred, slowly now, fifty, forty, thirty, and a halt at twenty yards: no, shuffling even closer to fifteen; the faces clearly defined beneath the broad brims, the dark, thin, round, flat, cruel, greedy faces ... (O'Rourke 1967:46)

Thus it can be assumed that the creation of concentric spaces surrounding a stationary participation unit helps the participants to maintain an adequate control and interpretation of their immediate environment without consuming too much of their time and energy. Of course, this is not the only method adopted for coping with possible sensory overload. It appears that there are two other ways of dealing with the problem. The first is limiting one's attention to certain aspects of outsiders' behaviour (e.g.locomotory or eye behaviour) while disattending other behaviours (e.g.type of gesticulation, content of speech, self-manipulation) (cf.Goffman 1975). Another tactic employed is to pay attention only to some classes of people (e.g stationary people, or people moving toward the gathering in question), while other users of the setting can be ignored either partially (e.g.people classified as "non-persons" - see Goffman 1963) or altogether (e.g.sitting people, individuals moving away from the stationary participation unit). However, the way these two tactics are interlocked with the third one, described above, is a problem which deserves careful and separate examination, something which obviously cannot be attempted here.

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APPENDICES

A. Computer programme used for plaza simulations

B. Questionnaire used for studying preferences for spatial arrangements

C. Photographs used in "Interview no. 2"

D. Tables referred to in the text

"BEGIN"
"COMMENT"

Appendix A

***** PLAZA SIMULATION *****

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THIS PROGRAMME SIMULATES THE PLACEMENT OF GROUPS OF PEOPLE IN RELATION TO THE PHYSICAL OBJECTS ON A RECTANGULAR PLAZA. THE SIMULATION IS BY PLACING THE GROUPS IN POSITION SUBJECT TO CERTAIN SIMPLE RULES:

1) THE CENTRE OF THE GROUP MUST BE WITHIN THE PLAZA'S BOUNDARIES,
2) THE CENTRE OF A GROUP MUST BE OUTSIDE A PHYSICAL OBJECT,
3) NO TWO GROUPS MAY OVERLAP,
4) THE POSITION OF THE GROUP MUST CONFORM TO A GIVEN DENSITY DISTRIBUTION

THE NUMBER OF PEOPLE IN THE GROUP AND HENCE ITS PHYSICAL SIZE, IS CHOSEN AT RANDOM IN ACCORDANCE WITH A GIVEN DISTRIBUTION. HAVING PLACED A SET OF GROUPS ON THE PLAZA, THE PROGRAM PLACES (NON-STATIONARY) SINGLE PEOPLE ON THE PLAZA, ALSO IN ACCORDANCE WITH THE ABOVE RULES FOR GROUPS. THE NUMBER OF SINGLE PEOPLE SO PLACED IS A CONSTANT MULTIPLE OF THE TOTAL NUMBER OF PEOPLE ON THE PLAZA IN THE GROUPS. THE SIMULATION IS IN A SERIES OF STEPS IN EACH OF WHICH A SMALL NUMBER OF GROUPS IS PLACED ON THE PLAZA, THE CONFIGURATION ANALYSED AND THE PLAZA WIPED CLEAN. AT EACH STEP THE NUMBER OF GROUPS PLACED IS IN ACCORDANCE WITH A GIVEN DISTRIBUTION, AND THIS STEP IS REPEATED UNTIL A REQUIRED NUMBER OF GROUPS ARE ANALYSED. THE DATA GATHERED BY THE PROGRAM FOR EACH GROUP ARE

1) THE NUMBER OF PEOPLE IN THE GROUP
2) THE DISTANCE TO THE CLOSEST PHYSICAL OBJECT,
3) THE TYPE OF THE CLOSEST PHYSICAL OBJECT,
4) THE DISTANCE TO THE SECOND CLOSEST PHYSICAL OBJECT,
5) THE TYPE OF THE SECOND CLOSEST PHYSICAL OBJECT,
6) THE DISTANCE TO THE CLOSEST GROUP, IF THERE IS ONE,
7) THE DISTANCE TO THE CLOSEST NON-STATIONARY SINGLE PERSON.

IN ADDITION A LINE-PRINTER PLOT IS PRODUCED SHOWING THE PLAZA, THE LOCATION OF ALL PHYSICAL OBJECTS AND OF ALL GROUPS.

THE PHYSICAL OBJECTS ARE OF 2 DISTINCT CLASSES WHICH MAY BE FURTHER SUBDIVIDED BY ASSIGNING A VALUE TO THEIR 'TYPE':

1) WALLS - STRAIGHT WALLS OF ZERO THICKNESS, SPECIFIED BY THE CO-ORDINATES OF THEIR END-POINTS. BY DEFINITION, 'TYPE'=0,
2) FURNISHINGS - APPROXIMATED AS CIRCULAR OBJECTS AND SPECIFIED BY THEIR CENTRE AND RADIUS. FURNISHINGS CAN BE ASSIGNED ANY 'TYPE' > 0.

THE PLAZA AND THESE OBJECTS ARE CONSTRUCTED SIMPLY IN TERMS OF THE GEOMETRICAL CONCEPTS OF RECTANGLE, POINT, LINE SEGMENT AND CIRCLE. THE SIMULA CLASS GEOMETRY DEFINED BELOW PROVIDES THESE CONCEPTS. FURTHER, THESE CONCEPTS ARE AVAILABLE TO THE SIMULA CLASS PLAZASIMULATION WHICH DEFINES THE CONCEPTS: PLAZA, OBJECTS (WITH SUBCLASSES WALL AND FURNISHING), GROUPLIST AND GROUP NEEDED IN THE SIMULATION. PHYSICAL OBJECTS ARE STORED IN THE LIST 'OBJECTS', AN ATTRIBUTE OF PLAZA. THE CLASS

GROUP DEFINES A GROUP AS A CIRCLE AND INCLUDES AS ATTRIBUTE THE NUMBER OF PEOPLE IN THE GROUP. GROUPLIST IS THE LIST (IE SET) OF ALL GROUPS ON THE PLAZA AT ANY INSTANT.

THE INPUT DATA TO THE PROGRAMME COMPRISES THE FOLLOWING SEQUENCE OF ITEMS:

1) THE OBSERVED FREQUENCY DISTRIBUTION FOR THE NUMBER OF PEOPLE IN A GROUP,
2) THE OBSERVED FREQUENCY DISTRIBUTIONS FOR THE NUMBER OF GROUPS ON THE PLAZA AT ANY INSTANT,
3) THE SIZES OF GROUPS WHERE THE I-TH ITEM IS THE SIZE OF A GROUP OF I PEOPLE,
4) AN IDENTIFYING TITLE FOR THE SIMULATION RUN,
5) THE LENGTH AND BREADTH OF THE PLAZA, AND THE SCALE (FEET/CM) TO BE USED WHEN PLOTTING THE PLAZA,
6) THE NUMBER OF WALL OBJECTS ON THE PLAZA,
7) FOR EACH WALL OBJECT THE (X,Y) COORDINATES OF ITS TWO END-POINTS,
8) THE NUMBER OF FURNISHINGS ON THE PLAZA,
9) FOR EACH FURNISHING THE (X,Y) COORDINATES OF ITS CENTRE, ITS RADIUS AND ITS TYPE (AN INTEGER>0),
10) THE NUMBER OF REGIONS ON THE PLAZA,
11) FOR EACH REGION, THE RANGE OF X AND Y VALUES COVERED BY THE REGION AND THE FREQUENCY WITH WHICH GROUPS OCCUR IN THIS REGION,
12) THE MINIMUM NUMBER OF GROUPS REQUIRED IN THE TOTAL SAMPLE, THE THE RATIO OF (NON-STATIONARY) SINGLE PEOPLE TO PEOPLE IN GROUPS, AND THE INITIAL SEED FOR THE RANDOM NUMBER GENERATOR.

THE FOLLOWING ARE THE GLOBAL VARIABLES:

TITLE	AN IDENTIFYING TITLE FOR THE SIMULATION,
NUMBERSOFGROUPS	OBSERVED CUMULATIVE DIST. FUNCT. FOR GROUPS/PLAZA,
SIMNOFG	SIMULATED VALUES FOR NUMBERSOFGROUPS,
PEOPLEINGROUPS	OBSERVED CUMULATIVE DIST. FUNCT. FOR PEOPLE/GROUP,
SIMNOFP	SIMULATED VALUES FOR PEOPLEINGROUPS,
BOUNDS	INTERVAL BOUNDARIES FOR ABOVE DISTRIBUTIONS,
SIZEOFGROUPS	RADIUS OF GROUPS WITH 1, 2, ... PEOPLE,
SEED	SEED FOR RANDOM NUMBER DRAWS,
MINGROUPS	MINIMUM NUMBER OF GROUPS NEEDED IN TOTAL SAMPLE,
TOTALGROUPS	TOTAL NUMBER OF GROUPS ATTAINED IN TOTAL SAMPLE,

FURTHER, THE FOLLOWING OBJECTS ARE LOCAL TO THE MAIN PROGRAMME BLOCK:

PL	PLAZA USED IN SIMULATION,
GROUPS	LIST OF GROUPS ON PLAZA AT ANY INSTANT;

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"COMMENT" ********************************************* GLOBAL VARIABLES;


"TEXT" TITLE;
"ARRAY" NUMBERSOFGROUPS, PEOPLEINGROUPS, SIZEOFGROUPS, BOUNDS [1:15],
       XBOUNDS, XDIST[0:10],    SIMNOFG, SIMNOFP[1:16];
"INTEGER" SEED, MINGROUPS, TOTALGROUPS;
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"COMMENT" ****************************************************** GEOMETRY

    THIS CLASS DEFINES THE ADDITIONAL CLASSES RECTANGLE, POINT, CIRCLE
AND (LINE) SEGMENT CORRESPONDING TO THE GEOMETRICAL OBJECTS OF THE SAME
NAME.  THE VARIOUS ATTRIBUTES ARE SYSTEMATICALLY NAMED:
    L, B            LENGTH AND BREADTH OF A RECTANGLE,
    X, Y            X AND Y COORDINATES OF A POINT,
    C, R            CENTRE AND RADIUS OF A CIRCLE,
    E1, E2          THE TWO ENDS OF A LINE SEGMENT,
    DISTANCE        A REAL PROCEDURE FOR THE DISTANCE OF THIS OBJECT FROM
                    THE NAMED POINT,
    INPLAZA         A BOOLEAN PROCEDURE WHICH IS TRUE IF THIS OBJECT IS
                    CONTAINED WITHIN THE NAMED RECTANGLE,
    DRAW            FOR RECTANGLE OBJECTS A PROCEDURE TO SETUP IN THE
                    ARRAY PLOT A PICTURE OF THE RECTANGLE,
                    FOR OTHER OBJECTS A PROCEDURE TO DRAW AN IMAGE OF
                    THIS OBJECT WITH THE GIVEN CHARACTER ON THE NAMED
                    RECTANGLE,
                    IMAGE OF THIS OBJECT,
    SETSCALE        A PROCEDURE FOR SETTING A DESIRED SCALE FOR PLOTTING
                    GEOMETRICAL OBJECTS,
    PRINTPLOTARRAY  PROCEDURE FOR COPYING THE PLOT ON TO THE PRIMARY
                    OUTPUT FILE;

SIMSET "CLASS" GEOMETRY;
"BEGIN";

"REAL" "PROCEDURE" MAX(X,Y); "REAL" X,Y;
    MAX := "IF" X>Y "THEN" X "ELSE" Y;

"CLASS" RECTANGLE(L,B); "REAL" L, B;
"BEGIN"  "CHARACTER" "ARRAY" PLOT[0:160,0:80];
         "INTEGER" XMAX, YMAX; "REAL" SCALE, XSCALE, YSCALE;
"PROCEDURE" DRAW;
    "BEGIN" "INTEGER" X, Y;
    "FOR" X:=0 "STEP" 1 "UNTIL" XMAX "DO" PLOT[X,0]:=PLOT[X,YMAX]:=$I$;
    "FOR" Y:=0 "STEP" 1 "UNTIL" YMAX "DO" PLOT[0,Y]:=PLOT[XMAX,Y]:=$-$;
    "FOR" X:=1 "STEP" 1 "UNTIL" XMAX-1 "DO"
    "FOR" Y:=1 "STEP" 1 "UNTIL" YMAX-1 "DO"  PLOT[X,Y] := $ $;
    "END" OF DRAW A RECTANGLE;
"PROCEDURE" PRINT PLOT ARRAY;
    "BEGIN" "INTEGER" X, Y;
    LINES PER PAGE(0);
    OUTTEXT(?SCALE IS 1 CM. =?); OUTFIX(SCALE,2,6); OUTTEXT(? FEET?);
    OUTIMAGE;  OUTIMAGE;
    "FOR" X:=0 "STEP" 1 "UNTIL" XMAX "DO" "BEGIN"
      "FOR" Y:=0 "STEP" 1 "UNTIL" YMAX "DO" OUTCHAR(PLOT[X,Y]);
      OUTIMAGE;  "END";
    LINES PER PAGE(63);
    "END" OF PRINTING PLOT ARRAY;
"PROCEDURE" SETSCALE(SC); "REAL" SC;
    "BEGIN" SCALE := MAX(SC, MAX(4*B/80, 2.4*L/160));
    YSCALE:=SCALE/4; XSCALE:=SCALE/2.4; XMAX:=L/XSCALE; YMAX:=B/YSCALE;
    "END" OF SETTING SCALE;
"END" OF CLASS RECTANGLE;

"CLASS" POINT(X,Y); "REAL" X,Y;
"BEGIN";
"REAL" "PROCEDURE" DISTANCE(P); "REF"(POINT) P;
    DISTANCE := SQRT((X-P.X)'2 + (Y-P.Y)'2);
"BOOLEAN" "PROCEDURE" INRECT(RECT); "REF"(RECTANGLE) RECT;
    INRECT := "NOT"((X<0) "OR" (X>RECT.L) "OR" (Y<0) "OR" (Y>RECT.B));
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"PROCEDURE" DRAW(RECT,CH); "REF"(RECTANGLE) RECT; "CHARACTER" CH;
    "IF" INRECT(RECT) "THEN" "INSPECT" RECT "DO"
    "BEGIN" "INTEGER" I, J;
    I := ENTIER(X/XSCALE+0.5);  J := ENTIER(Y/YSCALE+0.5);
    "IF" CH=$*$ & PLOT[I,J]"NOT EQUAL"$ $ "THEN"
      PLOT[I,J] := $?$ "ELSE" PLOT[I,J] := CH;
    "END"  OF DRAW A POINT;
"END" OF CLASS POINT;

"CLASS" CIRCLE(C,R); "REF"(POINT) C; "REAL" R;
    "BEGIN"  "REF"(SEGMENT) CRD;
"BOOLEAN" "PROCEDURE" INRECT(RECT); "REF"(RECTANGLE) RECT;
    INRECT := C.INRECT(RECT);
"PROCEDURE" DRAW(RECT,CH); "REF"(RECTANGLE) RECT; "CHARACTER" CH;
    "BEGIN" "REAL" X,Y, X0,Y0;
    "IF" R=0 "THEN" C.DRAW(RECT,CH) "ELSE"
      "FOR" X0:=0 "STEP" RECT.XSCALE "UNTIL" R "DO"
        "BEGIN" Y0 := SQRT(R'2 - X0'2);
        "FOR" X:=C.X-X0,C.X+X0 "DO"  "BEGIN"
          CRD.E1.X := CRD.E2.X := X;  CRD.E1.Y := C.Y - Y0;
          CRD.E2.Y := C.Y + Y0;  CRD.DRAW(RECT,CH);  "END";
        "END";
    "END"  OF DRAWING A CIRCLE;
CRD :- "NEW" SEGMENT("NEW" POINT(0,0), "NEW" POINT(0,0));
"END" OF CLASS CIRCLE;

"CLASS" SEGMENT(E1,E2); "REF"(POINT) E1, E2;
"BEGIN"  "REF"(POINT) P;
"REAL" "PROCEDURE" DISTANCE(P); "REF"(POINT) P;
    "BEGIN" "REAL" X,Y, X0,Y0, COSA,SINA, XROT, D;
    "COMMENT" TRANSLATE ORIGIN TO E1 AND ROTATE SO E2 ON X-AXIS;
    X  := E2.X - E1.X;  Y  := E2.Y - E1.Y;
    X0 := P.X - E1.X;      Y0 := P.Y - E1.Y;
    XROT := SQRT(X'2 + Y'2);  COSA := X/XROT;  SINA := Y/XROT;
    D := ABS(SINA*X0 - COSA*Y0);  X0 := COSA*X0 + SINA*Y0;
    "IF" X0<0    "THEN" D := P.DISTANCE(E1) "ELSE"
    "IF" X0>XROT "THEN" D := P.DISTANCE(E2);
    DISTANCE := D;
    "END" OF DISTANCE;
"BOOLEAN" "PROCEDURE" INRECT(RECT); "REF"(RECTANGLE) RECT;
    INRECT := E1.INRECT(RECT) & E2.INRECT(RECT);
"PROCEDURE" DRAW(RECT,CH); "REF"(RECTANGLE) RECT; "CHARACTER" CH;
    "BEGIN" "REAL" A, M, D;
    "INSPECT" RECT "DO"  "IF" E1.X=E2.X
    "THEN" "BEGIN" D:="IF" E2.Y>E1.Y "THEN" YSCALE "ELSE" -YSCALE;
      P.X := E1.X;
      "FOR" P.Y:=E1.Y "STEP" D "UNTIL" E2.Y "DO"
      P.DRAW(RECT,CH) "END"
    "ELSE" "BEGIN" D:="IF" E2.X>E1.X "THEN" XSCALE "ELSE" -XSCALE;
      M := (E2.Y-E1.Y)/(E2.X-E1.X); A := E2.Y - M*E2.X;
      "FOR" P.X:=E1.X "STEP" D "UNTIL" E2.X "DO"
        "BEGIN" P.Y := A + M*P.X; P.DRAW(RECT,CH) "END"   "END";
    E2.DRAW(RECT,CH);
    "END" OF DRAW A LINE SEGMENT;
P :- "NEW" POINT(0,0);
"END" OF CLASS SEGMENT;

"END" OF CLASS GEOMETRY;
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"COMMENT" ********************************************** PLAZA SIMULATION

    THIS CLASS COLLECTS TO GETHER AS SUBCLASSES THE VARIOUS CONCEPTS
REQUIRED IN THE PLAZA SIMULATION.  EACH CONCEPT IS DOCUMENTED WHEN IT
IS DEFINED;

GEOMETRY "CLASS" PLAZA SIMULATION;
"BEGIN"

"COMMENT" ******************************************************** PLAZA

    THIS CLASS CREATES A PLAZA, SETS THE SCALE FOR PLOTTING IT, CREATES
THE LIST OBJECTS FOR HOLDING THE OBJECTS AND CONSTRUCTS THE VARIOUS
OBJECTS ON THE PLAZA.  DATA ITEMS 5 - 9 (SEE ABOVE) ARE READ IN THIS
PROCESS,
    BOUNDARY         THE RECTANGULAR BOUNDARY OF THE PLAZA,
    OBJECTS          THE LIST (SET) IN WHICH THE OBJECTS ON THE PLAZA ARE
                     STORED,
    CREATEOBJECTS    PROCEDURE FOR CREATING OBJECTS ON THE PLAZA AND IF
                     THEY ARE VALID, ENTERING THEM INTO THE ABOVE LIST,
    DRAW             PROCEDURE FOR DRAWING ON BOUNDARY'S PLOT THE VARIOUS
                     PHYSICAL OBJECTS ON THIS PLAZA
    REGIONS          THE NUMBER OF REGIONS ON THE PLAZA,
    C1X, C2X         RANGE OF X-VALUES FOR EACH REGION,
    C1Y, C2Y         RANGE OF Y-VALUES FOR EACH REGION,
    FREQ             FREQUENCY WITH WHICH GROUPS OCCUR IN EACH REGION;

"CLASS" PLAZA;
"BEGIN" "REF"(RECTANGLE) BOUNDARY;  "INTEGER" REGIONS;
        "ARRAY" C1X,C1Y, C2X,C2Y, FREQ[1:30];
        "REF"(HEAD) OBJECTS;
"PROCEDURE" CREATE OBJECTS;
    "BEGIN" "INTEGER" I,J,N;  "REF"(OBJECT) O;
    "FOR" I:= 1,2 "DO"
      "BEGIN" OUTIMAGE;  N:=ININT;  INIMAGE;
      "IF" N>0 "THEN" "BEGIN" EJECT(LINE+2);
        "IF" I=1 "THEN"
          "BEGIN" OUTTEXT(?  WALL OBJECTS?); OUTIMAGE; OUTIMAGE;
          OUTTEXT(?        NO.         E1              E2?) "END";
        "IF" I=2 "THEN"
          "BEGIN" OUTTEXT(?  FURNISHINGS?); OUTIMAGE; OUTIMAGE;
          OUTTEXT(?        NO.       CENTRE     SIZE  TYPE?) "END";
        OUTIMAGE;
        "FOR" J:= 1 "STEP" 1 "UNTIL" N "DO"
          "BEGIN" OUTINT(J,9);
          "IF" I=1 "THEN" O:-"NEW" WALL "ELSE" O:-"NEW" FURNISHING;
          "IF" O.INPLAZA(BOUNDARY)
            "THEN" "BEGIN" O.INTO(OBJECTS) "END"
            "ELSE" "BEGIN" OUTTEXT(? *** INVALID OBJECT ?) "END";
          OUTIMAGE;
          "END";
        "END";
      "END";
    "END" OF CREATING OBJECTS;
"PROCEDURE" CREATE REGIONS;
    "BEGIN" "INTEGER" I;
    REGIONS := ININT;  INIMAGE;
    "IF" REGIONS>0
      "THEN"  "BEGIN"  "FOR" I:=1 "STEP" 1 "UNTIL" REGIONS "DO"
        "BEGIN"  C1X[I] := INREAL; C2X[I] := INREAL; C1Y[I]
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      C2Y[I] := INREAL; FREQ[I] := INREAL;  INIMAGE  "END"  "END"
     "ELSE" "BEGIN"
     REGIONS := 1; C1X[1] := C1Y[1] := 0;
     C2X[1] := BOUNDARY.L; C2Y[1] := BOUNDARY.B; FREQ[1] := 1;
     "END";
    EJECT(LINE+2); OUTTEXT(?REGIONS OF PLAZA?); OUTIMAGE; OUTIMAGE;
    OUTTEXT
     (?  REGION      C1X       C2X       C1Y       C2Y   FREQUENCY?));
    OUTIMAGE;
    "FOR" I:=1 "STEP" 1 "UNTIL" REGIONS "DO"
     "BEGIN" OUTINT(I,6); OUTFIX(C1X[I],1,10); OUTFIX(C2X[I],1,10);
     OUTFIX(C1Y[I],1,10); OUTFIX(C2Y[I],1,10); OUTFIX(FREQ[I],1,10);
     OUTIMAGE;  "END";
    RELFREQUENCY(FREQ,1,30);
    "END"  OF CREATING REGIONS;
"PROCEDURE" DRAW;
    "BEGIN" "REF"(OBJECT) O;
    BOUNDARY.DRAW;
    "IF" "NOT" OBJECTS.EMPTY "THEN"
     "FOR" O:-OBJECTS.FIRST,O.SUC "WHILE" O=/="NONE" "DO"
      O.DRAW(BOUNDARY);
    "END" OF DRAWING A PLAZA;

BOUNDARY :- "NEW" RECTANGLE(INREAL,INREAL); EJECT(LINE+2);
OUTTEXT(?  PLAZA HAS A LENGTH OF?); OUTFIX(BOUNDARY.L,1,6);
OUTTEXT(?  AND A BREADTH OF ?);     OUTFIX(BOUNDARY.B,1,6);
OUTIMAGE;
BOUNDARY.SET SCALE(INREAL); INIMAGE;
OBJECTS :- "NEW" HEAD;
CREATE OBJECTS;  CREATE REGIONS;
EJECT(LINE+2); OUTTEXT(?PLAZA CREATED?); OUTIMAGE;
"END" OF CLASS PLAZA;



"COMMENT" ********************************************************* OBJECT

    THIS CLASS INTRODUCES THE TWO CLASSES OF OBJECTS WHICH MAY APPEAR ON
A PLAZA AND THOSE ATTRIBUTES COMMON TO BOTH CLASSES.
    TYPE         AN INTEGER USED TO FURTHER CLASSIFY OBJECTS,
    INPLAZA      A BOOLEAN PROCEDURE WHICH IS TRUE IF THE OBJECT IS WITH-
                 IN THE BOUNDARY OF THE NAMED PLAZA,
    DRAW         A PROCEDURE TO DRAW THIS OBJECT ON THE NAMED PLAZA;

LINK "CLASS" OBJECT; "VIRTUAL": "BOOLEAN" "PROCEDURE" INPLAZA;
                                "PROCEDURE" DRAW;
"BEGIN" "INTEGER" TYPE;
"END" OF CLASS OBJECT;

"COMMENT" ************************************************************ WALL

    THIS IS A WALL OBJECT WHOSE LINE SEGMENT IS SEG AND WHOSE TYPE IS 0
BY DEFINITION. THE ACTIONS OF THE CLASS CREATE THE OBJECT BY READING
ONE OF THE DATA ITEMS 7 (SEE ABOVE);

OBJECT "CLASS" WALL;
"BEGIN"  "REF"(SEGMENT) SEG;
"BOOLEAN" "PROCEDURE" INPLAZA(BOUNDARY); "REF"(RECTANGLE) BOUNDARY;
    INPLAZA := SEG.INRECT(BOUNDARY);
"PROCEDURE" DRAW(RECT); "REF"(RECTANGLE) RECT;   SEG.DRAW(RECT,$W$);
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SEG :- "NEW" SEGMENT("NEW" POINT(INREAL,INREAL),
                     "NEW" POINT(INREAL,INREAL));
TYPE := 0;  INIMAGE;
OUTFIX(SEG.E1.X,1,10);  OUTFIX(SEG.E1.Y,1,6);
OUTFIX(SEG.E2.X,1,10);  OUTFIX(SEG.E2.Y,1,6);
"END" OF CLASS WALL;

"COMMENT"*************************************************** FURNISHING

    THIS IS A FURNISHING OBJECT WHOSE CIRCLE IS CRCL AND TYPE IS >0.
THE ACTIONS OF THE CLASS CREATE THE OBJECT BY READING ONE OF THE DATA
ITEMS 9 (SEE ABOVE);

OBJECT "CLASS" FURNISHING;
"BEGIN"  "REF"(CIRCLE) CRCL;
"BOOLEAN" "PROCEDURE" INPLAZA(BOUNDARY); "REF"(RECTANGLE) BOUNDARY;
    INPLAZA := CRCL.INRECT(BOUNDARY);
"PROCEDURE" DRAW(RECT); "REF"(RECTANGLE) RECT;   CRCL.DRAW(RECT,$F$);

CRCL :- "NEW" CIRCLE("NEW" POINT(INREAL,INREAL), INREAL);
TYPE := ININT; INIMAGE;
OUTFIX(CRCL.C.X,1,10);  OUTFIX(CRCL.C.Y,1,6);
OUTFIX(CRCL.R,1,6);     OUTINT(TYPE,5);
"END" OF CLASS FURNISHING;



"COMMENT" *************************************************** GROUPLIST

    THIS CLASS DEFINES A LIST OF GROUPS ASSOCIATED WITH A PLAZA AND THE
PROCEDURES REQUIRED FOR FORMING GROUPS AND REPORTING STATISTICS.
    DRAWGROUPS    MARK THE CENTRE OF EACH GROUP IN THIS LIST ON THE PLOT
                  OF THE NAMED PLAZA,
    FORMGROUPS    CREATE A LIST OF N GROUPS ON THE PLAZA PL AND FOR EACH
                  GROUP FIND ITS TWO NEAREST OBJECTS AND NEAREST GROUP,
    FORMSINGLES   CREATE A LIST OF (NON-STATIONARY) SINGLE PEOPLE ON THE
                  PLAZA AND FIND THE MINIMUM DISTANCE FROM EACH GROUP TO A
                  SINGLE PERSON,
    REPORT        PRINT THE STATISTICS GATHERED FOR EACH GROUP IN THIS
                  LIST,
    MINSEP        PROCEDURE RETURNING DISTANCE BETWEEN THE GROUP G AND ITS
                  CLOSEST NEIGHBOUR BETWEEN AND INCLUSIVE OF G1 AND G2.
    FIRSTSINGLE   POINTER TO THE FIRST SINGLE PERSON IN THE GROUPLIST;

HEAD "CLASS" GROUPLIST;
"BEGIN"  "REF"(GROUP) FIRSTSINGLE;
"PROCEDURE" DRAWGROUPS(PL); "REF"(PLAZA) PL;
    "IF" "NOT" EMPTY "THEN"
      "BEGIN" "REF"(GROUP) G;
      "FOR" G :- FIRST, G.SUC "WHILE" G=/=FIRSTSINGLE "DO"
      G.CRCL.C.DRAW(PL.BOUNDARY,CHAR(G.PEOPLE+RANK($0$)));
      "END" OF DRAWING A GROUPLIST;
"PROCEDURE" FORMGROUPS(N,PL); "INTEGER" N; "REF"(PLAZA) PL;
    "BEGIN" "INTEGER" I; "REF"(GROUP) G;
    CLEAR;
    "FOR" I:=0 "WHILE" CARDINAL<N "DO"
      "BEGIN" G :- "NEW" GROUP(PL);


      "IF" G.VALID "THEN"  "INSPECT" G "DO" "IF" CARDINAL=0
        "THEN" "BEGIN" INTO("THIS" GROUPLIST); FINDNGHBRS ...
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        "ELSE" "IF" MINSEP(G,FIRST,LAST)>0 "THEN"
          "BEGIN" INTO("THIS" GROUPLIST); FINDNGHBRS "END";
      "END";
    "FOR" G:-FIRST,G.SUC "WHILE" G=/="NONE" "DO"
      G.GRPSEP := MINSEP(G,FIRST,LAST);
    "END" OF FORMING GROUPS;
"PROCEDURE" FORMSINGLES(N,PL); "INTEGER" N; "REF"(PLAZA) PL;
    "BEGIN"  "INTEGER" I, WALKERS;  "REF"(GROUP) G;
    FIRSTSINGLE :- "NONE";    WALKERS := 0;
    "FOR" I:=0 "WHILE" WALKERS "LESS" N "DO"
      "BEGIN"  G :- "NEW" GROUP(PL);
      "IF" G.VALID & MINSEP(G,FIRST,LAST)>0 "THEN"
        "BEGIN" G.INTO("THIS" GROUPLIST);
         WALKERS := WALKERS + G.PEOPLE;
         "IF" FIRSTSINGLE=="NONE" "THEN" FIRSTSINGLE :- G;   "END";
      "END"   OF FORMING THE LIST OF SINGLES;
    "FOR" G:-FIRST, G.SUC "WHILE" G=/=FIRSTSINGLE "DO"
      G.GRPWLK := MINSEP(G,FIRSTSINGLE,LAST);
    "END" OF FORMSINGLES;
"REAL" "PROCEDURE" MINSEP(G,G1,G2); "REF"(GROUP) G,G1,G2;
  "BEGIN"  "BOOLEAN" MORE;  "REF"(GROUP) G0; "REAL" SEP, SEP0;
   SEP0 := 10'10;  MORE := G1=/="NONE";
  "IF"  MORE "THEN"    "FOR" G0:-G1, G0.SUC "WHILE" MORE "DO"
    "BEGIN" MORE := G0.SUC=/="NONE" & G0=/=G2;
    "IF" G0=/=G "THEN"
       "BEGIN" SEP:=(G0.CRCL.C).DISTANCE(G.CRCL.C)-G0.CRCL.R-G.CRCL.R;
       "IF" SEP<SEP0 "THEN" SEP0:=SEP;    "END";
    "END";
    MINSEP := SEP0;
  "END" OF MINSEP;
"PROCEDURE" REPORT;
    "BEGIN" "REF"(GROUP) G;
    "FOR" G:-FIRST,G.SUC "WHILE" G=/=FIRSTSINGLE "DO"
      "INSPECT" G "DO"
      "BEGIN"   OUTINT(PEOPLE,8);
      "IF" NGHBR1=/="NONE"
        "THEN" "BEGIN"
        OUTFIX(0.5*SEPARATION(NGHBR1),1,12); OUTINT(NGHBR1.TYPE,5);
        OUTFIX(0.5*SEPARATION(NGHBR2),1,10); OUTINT(NGHBR2.TYPE,5)  "END"
        "ELSE" OUTTEXT(?                                    ?);
      "IF" GRPSEP<10'10 "THEN" OUTFIX(0.5*GRPSEP,1,10)
                        "ELSE" OUTTEXT(?           ?);
      "IF" GRPWLK<10'10 "THEN" OUTFIX(0.5*GRPWLK,1,10)
                        "ELSE" OUTTEXT(?           ?);
      OUTIMAGE "END";
    OUTIMAGE;
    "END"  OF REPORT THIS GROUPLIST'S RESULTS;
"END" OF CLASS GROUPLIST;



"COMMENT" ************************************************************ GROUP

    THIS CLASS DEFINES THE CONCEPT OF A GROUP ASSOCIATED WITH THE PLAZA
PL.  ITS ACTIONS CREATE A RANDOM GROUP ON THIS PLAZA BUT DO NOT CHECK
ON ITS VALIDITY - THIS IS DONE IN GROUPLIST'S FORMGROUPS.
    PL              THE PLAZA ON WHICH THIS GROUP IS LOCATED,
    CRCL            THE CIRCLE REPRESENTING THIS GROUP,
    PEOPLE          THE NUMBER OF PEOPLE IN THIS GROUP,
    GRPSEP          THE DISTANCE TO THE NEAREST GROUP ON THE GROUPLIST
                    OF WHICH THIS GROUP IS A MEMBER,
```

```
    GRPWLK         DISTANCE TO CLOSEST NON-STATIONARY PERSON,
    NGHBR1          A REFERENCE TO THE OBJECT CLOSEST TO THIS GROUP,
    NGHBR2          REFERENCE TO THE SECOND CLOSEST OBJECT TO THIS GROUP,
    VALID           BOOLEAN PROCEDURE WHICH IS TRUE IF THIS GROUP IS A
                    LEGITIMATE GROUP ON THE PLAZA PL, TAKING ACCOUNT OF
                    OTHER GROUPS ON THAT PLAZA,
    SEPARATION      REAL PROCEDURE FOR THE DISTANCE BETWEEN THIS GROUP
                    AND THE NAMED OBJECT,
    FINDNGHRBS      PROCEDURE FOR DETERMINING NGHBR1 AND NGHBR2;

LINK "CLASS" GROUP(PL); "REF"(PLAZA) PL;
"BEGIN" "REF"(CIRCLE) CRCL; "REAL" GRPSEP, GRPWLK;  "INTEGER" PEOPLE;
      "REF"(OBJECT) NGHBR1, NGHBR2;
"BOOLEAN" "PROCEDURE" VALID;
    "BEGIN" "REF"(OBJECT) O;  "BOOLEAN" OK; OK := "TRUE";
    "IF" "NOT" PL.OBJECTS.EMPTY "THEN"
      "FOR" O:-PL.OBJECTS.FIRST,O.SUC "WHILE" O=/="NONE" & OK "DO"
        "IF" O "IS" FURNISHING "THEN"
        OK:=OK & (O "QUA" FURNISHING).CRCL.C.DISTANCE(CRCL.C) -
                 (O "QUA" FURNISHING).CRCL.R > 0;
    VALID := OK;
    "END"  OF VALID GROUP;
"REAL" "PROCEDURE" SEPARATION(O); "REF"(OBJECT) O;
    "BEGIN" "REAL" D;
    "IF" O "IS" FURNISHING "THEN"
      D := (O "QUA" FURNISHING).CRCL.C.DISTANCE(CRCL.C) - CRCL.R -
           (O "QUA" FURNISHING).CRCL.R;
    "IF" O "IS" WALL "THEN"
      D := (O "QUA" WALL).SEG.DISTANCE(CRCL.C) - CRCL.R;
    SEPARATION := "IF" D>0 "THEN" D "ELSE" 0;
    "END" OF SEPARATION;
"PROCEDURE" FINDNGHBRS;
    "INSPECT" PL.OBJECTS "DO" "IF" "NOT" EMPTY "THEN"
    "BEGIN" "REF"(OBJECT) O; "REAL" SEP, MINSEP;
    NGHBR1 :- FIRST;  MINSEP := 10'10;
    "FOR" O:-FIRST,O.SUC "WHILE" O=/="NONE" "DO"
      "BEGIN" SEP := SEPARATION(O);
      "IF" SEP<MINSEP "THEN" "BEGIN" NGHBR1:-O; MINSEP:=SEP "END";
      "END";
    NGHBR2 :- FIRST;  MINSEP := 10'10;
    "FOR" O:-FIRST,O.SUC "WHILE" O=/= "NONE" "DO"
      "BEGIN" SEP := SEPARATION(O);
      "IF" O=/=NGHBR1 & SEP<MINSEP "THEN"
        "BEGIN" NGHBR2 :- O; MINSEP := SEP "END";
      "END";
    "END" OF FINDNGHBRS;

"INSPECT" PL "DO"
  "BEGIN"  "REF"(POINT) C; "REAL" R; "INTEGER" I;
  I       := 1 + DISCRETE(FREQ,SEED);
  C       :- "NEW" POINT(UNIFORM(C1X[I],C2X[I],SEED),
                         UNIFORM(C1Y[I],C2Y[I],SEED));
  PEOPLE  := 1 + DISCRETE(PEOPLEINGROUPS,SEED);
  R       := SIZEOFGROUPS[PEOPLE];
  CRCL    :- "NEW" CIRCLE(C,R);
  "END"  OF CREATING THIS GROUP;
"END" OF CLASS GROUP;

"END" OF CLASS PLAZA SIMULATION;
```

```
"COMMENT" ************************************** PROCEDURE DECLARATIONS

    THE FOLLOWING PROCEDURES ARE USED IN THE PROGRAMME:

    NEWPAGE                  EJECTS TO A NEW PAGE AND PRINTS THE TITLE,
    INARRAY                  READS AN ARRAY, STOPPING AT FIRST ZERO ELEMENT,
    READCUMLT                READS A RELATIVE FREQUENCY DISTRIBUTION AND
                             CONVERTS IT TO A CUMULATIVE DISTRIBUTION FNCT,
    PRINTDISTRIBUTIONS       PRINTS THE TWO NAMED CUMULATIVE DISTRIBUTIONS,
    RELFREQUENCY             CONVERTS THE GIVEN RELATIVE FREQUENCY DIST-
                             RIBUTION INTO A CUMULATIVE DISTRIBUTION FNCT;

"PROCEDURE" NEWPAGE;
    "BEGIN" EJECT(2);
    OUTTEXT(?SIMULATION OF THE USE OF PEDESTRIAN PLAZAS --- EDITION 4?);
    OUTIMAGE;
    OUTTEXT(?========== == === === == ========== ======      =======?);
    OUTIMAGE;    OUTIMAGE;
    OUTTEXT(TITLE); OUTIMAGE; EJECT(LINE+2);
    "END" OF NEWPAGE;
"PROCEDURE" INARRAY(ARAY,LWR,UPR);  "INTEGER" LWR, UPR; "ARRAY" ARAY;
    "BEGIN" "INTEGER" I;
    "FOR" I:=LWR,I+1 "WHILE" ARAY[I-1]>0 & I-1<UPR "DO" ARAY[I]:=INREAL;
    INIMAGE;
    "END" OF INARRAY;
"PROCEDURE" READCUMLT(DST,LWR,UPR); "ARRAY" DST; "INTEGER" LWR,UPR;
    "BEGIN"
    INARRAY(DST,LWR,UPR);  RELFREQUENCY(DST,LWR,UPR);
    "END" OF READCUMLT;
"PROCEDURE" PRINTDISTRIBUTIONS(DST1,DST2,LWR,UPR);
    "ARRAY" DST1, DST2;  "INTEGER" LWR, UPR;
    "BEGIN" "INTEGER" I;
    OUTTEXT(?             RELATIVE FREQUENCIES FOR?);   OUTIMAGE;
    OUTTEXT(?   CASE   PEOPLE/GROUP   GROUPS/PLAZA?);  OUTIMAGE;
    "FOR" I:=LWR "STEP" 1 "UNTIL" UPR "DO"
      "BEGIN" OUTINT(I,5); OUTFIX(DST1[I],3,15); OUTFIX(DST2[I],3,15);
     OUTIMAGE;  "END";
    "END" OF PRINTDISTRIBUTIONS;
"PROCEDURE" RELFREQUENCY(DST,LWR,UPR); "ARRAY" DST; "INTEGER" LWR, UPR;
    "BEGIN" "INTEGER" I;
    "FOR" I:=LWR+1 "STEP" 1 "UNTIL" UPR "DO" DST[I]:=DST[I]+DST[I-1];
    "FOR" I:=LWR "STEP" 1 "UNTIL" UPR "DO" DST[I]:=DST[I]/DST[UPR];
    "END" OF RELFREQUENCY;



"COMMENT" ********************************************** MAIN PROGRAMME;

PLAZASIMULATION "BEGIN";
"REF" (PLAZA) PL;  "REF" (GROUPLIST) GROUPS;
"INTEGER" I, N, TOTALPEOPLE;  "REAL" SNGLRATIO;

"COMMENT" READ AND PRINT OBSERVED DISTRIBUTIONS, GROUP SIZES, ETC;
  "FOR" I:=1 "STEP" 1 "UNTIL" 15 "DO" BOUNDS[I] := I;
  READCUMLT(PEOPLEINGROUPS,1,15);  READCUMLT(NUMBERSOFGROUPS,1,15);
  INARRAY(SIZEOFGROUPS,1,15);
```

```
  TITLE :- BLANKS(80); TITLE := INTEXT(80); NEWPAGE;
  OUTTEXT(?    SIZES OF GROUPS:-?); OUTIMAGE; OUTIMAGE;
  OUTTEXT(?    PEOPLE: ?);
  "FOR" I:=1 "STEP" 1 "UNTIL" 10 "DO" OUTINT(I,6); OUTIMAGE;
  OUTTEXT(?    RADIUS: ?);
  "FOR" I:=1 "STEP" 1 "UNTIL" 10 "DO" OUTFIX(SIZEOFGROUPS[I],1,6);
  OUTIMAGE;  EJECT(LINE+2);
  OUTTEXT(?RELATIVE FREQUENCIES OF PEOPLE/GROUP, GROUPS/PLAZA USED ?);
  OUTTEXT(?DURING SIMULATION?); OUTIMAGE; OUTIMAGE;
  PRINTDISTRIBUTIONS(PEOPLEINGROUPS,NUMBERSOFGROUPS,1,12);

"COMMENT" CREATE PLAZA (NB:  THIS READS DATA ITEMS 5-11);
  PL :- "NEW" PLAZA;  PL.DRAW;

"COMMENT" READ THE MINIMUM NUMBER OF GROUPS REQUIRED, GENERATE THESE AND
PRINT THE DATA GATHERED FOR EACH GROUP;
  MINGROUPS := ININT;  SNGLRATIO := INREAL;  SEED := ININT;
  "IF" MINGROUPS>0 "THEN"
  "BEGIN"  NEWPAGE;
  OUTTEXT(?NUMBER OF GROUPS REQUIRED           =?);
  OUTINT(MINGROUPS,5);  OUTIMAGE;
  OUTTEXT(?RATIO OF SINGLES TO PEOPLE IN GROUPS =?);
  OUTFIX(SNGLRATIO,1,5);  OUTIMAGE;
  OUTTEXT(?INITIAL RANDOM NUMBER SEED          =?);
  OUTINT(SEED,8); OUTIMAGE;
  OUTIMAGE;
  OUTTEXT(?THE FOLLOWING DISTANCES ARE IN PACES (= 2.0 FEET)?);
  OUTIMAGE;
  EJECT(LINE+3); OUTTEXT
    (?    PEOPLE        CLOSEST  OBJECTS           CLOSEST   CLOSEST?);
  OUTIMAGE; OUTTEXT
    (?   IN GROUP  DISTANCE TYPE  DISTANCE TYPE     GROUP     WALKER?);
    OUTIMAGE;
  GROUPS :- "NEW" GROUPLIST;
  "FOR" I:=0 "WHILE" TOTALGROUPS<MINGROUPS "DO"
    "INSPECT" GROUPS "DO"
      "BEGIN"  "REF"(GROUP) G;
      N := 1 + DISCRETE(NUMBERSOFGROUPS,SEED);  FORMGROUPS(N,PL);
      TOTALPEOPLE := 0;
      "FOR" G:-FIRST,G.SUC "WHILE" G=/="NONE" "DO"
        TOTALPEOPLE := TOTALPEOPLE + G.PEOPLE;
      FORMSINGLES(ENTIER(SNGLRATIO*TOTALPEOPLE),PL);
      TOTALGROUPS := TOTALGROUPS + N;
      REPORT;    HISTO(SIMNOFG,BOUNDS,N,1);   DRAWGROUPS(PL);
      "FOR" G:-FIRST,G.SUC "WHILE" G=/=FIRSTSINGLE "DO"
          HISTO(SIMNOFP,BOUNDS,G.PEOPLE,1);
      "END"
  "END"
  "ELSE" "BEGIN"  OUTTEXT(?NO GROUPS REQUESTED?); OUTIMAGE "END";

"COMMENT" IF GROUPS WERE FORMED, PRINT THE CUMULATIVE DISTRIBUTIONS
GENERATED DURING THE SIMULATION;
  "IF" MINGROUPS>0 "THEN"
  "BEGIN" EJECT(LINE+2);
  OUTTEXT(?   NUMBER OF GROUPS IN SIMULATION WAS?);
  OUTINT(TOTALGROUPS,6); OUTIMAGE;
  RELFREQUENCY(SIMNOFP,1,15);  RELFREQUENCY(SIMNOFG,1,15);
  EJECT(LINE+2);
  OUTTEXT(?RELATIVE FREQUENCIES OF PEOPLE/GROUP, GROUPS/PLAZA IN ?);
  OUTTEXT(?SIMULATION?);  OUTIMAGE; EJECT(LINE+2);
  PRINTDISTRIBUTIONS(SIMNOFP,SIMNOFG,1,12);
  "END";
```

```
"COMMENT" COPY THE PLOT OF THE PLAZA ONTO THE PRIMARY OUTPUT FILE;
  NEWPAGE;  PL.BOUNDARY.PRINT PLOT ARRAY;

"END" OF MAIN PROGRAMME;
"END" OF PROGRAMME;




157 139 37  11  6   0                          DISTRIBUTION OF GROUP SIZES
23 27 16  7 11  8  3  4  1  1  2  0            GROUPS PER PHOTO
0.5 1.0 1.5 2.0 2.5  0                         RADII OF GROUPS
PETRIE PLAZA:  SIMULATION 3,  WALKERS NOW PLACED ON PLAZA
  323   100  5         DIMENSION CF STUDY AREA
    5                          DETAILS OF WALL OBJECTS
   30     0  273     0
    0    41    0    94
    6   100  125   100
  150   100  270   100
  323     0  323   100          KERB
   67                          DETAILS OF FURNISHINGS
    0     0    0     9         PILLAR
   15     0    0     9
  295     0    0     9
    0    35    2     7         NOTICE BOARD
  265    53    5     8         KIOSK
   48    29    4     6         BENCH  --- ALL TYPE 6 ARE BENCHES
   53    65    4     6
   53    80    4     6
   65    73    4     6
   91    73    4     6
  176    73    4     6
  164    65    4     6
  206    65    4     6
  265    65    4     6
  176    58    4     6
  180    35    4     6
  214    35    4     6
   74    51    6     6
  148    65    0    10         FOUNTAIN
  235    58    8    12         TABLES
   38    11    0     5         DUSTBIN --- ALL TYPE 5 ARE DUSTBINS
  139    11    0     5
  240    11    0     5
  211    46    0     5
  194    65    0     5
  278    65    0     5
   61    56    1     5
  173    43    1     5
  104    70    1     5
   39    56    0     4         LAMP --- ALL TYPE 4 ARE LAMPS
   60    19    0     4
   90    56    0     4
  129    80    0     4
  163    80    0     4
  189    35    0     4
  231    35    0     4
  231    66    0     4
```

```
 13    70    1    3          TREE --- ALL TYPE 3 ARE TREES
 35    79    0    3
 60    79    0    3
 86    79    0    3
104    79    0    3
180    79    0    3
206    79    0    3
264    79    0    3
291    79    0    3
228    79    0    3
 61    65    0    3
 75    70    0    3
168    56    0    3
193    56    0    3
279    56    0    3
214    65    0    3
291    66    0    3
 35    20    0    3
 89    20    0    3
140    20    0    3
195    20    0    3
155    34    0    3
168    26    0    3
206    34    0    3
219    26    0    3
231    30    0    3
248    33    0    3
291    53    0    3
 18                              REGIONS ON THE PLAZA
  0   161   85  100  16.1        FIRST 8 ARE HIGH DENSITY TRAFFIC AREAS
  0    50    0   85  28.4
 50    70    0   60   8
 70    90    0   45   6
 90   108    0   35   4.2
108   122    0   27   2.5
122   141    0   21   2.7
141   161    0   12   1.6
 50    70   60   85   0.9      NEXT 6 ARE HIGH DENSITY NON-TRAFFIC AREAS
 70    90   45   85   1.5
 90   108   35   85   1.7
108   122   27   85   1.5
122   141   21   85   2.2
141   161   12   85   2.7
161   310   12   85   2.6      LOW DENSITY NON-TRAFFIC AREA
161   323   85  100   7.9      LAST 3 ARE LOW DENSITY TRAFFIC AREAS
310   323   12   85   3.1
161   323    0   12   6.4
351 5.8 12345      TOTAL NUMBER OF GROUPS, SINGLES RATIO, INITIAL SEED
```

SIMULATION OF THE USE OF PEDESTRIAN PLAZAS --- EDITION 4

PETRIE PLAZA: SIMULATION 3, WALKERS NOW PLACED ON PLAZA

SIZES OF GROUPS:-

PEOPLE:	1	2	3	4	5	6	7	8	9	10
RADIUS:	0.5	1.0	1.5	2.0	2.5	0.0	0.0	0.0	0.0	0.0

RELATIVE FREQUENCIES OF PEOPLE/GROUP, GROUPS/PLAZA USED DURING SIMULATION

	RELATIVE FREQUENCIES FOR	
CASE	PEOPLE/GROUP	GROUPS/PLAZA
1	0.449	0.223
2	0.846	0.485
3	0.951	0.641
4	0.983	0.709
5	1.000	0.816
6	1.000	0.893
7	1.000	0.922
8	1.000	0.961
9	1.000	0.971
10	1.000	0.981
11	1.000	1.000
12	1.000	1.000

PLAZA HAS A LENGTH OF 323.0 AND A BREADTH OF 100.0

WALL OBJECTS

NO.	E1		E2	
1	30.0	0.0	273.0	0.0
2	0.0	41.0	0.0	94.0
3	6.0	100.0	125.0	100.0
4	150.0	100.0	270.0	100.0
5	323.0	0.0	323.0	100.0

FURNISHINGS

NO.	CENTRE		SIZE	TYPE
1	0.0	0.0	0.0	9
2	15.0	0.0	0.0	9
3	295.0	0.0	0.0	9
4	0.0	35.0	2.0	7
5	265.0	53.0	5.0	8
6	48.0	29.0	4.0	6
7	53.0	65.0	4.0	6
8	53.0	80.0	4.0	6
9	65.0	73.0	4.0	6
10	91.0	73.0	4.0	6
11	176.0	73.0	4.0	6

12	164.0	65.0	4.0	6
13	206.0	65.0	4.0	6
14	265.0	65.0	4.0	6
15	176.0	58.0	4.0	6
16	180.0	35.0	4.0	6
17	214.0	35.0	4.0	6
18	74.0	51.0	6.0	6
19	148.0	65.0	0.0	10
20	235.0	58.0	8.0	12
21	38.0	11.0	0.0	5
22	139.0	11.0	0.0	5
23	240.0	11.0	0.0	5
24	211.0	46.0	0.0	5
25	194.0	65.0	0.0	5
26	278.0	65.0	0.0	5
27	61.0	56.0	1.0	5
28	173.0	43.0	1.0	5
29	104.0	70.0	1.0	5
30	39.0	56.0	0.0	4
31	60.0	19.0	0.0	4
32	90.0	56.0	0.0	4
33	129.0	80.0	0.0	4
34	163.0	80.0	0.0	4
35	189.0	35.0	0.0	4
36	231.0	35.0	0.0	4
37	231.0	66.0	0.0	4
38	256.0	66.0	0.0	4
39	284.0	21.0	0.0	4
40	13.0	70.0	1.0	3
41	35.0	79.0	0.0	3
42	60.0	79.0	0.0	3
43	86.0	79.0	0.0	3
44	104.0	79.0	0.0	3
45	180.0	79.0	0.0	3
46	206.0	79.0	0.0	3
47	264.0	79.0	0.0	3
48	291.0	79.0	0.0	3
49	228.0	79.0	0.0	3
50	61.0	65.0	0.0	3
51	75.0	70.0	0.0	3
52	168.0	56.0	0.0	3
53	193.0	56.0	0.0	3
54	279.0	56.0	0.0	3
55	214.0	65.0	0.0	3
56	291.0	66.0	0.0	3
57	35.0	20.0	0.0	3
58	89.0	20.0	0.0	3
59	140.0	20.0	0.0	3
60	195.0	20.0	0.0	3
61	155.0	34.0	0.0	3
62	168.0	26.0	0.0	3
63	206.0	34.0	0.0	3
64	219.0	26.0	0.0	3
65	231.0	30.0	0.0	3
66	248.0	33.0	0.0	3
67	291.0	53.0	0.0	3

REGIONS OF PLAZA

REGION	C1X	C2X	C1Y	C2Y	FREQUENCY
1	0.0	161.0	85.0	100.0	16.1
2	0.0	50.0	0.0	85.0	28.4
3	50.0	70.0	0.0	60.0	8.0
4	70.0	90.0	0.0	45.0	6.0
5	90.0	108.0	0.0	35.0	4.2
6	108.0	122.0	0.0	27.0	2.5
7	122.0	141.0	0.0	21.0	2.7
8	141.0	161.0	0.0	12.0	1.6
9	50.0	70.0	60.0	85.0	0.9
10	70.0	90.0	45.0	85.0	1.5
11	90.0	108.0	35.0	85.0	1.7
12	108.0	122.0	27.0	85.0	1.5
13	122.0	141.0	21.0	85.0	2.2
14	141.0	161.0	12.0	85.0	2.7
15	161.0	310.0	12.0	85.0	2.6
16	161.0	323.0	85.0	100.0	7.9
17	310.0	323.0	12.0	85.0	3.1
18	161.0	323.0	0.0	12.0	6.4

PLAZA CREATED

SIMULATION OF THE USE OF PEDESTRIAN PLAZAS --- EDITION 4
========== == === === == ========== ======   =======

PETRIE PLAZA: SIMULATION 3, WALKERS NOW PLACED ON PLAZA

NUMBER OF GROUPS REQUIRED = 20
RATIO OF SINGLES TO PEOPLE IN GROUPS = 5.8
INITIAL RANDOM NUMBER SEED = 12345

THE FOLLOWING DISTANCES ARE IN PACES (= 2.0 FEET)

PEOPLE	CLOSEST		OBJECTS		CLOSEST	CLOSEST
IN GROUP	DISTANCE	TYPE	DISTANCE	TYPE	GROUP	WALKER
1	3.4	3	7.5	3	27.5	15.5
2	3.5	0	8.5	5	27.5	38.4
3	3.1	0	7.8	3	12.4	7.9
4	3.3	6	4.6	3	12.4	5.9
1	3.4	0	7.6	4	65.2	13.3
2	2.7	0	6.8	4		9.9
1	3.9	6	5.7	4	30.3	6.4
4	5.7	3	6.8	3	34.6	4.0
2	1.9	0	13.2	3	64.3	1.7
2	1.5	0	8.2	3	49.0	37.8
1	11.5	3	13.4	4	30.3	10.7
2	1.1	0	9.2	3	26.3	12.9
2	4.7	6	7.4	4	26.3	7.7
4	1.9	6	9.0	4	6.2	9.0
2	4.9	6	6.3	6	6.2	2.5
2	0.1	3	6.3	0	4.5	6.0
5	4.1	3	5.0	3	4.5	0.3
2	7.9	3	8.4	3	27.8	7.5
2	5.0	0	9.9	9	86.6	3.3
2	2.8	0	6.7	4	11.9	4.9
2	3.3	0	5.0	0	8.1	7.2
2	0.1	0	11.4	4	11.9	2.3
1	4.4	6	4.9	3	21.3	0.7

NUMBER OF GROUPS IN SIMULATION WAS 23

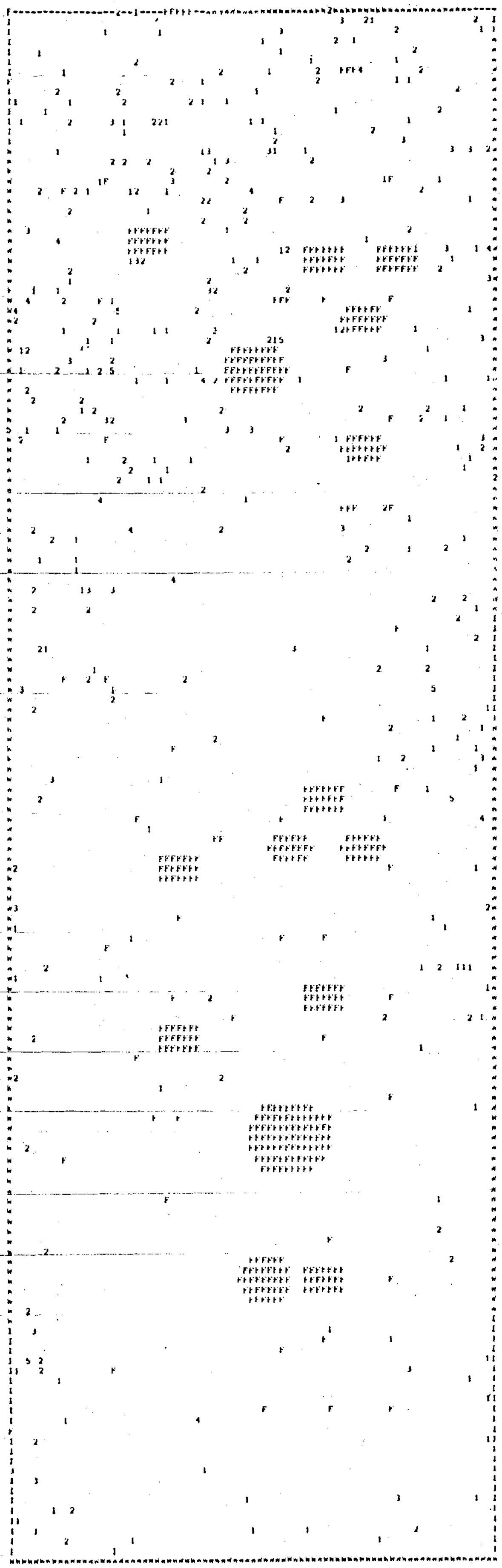
RELATIVE FREQUENCIES OF PEOPLE/GROUP, GROUPS/PLAZA IN SIMULATION

	RELATIVE FREQUENCIES FOR	
CASE	PEOPLE/GROUP	GROUPS/PLAZA
1	0.217	0.143
2	0.783	0.571
3	0.826	0.714
4	0.957	0.714
5	1.000	0.857
6	1.000	0.857
7	1.000	0.857
8	1.000	1.000
9	1.000	1.000
10	1.000	1.000
11	1.000	1.000
12	1.000	1.000

SIMULATION OF THE USE OF PEDESTRIAN PLAZAS --- EDITION 4

PETRIE PLAZA: SIMULATION 3, PLACEMENT OF GROUPS GIVEN BY FIELD DATA

SCALE IS 1 CM. = 5.00 FEET = 2.5 PACES

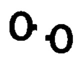
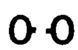
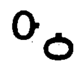


Appendix B

A questionnaire used for studying preferences for spatial arrangements in various types of conversations

When people talk to each other they are likely to form conversational clusters of various shapes and configurations. These different spatial forms of face-to-face social interaction can carry different meanings to an external observer. On this page there are shown six basic spatial arrangements which can be formed by a pair of standing and conversing individuals. Please look at these arrangements and try to indicate which of them seems to be the most suitable or appropriate for people engaged in (a) intimate, (b) personal, (c) business, (d) social, and (e) technical types of conversation.

The following diagram represents two-person conversational arrangements viewed from above. Ovals represent bodies of the participants and dots indicate the direction people are facing. When answering the questions below please use the following code letters to indicate the type of arrangement in each case:

N	*H*	*V*	*L*	*C*	*I*
					

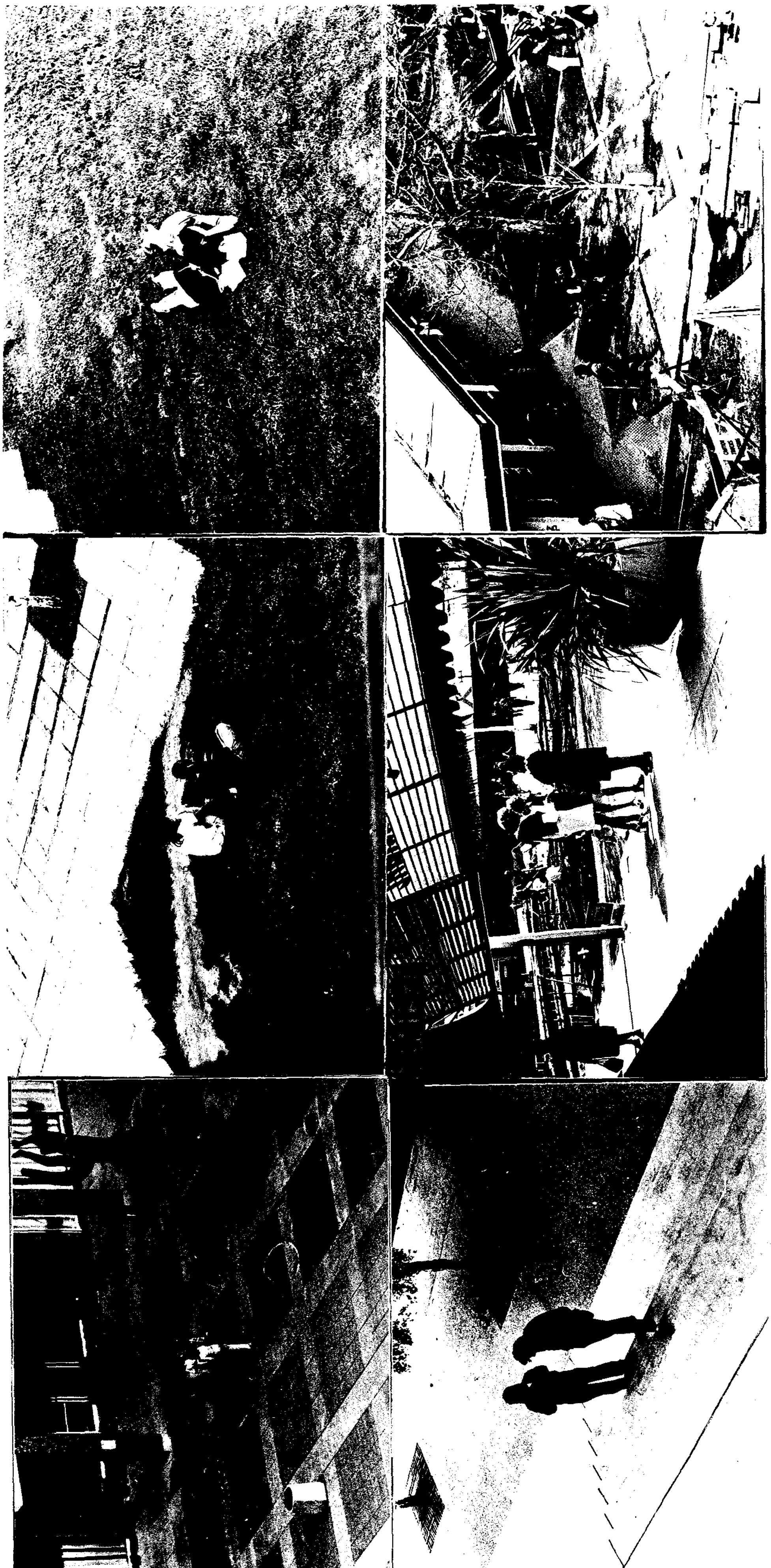
1. For an intimate conversation between people (e.g. discussing their marital or psychological problems)
the most suitable arrangement is...

2. For a personal conversation between people (e.g. discussing problems at work or their plans for the things to do in the future) the most suitable arrangement is...

3. For a business oriented conversation between people (e.g. discussing some aspects of their work, inquiring about a loan, arranging for a sale of a motorbike)
the most suitable arrangement is...

4. For a social conversation between people (e.g. discussing sport, cinema, cars, politics, holidays, books, etc)
the most suitable arrangement is...

5. For a technically oriented conversation between people (e.g. discussing the best way for taking apart an engine, for lifting a heavy object, for opening a jammed door, etc)
the most suitable arrangement is...



PHOTOGRAPHS USED FOR ELICITING COMMENTS ON THE EXTENT OF GROUP CLAIMED DOMAINS

APPENDIX D

Tables referred to in the text*

*the first number is the table number, the second number refers to the chapter where this table is examined

Table 1-2

Relative frequency of occurrence of various types of spatial arrangements among stationary duets from three cultures

PEOPLE AND AREA:	AUSTRALIANS (CANBERRA)	ENGA (LAIAGAM, PNG)	MURNGIN (NORTHERN TERRITORY)
Arrangement type:	%	%	%
N	7	5	-
H	13	13	3
V	25	29	15
L	25	11	15
C	19	16	12
I	9	8	21
subtotal	(98%)	(82%)	(70%)
N^o	1	13	18
T^o	-	-	3
T^-	1	5	-
C^o	-	-	6
H^o	-	-	3
V^o	-	-	3
Total	100%	100%	99%
No. of cases	118	38	33

(Source: "Sample 2", "Enga Sample", "Murngin Sample")

Table 2-2

Frequency of occurrence and duration of various types of spatial arrangements among three-person stationary f-formations

ARRANGEMENT TYPE:	%	AVERAGE DURATION (IN SEC.)
LVV	27	10.3
CVV	20	8.3
LHH	19	6.3
VVV	12	11.0
CVL	11	4.2
CVH	5	8.3
CVN	4	5.7
INN	1	1.6
CCV	1	4.0
TOTAL	100%	
No. of cases	143	Pearson correlation r = +.64

Mean duration of a rearrangement (N=115) = 2.0 sec.

(Source: Films Sample)

Table 1-3

Distribution of static people in relation to the type of nearby physical object: comparison of Samples 2 and 3

SAMPLE:	SAMPLE 2	SAMPLE 3	TOTAL
Type of closest object:			
"Barrier"	79	105	184
"Object"	134	192	326
"Utility object"	24	36	60
"Seat"	75	70	145
No. of cases	312	403	715

$Chi^2 = 5.1$ df=3 N.S.

Table 2-3

Distribution of people in relation to physical objects: comparison of Samples 2 and 3

SAMPLE:	SAMPLE 2	SAMPLE 3	TOTAL
Distance to nearest object:			
0 - 2 paces	202	436	638
3 - 4 paces	82	163	245
5 - 6 paces	44	67	111
6 paces +	21	45	66
No. of cases	349	711	1060

$Chi^2 = 2.8$ df=3 N.S.

Table 3-3

Distribution of stationary people in relation to traffic lines: comparison of Samples 2 and 3

SAMPLE:	SAMPLE 2	SAMPLE 3	TOTAL
Type of location:			
central	162	305	467
side	101	215	316
protected	44	65	109
away	44	118	162
No. of cases	351	703	1054

$Chi^2 = 5.8$ df=3 N.S.

Table 4-3

Distribution of stationary people in relation to other stationary people: comparison of Samples 2 and 3

SAMPLE:	SAMPLE 2	SAMPLE 3	TOTAL
Distance to nearest standing person or group:			
1 - 2 paces	15	83	98
3 - 4 paces	22	98	120
5 - 6 paces	38	68	106
6 paces +	275	335	610
No. of cases	350	584	934

$Chi^2 = 54.5$ df=3 $p < 0.001$

Table 5-3

Frequency distribution of people per group and groups per plaza used during the Computer Simulations 1 - 3

NUMBER OF PEOPLE PER GROUP:		GROUP's RADIUS (IN PACES)	NUMBER OF GROUPS	PER PLAZA
solos	157	0.3	1	23 times
duets	139	0.6	2	27 times
trios	37	0.9	3	16 times
quartets	11	1.2	4	7 times
quintets	6	1.5	5	11 times
			6	8 times
			7	3 times
			8	4 times
			9	1 time
			10	1 time
			11	2 times
No.of cases 350 groups			Total	103 photograph

(Source: Sample 2)

Table 1-4

The number of people photographed at Petrie Plaza according to the day of the week and behavior*

DAY:	MON	TUE	WED	THUR	FRID	SAT	SUN	TOTAL
Behavior:								
Walking	744	759	882	984	1191	765	60	5385
Standing	94	95	179	134	199	219	10	930
Sitting	218	235	578	160	76	161	4	1432
No.of people	1056	1089	1639	1278	1466	1145	74	7747
Av.per phot.	34	35	53	41	47	37	2	35

*each day 31 photographs were taken at 20 minutes intervals 10 hours daily, from 8 a.m. to 6 p.m.

(Source: Sample 1)

Table 2-4

Percentage of people engaged in various behaviors at different times of the day

TIME OF A DAY:	8 am - 11 am	11 am - 2 pm	2 pm - 6 pm	TOTAL
Behavior:				
Walking	77%	62%	76%	5385
Standing	14%	13%	12%	930
Sitting	9%	25%	12%	1432
Total per cent	100%	100%	100%	7747

(Source: Sample 1)

Table 3-4

Frequency of occurrence of activities according to sex of users of Petrie Plaza

ACTIVITY:	MALES	FEMALES	TOTAL
	%	%	%
Walking	68	73	70
Sitting	18	16	17
Standing	14	11	13
No. of cases	100% 3732	100% 3135	100% 6867
$Chi^2 = 34.2$ df=2 $p < 0.001$			

(Source: Sample 1)

Table 4-4

Frequency of occurrence of groups of various size as reported in five different investigations*

STUDY:	JAMES 1951	PREISER 1972[a]	PREISER 1973	BAKEMAN & BECK 1975	CIOLEK[a]
Group size: % of:					
Solos	65.5[b]	42.7	27.9	20.9	44.6
Groups	34.5	57.3	72.1	79.1	55.4
Observat.	100.0	100.0	100.0	100.0	100.0
Duets	71.0	60.3	64.4	68.9	71.3
Trios	20.2	24.2	23.5	21.1	19.0
Quartets	6.4	7.6	9.7	7.0	5.6
Quintets	1.8	5.8	[2.5]	1.9	3.1
Sextets	0.5	2.2		1.1	0.5
% of groups	99.9	100.1	100.1	100.0	99.5
Total no. of people	15486	937	?	1241	634

* gatherings of more than six persons occur only infrequently and are not included into the above calculations.

[a] data refer to stationary people only

[b] percentage of solos and groups taken from James 1953

(Source: data for Ciolek - Sample 2)

Table 5-4

Frequency of occurrence of stationary activities among users of pedestrian settings*

SETTING:	PETRIE PLAZA	PAVEMENTS & PATHS	SQUARES & COURTS	OTHER OUTDOOR SPACES	AVERAGE
Activity:	%	%	%	%	%
Conversing	60	51	69	62	61
Waiting & observing	19	36	14	20	22
Inf.gathering	6	8	8	5	7
Manipulation	13	5	7	12	8
Other[a]	2	-	2	1	2
No.of cases	100% (171)	100% (111)	100% (238)	100% (135)	100% (655)

*the data refer to standing people only

[a]other activities include, for example: eating, drinking, taking notes or photographs.

(Source: Sample 3)

Table 6-4

Stationary activity in multiperson participation units as a function of sex-composition

ACTIVITY:	CONVERSATIONAL	NON-CONVERSATIONAL	TOTAL
Sex composition:			
Male dominated	190	24	214
Female dominated	107	46	153
M/F balanced	102	26	128
No. of cases	399	96	495

$Chi^2 = 20.4$ df=2 $p < 0.001$

(Source: Sample 3)

Table 7-4

Type of non-conventional activities in relation to the size of a participation unit

GROUP SIZE:	SOLITARY PERSON	GATHERING	TOTAL
Activity:			
Waiting & observing	110	32	142
Inf. gathering	26	20	46
Manipulation	29	26	55
Other activities	1	9	10
No. of cases	166	87	253
$Chi^2 = 14.4$	df=2	$p < 0.001$[a]	

[a] the Chi-square test applied to table with excluded "other activities" row

(Source: Sample 3)

Table 8-4

The frequency distribution of life-times of f-formations on Petrie Plaza

DURATION:	No. OF CASES	%
Less than 1 minute	110	82.1
1 - 2 minutes	14	10.4
2 - 3 minutes	3	2.2
3 - 4 minutes	3	2.2
4 - 5 minutes	3	2.2
5 - 6 minutes	1	0.7
6+ minutes	-	-
No. of cases	134	99.8%

(Source: Videotape)

Table 9-4

The frequency distribution of life-times of f-formations lasting shorter than 60 seconds

DURATION:	No. OF CASES	%
Less than 10 seconds	55	50.0
11 - 20 seconds	29	26.4
21 - 30 seconds	8	7.3
31 - 40 seconds	7	6.4
41 - 50 seconds	6	5.5
51 - 60 seconds	5	4.5
No. of cases	110	100.1%

(Source: Videotape)

Table 10-4

The relationship between the mode of establishment of an f-formation and its life-time

THE WAY GATHERING WAS FORMED VIA:	STOP-OVER	MEETING	REARRANGEMENT	TOTAL
Duration:				
less than 60 seconds	96	13	2	111
more than 60 seconds	13	10	-	23
No. of cases	109	23	2	134
mean duration (in sec.)	30.6	64.6	-	

Chi^2 for a table with "rearrangement" column excluded = 13.2

df=1 $p < 0.001$

(Source: Videotape)

Table 11-4

The life-time of a static group in relation to its size

GATHERING TYPE:	SOLO	DUET	TRIO AND LARGER	TOTAL
Duration:				
less than 60 seconds	94	97	14	205
more than 60 seconds	6	15	8	29
No. of cases	100	112	22	234
mean duration (in sec)	21.6	28.2	76.0	
$Chi^2 = 15.8$	df=2	$p < 0.001$		

(Source: Videotape)

Table 12-4

Observed and expected distribution of people with respect to traffic lines

TYPE OF LOCATION:	FIELD DATA		RANDOM MODEL		TOTAL
	N	%	N	%	N
Central	162	46.2	151	42.9	313
Side	101	28.8	95	27.0	196
Protected	44	12.5	25	7.1	69
Away from traffic	44	12.5	81	23.0	125
No. of cases	351	100%	352	100%	703
$Chi^2 = 16.6$	df=3	$p < 0.001$			

(Source: Sample 2, Computer Simulation 1)

Table 13-4

Life-time of an f-formation as a function of its location in relation to traffic lines

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Duration:					
Less than 10 sec.	25	28	7	18	78
More than 10 sec.	28	9	3	16	56
No. of cases	53	37	10	34	134
Mean duration (in sec.)	27.2	34.6	56.9	46.6	
$Chi^2 = 7.81$	df=3	$p < 0.05$			

(Source: Videotape)

Table 14-4

Distribution of people with respect to the traffic lines in relation to the sex-composition of a participation unit

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Sex-composition:					
Male dominated	37	24	15	13	89
Female dominated	36	12	2	2	52
M/F balanced	36	8	3	4	51
No. of cases	109	44	20	19	192
$Chi^2 = 19.2$	df=6	$0.001 < p < 0.01$			

(Source: Sample 2)

Table 15-4

Spatial distribution of solitary individuals with respect to the traffic lines as a function of their sex

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Sex of a person:					
Male	27	39	19	20	105
Female	25	18	5	3	51
No. of cases	52	57	24	23	156
$Chi^2 = 11.1$	df=3	$0.02 < p < 0.01$			

(Source: Sample 2)

Table 16-4

Distribution of people with respect to the traffic lines in relation to the size of a participation unit

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Group size:					
Solitary person	52	57	24	23	156
Duet	79	31	12	16	138
Trio and larger	31	12	8	5	56
No. of cases	162	100	44	44	350
$Chi^2 = 20.5$	df=6	$0.001 < p < 0.01$			

(Source: Sample 2)

Table 17-4

Distribution of people with respect to the traffic lines in relation to the type of group activity*

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Activity:					
Conversational	202	93	36	55	386
Non-conversational	25	38	5	16	84
No. of cases	227	131	41	71	470

$Chi^2 = 20.4$ df=3 $p < 0.001$

* Non-conversational activities include: waiting, manipulation, observing, information gathering and other activities.

(Source: Sample 3)

Table 18-4

Distribution of people with respect to the traffic lines in relation to the type of group activity

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Gathering's activity:					
Conversation	202	93	36	55	386
Waiting & observing	12	9	2	8	31
Inf. gathering	2	14	1	3	20
Manipulation	9	10	2	3	24
Other	2	5	-	2	9
No. of cases	227	131	41	71	470

Chi^2 for a table excluding "conversation" row and "protected location" column and combining "other behavior" with "manipulation" = 9.1 df=4 p = N.S.

(Source: Sample 3)

Table 19-4

Distribution of people with respect to the traffic lines in relation to the type of solitary activity

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Person's activity:					
Waiting & observing	37	43	9	20	109
Inf. gathering	5	13	3	5	26
Manipulation	8	9	4	7	28
Other	-	1	-	-	1
No. of cases	50	66	16	32	164

Chi^2 for a table excluding "protected location" column and combining "other behavior" with "manipulation" = 3.0 df=4 p = N.S.

(Source: Sample 3)

Table 1-5

Choice of an arrangement in a two-person f-formation in relation to its spatial context

SPATIAL ARRANGEMENT USED:	N	H	V	L	C	I	TOTAL
Type of location:							
At the setting edge (next to a wall or similar barrier)	-	7	-	34	3	48	92
Away from the setting edges (in open unstructured space)	2	9	10	21	3	5	50
In the traffic line transsecting a pedestrian setting (a plaza)	9	25	14	82	11	39	180
On a path transsecting an open non-pedestrian setting (a lawn)	11	37	6	19	5	2	80
No. of cases	22	78	30	156	22	94	402

Chi^2 for a table with columns (N+H+V) and (C+I) combined = 100.06

df=6 $p < 0.001$

(Source: Observation 1)

Table 2-5

Spatial orientation of a two-person f-formation arrangement relative to the flow of walking people

TYPE OF ARRANGEMENT:	H + N + V	L	C + I
Spatial orientation:*			
Parallel to the traffic	20	(44)	53
Oblique	43	(5[a] + 12[b])	22
Perpendicular	9	(44)	17
No. of cases	72	61	92

Chi^2 for a table with "L" column excluded = 22.04 df=2 $p < 0.001$

* orientation refers to the positioning of the body plane of the left-hand side person in the studied f-formation in relation to the main axis of the pedestrian traffic flow. If people are in L arrangement and one of the persons is parallel to the traffic flow, the other person automatically is positioned perpendicularly.

[a] obliquely positioned L-shaped arrangement faces across the traffic line.

[b] obliquely positioned L-shaped arrangement faces along the traffic line.

(Source: Observation 2)

Table 3-5

Spatial orientation of a three-person f-formation arrangement in relation to flow of people and placement within the physical context

TYPE OF LOCATION:	CLOSE TO A WALL	MIDDLE OF A SIDEWALK	TOTAL
Spatial orientation:			
One person is perpendicular to the traffic flow	9	41	50
One person is parallel to the traffic flow	21	25	46
No. of cases	30	66	96

$Chi^2 = 8.5$ df=1 $0.001 < p < 0.01$

(Source: Observation 3)

Table 4-5

Spatial orientation of solitary people in relation to the flow of walking people and the placement within the physical context

TYPE OF LOCATION:	CLOSE TO A WALL	MIDDLE OF A SIDEWALK	TOTAL
Body plane orientation:			
Parallel to traffic	30	19	49
Oblique	15	9	24
Perpendicular	14	11	25
No. of cases	59	39	98
$Chi^2 = 0.2$	df=1	N.S.	

(Source: Observation 3)

Table 5-5

Effect of gathering's orientation on the flow of people on a sidewalk*

CONDITION:	CONTROL	GROUP ORIENT. TO TRAFFIC	GROUP ORIENT. TO WALL
Sidewalk zone:	%	%	%
A (120 cm)	27	occupied by the group	occupied by the group
B (90 cm)	30	41	44
C (90 cm)	25	30	30
D (90 cm)	12	22	19
E (90 cm)	6	7	7
No. of cases	100%	100%	100%
	344	271	324

* The table refers to the flow of solitary people only. Zone A is the closest and Zone E is the furthest from a building wall. The experimental conditions involved two persons standing in L-shaped arrangement, facing the traffic or facing away from the traffic. Control condition refers to the flow of pedestrians when the location was not occupied by any static gathering.

(Source: Observation 4)

Table 1-6

Observed and expected distribution of walking people with respect to a stationary group

SEPARATION DISTANCE:	FIELD DATA N	FIELD DATA %	RANDOM MODEL N	RANDOM MODEL %	TOTAL N
0 - 2 paces	76	22.2	57	15.9	133
3 - 4 paces	83	24.3	69	19.2	152
5 - 6 paces	66	19.3	63	17.5	129
7 - 8 paces	33	9.6	44	12.3	77
9 - 10 paces	19	5.6	30	8.4	49
11 - 12 paces	5	1.5	22	6.1	27
12 + paces	60	17.5	74	20.6	134
No. of cases	342	100.0%	359	100.0%	701
$Chi^2 = 19.95$ df=6		$p < 0.01$			
Mean separation distance					
(0 - 12 p)	4.4 paces		5.4 paces		
(0 - 6 p)	3.4 paces		3.6 paces		

(Source: Sample 2, Computer Simulation 3)

Table 2-6

Observed and expected distribution of walking people with respect to a stationary group

SEPARATION DISTANCE:	FIELD DATA	RANDOM MODEL	TOTAL
0 - 1 pace	29	30	59
2 paces	47	27	74
3 paces	44	29	73
4 paces	39	40	79
5 paces	41	32	73
6 paces	25	31	56
No. of cases	225	189	414
$Chi^2 = 7.13$ df=5	N.S.		

(Source: Sample 2, Computer Simulation 3)

Table 3-6

Effect of group's placement in relation to traffic lines on the separation distance from the nearest walking stranger

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Separation distance:					
1 - 2 paces	49	24	2	1	76
3 - 4 paces	45	26	8	4	83
5 - 6 paces	27	19	10	10	66
No. of cases	121	69	20	15	225
Average separation distance*	3.1	3.4	4.4	4.7 paces	

$Chi^2 = 20.8$ df=6 $p < 0.01$

* Average values computed for separation distance 1 - 6 paces

(Source: Sample 2)

Table 4-6

Effect of the choice of location in relation to the nearest physical object on the separation distance from the nearest walking stranger

PASSERBY TO GROUP DISTANCE (in paces):	1-2	3-4	5-6	TOTAL	AVERAGE PASSERBY TO GROUP DISTANCE
Distance to physical object:					
0 - 2 paces	40	42	43	125	3.6 paces
3 - 4 paces	22	18	15	55	3.2 paces
5 - 6 paces	7	17	6	30	3.2 paces
No. of cases	69	77	64	210	

$Chi^2 = 7.4$ df=4 N.S.

(Source: Sample 2)

Table 5-6

Effect of a choice of a location in relation to the type of nearest object on separation distance from the nearest walking stranger

TYPE OF CLOSEST OBJECT:	"BARRIER"	"OBJECT"	"UTILITY OBJECT"	"SEAT"	TOTAL
Separation distance:					
1 pace	15	6	1	3	25
2 paces	19	19	-	7	45
3 paces	9	20	5	7	41
4 paces	5	23	1	8	37
5 paces	8	13	5	9	35
6 paces	4	9	1	5	19
No. of cases	60	90	13	39	202
$Chi^2 = 32.74$	df=15	$p = 0.005$			
Average separation distance (1-6 paces)	2.7 p	3.5 p	3.9 p	3.7 p	

(Source: Sample 2)

Table 6-6

Separation distance from the nearest walking stranger in relation to the sex-composition of a participation unit

SEPARATION DISTANCE:	1-2	3-4	5-6 paces	TOTAL	AVERAGE*
Male dominated	17	16	25	58	3.8 paces
Female dominated	16	15	6	37	2.9 paces
M/F balanced	13	12	6	31	3.0 paces
No. of cases	46	43	37	126	
$Chi^2 = 10.1$	df=4	$p < 0.05$			

* The average values computed for separation distance 1 - 6 paces

(Source: Sample 2)

Table 7-6

Separation distance from the nearest walking stranger in relation to the sex-composition of a participation unit

SEPARATION DISTANCE:	1-2	3-4	5-6 paces	TOTAL	AVERAGE*
Sex of the people:					
Solitary male[a]	22	17	23	62	3.5 paces
Solitary female	8	23	5	36	3.3 paces
MM duet[b]	9	9	15	33	4.0 paces
MF duet	13	12	6	31	3.0 paces
FF duet	10	10	3	23	2.9 paces

* Average values computed for separation distance 1 - 6 paces

[a] Chi^2 value for the solitary people only = 13.0 df=2 $p \leqslant 0.01$

[b] Chi^2 value for the duets only = 9.6 df=4 $0.02 < p < 0.05$

(Source: Sample 2)

Table 8-6

Separation distance from the nearest walking stranger in relation to the size of a participation unit

SEPARATION DISTANCE:	1-2	3-4	5-6 paces	TOTAL	AVERAGE*
Solitary person	30	40	28	98	3.4 paces
Multiperson gathering	46	43	38	127	3.4 paces
No. of cases	76	83	66	225	

$Chi^2 = 1.2$ df=2 p = N.S.

* Average values computed for separation distance 1 - 6 paces

(Source: Sample 2)

Table 9-6

Relationship between separation distance from the nearest walking stranger and the type of spatial arrangement

TYPE OF AN ARRANGEMENT:	N	H	V	L	C	I	TOTAL
Separation distance:							
1 - 2 paces	5	3	3	11	4	3	29
3 - 4 paces	1	1	9	6	4	4	25
5 - 6 paces	1	4	9	2	6	-	22
No. of cases	7	8	21	19	14	7	76

Chi^2 for a table with combined cells (N+H+V) and (L+C+I) = 3.5

df=2 p = N.S.

(Source: Sample 2)

Table 10-6

Relationship between separation distance from a nearest stranger and the type of spatial arrangement*

ARRANGEMENT ADOPTED:	TYPE OF ACTIVITY A STRANGER IS ENGAGED IN: WALKING	STANDING	SITTING
Closed (N+H+V)	(36) 3.7 paces	(9) 4.3 paces	(10) 4.3 paces
Open (L+C+I)	(40) 3.0 paces	(13) 3.5 paces	(14) 4.2 paces
No. of cases	(76)	(22)	(24) Total: 122 duets

* Average values calculated for separation distance 1 - 6 paces

(Source: Sample 2)

Table 11-6

Effect of activity of a stranger on the separation distance with respect to the stranger

SEPARATION DISTANCE:	TYPE OF ACTIVITY A STRANGER IS ENGAGED IN: WALKING	STANDING	SITTING
1 - 12 paces	82.5%	33.7%	43.0%
12 + paces	17.5%	66.3%	57.0%
No. of cases	342	350	349
$Chi^2 = 185.3$	df=2	$p < 0.001$	

(Source: Sample 2)

Table 12-6

Effect of activity of a stranger on the separation distance with respect to the stranger

SEPARATION DISTANCE:	TYPE OF ACTIVITY A STRANGER IS ENGAGED IN: WALKING	STANDING	SITTING
1 - 6 paces	79.8%	63.5%	48.8%
7 - 12 paces	20.2%	36.5%	51.2%
No. of cases	282	118	150
Mean separation distance (1 - 12 paces)	4.4 paces	6.0 paces	6.7 paces
Mean separation distance (1 - 6 paces)	3.4 paces	4.2 paces	4.2 paces
$Chi^2 = 44.8$	df=2	$p < 0.001$	

(Source: Sample 2)

Table 13-6

Choice of location with respect to another f-formation as a function of acquaintanceship

TYPE OF GATHERING:	ASSOCIATED*	STRANGE	TOTAL
Separation distance:			
1 pace	3	1	4
2 paces	14	23	37
3 paces	2	15	17
4 paces	-	28	28
5 paces	1	22	23
6 paces	1	23	24
7 paces	-	17	17
8 paces	1	14	15
9 paces	-	5	5
10 paces	-	7	7
11 paces	-	5	5
12 paces	-	4	4
No. of cases	22	164	186
Mean separation distance (1 - 12 paces)	2.5 paces	5.5 paces	
Mean separation distance (1 - 6 paces)	2.3 paces	4.0 paces	

Chi^2 value for a 3 x 2 table (1-2 paces, 3-4, 5-6 paces) = 29.2

df=2 $p < 0.001$

*Associated f-formations remain in verbal contact, or exchange freely participants and their participants form mobile "withs" together with participants of another associated formation upon termination of static encounters.

(Source: Observation 5)

Table 14-6

Separation distance between an f-formation and a nearby solitary static person as a function of acquaintanceship

TYPE OF A PERSON:	ACQUAINTED*	STRANGE	TOTAL
Separation distance:			
1 pace	24	1	25
2 paces	22	6	28
3 paces	9	9	18
4 paces	5	8	13
5 paces	4	15	19
6 paces	1	14	15
7 paces	1	16	17
8 paces	-	3	3
9 paces	-	4	4
10 paces	-	5	5
11 paces	-	2	2
12 paces	1	3	4
No. of cases	67	86	153
Mean separation distance (1 - 12 paces)	2.2 paces	5.8 paces	
Mean separation distance (1 - 6 paces)	2.2 paces	4.3 paces	

Chi^2 value for a 3 x 2 table (1-2 paces, 3-4, 5-6 paces) = 43.2

df=2 $p < 0.001$

*An acquaintance was a person who in course of the existence of a given f-formation either joined it as fully fledged member or, when it dispersed, became a "with" together with the formation's ex-participant(s).

(Source: Observation 5)

Table 15-6

Separation distance between an f-formation and another stationary participation unit as a function of the size of such a participation unit

TYPE OF A UNIT:	STRANGERS f-form.	STRANGERS Solitary person	ACQUAINTANCES f-form.	ACQUAINTANCES Solitary person
Separation distance:				
1 pace	1	1	3	24
2 paces	23	6	14	22
3 paces	15	9	2	9
4 paces	28	8	-	5
5 paces	22	15	1	4
6 paces	23	12	1	1
No. of cases	112	51	21	65
Average dist.	4.0 paces	4.3 paces	2.3 paces	2.2 paces

Chi^2 for table STRANGERS (with the first row excluded from computations) = 4.92 df=4 N.S.

(Source: Observation 5)

Table 16-6

Separation distance between an f-formation and a nearby person as a function of person's orientation - case of acquaintances

ADOPTED ORIENTATION:	FRONTAL	OBLIQ. FRONTAL	SIDEWISE	OBLIQ. DORSAL	DORSAL	TOTAL
Separation distance:						
1 pace	10	9	3	1	1	24
2 paces	9	6	4	2	1	22
3 paces	2	3	4	-	-	9
4 paces	3	2	-	-	-	5
5 paces	4	-	-	-	-	4
6 paces	-	-	1	-	-	1
7 paces	1	-	-	-	-	1
8 paces	-	-	-	-	-	-
9 paces	-	-	-	-	-	-
10 paces	-	-	-	-	-	-
11 paces	-	-	-	-	-	-
12 paces	1	-	-	-	-	1
No. of cases	30	20	12	3	2	67
Mean sep. dist. (1 - 12 p)	2.8 p	1.9 p	2.4 p	1.7 p	1.5 p	
Mean sep. dist. (1 - 6 p)	2.3 p	1.9 p	2.4 p	1.7 p	1.5 p	

(Source: Observation 5)

Table 17-6

Separation distance between a static gathering and a nearby person as a function of person's orientation - case of strangers

ADOPTED ORIENTATION:	FRONTAL	OBLIQ. FRONTAL	SIDEWISE	OBLIQ. DORSAL	DORSAL	TOTAL
Separation distance:						
1 pace	-	1	-	-	-	1
2 paces	2	2	-	-	2	6
3 paces	-	-	3	1	5	9
4 paces	2	4	2	-	-	8
5 paces	1	2	4	5	3	15
6 paces	4	-	3	5	2	14
7 paces	7	3	4	-	2	16
8 paces	-	1	1	1	-	3
9 paces	4	-	-	-	-	4
10 paces	3	1	1	-	-	5
11 paces	-	1	-	-	1	2
12 paces	1	1	-	-	1	3
No. of cases	24	16	18	12	16	86
Mean sep. dist. (1 - 12 p)	7.0 p	5.8 p	5.6 p	5.5 p	5.2 p	
Mean sep. dist. (1 - 6 p)	4.5 p	3.4 p	4.6 p	5.3 p	3.8 p	

(Source: Observation 5)

Table 18-6

Choice of a person's orientation toward a static gathering as a function of acquaintanceship

TYPE OF RELATIONS:	ACQUAINTANCESHIP	NO ACQUAINTANCESHIP	TOTAL
Orientation adopted:			
Frontal	30	24	54
Oblique frontal	20	16	36
Sidewise	12	18	30
Oblique dorsal	3	12	15
Dorsal	2	16	18
No. of cases	67	86	153

$Chi^2 = 15.2$ df=4 $p < 0.01$

(Source: Observation 5)

Table 19-6

Distance and spatial orientation of a stationary individual in relation to a physical object

ADOPTED ORIENTATION:	FRONTAL	OBLIQ. FRONTAL	SIDEWISE	OBLIQ. DORSAL	DORSAL	TOTAL
Separation distance:						
in physical contact	9	2	5	1	1	18
1 pace	9	2	5	2	5	23
2 paces	2	1	6	1	1	11
3 paces	2	4	-	2	-	8
4 paces	1	4	3	3	-	11
5 paces	-	-	2	2	-	4
6 paces	1	-	-	2	1	4
6 paces +	1	1	-	-	-	2
No. of cases	25	14	21	13	8	81
Mean sep. dist.	1.2 p	2.5 p	1.9 p	3.4 p	1.6 p	2.0 p

Chi^2 for a table with rows (0 - 2 paces) and (3 - 6+ paces) combined, and with column "DORSAL" excluded from computations = 14.64

df=3 $p < 0.01$

(Source: Observation 5)

Table 20-6

Separation distance of a stationary individual in relation to closest physical object and closest f-formation*

DISTANCE TO:	OBJECTS	F-FORMATIONS	TOTAL
in physical contact	18	-	18
1 pace	23	25	48
2 paces	11	28	39
3 paces	8	18	26
4 paces	11	13	24
5 paces	4	19	23
6 paces	4	15	19
6 paces +	2	35	37
No. of cases	81	153	234

Chi^2 for a table with combined rows (0 - 2 paces, 3 - 4 paces, 5 - 6 paces) = 28.04 df=3 $p < 0.001$

* Data on spacing of "associates" and strangers lumped together.

(Source: Observation 5)

Table 21-6

Observed and expected choice of location with respect to nearest static stranger*

SEPARATION DISTANCE:	FIELD DATA N	%	RANDOM MODEL N	%	TOTAL N
1 - 2 paces	15	12.7	4	3.4	19
3 - 4 paces	22	18.6	26	22.0	48
5 - 6 paces	38	32.2	19	16.1	57
7 - 8 paces	21	17.8	26	22.0	47
9 - 10 paces	9	7.6	17	14.4	26
11 - 12 paces	13	11.0	26	22.0	39
No. of cases	118	99.9%	118	99.9%	236

$Chi^2 = 20.6$ df=5 $p < 0.001$

Mean sep. dist. (1 - 12 p)	6.0 p	7.2 p
Mean sep. dist. (1 - 6 p)	4.2 p	4.0 p

* The data refers to the distance to the nearest person regardless whether standing alone or participating in a "with".

(Source: Sample 2, Computer Simulation 2)

Table 22-6

Effect of a choice of location in relation to traffic lines on the separation distance from the nearest static stranger

TYPE OF LOCATION:	CENTRAL	SIDE	PROTECTED	AWAY	TOTAL
Separation distance:					
1 - 2	8	3	2	2	15
3 - 4	11	11	-	-	22
5 - 6	16	12	5	5	38
7 - 8	11	7	1	2	21
9 - 10	5	2	1	1	9
11 - 12	3	3	1	5	12
12 and more paces	108	62	33	29	232
No. of cases	162	100	43	44	349

Chi^2 for a table with combined cells (1 - 6) and (7 - 12) = 5.4

df=6 p = N.S.

(Source: Sample 2)

Table 23-6

Relationship between separation distance from the nearest static stranger and the distance from the nearest walking stranger

SEPARATION DISTANCE FROM WALKING PERSON:	1 - 6	7 - 12	12+	TOTAL
Separation distance from static person:				
1 - 4 paces	22	7	5	34
5 - 8 paces	44	7	5	56
9 - 12 paces	14	5	2	21
12 and more paces	141	38	48	227
No. of cases	221	57	60	338

$Chi^2 = 8.4$ df=6 p = N.S.

(Source: Sample 2)

Table 24-6

Relationship between the separation distance from the nearest static stranger and the choice of location with respect to the nearest physical object

STRANGER TO GROUP DISTANCE (in paces)	1-2	3-4	5-6	TOTAL	AVERAGE STRANGER TO GROUP DISTANCE
Group to object distance:					
0 - 2 paces	12	11	22	45	4.0 paces
3 - 4 paces	3	8	9	20	4.2 paces
5 - 6 paces	-	2	6	8	4.9 paces
No. of cases	15	21	37	73	

Chi^2 for a table with a combined second and third row = 2.8

df=2 p = N.S.

(Source: Sample 2)

Table 25-6

Relationship between the separation distance to the nearest static stranger and the choice of location in relation to nearest physical object

STRANGER TO GROUP DISTANCE:	1-2	3-4	5-6	TOTAL	AVERAGE STRANGER TO GROUP DISTANCE
Group to object distance:					
0 - 2 paces	58	65	44	167	3.3 paces
3 - 4 paces	22	25	6	53	2.9 paces
5 - 6 paces	3	6	10	19	4.2 paces
No. of cases	83	96	60	239	

$Chi^2 = 13.4$ df=4 $p < 0.01$

(Source: Pilot Study)

Table 26-6

Effect of the type of closest object on intergroup-spacing

TYPE OF CLOSEST OBJECT:	"BARRIERS"	"OBJECT"	"UTILITY OBJECT"	"SEAT"	TOTAL
Separation distance:					
1 pace	2	-	-	1	3
2 paces	4	2	2	3	11
3 paces	2	3	-	6	11
4 paces	3	3	-	3	9
5 paces	5	7	1	4	17
6 paces	6	8	1	6	21
No. of cases	22	23	4	23	72
Average separation distance	3.8 p	4.7 p	3.7 p	4.0 p	

Chi^2 for a table with combined (1 - 3 p and 4 - 6 p) rows and excluded "UTILITY" column = 2.5 df=2 p = N.S.

(Source: Sample 2)

Table 27-6

Effect of the size of the "target" group on separation distance from nearest static stranger

SEPARATION DISTANCE (in paces):	1-2	3-4	5-6	TOTAL	AVERAGE*
Target group size:					
Solitary person	7	11	19	37	4.2 paces
Gathering	8	11	18	37	4.1 paces
No. of cases	15	22	37	74	

* Calculated for 1 - 6 paces distance p = N.S.

(Source: Sample 2)

Table 28-6

Relationship between separation distance from the nearest static stranger and the sex-composition of a participation unit

SEX-COMPOSITION:	F-FORMATIONS			SOLITARY PEOPLE	
	M.d.	F.d.	M/F	M	F
Separation distance:					
1 - 2 paces	18	3	3	6	1
3 - 4 paces	18	14	6	4	7
5 - 6 paces	20	12	18	9	10
No. of cases	56	29	27	19	18
				Total: 149	
Average separation distance:	3.6 p	4.3 p	4.7 p	3.9 p	4.4 p

Chi^2 for f-formations = 12.9 df=4 $p < 0.02$

(Source: Sample 2)

Table 29-6

Relationship between separation distance from the nearest static stranger and the type of adopted spatial arrangement

TYPE OF AN ARRANGEMENT:	N	H	V	L	C	I	TOTAL
Separation distance:							
1 - 2 paces	-	1	1	1	3	-	6
3 - 4 paces	1	-	2	4	1	-	8
5 - 6 paces	3	-	1	2	1	1	8
No. of cases	4	1	4	7	5	1	22

Separation distance for closed arrangements (N+H+V) = 4.3 p
for open arrangements (L+C+I) = 3.5 p

(Source: Sample 2)

Table 30-6

Relationship between the separation distance from the nearest static stranger and activity of a "target" participation unit*

TYPE OF ACTIVITY:	CONVERSATIONAL	NON-CONVERSATIONAL	TOTAL
Separation distance:			
1 - 2 paces	26	7	33
3 - 4 paces	40	17	57
5 - 6 paces	42	6	48
7 - 8 paces	32	2	34
No. of cases	140	32	172
Mean separation distance (1 - 6 paces)	3.7 paces	3.3 paces	

$Chi^2 = 9.6$ df=3 $p < 0.05$

* Data refer to two-person and larger f-formations only, solitary individuals are not included in this table.

(Source: Sample 3)

Table 31-6

Zones of "waste disposal" by a solitary individual as recorded in 91 unsystematic observations in outdoor public settings

DISTANCE FROM THE BODY SURFACE (in paces):	Type of the disposed "waste" SPITTLE	MATCHES & FAG-ENDS	WRAPPING & FOOD LEFTOVERS	TOTAL
0.5 - 1	7	9	5	21
1 - 2	17	9	8	34
2 - 3	8	3	8	19
3 - 4	5	1	6	12
4 - 5	-	-	1	1
5 - 6	-	-	2	2
6 - 7	-	-	2	2
No. of cases	37	22	32	91
Average distance:	1.8 paces	1.4 paces	2.7 paces	2.0 p

Within the first 2 paces 60% of disposals
first 4 paces 95% of disposals

(Source: Unsystematic fieldnotes)

Table 1-7

Spatial distribution of stationary participation units in vicinity of the interviewed groups

TYPE OF PARTICIPATION UNIT STANDING NEARBY:	F-FORMATION	SOLO PERSON	TOTAL
Separation distance:			
1 pace	-	-	-
2 paces	5	1	6
3 paces	3	2	5
4 paces	2	2	4
5 paces	3	4	7
6 paces	-	3	3
7 paces	2	3	5
8 paces	1	1	2
9 paces	-	-	-
10 paces	2	5	7
11 paces	-	-	-
12 paces	3	3	6
No. of cases	21	24	45
Average distance (0 - 6 p)	3.2 paces	4.5 paces	
(0 -12 p)	5.7 paces	6.7 paces	

(Source: Interview 1)

Table 2-7

Size of spatial domains free of other stationary people as claimed by stationary groups of varying size

GROUP SIZE:	SOLO PERSON	DUET	TRIO	QUARTET	QUINTET & +	TOTAL	
Radius in cm*							%
0- 60 (0-1 p)	-	1	-	-	-	1	0.5
61-120 (1-2 p)	13	4	1	1	-	19	9.0
121-180 (2-3 p)	22	24	11	10	2	69	32.9
181-240 (3-4 p)	13	32	25	12	4	86	41.0
241-300 (4-5 p)	-	13	5	2	2	22	10.5
301-360 (5-6 p)	-	2	3	1	-	6	2.9
361-420 (6-7 p)	-	1	2	-	-	3	1.4
421 +	-	1	3	-	-	4	1.9
No. of measurement	48	78	50	26	8	210	100.1%
No. of groups	24	36	24	13	4	101	
Av.radius (cm). (paces)	152.8 2.5 p	200.3 3.3 p	240.0 4.0 p	187.0 3.1 p	215.5 3.6 p		
Stand. deviation	42.8	73.5	100.0	47.5	42.3		

Pearson corr. (computed from raw data) r = +0.28 $p < 0.002$

* Radius measured from the center of a gathering (or in the case of solitary people, from the point between the feet of a subject)

(Source: Interview 1)

Table 3-7

Size of spatial domains free of other stationary people as claimed by stationary groups of various size

GROUP SIZE:	SOLO PERSON	DUET	TRIO	QUARTET	QUINTET & +	TOTAL
Radius (in cm) :						
less than 180 (approx. 3 paces)	35	29	12	11	2	89
180 and more	13	49	38	15	6	121
No. of measurements	48	78	50	26	8	210
No. of groups interviewed	24	36	24	13	4	101

Chi^2 for a table with "QUINTET & +" column excluded = 25.95

df=3 $p < 0.01$

(Source: Interview 1)

Table 4-7

Size of spatial domains free of other stationary people as claimed by stationary participation units of various sex-composition

SEX COMPOSITION:	SOLITARY PERSON M	F	DUET MM	MF	FF	TRIO M. DOM.	F.DOM.
Radius in cm.:							
less than 180 (approx. 3 paces)	20	15	11	13	5	9	3
180 and more	4	9	15	13	21	18	20
No. of measurements	24	24	26	26	26	27	23

Chi^2 for solo people = 2.64 df=1 $0.10 > p > 0.05$

Chi^2 for duets = 5.72 df=2 $0.10 > p > 0.05$

Chi^2 for trios = 2.80 df=1 $0.10 > p > 0.05$

(Source: Interview 1)

Table 5-7

Average radius of spatial domain free of other stationary people as claimed by stationary groups of various sex-composition

SIZE OF A GROUP:	SOLE PERSON	DUET	TRIO	QUARTET	TOTAL
Sex composition:					
Male dominated	138 cm (2.3 p)	183 cm (3.1 p)	213 cm (3.6 p)	128 cm (2.1 p)	39
Female dominated	167 cm (2.8 p)	233 cm (3.9 p)	252 cm (4.2 p)	224 cm (3.7 p)	40
M/F balanced	x	175 cm (2.9 p)	x	177 cm (3,0 p)	18
No. of groups	24	36	24	13	97

(Source: Interview 1)

Table 6-7

Type of spatial arrangement and sex-composition of a two-person f-formation

ARRANGEMENT:	N	H	V	L	C	I	TOTAL
Sex-composition:							
MM	3	5	10	15	9	3	45
FM	5	4	7	11	13	5	45
FF	-	6	12	3	1	3	25
No. of cases	8	15	29	29	23	11	115
$Chi^2 = 21.1$	df=10	$p < 0.02$					

(Source: Sample 2)

Table 7-7

Choice of arrangement in relation to the topic of a conversation among standing people

TOPIC:*	SOCIALLY ORIENTED	TASK ORIENTED	TOTAL
Arrangement:			
N	9	7	16
H	46	21	67
V	41	15	56
L	14	18	32
C	8	16	24
I	2	3	5
No. of cases	120	80	200

Chi^2 for a comparison between closed (N+H+V) and open (L+C+I) arrangements = 15.6 df=1 $p < 0.001$

* (Socially oriented conversations: people discuss their marital problems, problems at work, talk about sport, cinema, politics, etc.
(Task oriented conversations : people discuss some aspects of their work, inquire about a loan, discuss the best way to lift a heavy object, etc.)

(Source: Questionnaire, see Appendix B)

Table 8-7

Choice of arrangement in relation to the intimacy of a social conversation among standing people

TYPE OF A CONVERSATION:	INTIMATE	PERSONAL	SOCIAL	TOTAL
Arrangement:				
N	1	6	2	9
H	30	10	6	46
V	6	21	14	41
L	2	3	9	14
C	1	-	7	8
I	-	-	2	2
No. of cases	40	40	40	120

Chi^2 for a comparison between closed (N+H+V) and open (L+C+I) arrangements= 23.4 df=2 $p < 0.001$

(Source: Questionnaire, see Appendix B)

Table 1-8

Inter-participation unit distances and the radii of spatial domains assigned to nearby f-formations - as indicated by subjects of the "Interview 2"

APPROXIMATE DISTANCE IN PACES:	1	2	3	4	5	6	6+	TOTAL	AVERAGE
Target f-formation to nearest mobile unit	44	23	7	6	4	1	-	85	approx.1.9p
Target f-formation to nearest stationary unit	8	10	10	10	14	13	7	72	approx.4.0p
Radius of a domain assigned to a nearby stationary unit	17	41	31	18	6	5	-	118	approx.2.7p

(Source: "Interview 2", see Appendix C)

Table 2-8

Observed and expected choice of location with respect to physical objects

SEPARATION DISTANCE	FIELD DATA		RANDOM MODEL		TOTAL
	N	%	N	%	N
in physical contact	61	17.5	34	9.7	95
1 pace	84	24.1	47	13.4	131
2 paces	57	16.3	53	15.1	110
3 paces	47	13.5	50	14.2	97
4 paces	35	10.0	47	13.4	82
5 paces	28	8.0	42	12.0	70
6 paces	16	4.6	34	9.7	50
7 paces and more	21	6.0	44	12.5	65
No. of cases	349	100.0%	351	100.0%	700

Mean separation distance (0-6 p.) 2.1 p 2.9 p

$Chi^2 = 37.8$ df=7 $p < 0.001$

(Source: Sample 2, Computer simulation 2)

Table 3-8

Relationship between the size of a participation unit and its distance from objects

No. OF PEOPLE PER LOCATION	DISTANCE IN PACES 0-2	3-4	5-6	TOTAL	AVERAGE SEP.DISTANCE
1	108	31	11	150	1.7 paces
2	58	40	27	125	2.7 paces
3-6	36	11	5	52	2.2 paces
No. of cases	202	82	43	327	

$Chi^2 = 22.9$ df=4 $p < 0.001$

(Source: Sample 2)

Table 4-8

Relationship between the size of a participation unit, sex-composition and distance from the nearest object*

Distance from the nearest object (in paces)* SIZE OF A GROUP	SOLO PERSON	DUET	TRIO	QUARTET & LARGER	TOTAL
Sex composition:					
Male dominated	1.4 p	2.0 p	1.7 p	2.0 p	183
Female dominated	2.3 p	3.4 p	2.6 p	1.5 p	97
M/F balanced	x	3.2 p	x	3.0 p	44
No. of cases	150	122	35	17	324

* Average values calculated for distance (1-6 paces)

(Source: Sample 2)

Table 5-8

Relationship between the sex-composition of a participation unit and distance from objects

SEX COMPOSITION	DISTANCE IN PACES 0-2	3-4	5-6	TOTAL	AVERAGE SEP. DISTANCE
Male dominated	56	16	10	82	2.0 paces
Female dominated	23	13	12	48	3.4 paces
M/F balanced	14	20	11	45	3.2 paces
No. of cases	93	49	33	175	

$Chi^2 = 17.8$ df=4 $p < 0.01$

(Source: Sample 2)

Table 6-8

Relationship between the activity of a multiperson participation unit and its distance from the nearest object

ACTIVITY	CONVERSATION	WAITING & OBSERVING	OTHER[a]	TOTAL
Separation distance:				
0- 2 paces	215	97	84	396
3 - 4 paces	98	27	19	144
5 - 6 paces	48	10	5	63
No. of cases	361	134	108	603
Mean sep. distance (0 - 6 p)	2.3 p	1.8 p	1.6 p	

$Chi^2 = 17.0$ df=4 $0.001 < p < 0.01$

[a] other activities include "inf. gathering", "manipulation"

(Source: Sample 3)

Table 7-8

Relationship between distance from the nearest object and the type of arrangement

TYPE OF ARRANGEMENT	N	H	V	L	C	I	TOTAL
Separation distance:							
0 - 2 paces	4	3	13	12	9	5	46
3 - 4 paces	6	3	2	9	6	5	31
5 - 6 paces	2	2	8	7	5	1	25
7 and more paces	3	-	5	1	3	-	12
No. of cases	15	8	28	29	23	11	114

Chi^2 for a table with combined cells (N+H+V) and (L+C+I) = 2.6

df=3 p = N.S.

Average separate distance (0-6 paces) (N+H+V) = 2.86 paces
(L+C+I) = 2.83 paces

(Source: Sample 2)

Table 8-8

Relationship between the choice of the type of nearest objects by participation units and distance from this object

TYPE OF OBJECTS	DISTANCE IN PACES 0-2	3-4	5-6	TOTAL	AVERAGE SEP. DISTANCE
"Barriers"	42	27	9	78	2.3 p
"Objects"	62	39	27	128	2.8 p
"Utility objects"	21	2	-	23	1.2 p
"Seats"	54	11	7	72	1.7 p
No. of cases	179	79	43	301	

$Chi^2 = 27.7$ df=6 $p < 0.001$

(Source: Sample 2)

Table 9-8

Observed and expected choice of location by participation unit with respect to type of physical objects

TYPE OF OBJECTS	"BARRIERS"	"OBJECTS"	"UTILITY-OBJECTS"	"SEATS"	TOTAL
Random model data	134	153	10	54	351
Field data	79	134	24	75	312
No. of cases	213	287	34	129	663

$Chi^2 = 22.5$ df=2 $p < 0.001$

(Source: Sample 2, Computer Simulation 2)

Table 10-8

Effect of the size of the participation unit on the choice of the type of nearest object

	"BARRIER"	"OBJECT"	"UTILITY-OBJECT"	"SEAT"	TOTAL
Solitary person	36	51	17	40	144
Group	43	83	7	35	168
No. of cases	79	134	24	75	312

$Chi^2 = 10.98$ df=3 $p < 0.02$

(Source: Sample 2)

Table 11-8

Relationship between the sex-composition of a participation unit and the choice of location with respect to the type of a nearest object

TYPE OF CLOSEST OBJECT	"BARRIER"	"OBJECT"	"UTILITY-OBJECT"	"SEAT"	TOTAL
Sex-composition:					
Male dominated	23	26	3	17	69
Female dominated	12	26	3	8	49
M/F balanced	8	26	1	9	44
No. of cases	43	78	7	34	162

Chi^2 for a table with excluded "Utility object" column = 6.2

df=4   p = N.S.

(Source: Sample 2)

Table 14-8

Relationship between the activity in a participation unit and the choice of type of nearest object

TYPE OF CLOSEST OBJECT:	"BARRIER"	"OBJECT"	"UTILITY OBJECT"	"SEAT"	TOTAL	TOTAL
Activity type:	%	%	%	%	%	N
Conversing	22	53	6	19	100	251
Waiting & observing	26	48	16	10	100	19
Inf. gathering	76	24	-	-	100	17
Manipulation	46	24	15	15	100	13

(Source: Sample 3) N = 300

Table 15-8

Relationship between type of solitary activity and choice of type of nearest object

TYPE OF CLOSEST OBJECT:	"BARRIER"	"OBJECT"	"UTILITY OBJECT"	"SEAT"	TOTAL	TOTAL
Activity type:	%	%	%	%	%	N
Waiting & observing	28	55	4	13	100	53
Inf. gathering	42	47	11	-	100	19
Manipulation	20	20	15	45	100	20

(Source: Sample 3) N = 92

Table 1-9

Occurrence of verbal and gestural salutations between participants of an f-formation and a passerby as a function of separation distance

DISTANCE IN PACES:	INDOOR SPACES	OUTDOOR SPACES	TOTAL
1	1	2	3
2	5	4	9
3	7	5	12
4	4	6	10
5	-	1	1
6	2	-	2
7	3	1	4
8	-	2	2
9	-	-	-
10	-	2	2
...			
14 paces	1	-	1
...			
21 paces	1	-	1
No. of cases	24	23	47

(Source: Unsystematic fieldnotes)

Table 2-9

Frequency distribution of distances over which gestural salutations* occurred between an individual and the f-formation participants

DISTANCE IN PACES:	SALUTATIONS ON ARRIVAL	SALUTATIONS** ON DEPARTURE	TOTAL
1	3	-	3
2	2	-	2
3	4	1	5
4	-	2	2
5	2	2	4
6	-	-	-
7	1	3	4
8	-	2	2
9	1	3	4
10	1	2	3
11	1	1	2
12	1	1	2
13	-	-	-
14	1	-	1
15	-	-	-
16	-	1	1
17	1	-	1
18	-	-	-
19	-	-	-
20	-	-	-
No. of cases	18	18	36

* hand wave, or palm presentation;

** people taking leave frequently were seen to engage in over-shoulder look directed toward the f-formation and combine it with a farewell gesture.

(Source: Unsystematic fieldnotes)