From Personal Space to Cyberspace

Robert Sommer

There seems to be less respect these days for personal space. People are crowding each other in movie lines, elevators, subways and on the streets. (New Yorker, 7/24/95, p. 70).

1. INTRODUCTION

The language of human relationships is rich in spatial metaphor. We speak of looking up to or down upon another person, appearing distant or close, needing elbow room, and keeping another person at arm's length. The term personal space (PS) was introduced into the social psychological literature to describe the emotionally-tinged zone around the human body that people feel is "their space" (Sommer, 1959). The dimensions of the emotionally-tinged zone are not fixed but vary according to internal states, culture, and context.

This chapter will describe the history of the PS concept, its theoretical underpinnings, different techniques for its measurement, research findings, areas of application, PS in the digital age, clarify terminology, and lists some unanswered questions. Related topics on which considerable research has been done, such as territoriality, crowding, and privacy, are mentioned only in passing, with their definitions, theories, and research findings left to other chapters.

2. PRECURSORS AND RELATED CONCEPTS

The PS concept has its roots in animal studies, particularly the work of ethologists and zoologists. Katz (1937) compared PS to the shell of a snail; Von Uexkull (1957) made the analogy of individuals surrounded by soap bubble worlds, and Stern (1938) likened the "personally near" to an aura surrounding the body. Ethology at the time included many descriptive studies where terminology was not used precisely. The concept of personal space overlapped with several existing concepts and some that came afterward, including the following terms:

Individual distance: the amount of space between organisms and their conspecifics. Useful in interpreting naturalistic studies of human spacing.

Flight distance: the amount of space between individuals and members of other species seen as potential predators. When used in human studies this became the basis of invasion studies of personal space.

Proxemics: Term introduced by Hall (1959, 1966) for the study of spatial relationships. Hall identified four interaction zones: Intimate distance (0-18"), Personal distance (1.5'-4'), Social distance (4'-12'), and Public distance (12'-25').

Territory: A fixed geographical space marked and defended by an organism and used for life-sustaining activities. Although personal space has occasionally been described as a temporary or portable territory, there are important differences between the two concepts. Territory refers to a fixed geographic location while PS does not. The boundaries of territory are marked while those of PS are invisible. PS has the body at its center while territory has the home or nest as center.

Distancing: To put physical distance between self and others in order to gain privacy (Buslig, 1999).

Defensible space: Introduced by Newman (1972) to describe the ways in which well-marked territories and good surveillance can increase the safety of residential housing. The concept has been widely applied in city planning and urban design.

Body buffer zone: Term introduced by Horowitz, Duff, and Stratton (1964) with a meaning very similar to that of personal space. Can be used as a synonym.

3. UTILITY OF THE CONCEPT

A search was made on the PsycINFO database using "personal space" as the subject. From 1970, when the term first appeared on the database, through 1999, there were 873 abstracts of articles and chapters, and 233 dissertations. These numbers are undercounts as they exclude all the pre-1970 research undertaken before "personal space" became a separate index term and all dissertations outside the United States and Canada.

Personal space has become a common term in social psychology and communications textbooks, and a chapter heading in environmental psychology textbooks, often in

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concert with territory and crowding. Demonstrations of PS invasions are included as exercises in psychology classes. Applications of the PS concept in design, education, government standards, and in the courts will be described later in this chapter.

4. SEARCH FOR THEORY

When the personal space concept was developed in the 1950s, there was very little published research on interaction distances among humans. The most relevant experimental studies had been done by ethologists using animal species under the rubric of individual distance (Hediger, 1950; Tinbergen, 1953). Most animals in the wild maintained defined distances from conspecifics, and these distances were influenced by the animal's age, size, gender, and other factors. Particularly relevant were the theories of Hediger, which had come directly out of his efforts to improve zoo environments, illustrating the reciprocal relationship between applied research and theory. Research can be based on theory but it may also lead to new theories.

Using these animal studies as a model, Sommer and Ross (1958) undertook research on interpersonal spacing in humans as part of a larger effort to improve mental hospital conditions. It was expected that information about human spatial needs would assist in designing suitable living quarters for patients. The work began on this atheoretical basis and continued this way for many years. Evans and Howard (1973) noted the paucity of theoretical discussion of PS. Other writers responded to the absence of a satisfactory theory by importing explanatory concepts from social psychology, based either on considerations of protection or communication (Bell et al., 1996). Within the category of protection, the overload theory of Scott (1993) maintained that distance from others was needed to prevent overstimulation. Horowitz, Duff, and Stratton (1964) and Dosey and Meisels (1969) saw the body buffer zone protecting individuals from threat. Altman (1975) described it as a boundary regulation mechanism intended to achieve desired levels of privacy. In a similar vein, Aiello (1987) proposed a comfort model based on the equilibrium or affiliative-conflict model (Argyle & Dean, 1965) in which a person seeks an optimal level of closeness with others. If this equilibrium is disturbed by people coming too close or staying too far away, compensatory behaviors will be used, such as decreased or increased eye contact. Hayduk (1994) explained the results of stop-distance spatial invasions as a dynamic readjustment of the participants. Using Lewin's (1951) field theory, Knowles (1989) interpreted interpersonal spacing as gradients of attraction and avoidance. Other writers spoke of the protection function in terms of reduced arousal (Patterson, 1976). The behavioral constraint perspective suggested that PS increases personal autonomy and helps maintain control in social situations (Edney, Walker, & Jorden (1976). Hall (1959; 1966) viewed interpersonal distance as a type of nonverbal communication which conveys information about the nature of participants relationship both to the participants themselves and to observers.

As the concept of personal space was an outgrowth of ethological research, there have also been evolutionary theories. Evans and Howard (1973) suggested that a more thorough understanding of personal space could be achieved by viewing it in functional terms. They proposed that PS is a mediating cognitive construct which allows human beings to operate at acceptable stress levels and aids in the control of intraspecies aggression. By maintaining a minimum distance from their fellows, humans are exhibiting adaptive, stress-reducing behavior and this has selective advantages in the evolutionary process. Burgess (1983) sees similarities between spacing in human aggregations which are "close but not too close" and the protective function of grouping in other species following the "the selfish herd" concept (Hamilton, 1971).

As environmental psychologists have begun to study the natural as distinct from the human-made environment, the heuristic value of evolutionary explanations has become more evident (Kaplan, 1992). Studies of human response to the landscape draw heavily from Orians' Savanna Theory (1986), Appleton's Prospect-Refuge Theory (1990), and the Biophilia Hypothesis proposed by Kellert and Wilson (1993) and developed by Ulrich (1993). The new evolutionary theories are more sophisticated than earlier ones. They do not neglect culture but include it in a lengthy process of gene-culture co-evolution through natural selection (Wilson, 1998). Testable Darwinian explanations will promote consilience, defined by Wilson (1998) as "the linking of facts and fact-based theories across disciplines to create a common groundwork of explanations" (p. 8). Specifically, a Darwinian framework of PS will bring together studies of human spatial behavior by environmental psychologists with the much larger body of studies by ethologists and zoologists on animal spatial behavior and reawaken interest in collaborative research between psychologists and biologists in this area.

Darwin's (1909) evolutionary theory emphasizes reproductive success as a force in natural selection. Behaviors that bring a competitive advantage in reproductive success will be favored over those that do not. Social theorists such as Herbert Spencer (1898) maintained that natural selection was the mechanism by which cultural traits evolve. Darwinian theory goes directly to the "Why?" questions that most writers in the field avoided. It is time to remedy this oversight and address the functional basis of the needs for privacy, affiliation, and equilibrium mentioned in the social psychological theories of personal space. Testable formulations based on evolutionary theory as applied to human spatial behavior will be proposed. Some of the research has already been done outside this framework. The task now is to move in the direction of consilience and integrate what have been social-psychological concepts and research into an evolutionary framework. Other studies remain to be done; e.g. examining approach distances between siblings

according to age and gender.

4.1. A functional framework

Rationale: Ample high quality space enhances survival, reproductive success, and child-rearing. From this assumption, various derivations can be made. This list can be added to and revised by other researchers.

Adults will seek proximity to:

1 Desirable mates

2 Non-competing own offspring in need of protection

3 Similar conspecifics who will make future allies

Adults will maintain distance from:

1 Stigmatized individuals who will adversely affect survival or reproduction

2 Strangers and other unpredictable individuals

3 Any individual who is perceived as a threat

4 Family members subject to incest taboos.

Other predictions relate to social organization (including dominance orders), territory, crowding, and the immediate response to invasions of personal space.

1 High status, dominant individuals will be allocated more high quality space than will low status individuals.

2 Unwanted closeness will produce signs of discomfort and hasten withdrawal.

3 Approaches from the rear are potentially more dangerous and will be more threatening than approaches from the front or side.

4 As territory is used for vital, life-sustaining activities, a spatial invasion in a person's territory will provoke greater resistance than an invasion in other settings.

5 Crowding produces unwanted proximity and thereby shrinks personal space boundaries. It can also be viewed as a threat to reproductive success, in terms of a surfeit of competitors in limited space. Crowding therefore results in discomfort, lower helpfulness, and various compensatory behaviors.

6 During stages of dependence, children will remain close to the primary care provider. As the child develops, this distance increases.

7 When the child reaches puberty, distance to opposite sex parent and post-pubertal siblings will increase because of incest taboos.

8 The group has a biological interest in successful reproduction of its members. It will stigmatize unhealthy, non-reproducing members and discourage union with outsiders. This leads to a prediction of closeness between group members, particularly those who will make good reproductive mates or allies.

5. METHODS OF MEASUREMENT

5.1. Field studies

Undertaken in natural settings, the anonymous participants are unaware their behavior is being recorded. The dependent variable may be measured during the invasion (e.g. faster departure) or afterward (e.g. less helpfulness in a subsequent encounter).

Unobtrusive observation in natural settings. Quantification of data from photographs, video, or seating charts. This method is especially useful in cross-cultural studies as language is not a barrier.

Staged invasions in natural settings. A confederate stands too close to an unwitting subject while an observer records the subject's response.

Blocked access. In one variant of this method, pairs of confederates stage a conversation that partially blocks a corridor or sidewalk,. An observer records whether people walk through or around the conversing pair (Schiavo et al., 1995). Another variant of this approach stations a confederate unusually close to a drinking fountain to see if this discourages usage of the fountain by others (Ruback & Snow, 1993). The confederates can be varied by gender, ethnicity, dress, or status.

5.2. Simulations

The participants are aware that they are being observed or tested, although the particular variables of interest to the researcher, such as space usage, may not be specified.

Spatial preference. Studies how people place themselves under various laboratory conditions, i.e. high and low anxiety situations or after success or failure.

Stop distance. A confederate approaches the subject who tells the other person to stop when the confederate comes uncomfortably close.

Approach distance. Subjects are asked to move toward another person or a person-surrogate, such as a photograph of a person showing a specific emotional expression such as happiness or fear, and to stop at a comfortable interaction distance. A variation suitable for three individuals at a time is the Family Approach-Stop Measure (Larson & Lowe, 1990). Family members are asked to stand approximately 10 feet from each other in a triangular formation and move toward each other and stop "at a comfortable distance."

Retreat. Albas (1991) employed retreat rather than invasion. When the confederate moved the chair farther away from the subject during a staged interview, the subject moved forward to maintain a comfortable conversation distance.

Figure placement tests. Respondents place surrogate human figures in conversational or other social arrangements. Stimuli have included silhouettes (Greenberg, Strube, & Myers, 1980), photographs (Strayer & Roberts, 1997), felt cut-outs (Kuethe, 1962), manikins (Ruggieri & Frondaroli, 1989) and dolls (Summit, Westfall, Sommer, & Harrison, 1992).

Paper and pencil tests. These have included the Comfortable Interaction Distance Scale (Duke & Nowicki, 1972), the Psychological Distance Map (Kogawa, 1983), figure drawing tests (Holmes, 1992), the Individuation-Attachment Questionnaire (Kaplan, 1988), and the Interpersonal Distance Measure (Pedersen, 1973.

Physiological recording. Researcher records the subject's eyeblink rate, heart rate, or other physiological measures as a function of interpersonal distance (Omori & Miyata, 1998).

6. RESEARCH FINDINGS

There are too many studies on the determinants of interpersonal distance to describe them all in terms of subject population, treatment, and results. There are some excellent reviews available, see particularly Aiello (1987); Bechtel (1997); Bell, Fisher, Baum, & Green (1996); Gifford (1996); and Knowles (1989). Recent research has broadened the populations and sites studied, and include samples from Turkey (Kaya & Erkip, 1999), Japan (Yamaguchi,1997), South Africa (Akande, 1997), India (Sinha & Mukherjee, 1996), England, France, Netherlands, Italy, Greece, Scotland, and Ireland (Remland, Jones, & Brinkman, 1995), Canada (Gifford & Sacilotto), and Nigeria (Balogun, 1991). Observational sites extend to elevators and bars (Hewitt, J. & Henley, R., 1987), ATMs (Kaya & Erkip, 1999), telephone booths (Ruback, Pape, & Doriot, 1989), preschools (Burgess & Fordyce, 1989), dentist waiting room (Ajdukovic, 1988), water fountains (Ruback & Snow, 1993) and busses (Rivano-Fischer, 1988). Specialized subgroups of respondents involved in the research, either as subjects or confederates, have included visually impaired persons (Eaton, Fuchs, & Snook-Hill, 1998), hearing impaired persons (Jones, 1985), maladjusted children (Dawson & Scarborough, 1994), pregnant women (Davis & Lennon, 1983), and employees working in isolation (Gifford & Sacilotto, 1993). New combinations of participants whose spatial behavior has been observed are attorney-witness (Brodsky, Hooper, Tipper, & Yates, 1999), police-suspect (Winkel, Koppelaar, & Vrij, 1988), salesperson-customer (McElroy & Morrow, 1994), manager-employee (Smeltzer, Waltman, & Leonard, 1999), husband-wife (Sinha & Mukherjee, 1990), photographer-subject (Hosch & Himelstein, 1982), and nurse-patient (Smith & Cantrell, 1988).

Table 1 summarizes those findings which seem best substantiated within this copious body of research. These have come from field studies, simulations, or in both. For the most consistent findings based upon numerous studies (e.g. spatial invasions are stressful or friends interact at closer distances than strangers), a review chapter summarizing the findings will be cited. For conclusions based on a limited number of studies, only one or two of the original articles will be listed. More detailed accounts can be found in the review articles and chapters listed earlier.

Table 1. Influences upon Interpersonal Distance: Summary of Research Findings.

(-) decreases distance

(+) increases distance

(A<B) A has larger space than B

1. attractiveness: (-) (Gifford, 1996)
2. acquaintanceship, friendship: (-) (Bell, Kline, & Barnard, 1988; Gifford, 1996)
3. cooperation: (-) (Mehrabian, 1968; Tedesco & Fromme, 1974)
4. similarity: (-) (Gifford, 1996)
5. family cohesion: (-) (DeCarlo, Sandler, & Tittler, 1981).
6. dark glasses or eyes closed: (-) (Argyle & Dean, 1965)
7. stigma: (+) (Conigliaro, Cullerton, Flynn, & Roeder, 1989; Stephens & Clark, 1987)
8. threat, anxiety, insult: (+) (Albas & Albas, 1989; O'Neal et al., 1980; Skorjanc, 1991)
9. inappropriate staring: (+) (Tobiasen & Allen, 1983)
10. mental disorder: (+) (Srivastava & Mandal, 1990; Gifford, 1996)
11. child's age: (+) (Larson & Lowe, 1990; Sigelman & Adams, 1990).
12. smoking: (+) (Kunzendorf & Denny, 1982)
13. approach angle: side<front in terms of preferred distance in invasion studies. Long rear distance particularly marked in studies with violent offenders (Wormith, 1984).
14. cultural factors: Most studies support Hall's contention that people from contact cultures (Mediterranean and Latin backgrounds) sit and stand closer together people from noncontact cultures (Anglo Saxon background). (Aiello, 1987)
15. gender: female pairs<male pairs (Daigle, 1996; Gifford, 1996). Findings with opposite sex pairs appear to depend on level of acquaintance or relationship (Bell, Kline, & Barnard, 1988).
16. participants' height: (+) (Caplan & Goldman, 1981)
17. isolation: (+) (Worchel, 1986; Gifford & Sacilotto, 1993)
18. environmental variables: Studies of the effects of room size and shape, location in the room, and room density (Evans, Lepore, & Schroeder, 1996), ceiling height (Cochran & Urbanczyk, 1982), indoors v. outdoors (Cochran, Hale, & Hissam, 1984), and lighting (Adams & Zuckerman, 1991).
19. personality variables. Researchers have examined the relationship between PS and numerous personality variables. Gifford (1996) provides a good review of the studies. Probably the most consistent findings are that people who are extroverted, field dependent, affiliative and cooperative tend to interact at a closer distance than those who are anxious, maladjusted, and introverted. A favorable attitude toward touching is also associated with reduced personal space (Andersen & Sull, 1985).

7. APPLICATIONS

In addition to studies in the technical literature, another

test of the importance and durability of a concept lies in the area of application. How have professionals whose concerns include interpersonal distance used the concept during the past 30 years? Several areas of application are identified.

7.1. Design uses

Studies have attempted to define the optimal layout of furnishings for maintaining individuals' feelings of adequate space and for allowing people to regulate their interactional distance from others to reduce unwanted closeness. The PS concept has been used in the design of offices, stores, banks, and other building types, but its greatest applicability is in mass transit and institutional settings with fixed seating and little opportunity for personal mobility. The American space agency NASA used the results of PS research to improve habitability in the space station (Harrison, Clearwater, & McKay, 1991; Price, 1996).

7.2. Teaching uses

Hall (1966) taught classes for diplomats and corporate executives being posted to different cultures, describing the different ways that people around the globe used space and time. Others applied these ideas to interactions between salespeople and customers, police interrogations, nurse-patient relationships, and interactions among family members.

7.3. Legal uses

In the United States, the concept of PS had almost as much application in the courtroom as in design. Space usage became a pivotal issue in lawsuits on sexual harassment, as unwanted closeness was interpreted as a form of harassment toward individuals considered to lack power to challenge it. Consultants in jury selection evaluate space usage by potential jurors, noting how far people stand and sit from one another, and observing their postures and gestures as they respond to questions asked during the selection process.

Hall (1959, 1966) and LaFrance (LaFrance & Mayo, 1978) testified as expert witnesses on interpersonal distance in a case where a city government enacted a "body buffer" ordinance to protect women entering an abortion clinic. The court considered angry protesters' deliberately getting unusually close to anxious and vulnerable clients to be a form of harassment. The judge upheld a minimum distance to be maintained between demonstrators and clinic patients (Hern, 1991).

8. PERSONAL SPACE IN A DIGITAL AGE

8.1. Utopian and dystopian visions

When a new technology is introduced, there will be contrasting predictions from proponents and opponents regarding its impacts upon society. The negative response from those wedded to earlier technologies will be most apparent at the outset, before the bugs have been worked out of the innovation, and displacements of people and activities occur. As the benefits of the new technology become evident and the early problems are resolved, oppositional tendencies diminish and a reasoned appraisal of overall costs and benefits becomes possible.

There is a dystopian literature about the effects of computers on human relationships (e.g. Roszak, 1986; Stoll, 1995). Sprandel (1982) reported that "computer addicts" can lose touch with the real world, feel a loss of control, and feel dehumanized. A survey of undergraduates found that they regard the computer as efficient and enjoyable, but also desocializing in its effects (Kerber, 1983). Others see it fostering solipsism (Levy, 1984) and disembodiment in terms of reduced interest in the body and physical appearance (Travers, 2000). Virtual images can crowd out real world interactions, distancing people from direct physical information about the world. In a detailed study of 73 households during their first years online, Kraut et al. (1998) found greater use of the Internet associated with a decline in participants communication with family members in the household, a decrease in the size of their social circles, and increased feelings of loneliness. Some researchers report a change in modes of communication following interest in computers (Orcutt & Anderson, 1977), with heavy users becoming less social and less able to communicate effectively with other people, with reduced interest in interpreting nonverbal aspects of communication (Simons, 1985). In his book The technological society, Ellul (1965) maintains that new technology separates people from nature. Simons (1985) only half-jokingly suggests that computer documentation should include a warning from the Surgeon General: "Only to be set up near a window where you can preferably see one tree." (p. 100). This proposal is consistent with research documenting the benefits of viewing nature (Ulrich, 1984).

On the opposite side of the argument, there are community activists who see computer networks as tools for building community, overcoming alienation and anomie, leading to empowerment of the disenfranchised (Agre & Schuler, 1997). There is a social movement dedicated to socially responsible computing intent on building bridges between computer professionals and nontechnical people. The Berkeley Community Memory Project placed computer terminals in public locations in working class neighborhoods (Farrington & Pine, 1997). The manager of an interactive online service compares himself to an innkeeper or resort manager, describing groups such as The Well or The Gate as villages, communities, and safe places (Coate, 1997).

This section considers the implications of a largely aspatial technology on human spatial interactions. People no longer need to live close to where they work or physically commute to work; they can telecommute and telework. They do not need to see or even know the people with whom they interact in an online group. They can physically be in one location, such as an airport or sidewalk corner, surrounded by people, and talk on a cell phone or send e-mail messages to someone else. In an online group, they find people with similar interests, drawing from a wider pool than exists in their own

neighborhoods (Sproull & Faraj, 1995). Relative to face-to-face communication, online communication lacks cues from facial expressions, eye contact, body language, and interpersonal spacing. Some people change their personas online, especially if they can remain anonymous, becoming more assertive and willing to say what might cause an irrevocable rupture in face-to-face interaction. Physical appearance, age, and dress have less meaning in online interactions, but this may change as two-way viewing is integrated into computer technology. Although the videotelephone is not yet commercially successful, Kraut and Fish (1997) found that many customers appreciate its enhancement of the social aspects of communication. Heath and Luff (1993) provide an excellent discussion of interactional problems in existing video-mediated communication and how these are being resolved. Bolt (1984) believes that future computer interfaces will become even more like face-to-face conversations, responding directly to user gestures, movements, and gaze, as some virtual reality transmitting devices are able to do.

As with other design-related terms appropriated by computer users (e.g., rooms, architecture, portals, exits, and furniture) personal space possesses a metaphorical meaning in virtual space related to privacy and regulation of the intensity of interaction. It is important to remember that at some point this virtual world intersects with the real world. All messages are composed and read in real settings where the principles of environmental influence and interpersonal spacing still apply. Individuals interacting electronically may eventually meet face-to-face. The manager of an online group notes that members like to see each other socially, and the groups sponsor potlucks, parties, and other social events for members, in which the virtual and real personas collide. The face-to-face meeting influences subsequent online communication (Coate, 1997). Because of the newness of the technology, most of these issues have not been addressed by researchers.

8.2 Cell phones

The cell phone has removed the requirement of a fixed location to receive messages. One can be in a public place with several other people, each of whom is engaged in an independent conversation with others not present. Those nearby, unable to shut out the various cell phone conversations, feel as if they are being subjected to an auditory invasion. Some professionals use cell phones to communicate on a regular basis with clients at work or on vacation. The "office in the saddle" consists of a car, a briefcase, and a cell phone (Weigel, 1998).

There is little or no published research of the effects of cell phones on human spacing. It would be feasible to conduct both field or simulation studies of the effects of cell phones upon interpersonal distance. A desire for increased personal space may be one of the motivations for using a cell phone in a public place. Observations can be made in public locations at times of low density to see how close people sit in relation to those engaged in cell phone conversations. Invasions can be staged in public locations by sitting next to those talking on cell phones to observe signs of discomfort, reduced conversational length, or departure from the invaded space. Simulations can be conducted on preferred conversational distance from someone holding a cell phone, with the control condition involving an object of similar size and shape.

8.3. The Internet

With digital media, a distinction must be made between surfing the Web, which is interaction with media rather than specific individuals, and conversation through e-mail and chat rooms which are conversations with individuals who happen not to be physically present. Surfing the web is a virtual rather than a real encounter with other people. In contrast, e-mail can be a real, although an aspatial and asynchronous interaction with another person. There are many testimonials to the closeness e-mail can bring to physically-distant family members, friends, and colleagues. On the other hand, individuals in the same office or household sometimes leave messages for one another on e-mail rather than have a face-to-face conversation. E-mail can discourage telephone calls which provide real-time contact with additional voice cues available for interpretation. It also facilitates telecommuting which reduces face-to-face contact among office workers (Simons, 1985).

Internet technology is developing so rapidly that it is too early to gauge its effects on the amount and quality of social interaction. Now is the time to collect the naturalistic baseline data. How many people do we interact with each day and for how long and what is the content of these interactions? The logistics, expense, and privacy implications of data collection make this a daunting task, probably not practicable on a large scale, although Kraut et al. (1998) came close to this detail in a study of 73 households in a single city.

Research has not addressed context effects on Internet use. Important questions of workplace quality lie at the heart of this issue. Does it matter that messages are sent or received in a bare cramped cubicle or in a well-lit, spacious, attractively furnished office? To what degree are the flat keyboard and flickering screen of the monitor the only significant realities for the office worker? These questions can be answered experimentally by comparing messages composed in different types of settings. Following Maslow & Mintz (1956), one would predict shorter messages in ugly setting) and various subtle content differences.

Do previous virtual encounters with another person reduce the distance between them in subsequent face-to-face interaction? An affirmative prediction can be made following the well-documented finding that friends converse at smaller distances than do strangers. How are message senders and receivers affected by the proximity of other people, including those who sit or stand too close for comfort? Will messages typed by those whose space has been invaded show signs of discomfort and tension, not only in behavior, but also in message content and length, including fewer positive and more negative terms,

and more typing errors? On the basis of the extensive studies of the negative effects of spatial invasions on other processes (less helpfulness, more negative affect, more foot-tapping, fidgeting with hair, and other indicators of tension, and hastened departure), affirmative predictions can be made.

8.4. Invasions of cyberspace.

Hackers are cyberspace invaders who attack, not only corporate and government security, but also personal computers files and sometimes taking personal identities. There are also serious concerns about the protection of e-mail messages which can be read and stored by operators at both ends of a system. Most system operators have the right to read messages and government agencies can intercept and read them. In 1986 the US Congress passed the Electronics Communication Privacy Act to address some of these issues.

Domain names are territorial markers in cyberspace. It takes only a small fee to buy a domain name and hold it for two years. The United States Congress passed the cybersquatter act to prevent a person appropriating domain names that steal the identity of another person or company. There is also legislative concern with computer viruses inserted to deliberate overload a system and "invade" a computer network. Is Milgram's (1970) list of responses to potential stimulus overload among city residents applicable to digital overload? Little research has been done about the psychological consequences of these and other cyberspace encounters which are virtual in their electronic format but very real in terms of costs and consequences.

9. OVERVIEW AND FUTURE DIRECTIONS

Problems of definition continue to trouble those who review research studies in this area. It seems less of a problem for researchers who employ operational definitions. My own view is that personal space should be reserved for the emotionally charged zone or around individuals or body buffer zone. Analogies to a soap bubble or snail shell can be misleading, as the shape of this zone is more like an hourglass than circular, with longer distances in front and rear than at the sides. The term personal space seems particularly suited for interpreting the results of staged invasions, especially when the approach is arbitrary and unnatural, such as a side or rear invasion with the subject facing ahead. It is difficult to call the chosen distance in these cases "interaction space" as the unusual arrangement was not selected by the actors.

A different term is required for the space between two or more interacting people, what Goffman (1971) labeled "interactional space." I would be content to use Hall's zone system or Lewin's field terminology to describe this, although I prefer a parsimonious term like interaction distance. Clearly this concept has wider applicability than personal space, especially in social psychology which is concerned with group interaction.

My recommendation is as follows: when the measurement involves the space surrounding a single individual's body, the use of personal space seems appropriate. When the measurement involves the space between two or more interacting individuals, then interaction distance should be used. With this nomenclature, personal space is a mentalistic concept, similar to body image in its subjectivity and individual centeredness. In contrast, interaction distance is an objective group concept, measured in terms of distances between two or more people.

The lack of functional theories attempting to explain why people maintain distance from others (or why people seek privacy, comfort, reduced arousal, or equilibrium to cite several of the social-psychological theories) has hindered consilience, in keeping separate the research with humans from the largely body of work on animal spatial behavior. Hopefully the framework presented in Table 1 will have some heuristic value. Comparing preferred interaction distances between pre- and post-pubertal sibs, and between them and same- and opposite-sex parents will test Wilson's consilience model. There is a developing literature relating interaction distance to attitude toward touching. The taboos surrounding haptic research in which people might touch one another suggests another interesting, albeit difficult and even risky, test of consilience in this area.

There is a developing research literature on interpersonal spacing in various human services fields, such as nursing, psychotherapy, social work, and family counseling. Much of this is in the form of dissertations and unpublished presentations. There is also a proliferation of how-to books describing appropriate space usage in various interpersonal encounters. Some of this is directed to protection from lawsuits but other books deliberately recommend the aggressive appropriation of space in areas of sales, management, and dating to demonstrate dominance or make an impression. There continues to be a flourishing cross-cultural literature stimulated by Hall's proxemic theory.

Is has been interesting to observe personal space enter the popular culture. Airlines advertise more of it in their seating, homeless shelter residents complain that they have too little of it, and corporate training manuals warn employees to respect each others' personal space. Whether this usage is good or bad for research and theory building in this area is debatable. What is clear is that the concepts of personal space and interaction distance have lasted four decades and show no signs of disappearing even in a digital age when communication is increasingly aspatial. The verdict is still out as to whether the Internet is a technology like the telephone that increases social participation (Fischer, 1992) or is more like television in reducing it (Brody, 1990). Probably the answer will be that under some circumstances, the Internet can enhance interaction and in other cases, it will reduce it, and an overall conclusion independent of context has little relevance.

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