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City University of New York PH.D. 1986

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WORKING AT HOME AND BEING AT HOME: THE INTERACTION OF MICROCOMPUTERS AND THE SOCIAL LIFE OF HOUSEHOLDS

by

JAMIE HORWITZ

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1986

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This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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ABSTRACT

Not until the recent upsurge of interest in microcomputers and home work has attention been devoted to the household as a setting for technical learning and invention, or organizational and independent work. Drawing upon theoretical implications of research on industrial technology and the household, this study contributes to the development of an empirical basis for understanding the first ten years of microcomputer use at home.

The environmental approach to this psychological study includes two stages. In the first, a survey and content analysis of over 400 articles in mainstream periodicals and national newspapers revealed that since 1976 the representation of computer home-use shifted toward work-related purposes. In the second stage, six case studies of urban families with school-age children were conducted in order to understand the evolution that had occured since they purchased microcomputers and attempted to use them for self-employment.

Interviews revealed that while adults and children use microcomputers to learn independently of their schools, and to work independently of their jobs, individual uses of microcomputers are not an entirely individual matter. A second income was needed to support the first years of self-employment, and gender influenced whose computing was encouraged, and whose work was interrupted. In every household, there was an increase in time spent working, though not necessarily, time spent earning. Media illustrations included.

ACKNOWLEDGEMENTS

Being author of this dissertation has made me the beneficiary of many people's encouragement and support. From the outset, Maxine Wolfe and Leanne Rivlin generously gave their time and their ideas to this research and this researcher. It is their belief in the unfolding process of environmental psychological inquiry that made this dissertation a reality.

At a critical stage in its completion, several individuals brought renewed life to this project. Hal Proshansky bridged the gap with a Grant in Aid from the President of the Graduate Center's special fund, and with his lively interest in this dissertation. Marjory Rosen Horwitz lent her ear to the recorded interviews and her perfect pitch to the process of sifting through the many voices. Shelia Lehman read the first full draft. Many of her criticisms and comments found their way into this text. Hours of tedious work were lightened by the linguistic clarity and good humour of Louise Moed. I am grateful to each of them for their willingness to nurture this process.

Acknowledgements are due to long friendships, as well. Jan Zimmerman first brought my attention to communications technologies and encouraged me to explore the roles they can play in women's lives. Cheryl McQueen helped me overcome my uneasiness with microcomputers and discover my pleasure in learning with them. More than a decade ago, Mayer Spivack inspired my continued interest in new combinations of home and work. Without his caring spirit, or the scintillating conversation of Anneliese Riess, my efforts on this project would not have been as sustained nor as enjoyable.

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CHAPTER ONE

INTRODUCTION

The idea that widespread uses of information and communications technologies might lead to new worlds of experience at home has been circulating in news media and scholarly reports since the late 1960s. When a U.S. Patent Office research scientist coined the term "domonetics" (cited in Nora & Minc,1980) by linking "domicile," "electronics," and "nexus," he was the first of many researchers to suggest that new patterns of storing, processing, and retrieving information with computing systems could lead to changes in the situated meaning of living environments.

Throughout the 1970s and early 1980s, futures in which a majority of white-collar office workers would bicycle to their neighborhood telecommunications work stations (instead of commuting to central business districts) have been envisioned in scientific reports (Nilles, Carlson, Gray, & Hanneman 1976; Harkness, 1977; Tydeman et al., 1983). Predictions that children and parents would be brought closer together through computer-based household employment (Toffler, 1980) have been amplified throughout mainstream media. Designs for housing that features computer-based systems have been a focus of national attention ("A House That Thinks for Itself," 1976; Mason, Jennings, and Evans, 1983), and the use of computers for working at home has inspired architectural competitions (Sherman,

1983) as well as local zoning debates (Brooks, 1983) and Internal Revenue Service controversies (Busch, 1980) about the integration of work into residential settings. Yet, in the midst of considerable popular speculation, market strategizing and scientific debate over the future design, policy, and implications of the residential uses of new technologies, we know very little about how the microcomputers (see Note 1) purchased by 12.5 million U.S. households (Office of Technology Assessment, 1985) mediate the experience and use of residential environments, or how the social life of households may be mediating the uses of computing systems.

The purpose of this dissertation is to bring an environmental approach to the psychological study of the interaction of microcomputers and households. Its goal is to contribute to the development of an empirical basis for understanding what aspects of the household environment may be meaningfully related to the evolution of microcomputer uses at home. It does so by surveying the circulation of ideas and images about the home uses of microcomputers in mainstream journalism and by investigating the environmental context of six middle-class households with school-age children that purchased microcomputers for self-employment and personal enrichment.

Chapter One provides a background for this study by introducing its environmental approach. It begins with the environmental-psychological perspective on the interaction of people and environments, and then reviews literature on the interaction of technology and households preceding any empirical research on the introduction of microcomputers. In the absence of empirical research in 1983 (when this project was accepted) on the extent or diversity of household uses of computers, this research began with the decision that

there is a great deal to be learned about the phenomenon without conducting survey research.

Chapter Two explains the methods of data collection and analysis of two types of data: A search of mass-circulation periodicals was conducted and its results were used to build conceptual categories and select households for in-depth interviews.

Chapter Three traces four images of home as computing environments that emerged in mainstream media. Chapter Four presents a summary of household interviews used to investigate these images. Chapter Five analyzes in detail the history of the interaction of microcomputers and the social life of the six households in which self-employment was an intention or a result of their computer home-use.

Chapter Six concludes by reflecting on these findings in light of research on the household uses of microcomputers and the uses of the household in a technologically changing society.

The rest of Chapter One discusses the conceptual and analytic framework of this dissertation, and the assumptions and questions that guide it.

An Environmental Approach to the Psychological Study of Microcomputers and Households

The study of the interaction of computing and households is well suited to the interdisciplinary approach of environmental psychology as it is delineated by Proshansky, Ittleson, and Rivlin (1976, pp.9-12). Like many other social sciences, environmental psychology understands society to be more than an aggregate of individuals, and unlike many psychologies, it understands the physical environment to be more than a backdrop for human behavior.

Although it is commonly agreed that physical settings and objects have psychological importance in people's lives, environmental psychology concentrates on the importance of understanding how this relationship between people and environments operates at different levels of experience. The individual's relationship to the environment occurs at the level of inner experience (feelings, motivations, perceptions) as well as at levels that are not defined by individuals alone (such as developmental processes and social group membership). It is the inclusion of different levels of analysis that enables environmental psychology to be an interdisciplinary research endeavor that situates research not only within scientific literature and its categories, but also within archival and historical literature and its categories (for example, see Rivlin and Wolfe, 1985). As such, the field of environmental psychology has charted a path in which it is possible to define the material surroundings as a social and historical product, and to include it in the psychological study of human experience.

Rather than a neutral presence in social life, the environment is understood to be an "actor." At the same time, to analyze the

role of the environment, it is necessary to view it in the social context in which it is situated.

> In the same way that it (the environment) may limit or support action, it also reflects and helps to define a system of social relations and the person as a part of that system. (Rivlin and Wolfe, 1985, p. 8)

This definition of environment as the material reality of social existence is used in this dissertation to encompass computing systems. Microcomputers may be unique in the history of technology, but they are also designed objects that are integrated into the physical settings and social organizations in which they are used. While there is a diverse literature that defines technology as both the application of scientific knowledge to the solving of practical problems (for example, see Pacey, 1983) as well as the definition of computing systems as social organization (Kling and Schacci, 1982), and their design as a process of social activity (Nygaard, 1986), this dissertation begins by viewing technological environments through the environmental perspective of behavioral settings:

> If human behavior in relation to the physical setting can only be understood by analyzing it at all levels of social organization, then from a theoretical point of view there is no physical environment apart from human experience and social organization. The physical environment that we construct is as much a social phenomenon as a physical one. (Proshansky et al., 1976, p.5)

It is because of this transactional relationship between people and surroundings that designed objects and settings are considered "human environments" that have both collective as well as personal meanings. Sometimes these two levels of environmental meaning are consistent and commonly understood. For instance, the symbolic meaning of the teacher's desk at the head of the class, or the allocation of offices with or without windows do not need to be

explained as examples of shared knowledge about the social meaning of the physical environment within this culture. While some environmental meanings are apparent to an observer, others are known only to the intimates of a place. It is because environmental meaning is understood to be a product of human/environmental interactions that we also assume that it varies across different social groups.

An environmental approach to the study of an individual's perception of surroundings assumes the importance of understanding the social group context in which people act. In researching children's perception of place, Hart (1979:342) shows that adults' perception of the landscape is not a beginning point from which to investigate the physical world in which children know, name, fear, and manipulate their landscape. Rivlin and Wolfe (1985, p. 9) point out that children, by virtue of their limited social power, are greatly impacted by their physical surroundings, and may also derive unintended meanings from environmental elements they do not easily negotiate. An example they provide is that of a very heavy door in a children's room that may lead children to feel a sense of incompetence.

Similarly, environmental research on older people investigates issues such as the extent to which the immediate environment supports or inhibits the ability to meet everyday needs and goals. This research indicates that knowledge about adjusting the immediate environment may contribute toward more efficient sensory functioning, for instance, the adjustment of the intensity and glare of lighting (Hiat, Brieff, Horwitz, and McQueen, 1982). These examples suggest that an environmental approach to the psychological study of people and surroundings is one that seeks to understand individual percep-

tion in the socially meaningful physical environment in which human agency takes place. Such inquiries also occur at a higher level of abstraction, through studies of place meanings.

Residential place meanings have been defined in terms of individual perception of spatial identity (Fried, 1963) and place identity as a component of self identity (Proshansky, 1978). Place meaning has also been found to be rooted in group membership (Rivlin, 1982), while the psychological concept of home has been found to be multi-dimensional and primarily related to close attachments to other people (Hayward, 1977). Relations between built form and the emotional health of households have been the focus of architectural research (Evans, 1977; Lennard and Lennard, 1979); and psychological inquiry regarding communication patterns (Kantor and Lehr, 1975) and developmental needs of adults to create a place that "feels like home" (Horwitz and Tognoli, 1982). The line of inquiry opened up by this research is that residential settings are not simply containers of domestic life. Rather, they are active mediums of expression in the history of social groups as well as in personal development across the life cycle.

Thus, an environmental approach to computing and households is one that assumes that whether or not computers are defined as "neutral tools," the settings in which they are used are not neutral. On the contrary, home environments are thick with meaning (Altman and Werner, 1985). Thus, an environmental approach to the psychological study of microcomputer use assumes not only the importance of users' intentions, but also the importance of investigating how these intentions are supported and limited by the social, physical, and technological contexts in which they are situated.

There is much to be learned about microcomputers and how they are perceived, and used or not used, by children and adults in a residential setting. Because of the many roles of computers in offices, schools, research environments, and the military, computers carry many collective and personal meanings that might be investigated. However, what distinguishes the environmental perspective of this psychological research is that the collective and personal meanings of microcomputers were not studied as a psychological phenomenon unto itself. Instead, the environmental approach necessitated that microcomputer use be investigated within a context in which the setting is more than a backdrop for behavior, and is understood as "part of a totality...(that) helps to define a system of social relations and the person as a part of that system" (Rivlin and Wolfe, 1985, p. 10). In this case, microcomputer use is investigated in the context of the middle-class households that purchased microcomputers since the time they were first introduced in the mid-1970s. In keeping with the environmental psychologist's emphasis on generating empirically-based concepts of the environment (Proshansky et al., 1976, p. 10), the goal of this dissertation is to begin to generate an empirical basis for conceptualizing the environmental context in which computing takes place at home. In order not to lose sight of the historical processes through which unchanging ideas may come to operate in new or changing contexts, the next section is devoted to identifying underlying assumptions about the household as a setting that changes in relation to technological change.

Defining the Household in Relation to Technological Change

The literature on the interaction of technological change and the household (see Note 2)is based on two different "readings" of the history of industrialization. Until the mid-1970s, the standard perspective underlying research on technology and the household came from the school of functionalism and its major theoretician, Talcott Parsons (see Parsons, 1949).

The Functionalist Approach

Those who apply functionalist theory to the study of "technology and the family" (Anshen 1949; Ogburn and Nimkoff, 1955) build on the notion that the household lost its self-sustaining function when most forms of production shifted from a household-based economy to a market economy during the industrial revolution. While pre-industrial families were held together by their functional interdependency, functionalist theory assumes that, given the changes of an industrialized society, social bonds became "loosened." The functionalists define the main purposes of the modern household to be consumption, the socialization of children, and tension management. As such, the household is defined by its relation to the marketplace and the centralization of production and labor outside the home. This division between "home" and "work" is also seen as a "functional separation" that ensures the stability and continuity of both institutions (Parsons, 1949).

When Ogburn & Nimkoff (1955) discuss "technology and the future of the family," they limit their expectations to the extent to which new appliances might deliver the household from its unproductive

capacity. For example, without overcoming the historical context of the household, they explain that the manufacture of ice in the mechanical refrigerator is about the only new "productive function" that has been recently added to the home.

From this perspective, the introduction of computer technology to the household can be understood as the introduction of a technology with productive functions, and thus a transformation of the capacity of the household itself toward one of a "lost" productivity. In his chapter "The Electronic Cottage," the liberal futurist Alvin Toffler positions the future of technology and families in this functionalist tradition:

> Today it takes an act of courage to suggest that our biggest factories and office towers may, within our lifetimes, stand half empty, reduced to use as ghostly warehouses or converted into living space. Yet this is precisely what the new mode of production makes possible: a return to cottage industry on a new, higher, electronic basis, and with it a new emphasis on the home as the center of society. (Toffler, 1980, p. 194)

Defining the home as a center of society because there may be an increase in people doing income-producing work at home rather than at central office sites, is the same dualistic view that defines the household as marginal in a society in which the production is centralized. This workplace-centered perspective has been rejected by a wide, multi-disciplinary group of scholars who began rethinking the role of the household in industrialization and, in particular, the effect of industrialization on women's everyday lives. The anti-functionalist research continually examines the inter-relationships and mutually-influencing "worlds" of households, private enterprise, and public policy.

The Contextual Approach

The refutation of socio-functionalist theory began with groundbreaking research on the history of the family (Aries, 1960; Demos, 1970) showing that pre-industrial households were not always tightly bound together, but were considerably interdependent. As settings that were involved in seasonal forms of production, they were frequently in flux with the comings and goings of people who were not necessarily kin. Attention to the workers who remained in households after industrialization grew out of equally groundbreaking historical and anthropological analysis of the gendered relations between public and private spaces, inspired by the revitalization of the women's movement (for example, see Rosaldo and Lamphere, 1974; Kelly, 1979). Since the mid-1970s, a new literature about the phenomenology of domestic life has documented the ways that households interact in complex relations with larger social organizations across history. (For a review, see Kanter, 1978.)

This more contextual approach to the history of households and technology has focused on periods when rapid technological change brought new utilities to most U.S. households, e.g., 1870-1930 (Cowan, 1976; Strasser, 1979; Berch, 1980), or on the effects of electricity and appliances across the 40-60-year period that has followed (Vanek, 1974; Hartmann, 1981; Thrall, 1982). In so doing, an empirical basis has been laid for considering how new technologies may effect the work at home without removing it; and may decrease the arduous aspects of work without decreasing the time spent doing it.

Technological Change and Household Life

Reviewing the research on technology and domestic life between the turn of the century and the 1960s, McGaw (1982) finds the following:

> Domestic technology made housework less arduous but was not used to make it less time-consuming. Housing reform altered interior and exterior spatial arrangement and decor but kept homemakers relatively isolated and inefficient. Well-trained specialists in home economics sought to professionalize, industrialize and standardize America's domestic work but relied on unpaid generalists serving single families to implement their suggestions. Thus substantial changes in household technology left the sex, hours, efficiency and status of the household worker essentially unaltered [emphasis added]. (McGaw, 1982, p. 814)

Confidence in this reporting derives from the numerous surveys of time spent on housework. In particular, Vanek (1974) compared research from the 1920s and 1960s, statistically analyzing temporally and geographically diverse surveys of time spent on housework. Controlling for work outside the home, she found that by the 1960s, when poor and rural women had obtained the same household technologies that middle-class women had acquired in the 1920s, no significant differences existed in the length of a housework day or distribution of time among tasks by women across class or region for those forty years. Reports from England comparing the same periods show an increase in time spent on housework (Oakely, 1974).

By studying the convergence of class, race, and sex hierarchies in the American history of domestic labor, Aptheker (1983) explains that the role of household appliances is related to work practices outside the home as well as inside it. It is not until more women were needed in the industrial, service, and clerical work force, during each of the World Wars, that household appliances were mar-

keted on a mass scale. The periods when middle-class households decided to purchase "labor-saving" appliances instead of purchasing the labor of domestic servants, were the same periods when immigrant and black women (whose employment opportunitiess had previously been largely restricted to domestic service) jumped at the opportunity of better wages and better working conditions as factories and offices began seeking their labor. Aptheker explains the relationship between new appliances in the home and the organization of industrial labor by quoting an article written in 1910 in Mclure's Magazine, in which a well-known socialist economist of the period, I.M. Rubinow, states:

> The patent office in Washington is even now filled with devices that would reduce all housework to a matter of pushing buttons. Why are these not in use? Because it does not pay to market them. Why not? Because...there has been plentiful supply of cheap human labor. (cited in Aptheker, 1983)

The expectation that a machine might turn housework to button-pushing is a recurring and false promise throughout this century. However, there is a relationship between techological change and who does what at home. Industrialization not only shifted patterns of employment and introduced new appliances to the home, it also was accompanied by advertising campaigns to sell home appliances to a "modern mother." In the 1920s, women's clubs and the new field of home economics also spread a philosophy that applied the principles of scientific management to housekeeping and homemaking among a larger population of women and girls (Cowan, 1976; Strasser, 1982; Berch, 1980). At the the same time that employment opportunities for women in factories and offices were opening up, many devices that help to keep households protected, warm, fed, clean, healthy, alert, and so on were being mass-marketed for the first time. But

the electrical devices could never begin to be "labor saving" without the infrastructural "juice" of electrification.

> The electrification of homes in the United States was completed by 1928. As early as 1920, coal and wood stoves had been largely replaced by gas, oil and electric models....By 1935, in fact, most homes had indoor plumbing, hot and cold running water and centralized heating. As a consequence of these and similar technologies, Frank Lloyd Wright designed the first kitchen that was not entirely a separate room in 1934. Electrification brought with it the mass production of household appliances including electric irons, vacuum cleaners, washing machines and refrigerators. (Aptheker, 1983, p. 118)

The theoretical perspective that has grown out of this body of empirical research is that, although housework changed, the household organization of labor was never "industrialized" in the sense of being a centralized, rationalized, or capitalized form of labor. On the contrary, the modernization of household work involved a form of emotionalization and isolation.

> Several million American women cook supper each night in several million separate homes over several million separate stoves. Out there in the land of household work there are small industrial plants which sit idle for the better part of a day; there are expensive pieces of highly mechanized equipment which only get used once or twice a month; there are consumption units which trundle out to their markets to buy 8 ounces of this...--a specter which should be sufficient to drive any rational technocrat into a looney bin but which does not. (Cowan, 1979, p. 79)

While the tools and techniques improved, the structure of the job remained one in which an individual generalist performs many tasks, with fewer people to help, in small units, in an emotionalized climate in which the standards are constantly rising. Washing machines provide a good example (for example, see Strasser, 1982) of how machines can take the arduous labor out of laundry (and take the market away from many laundresses), while they are accompanied by an increase in the standard and demand for constantly fresh linens and clothes in middle-class households. New washing machines were

followed by new machine-washable fabrics and increased manufacture of, and focus on, children's wear. A job that had often been accomplished by several people, one day a week, became for many households an activity that each woman does much more frequently.

A more recent example from the research of Charles Thrall (1982) moves the study of domestic technologies further into the question of the division of labor in contemporary households. Thrall finds that not only have "labor-saving devices" not altered the quantity of time households spend on maintenance, but "household technology has tended to support, perhaps even to reinforce, existing social arrangments" (1982, p. 176). He interviewed 99 middle-class households in suburban Boston to determine which of 26 items of household equipment (garbage disposal units, electric lawn equipment, vacuum cleaners, etc.) were owned and used by different household members, for what length of time, and with whom a task was shared. He found that the possession of appliances tends to reinforce sex-stereotyped task assignments, decreases sharing, and reinforces traditional divisions of labor. Thrall explains these "conservative" trends by showing that when motored devices replace a manually driven device (like a lawn mower), the sharing of tasks by children is often replaced by an adult doing the job. Other electrical devices such as a garbage disposal tends to create a job cluster, which also eliminates cooperation among household members. So, for instance, the person who washes the dishes will also be fully in charge of the garbage, when previously "taking out the garbage" had been a task allocated to another household member. Thrall's work points out that because household technologies have played a conservative role in the household organization of labor, they have also played a conservative role in the socialization of children as well. These patterns place more

burdens upon the one who already takes responsibility for a cluster of activities in the household. Women have absorbed additional tasks as a result of the use of electrical appliances in household work.

Detailed empirical studies of women's unpaid household work and childcare show that not only has the time women spend on housework not significantly decreased, but also the rise in women's full-time participation in the workforce creates severe time pressures in which women operate (Szalai, 1972; Berk,1980). In their broad-based survey and in-depth interview research on heterosexual and homosexual couples, Blumstein and Schwartz (1983) found that in the midst of many powerful changes in social life, the division of household labor among husbands and wives remains untransformed, and the only condition in which men increase their share of the housework is when they are unemployed.

Defining the Work of Households in Relation to Society

Thus, contextual/anti-functionalist research on the household reveals that industrialization did not remove all the work from households: it simply changed it. In addition, theoretical perspectives have grown from this empirical research. They suggest that the lessons to be learned from the history of technological housework are a legacy of illusions about "private life" in industrial society, and emphasize the importance of looking at a broader social context while trying to understand the interaction of new technologies and the social life of the household. Of particular relevance to this dissertation are essays by Hartmann and Papanek, who define the productivity of unwaged work within the household.

Hartmann suggests that during industrialization, when households became income-pooling units rather than income-producing units (e.g., when most men and unmarried women began to work outside the household for cash), the household began to be mistakenly perceived as a unit of "unitary interests, despite the very different relations to production of its separate members" (Hartmann, 1981, p. 374). On this basis, Hartmann redefines the family in industrial society as a unit that is shaped by more than affect and kinship. The family household is shaped by the social and economic relations in which individual members and individual households are situated. It is a zone of both cooperation and conflict, which can be understood as a location where resources are produced and redistributed among members.

As such, Hartmann builds an analytic concept of the industrial household by showing the matrix of tensions and conflicts in which its social organization is economically situated. She explains that the family is both a "locus of internal struggle" over the division of labor and resources within a household, as well as a locus of conflict and cooperation (by its members as a unit) in relation to larger social institutions and the state. This definition of the household assumes the dynamism of its own internal organization as well as the influence of larger social institutions.

The other assumption in this study about the productivity of households draws from the analytic concept of "family status production" as defined by Papanek (1979). Status production is work that is not income earning but that enhances and contributes to the earning potential and quality of life of a household. It includes

three types of "support work": the demands surrounding employment (in preparing lunches, typing reports, or entertaining co-workers); the training of children in "status appropriate language" and behavior; and the maintenance of information and communications networks with both family and community, as well as institutions. Overall, these activities involve acts of bridging and becoming for oneself, one's children, spouse, or friends. They are activities that preoccupy middle-class women around the world, Papanek says, because middle-class women feel they have the most to gain from social mobility.

> All imply positions in a hierarchy and some degree of movement between positions, since some mobility is possible even in rigidly ascriptive systems like the Indian caste system. Moreover, in most societies there are conflicting systems of status evaluation that affect the social position of any given unit. The conflicts between evaluative systems are not necessarily resolvable in either theory or practice. (Papanek, 1979, p. 176)

While the benefits of status work are pooled in the household, its laborers are rarely identifiable or recognized for the time, energy, or skill they expend. Status production is invisible work. By explicitely recognizing the intellectual effort as well as the emotional energy needed to maintain households, Papenek notes that she has stressed its "work content."

Before there was any scholarly discussion of computer use at home, researchers (criticizing functionalism) began formulating not only the "work content" of women's unpaid tasks, but also the movement between worlds that can never be described by the functionalists' dichotomous view of home and work.

While the separation between workplaces and residential settings has been, for the most part, built into the geographical and politi-

cal organization of the industrial landscape, this review has shown that the abstract conception of "home" and "work" as separate does not describe the phenomenological relationship between home and work.

Implications of Research for Dissertation

This chapter has identified an environmental appoach to the psychological study of physical surroundings based on principles of environmental psychology (as described by Proshansky et al., 1976; Rivlin and Wolfe, 1985). This approach is understood to involve:

1. A definition of the environment that assumes it to be as much a physical construction as a social construction, and a definition of environmental research that assumes the importance of the social context and physical world in which the inquiry takes place, and recognizes the importance of developing an empirically-based concept of the setting.

2. A definition of an empirically-based concept of the setting is one that recognizes that inter-relationships with the environment exist at many levels of experience: individual, household, community, socio-economic, and cultural.

In addition, this chapter has also discussed a body of research on industrial/technological change within the household that rejects a socio-functionalist view.

By rejecting a view that households became "functionally" separated from workplaces during the rise of industrial manufacturing, we assume that functionalism never fully describes what households do for their members or for society. In its dualistic perspective, functionalism offers little analytic power in understanding how ideas circulate, or how changes that begin in one "sphere" come to dwell in another.

Contextural (anti-functionalist) views emphasize that what occurs in the "private sphere" of households is related to what occurs in the "public sphere" of larger social institutions, business, and the state. The reliance between spheres, large and small institutions, and the interdependence of emotional, manual, and intellectual efforts in the maintenance of daily life is seen as an on-going tension and, in fact, a mutually influencing dynamic between more and less empowered groups. The unpaid "non-work" of households, including housework, is analyzed in terms of both its human costs as unwaged work, as well as its contribution to the quality of everday life and the earning potential of a household. Thus, the household is defined as a residential unit in which the pooling and expenditure of resources among members is not fully determined by the system of social relations in which it is historically stituated. Instead it is seen in terms of a matrix of tensions existing both internally--between individuals within a household--and between households and larger social institutions.

Research on housework, electrical appliances, and the influence of domestic technologies on household life has also contributed something specific to this dissertation. This research has shown that industrial modes of production may bring new tools into the household without ever "industrializing" work at home or substantially reducing

the time spent on housework. It has shown that the use of electrical appliances may have unexpected and contradictory effects, and that new tools at home have been accompanied by changing employment patterns for women, rising standards in household and childcare, and changing domestic ideals. And none of these changes necessarily shift the gendered division of labor within a household or women's roles and responsibilities in the making and keeping of homes.

Thus, this literature review has shown that the consequences of large scale technological changes take many years to evolve and for their inter-relationships with households to become visible. As patterns emerge, many factors contribute to seemingly contradictary consequences of the integration of "labor-saving" devices into the household environment. They suggest that in order to understand what survey research may document, it is necessary to closely examine the reality in which people act.

This review suggests that we know very little about the subjective experience of the integration of domestic technologies or how individuals and households negotiate their use. In addition, these studies lack attention to the multiplicity of activities other than housework that occur within households, or the ways that technologies have influenced other types of activity. Yet they assert the need to continue to investigate the ways in which housework, household management, and childcare are influenced by the introduction of new technologies, and the ways that domestic and personal life are situated in the shifting pressures of a technologically changing industrial society. Chapter Two will explain how this dissertation studied the introduction of microcomputers into U.S. households.

Chapter One Notes

1. A microcomputer is a desk-top-size computer. It is assumed to have, as a minimum, an alphanumeric keyboard, a display screen, and the capability of handling both manufactured and user-created programs. With the addition of a printer, such devices commonly cost between $2,000 and $3,000. The term "home computer" refers to a less powerful, less expensive, and more restricted device, primarily used for games. The home computer is not the subject of this investigation.

2. While " household" is discussed as a historically changing and complex social setting, the term "household" is generally agreed to mean a residential unit in which people live. Demographers, census takers, and anthropologists distinguish between households and families: Households are empirically measurable units. Both families and households pool resources, transforming and consuming them among its members; while they may overlap, "family" is not always synonymous with "household" (see Rapp, 1978, p. 282). A family is not necessarily the household unit in which an individual lives. "Family" refers to two levels of kinship relations. A narrower definition of the family unit is the "nuclear family" of husband, wife, and children. The broader definition of family involves a web of kinship ties. There are analytic differences as well. While the normative process of household formation is through families, household formation may reoccur across the lifecycle, and be unrelated to kinship ties (Horwitz and Tognoli, 1982).

CHAPTER TWO

METHODOLOGY

As Chapter One has emphasized, the goal of this research was to bring an environmental perspective to the psychological study of computers and households by building up an empirical concept of home as a computing environment. This chapter describes the two stages of research that were conducted. In the first, data were collected from mass-circulation print on the household uses of microcomputers. Through analyzing these materials, a rough typology of household computing environments was generated and used to select a small group of households for intensive interviews.

This chapter describes several different approaches that were used in this empirical study of the evolution of microcomputer uses in U.S. households. The description of the first stage of research--a survey and content analysis of mass-circulation magazines--includes the reasons why this approach was taken, examples of the use of communications data in the study of technology and society, methods of data collection and analysis, as well as results of the initial phase of its analysis. For the second stage of research--case studies and an environmental analysis of six households--methods of selecting, interviewing and analyzing household stories are described.

Stage One: The Investigation of Communications Data

In order to develop a concept of home as a computing environment, this research began with a wide literature search using libraries of communications, labor, architecture, and social science. While scattered reports anticipating the future uses of information and communications technology in residential communities were available (Harkness, 1977; Nilles, et al.1976; Nora and Minc, 1980; Anderson, 1980; Toffler, 1980), no baseline data or empirical research was available in the public domain in 1983.

In order to locate scientific literature on this topic, an electronic data base search of the Social Science Index, the Dissertation Abstracts, and the Psych Abstracts was carried out. A search using the key words "computers," "microcomputers," "personal computers," "social aspects," "households," "home," "electronic home work," "home labor," and "telecommuting" yielded only one article (Anderson, 1980). The New York State Data Base librarian who conducted this electronic search advised me that my topic was not "appropriate" for these indexes. In addition, on his or her own initiative, the librarian provided me with a print-out of a search from the NNI (National Newspaper Index) and the MAGI (Magazine Index) that contained more than 60 articles (see Note 1). Locating these articles led to an exploratory phase of studying the manually-manipulated (rather than the electronic) data base of the Magazine Index to understand how articles on computers and households were being categorized.

Articles on the interaction of computers and households could be found, as one might expect, under many different sub-headings in

this chronologically and topically organized index. For instance, under the heading "COMPUTERS" is the sub-heading "Social Issues." Articles or editorials appeared sporadically on the social impacts of computers on a society increasingly driven by computer-based systems, in relation to broad and loosely defined topics such as education, family, and employment. Beginning in 1981, the sub-heading "Telecommuting" also appeared. It included a few articles discussing the use of computers for experimental programs in which organizations tested the viability of employees working remotely from their homes.

Unlike many sub-headings under "COMPUTERS" that have appeared sporadically, the sub-heading "Home-use" has appeared continuously since 1976. The sub-heading contains a wide assortment of articles that data-base cataloguers have defined as the home-uses of computers. It is important to note that while many of the articles appearing under "Home-use" also appear under more narrowly defined sub-headings, such as "Telecommuting," or more widely defined sub-headings, such as "Social-aspects," these sub-headings are not fully cross-referenced. This inconsistency may reflect a lack of understanding that telecommuting, for example, is a form of computer home use. Yet, other inconsistencies, such as the lack of cross-referencing between "COMPUTER-AIDED EDUCATION, Home-Use" and "COMPUTERS, Home-use" suggest that it is useful to conduct a manual search of indexes simply to understand the terms and their relation to one another, before using electronic searches

Collecting Communications Data

The use of "library research" for qualitative research in the social sciences has been defined by Glazer and Strauss (1967), who

explain that cultural documents are not always "background" for the social scientist. Instead they can act as primary source materials that "ground" the search for--and the construction of--social categories.

> These materials are as potentially valuable for generating theory as our observations and interviews. (Glazer and Strauss, 1967, p. 162)

Given the absence of any baseline data, and the contemporary nature of this phenomenon, journalistic reports not only provide the fastest response to changing events (while academic research may be the slowest), they also offer a set of documents that can be systematically observed over time.

The category "COMPUTERS, Home-use" serves, in this research, as what Glazer and Strauss (1967) refer to as a "key locale" or position from which to survey a rapidly changing phenomenon.

> Various procedures, or tactics, available to the field worker for gathering data have their analogues in library research. One procedure in the field is to select a key locale, station oneself there and oversee the passing scene. Where he goes is directed by what he expects or hopes to see; the more advanced his research, the more directed his locale. (Glazer and Strauss, 1967, p. 164)

The second reason for using print media communications as a source of data analysis in this research is that it provides a shifting portrait of the evolution of household computer use. Interdisciplinary study of technology and everyday life has often drawn upon a wide array of communications documents that record both the integration of technology into human environments, as well as evidence of individuals' perceptions of it.

For example, seminal theorists of the social impacts of mechanization on the household have drawn upon a wide array of primary sources to portray the environmental changes that have accompanied technological change. Swiss architect Sigfried Gideon (1948) used paintings from the Middle Ages, and patent records and commercial catalogues of the 19th and 20th centuries as he traced the evolution of the influence of mechanization in the design and organization of human surroundings. Yet, as Susan Strasser has pointed out (1982, p. 314), such sources do not always allow Gideon to question the extent of the diffusion of any of the technologies he considers.

It is both the diffusion of technologies, as well as the social construction of their integration in settings that underlies an environmental approach to the psychological study of technology and settings. Historians who share this concern with the role of technology in the shaping of human environments suggest methodological approaches. When historian Ruth Schwartz Cowan (1974) began to ask questions about the household in relation to technological changes, she assumed that there was a complex process in which household appliances were entering into domestic life. By focusing on a period of rapid technological change in the 1920s, she reflected on both the integration as well as the resistance of households to industrialization. Cowan studied women's magazines of the period of widespread commercial introduction of mass-produced goods and household appliances, and found that the imagery in these magazines was very reliable in terms of the the U.S. census and household surveys of the period. For example, when gas lights disappeared from illustrations, electrification had reached a majority of homes.

Through the use of communications data, Cowan was one of many historians and sociologists who vividly examined the interaction of technology and households as one that involves a circulation of ideas and ideals about the home, not just a circulation of tools and techniques. Social historian E.P. Thompson (1967) portrayed the dynamic process through which individuals negotiate a technologically changing environment by studying the evidence of a changing perception of time in the poetry of eighteenth and nineteenth century English working classes. Through the voices of women who remain laboring (for no cash) and men whose lives become routinized by the "clock" of wage labor, Thompson portrays industrialization through the gendered and diverging rhythms the industrial order brings to households, and the "inward apprehension of time" that it brings to individual women and men.

The study by historians of communications (letters, poetry, patent records, etc.) began long before the existence of mass communications. However, since the 1930s social scientists began viewing mass communications as a rich source of data for tracing cultural change as well (Selitz et al., 1976, p. 387). Since the late 1930s, a set of special techniques, generally referred to as "content analysis," was developed for describing, in systematic form, the content of the media. The attempt to quantify this content and add precision to insight began with the public opinion research of Laswell and his associates (1942a, 1942b).

Content analysis in the social sciences is generally characterized by its regard for quantitative analysis. In their book on research methods, Selitz, Wrightsman, and Cook (1976, p. 392) refer to it as an application of the scientific method to documentary

evidence because the materials of content analysis are consistently included or excluded on the basis of rules regarding, for instance, the sampling of sources, dates, and units of analysis.

However, content analysis may also be carried out in several different ways, and two types are utilized in this study of media content. As mentioned earlier in this chapter, Glazer and Strauss (1967) define a method of qualitative analysis of "library research" in which an immersion in sufficiently different kinds of documents helps the researcher to begin to contrast and compare different formulations of an issue and build categories that can be further investigated in ethnographic or survey research.

In sum, the reasons for using media-content analysis as a beginning point in this dissertation included not only its abundance, but also my commitment to considering the circulation of ideas and images about computer home-use. The purpose of the content analysis of literature in this research was to begin the empirical search for generating concepts of home as a computing environment. This occurred in two steps: first, by generating these concepts through several stages of analysis, and then by using these categories as a means of selecting households for intensive interviewing.

The availability of an aggregate of articles on "COMPUTERS, Home-use" that was longitudinally up-dated provided an exploratory phase for developing categories. The full contents of the sub-heading defined the sampling procedure regarding both the sources being used, as well as the sampling of dates (beginning with the appearance of the sub-heading in 1976 and continuing through 1984). To determine the sampling of units of analysis, several phases of analysis were used.

Analyzing Communications Data

Over 400 articles were collected from the "COMPUTERS, Home-use" category of the Magazine Index, using both the Mid-Manhattan and Research Libraries of the New York Public Library system. Every article that appeared between 1976 and 1984 was tracked. For the complete analysis, over 300 were used (see Note 2).

The preliminary process of analyzing this body of literature occurred over a period of three months. Different methods of categorizing contents were developed in order to understand the major themes in this literature. Each categorization yielded information. Each was fruitful in the eventual understanding. The following discussion portrays four significant steps in the analysis of media content.

Diverse Periodicals Devote Attention to "COMPUTER, Home-use"

The first method of disaggregating media content involved a listing of articles by magazine (see Table 1). This display of the literature revealed:

1. The magazines that devote space to the topic of computer home-use increased every year until 1983, when the number of articles started to decline;

2. Eighty one magazines devoted editorial space to the home-use of computers; yet, over one-half of the periodicals contain only one article on this topic over the eight-year period.

Table 1

Magazine Articles Indexed in MAGI Under "COMPUTERS, Home-use"

	1976	1977	1978	1979	1980	1981	1982	1983
Science Digest	1		3		1	1	2	
Newsweek	1			1	4	1	1	
Popular Mechanics	1	4	2	1	3	2	2	1
House and Garden	1				2	2		1
Popular Science	1	3	4	2	1	1	2	
Changing Times		1				1	1	1
House Beautiful		1		1			1	
New Yorker		1		1	1			
Mechanics Illustrated		2		1		1	3	
Popular Electronics		3		2	1	2		
Time		1	1	1		2	3	1
U.S. News and World Report		1		2		1	2	1
Working Woman			1				1	
Radio Electronics			2	2	3		2	
Money			1		2		2	
Town and Country				1				
Saturday Review				1				
New York				1		1		
McLeans				1			1	2
Datamation				4	2			
Electronics				4	3	4		2
Publishers Weekly				1	1		1	
Human Behavior				2				
Industry Week				1		1		
Futurist				1	1		2	1
Variety				1			1	
Mother Jones				1				

(table continues)

	1976	1977	1978	1979	1980	1981	1982	1983
Moneysworth				2	1		1	
Esquire				1			1	1
Apartment Life				1				
Business Week				2	2	5	2	2
Design News				2	2	1		
McCalls					1	1	3	
Organic Farm						1		
Sales and Market						1		
Forbes						2	1	1
World Press Review						1		
CoEvolution Quarterly						1		
Technology Review						1	3	
Bible Society						1		
Current						1		
Progressive						1		
Christian Century						1		
Fortune						2	1	
Better Homes and Gardens						1		1
Playboy						1		
Camera 35						2		
Administrative Management						2		
Saturday Evening Post						1	1	
Glamour						1	1	
50 Plus						1		
Modern Office Procedures						1		
Dunn's Review						1		
Reader's Digest						1		
New York Times Magazine						2		
American Legion						1		1
Ms. Magazine						1	1	1
BYTE							1	
Washingtonian								1
Architectural Record							2	

(table continues)

	1976	1977	1978	1979	1980	1981	1982	1983
Boy's Life							1	
TV Guide							1	
Minneapolis							1	
Senior Scholastic							1	
Blair Ketchum's City Journal							1	
Parents' Magazine							1	1
Industrial Research							1	
Essence							1	
Natural History							1	
Consumer Research Magazine							1	1
Atlantic							1	
Vogue							1	
Scientific American							1	
Science							2	
Family Handyman								1
Nation								2
Metropolitan Home								1
Better Homes and Gardens								1
Psychology Today								2
Annals of the Ameerican Academy of Political and Social Science								1
Washington Monthly								1
	5	17	14	41	31	56	60	29

The first display of articles led me to wonder whether magazines of similar types were delivering similar messages about computers and households, or whether the type of magazine was any kind of indicator of subject matter on this topic. Grouping articles from one type of magazine over the eight-year period revealed that subject matter was indeed shifting over time. However, as the next section shows, a magazine's "type" is a poor indicator of media content on computers and households.

A Migration of Technical and Social Issues Between Magazine Types

The second method for exploring media content within the category "COMPUTERS, Home-use" involved an examination of articles from magazines of a similar focus (e.g., "shelter magazines," "electronics and science magazines," "women's magazines" and so on). When all the articles on computer home-use published in Science Digest, Popular Mechanic, Popular Science, Mechanics Illustrated, Popular Electronics, Radio Electronics, and Electronics (later changed to Computer Electronics) are listed (see Table 2). Four kinds of editorial content can be found. Between 1975 and 1980, the majority of articles are addressed to the reader who is (as they are called in these articles) a "do-it-yourselfer"--one who is assembling a computer from a kit, or modifying electronics equipment and computing systems for personal purposes. Beginning in 1979, a shift can be seen toward articles about computers for the person these magazines call "the everyman"--the reader who purchases (rather than builds) microcomputers or other devices. As more readers were purchasing pre-assembled systems and programs, the discussion turned toward news about the computer industry and social issues.

Table 2

"COMPUTERS,Home-use" articles that appeared in popular science and technology periodicals

	1976	1977	1978	1979	1980	1981	1982	1983
ScienceDigest	1		3		1	1	2	1
Popular Mechanics	1	4	1	1	3	2	2	1
Popular Science	1	3	4	2	1	1	2	
Mech. Illus.		2		1		1	3	
Popular Electronics		3		2	1	2		
Radio Electronics			2	2	3		1	
Electronics				4	3	4		2
Total	3	12	10	12	12	11	10	4

Topics discussed in above articles

	1976	1977	1978	1979	1980	1981	1982	1983
The "do-it-yourselfer"	3	8	7	6	5	2		
The "Everyman"		4	3	4		2	4	2
Industry News				2	7	7	6	
Social Issues								2

By 1983, articles indexed under "COMPUTERS, Home-use" from Computer Electronics were no longer about what individuals do with computers in their basements. Instead, they were about the social applications and context of computing, such as "Sexism and the Computer" and "Computer Sex Therapy." At the same time, magazines whose editorial focus is on social and psychological issues, such as Psychology Today, devoted a full issue (January 1984) to computer hardware.

The fact that a popular "psychology" magazine devoted attention to computer hardware, and an electronics magazine focused on socially related aspects of software is just one indication of the migration of subject matter occurring along with the diffusion of new technologies among people with different interests and backgrounds, and thus between magazine "types." This method of sorting reveals not only a migration of subject matter between the "technical" and "non-technical" periodicals, but also a breakdown of former categories and a greater similarity between groups. Both the evolution of concerns within different types of magazines and the migration of subject matter between technical and non-technical periodicals reflect the ways that the commercial introduction of microcomputers and their integration in U.S. households is a "moving target" that journalists, as well as researchers, are trying to capture.

The Emergence of a Historical Development

Building upon the findings of the first two preliminary methods of disaggregating the literature, the next approach involved an analysis of themes, measured by their quantitative distribution across the literature. This occurred in two steps. First, thematic sub-categories were established, and secondly these groups were displayed chronologically (see Tables 3 and 4).

The process of determining themes involved careful re-reading of articles to determine primary content, and to evaluate whether the substantive issues in an article could be represented as a major theme in the literature, or was an aspect of many themes in the literature. For example, nearly every article is, in some way, related to computer literacy and learning. However, "computer learning" is not a sub-heading of "COMPUTER, Home-use," nor is it an explicit theme as it is represented in commmunications media. It is, however, often the underlying subject matter. Thus, it was not selected as a theme, but was identified as an analytic issue to be explored. On the other hand, the physical environmental design of computing settings is both an implicit and an explicit theme in articles indexed under "COMPUTERS, Home-use." While there is evidence (through photographs and descriptions of computer-use scenarios) of the different ways that individuals situate their computers and their computing activity within domestic interiors, at the same time articles about the professional designer's treatment of residential computing is a thematic sub-category named "Dwelling." Similarly, only those articles explicitely concerned with "working at home with computers" were identified as examples of a sub-category named "Homework."

Table 3

Thematic content of the MAGI articles indexed under COMPUTERS, Home-use.

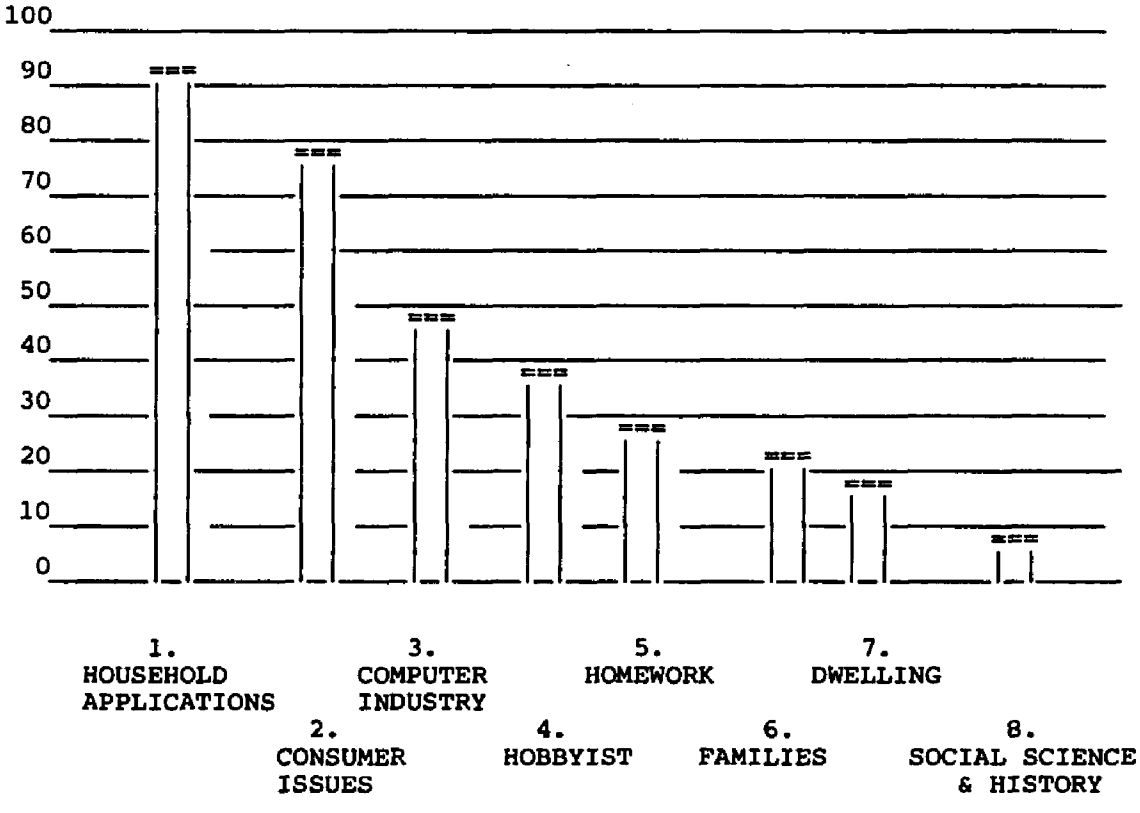


Table 4

Chronological display of the thematic content of "COMPUTERS,Home-use"

TOPICS

	1976	1977	1978	1979	1980	1981	1982	1983	TOTAL
HOUSEHOLD APPLICA-TIONS	1	3	3	19	23	13	13	17	92
CONSUMER ISSUES		2	4	9	10	22	20	12	79
COMPUTER INDUSTRY				6	10	18	5	6	45
HOBBYIST	3	10	7	6	7	1	5		38
HOMEWORK						11	7	8	26
FAMILIES						11	4	8	23
DWELLING	1	1		1	3	4	3	8	21
SOCIAL SCI & HISTORY							2	2	4

1975 — 1ST MICROCOMPUTER

1979 — VISI-CALC

1980 — REAGAN ELECTED; THE THIRD WAVE PRINTED

1981 — IBM PC INTRODUCED

The process of identifying explicit thematic sub-categories of the articles contained in the category "COMPUTERS, Home-use" revealed that over 50% of the articles concerned "household applications" (what you can do with a microcomputer at home), "consumer issues" (how to decide which microcomputer to purchase), and "computer industry" news (see Table 3). Three "user groups" are identifiable: "Hobbyists," "families," and "homeworkers" are the sub-categories that compose 30% of the aggregate. The remaining 20% is comprised of articles about the design of model computerized dwellings (under the sub-heading "Dwelling") and articles on "social and historical issues." These groups were then displayed chronologically (see Table 4).

By displaying these thematic groups chronologically, one sharply delineated pattern emerged. Articles on the home-use of computers did not begin portraying this activity as either a "work-related" or "family-related" activity until 1981 (see Table 4). Prior to that time, computing activity at home was framed in mass communications media as either a "hobbying" activity (which is an activity enjoyed for its intrinsic value) or in terms of useful household applications (managing recipe files, keeping accounts for taxes, etc.).

A Set of Environmental Portraits Shifting Over Time

In addition to finding the sharp chronological shift of focus in the media content, the process of identifying explicit themes once again revealed many implicit and subtler aspects of these articles. In particular, by chronologically reviewing articles within each thematic sub-category, the evolution of visual imagery across time became evident. A progression in the visual concept of

home as a computing environment could be seen within the photographs and artwork accompanying the articles, as well as in the verbal depictions of the scenarios of everyday life that were used to illustrate the journalistic perspective. The process of analyzing the content of magazine articles also provided an opportunity to reflect on the graphic design and artwork accompanying print on microcomputers and households. Thus, a content analysis of media included not only an initial analysis of the quantitative distribution of topics across eight years of literature: It led to a qualitative analysis of the evolution of environments in which computer home-use is situated. Chapter Three describes the results of this second phase of qualitative analysis (see Note 3).

Both a quantitative and qualitative approach to media content revealed a rich set of environmental portraits shifting over time. They are described in the next chapter through four images of home as a computer environment:

- The Image of Computer Home-use as a Hobbying Activity
- The Image of Computer Home-use as a Button-pushing Activity
- The Image of Computer Home-use as a Family Activity
- The Image of Computer Home-use as a Work Activity

These portraits are described in the next chapter by using a wider set of current literature than was utilized for the preliminary phase of content analysis. They are also described through the photographs and illustrations that accompanied the articles, and that contributed toward the understanding that images of computer home-use were being associated, as one might expect, with more familiar and habituated patterns of domestic life. Each image of home as a set-

ting for computer use is actually a hybrid, combining familiar domestic imagery and behavioral patterns with a particular orientation toward microcomputers.

In sum, the preliminary process of disaggregating the media content of the articles in the category "COMPUTERS, Home-use" revealed the following:

1. Greatly diverse periodicals devoted space to this topic; yet the editorial content was largely homogeneous. The strongest differences appeared over time, not across publications at any one time.

2. There is evidence of a migration of subject matter between technical and non-technical periodicals; however, this diffusion of technological and socio-technological information across diverse periodicals indicates both a breakdown of traditional categories and a cross-fertilization between different special-interest groups.

3. There is a dramatic shift in the media representation of computer home-use after 1980, away from a hobbyist's orientation toward the use of computers for income-earning and income-related work at home, as well as attention to the notion of the microcomputer as a center of "family" and "work" activity.

4. The analysis generated a set of environmental portraits of households that purchased microcomputers for "hobbying," "household," "family," or "work" purposes.

Thus, these four environmental portraits emerged from the understanding that a repetition among not only types of articles,

but also types of "illustrations" indicated several environmentally situated models of computer home-use. Sometimes graphic illustrations were repeated in the sense that different periodicals literally used the same photograph, or look-a-like photographs to illustrate the hobbyist, the computing family, the work-at-home father, and so on. Sometimes the repeating patterns were linguistic, and included similar language or metaphors to portray home computing environments. And sometimes the repetition was literally the use of the same subjects to "illustrate" the point. Between 1981 and 1984, several individuals were being repeatedly interviewed in different periodicals.

Evidence of shifting patterns provided the basis on which to begin writing about computer home-use through a more analytical and fine-grained analysis. The evidence suggests, at the same time, the limits of this method:

1. The quantity of media attention to computer home-use might far exceed the scope of the phenomenon, or the real numbers of people involved; and

2. The homogeneity of media attention may be far more limited than the true variability of individuals' experiences.

The purpose of the media study was to create a beginning point, to introduce questions about the home as a computing environment, and to select households that could begin to provide the empirical basis for analysis. As these four portraits of home as a computing environment are introduced, the questions that are raised, and the perspectives that are offered, are attempts to move these envi-

ronmental images into analytic concepts of home. The purpose of the second stage of research is to understand the matrix of social relations in which microcomputer uses are situated in the complex and historical process of household life.

Stage Two: The Investigation of Households

This second stage of conceptualizing home as a computing environment built on the review and analysis of communications data. It did so by utilizing two different kinds of issues that emerged from the media content analysis in its selection of households.

First, it continued to investigate the emerging environmental portraits of computer home-use by selecting households that purchased microcomputers at different times, and for different reasons. Secondly, it investigated the cummulative perpespective, reported in the media, that microcomputing activities had increasingly significant economic and social meaning, by selecting households that either began to use their micros for self-employment, or purchased them for that purpose.

Criteria for Selecting Households for Interview Analysis

The selection of households for this dissertation was not a random process. Interviews were not intended to be used to generalize to a total population. Instead, the purpose of interviews were to begin to develop an understanding of how individuals view the introduction of microcomputers into their households, and what aspects of the environmental context individuals perceive to be meaningfully

related to the evolution of microcomputer uses within their own homes.

The process of selecting households involved both opportunistic meetings, the use of the "snowball" method (interviewees referring me to their cohorts), as well as contacting people I thought would be likely to know individuals who met my criteria.

In order to understand how members of a household think about their home as a computing environment, it was necessary to speak with households in which computing was a significant activity. The first criterion used to select households was that at least one member be using a microcomputer for income-earning purposes at home. This person did not need to be financially supporting the household with computing, but this criterion was to ensure that computing was perceived as a part of the pattern of household life.

The second criterion was based on the assumption that because media analysis had suggested a dramatic shift in the orientation of computer home-use, households should be selected across the full span of the availability of microcomputers, e.g., there should be households that purchased the earliest models in 1976, the first assembled micros in 1978 and 1979, and the small business machines introduced in 1981. In the media, these three groups are portrayed as users who purchased microcomputers for "hobby," "family," and "work" purposes.

The third criterion was that each household include school-age children in order to consider the role of children in adults' perception of home as a computing environment, as well as children's perception of their parents' use of home as a computing environment.

The last criterion was that interviews include both women and men who did and did not have previous computing experience, and who were engaged in the intensive use of microcomputers at home.

The Interview Format

Interviews were carried out in two stages. Telephone interviews were conducted as a screen for the above criteria, and in-home interviews were conducted with at least two members of each household. Interviews lasted an average of three hours.

Open-ended, guided interviews were tape recorded (for transcription) with the approval of all household members. Since the purpose of the interviews was to explore the background and circumstances under which microcomputers were purchased, and the context in which microcomputer uses evolved over time, the interviews were structured in terms of a chronology of decision- making. An environmental autobiographical approach (for a review of literature on this approach, see Horwitz, 1982) was used to guide the discussion through a sequence of context-focused questions about development of personal experience.

1. Do you remember your introduction to microcomputers?

2. Under what circumstances did you purchase your first micro?

   What did you expect you would be doing with it?

   On what basis did you decide where to locate it? Have you relocated your microcomputer in your home? Why?

   Who uses it? For what purposes?

3. What is your history of working at home?

   How have you organized your work environment at home? Has that changed over the years?

4. Now that you have had a microcomputer for some years, how do you think about computers? Has your thinking about your worklife changed? Has your thinking about home changed?

5. When you consider your everyday household routines and the ways your household is organized, how has time spent with the microcomputer influenced the time you spend on other activities? What relationships have strengthened? broken?

Within this framework, each interview was tailored to the particular circumstances and issues that emerged in discussion.

The Analysis of Open-Ended Interviews

Interviews were conducted to understand how individuals make sense out of their microcomputing experience, and what they perceive to be meaningfully related to the evolution of their computer home-uses and their thoughts about home as a computing environment. Toward that end, interviews were analyzed in terms of two stages in computer use: the introduction of a microcomputer into the house (e.g., in light of one's background, expectations, intentions, and current circumstances) and the progression that followed (e.g., how perceptions and behaviors evolved over time).

The environmental approach to this inquiry necessitated that individual experience be examined at different levels of analysis (individual and social group) and in terms of the social organization and physical environmental context of household life. Therefore, women, men, boys, and girls were considered as individuals and as members of gender groups and households. Backgrounds in computing,

work experience, and residential histories were examined as preconditions, and household members perceptions of one another's computing experience was added into these descriptive accounts. A qualitative analysis of the context in which computing uses evolved is the basis for describing the home as a computing environment.

Before introducing these households (Chapter Four) or analyzing the environmental context in which their microcomputer uses evolved (Chapter Five), this dissertation will devote a chapter to a qualitative analysis of the reporting on the introduction of microcomputers into U.S. households.

Chapter Two Notes

1. The NNI contains five national newspapers: The New York Times, The Washington Post, The Los Angeles Times, The Wall Street Journal, and The Christian Science Monitor. The MAGI contains 420 mainstream periodicals, such as the Reader's Digest, Fortune, and Popular Electronics.

2. Those articles that had been stored on microfilm (often science and electronics hobbyists magazines from the mid-1970s) were less frequently reproduced as a result of the difficulties of this process in the libraries I used. In addition, some of the more recent articles had been torn out of magazines, or the issue had been lost or stolen. However, a majority were available and were reproduced for use in content and pictorial analysis.

3. A full listing of articles are available from the author.

CHAPTER THREE

IMAGES OF COMPUTER HOME USE IN MAINSTREAM MEDIA

This chapter describes the emerging contexts of household computer-use during the first ten years of the commercial availability of microcomputers. It builds upon a quantitative analysis of mainstream periodicals (as described in Chapter Two) and draws upon a wider array of literature to portray the popular images of home as a computing environment which have been circulating since 1976.

Changes in the popular images of computingat home may be easily seen as linked to technological developments. For example, the introduction of the first microcomputer kits in 1975 were identified as a hobbyist's tool; the introduction of preassembled microcomputers with packaged programs were portrayed as electronic servants for families; and the introduction of software such as electronic spreadsheets and word-processing programs after 1979 signified new tools for professional and clerical work at home. Yet each of these practices-- of hobbying, doing household work, or earning part or all of one's income at home--are embedded in the social relations of particular households, and the spatial divisions of labor and leisure in society, generally.

The environmental approach of this dissertation research assumes that the design of technology, alone, can not fully explain nor determine the uses of microcomputers at home. Chapter Three reviews the literature which first introduced the home use of microcomputers to a mass audience. It searches for clues about the physical, social and economic context in which microcomputers are being integrated into domestic life before interviewing households who purchased microcomputers for what they called "hobby," "family," and "work" purposes.

The Image of Computer Home-use as a Hobbying Activity

Although futurists and planners had been describing the potential use of computer-based communications systems for remote, residence-based employment since the late 1960s, unanticipated developments in microelectronics in the mid-1970s brought a computer drastically reduced in size and price into the consumer marketplace. In 1975, the first microcomputers were advertised as unassembled kits, available by mail order for only several hundred dollars. These kits required elaborate assemblage and programming, as well as a video monitor and a keyboard. Although their use was limited to those with considerable skill and patience, journalists, computer scientists, electronics hobbyists, and many others heralded the innovation of the "micro" as a thrilling moment in the history of technology and its democratization.

While it had been possible to have a "dumb" computer terminal in one's residence, linked by telephone to a mainframe computer at a central office facility, the first microcomputers pointed toward the possibility of individuals defining and initiating the uses of

computing power (Anderson, 1980). Rather than only large businesses, research facilities, or government agencies being able to afford to use computers, the microcomputer constituted the beginning of a reasonably priced desktop computer that "stood alone" and did not have to be connected to a mainframe for either its data or the logic to manipulate it.

This enormous reduction in the size and price of computers and communications operations, and the expansion of computer accessibility were results of the development of the micro-chip. The micro-chip replaced the room-size computer of the 1950s with a tiny chip with the capacity to be combined with a wide array of electronic devices, such that they too can be "intelligent" and perform computations, recall information, or make comparisons. The micro-chip is a single, integrated circuit on a chip of silicon, mounted on a heavy plastic circuit board. These circuit boards constitute the primary memory of the computer where both instructions and data are stored.

The small size of the circuit boards also figures in stories about the first people involved with microcomputers at home. Even before adventurous individuals could purchase mail-order microcomputer kits, there were computer professionals working in their homes on the invention of microcomputers. Stories about the rapid success of microcomputer hardware innovations by individuals (such as Stephen Wozniak and Steve Jobs, co-founders of the Apple Computer Co.) often begin by explaining that circuit boards were small enough to be tucked into brief cases and brought home from computer industry shop floors for a night of "tinkering" on a living room or garage floor (Levey, 1984).

During the mid-1970s, when the first microcomputers were com-

mercially available as kits (for several hundred dollars), articles in electronics and science magazines were devoted to the activity of assembling the kit. With no attempt to identify computing uses, they conveyed a seriousness of purpose about the "tinkering" much like that of the electronics or short-wave radio hobbyists. They also portrayed these early computer users in what might be termed the "hobbyist's niche." In the first photographs of these computer users in traditonal electronics magazines such as Popular Electronics, men are seen sitting at terminals, or constructing computers, in unidentifiable locations (see Figure 1). Sometimes hobbyists are reaching into a disassembled computer interior, and the photographs show only human limbs cropped at the wrists or elbows.

These photographs do not express the importance of location. No signs of domesticity: No children, no pets, no cozy signs of home life can be seen. They do not tell us that the hobbyist is either "at home" or "at work."



Home sweet computerized home

How soon will your home have its own computer? Thousands have them now!

by Ivan Berger ELECTRONICS EDITOR

Everybody knows what a computer is: a roomful of multimillion-dollar boxes looking like refrigerators with a dazzle of flickering lights, all working swiftly and efficiently to screw up our charge-account bills.

But for an estimated 5000 to 10,000 Americans right now, a computer is a twinkly-eyed gadget about the size of two breadboxes that not only does a lot of figuring, but also acts as referee—and sometimes opponent—in games of wit, logic or dexterity. And it's affordable—more or less.

Today, you can buy a basic computer processing unit for $400 or even less. The price includes the computer chip itself, some memory, means of getting data in (usually by front-panel switches or a calculator-type keyboard) and out (with blinking lights or a numerical display).

But a bare-bones computer like that will be tedious to use and limited in its uses. For a full operating system, you'd want a keyboard having both letters and numbers (under $50, if you shop around), a video monitor to display the computer's input and output (readily made from any TV you're no longer using), and either a computer output printer or a teletype (about $600 up—devices printing both capital and lower-case letters will cost more). Add another several hundred for additional memory and programs to run on the machine, and you can easily run your system up to a few thousand dollars.

Costs dropping

But the cost of home computers isn't rising—it's going down. The computer processing units that cost a few hundred dollars now have the power of computers that cost a hundred times that much or more a few years back. And the prices of the peripheral devices that turn those bare computers into operating systems—the printers, keyboard, memories and so on—are dropping like snowflakes in an avalanche ("Cheap" floppy-disc memories, for example, costing about $1500 when I started this story, should be available for about $400 soon).

Even so, a computer is still costly compared to some hobbies. But it's cheaper than a sports car or a medium-size sailboat. And will a sports car or a sailboat do your income tax? Help you design electronic circuits? Remind you to send birthday cards? Play—and compose—music? Draw pictures and diagrams? Plan nutritionally balanced menus?

Typical system components (left) include (clockwise from left front) MITS Altair 8800 computer, printer, teletype, floppy-disc memory. Memory boards are in front. Smaller Altair 8800 computer in center. Below, right, MITS 8800b.

A computer can do all that for you and still play all the games that thousands of happy hobbyists can dream up for it—if you can either write the programs that tell the computer what to do and how to do it, or wait till someone else writes such a program.

Talking its language

Writing programs in the computer's own, internal "machine language" is difficult, and such programs won't run on computers of a different type. But you can write many programs very easily in Basic, a language which uses English much the same way you do.

For example, tell the computer:

PRINT "4 + 2"

and it will print "4+2". But tell it simply:

4+2

and it will automatically perform the addition, and print "6." With a little practice, you can get into more complex programs that perform different actions according to the inputs the computer receives. For instance, the computer could print:

WHAT'S YOUR NAME?

and respond with insults, flattery, or a request to borrow money, depending on the name given.

A home appliance

All this is still meat more for hobbyists than for the average man. But the time is coming—soon—when you'll buy a computer for your home about as naturally as you now buy a dishwasher—and more easily. Computer stores are springing up all over the country. In two to five years, you'll be able to go to one, say what you want a computer to do, and walk out with equipment that's as easy to use and plug together as hi-fi components, with programs as easy to load as phonograph records or cassettes.

Chances are there's a home computer somewhere in your neighborhood already: we only had to make one phone call to find the computer setup shown here—just two blocks from our office. • • •

SEPTEMBER 1976

Figure 1.
The image of computer home-use as a hobbying activity.

Computer professionals are not the only people whose curiosity and imagination have been captured by the inventive possibilities of manipulating even crude computing systems. Nor are they unique in their desire to have creative control over a process that is different from the confines of their employment.

> Games are the big thing at the moment, but what's interesting is that people with little or no electronics background are getting into the field and since they've never been instructed about what the computer can't do, they're coming up with completely unheard of uses for computers.(Chips and Bytes,The New Yorker, April 4, 1977)

While social and computer scientists', as well as journalists', accounts of computer hobbyists reveal that they do not all have computing or electronics backgrounds, those who were designing and developing computing innovations in the freedom of their own time and space at home appear to share certain traits. All those portrayed are male, and all are portrayed, in different ways, as disconnected from social worlds. In the early 1980s, this sense is confirmed by women who were living with hobbyists.

Among the first voices of women to be heard in mainstream media were the letters of protest, published in columns devoted to "readers viewpoints," from the wives of computer hobbyists. These letters followed similar patterns. They begin with an initial enthusiasm:

> ...his excitement was infectious. He even taught a friend of mine how to use his micro, and today she plans to be a programmer! So, I began to see the positve sides of his hobby. After all, at least a microcomputer does keep an addict at home. (Scott, Ladies Home Journal, 1982, p. 14)

But a curve of disappointment follows as they find that it doesn't matter that he is in the house.

> I realized he wasn't just glad to be home. He was thrilled about the prospect of getting back to his terminal!...just biding his time till he could get back to his terminal and spend his evening working. (Ibid.)

> And then came the home computer....Now on Saturday evening he asks: "And what have you done all day?" The question slips out before he realizes it and betrays the reality that he's been virtually unaware of my presence in the same house....And so it goes with all the endeavors that used to make up a unified relationship. Physical proximity without sharing--it's the lot of the computer widow. ("The Invasion of Home Computers," 1983, p. G1)

While it is never exactly clear in these letters what their husbands are doing during the long hours spent "working", after work hours on their micros, the quantity of discretionary time men have devoted to computing is becoming well documented through survey research. In the first National Science Foundation survey of microcomputer owning households, the National Outlook on Automation at Home (NOAH) project conducted at U.C. Irvine found that in its 96% male sample of 300 households (drawn from a computing club in Southern California), changes in time allocation were dramatic during the first year after the purchase of a microcomputer (Vitalari, Venkatesh, and Gronhaug, 1985). The differences between those who did and did not have previous experience with computers were felt most during the first year of computer use.

> ...during the first year of ownership, T.V. watching decreased to a greater extent among the no-previous-experience group (100%) as opposed to 67% for the experienced group. Such differential impact can also be found in the case of other categories such as leisure time with friends (30% and 13% respectively). (Vitalari et al., 1985, p. 11)

After three years, Project NOAH found that with or without a background of computing experience, men were spending between 20-36% more of their time at home alone after purchasing a microcomputer. In

a national sample of 900 households, these same researchers have now found that households are spending an average of 20 hours a week using their microcomputers for an activity that is primarily identified as "job-related" (Abrams, 1985).

As the letters to the editors suggest, and survey research confirms, the time men are spending at their microcomputers may be a large part of the small amount of discretionary time that exists within middle-class households. Furthermore, women's letters tell their story: as men become more engaged in computing at home, they become less engaged in the care of their households.

The real contributions of computer hobbyists, within and beyond their immediate households were also not immediately apparent. In the first accounts of young computer scientists and computer professionals who are using microcomputers at home as hobbyists Turkle, (1982) articulates how a passionate relationship with computers may also substitute for satisfying relationships that are absent within other worlds.

> Bob is a computer professional, a microprocessor engineer who works all day on the development of hardware for a large industrial data system. He has recently built a small computer system for his home and devotes much of his leisure time to programming it....Although Bob works all day with computers, his building them at home is not more of the same. At work he sees himself as part of a process he can't see and over which he feels no mastery or ownership: "Like they say, I'm just a cog." At home, Bob works on well-defined projects of his own choosing....He describes the home projects as a compensation for the alienation of his job. (Turkle, 1982, p. 181)

While computer hobbyists were playing and inventing games, some were designing and developing innovations in the freedom and comfort of their own homes. They were experimenting without the pressures of

a workplaces, or the constraints of employer management. Sometimes they brought their solutions back to their companies, sometimes they began new careers, a few developed whole new industries. But market analysts, researchers, and journalists in the 1980s concur that computer hobbyists bridged a gap between the mainframe-oriented computer industry and the small-business and home-use personal computer market. They did this primarily by creating the applications programs that were the reason that a non-technically-oriented public purchased microcomputers in the 1980s.

When microcomputer market analyst Portia Isaacson was interviewed in The Wall Street Journal (Shaffer, 1982) about the future of a "home robot" industry after Zenith, the largest manufacturer of electronics kits introduced a "build-it-yourself" robot," she explained that robot kits of the 1980s were playing a role similar to the role microcomputer kits and their hobbyists played in the 1970s:

> The ingenious amateurs who might be expected to develop complicated programming needed for robots--as they did for computers--need some machines to work with....they find it difficult to collect all the gears, motors, sensors, etc.... Successful home computers were developed by individual experimenters, "basement tinkerers" not really in the industry, during its important hobbyist phase. (Shaffer, 1982)

Computer hobbyists can also be seen "bridging a gap" between the mainframe and microcomputer markets by generating the communities of "computer user groups" into which some new-comers (who feel comfortable going to these meetings) could become integrated. While many computer "user groups" have been formed by computer vendors as a way of creating a useful exchange between consumers and producers, others were initiated as consumer advocacy groups. In addition to providing a forum for dialogue between users and vendors, or to exert pressure on vendors, these groups also became a place where users

exchanged information and technical assistance with one another about the microcomputers that they were learning to operate and adapt in their homes or dormitories. Yet these early microcomputer enthusiasts were doing more than being vocal consumers and socializing each other into a new technological world in which many had never had any previous experience. They were also investing enormous energy and intelligence into the development of computer applications from their own particular areas of interest or those they were contracted to develop.

> A personal computer is indeed personal. Not only can you use it one on one, but with a low-cost Apple, Pet or TRS-80 on the kitchen table, you can set out to develop programs yourself....there are thousands of individual and small group operations that began in apartments and thousands of individual free-lancers...more than 10,000 in the San Francisco area alone. (Cowan, 1982, p.21)

Yet no one who designed microcomputer hardware in their garages in the early 1970s or designed software systems for the pre-assembled microcomputers that were available in the late 1970s were described in the media as "working at home." And they weren't. They were using their intellects, discretionary time, residential environment, and microcomputer components as investment in future business ventures. And over the succeeding ten years, as stories about the financial success of a small number of them became legends, it is worth recalling that initially, those who "tinkered" with computer components or kits were called hobbyists, not entrepreneurs.

Hobbying is defined in Webster's New Collegiate Dictionary (1961) as "an occupation to which one gives his spare time." The word "hobbyist" derives from one who rides a stick, or hobby horse, i.e., a horse that can go nowhere. The financial success of a small proportion of those early experimenters carried a different message.

Rather than being isolated hobbyists tinkering away in a basement or a garage, between 1975 and 1980 many hobbyists were relating to one another and to the opportunities for entrepreneurial developments. The image of home as a computing environment moved during this period from that of the lone hobbyist to an image that could never be adequately photographed but that has indelibly become part of the "American Dream." With the addition of a microcomputer, the presence of an electronics hobbyist at home began to reflect on the entire domestic environment, and to signify that it was an enterprising household.

The Image of Computer Home-use as a Push-Button Activty

Articles devoted to household computer environments in the 1970's were not all oriented toward the serious play of computer hobbyists. Since 1976, novice microcomputer users have also been addressed in articles which often refer to a non-technically trained public as "button pushers". For the uninitiated, microcomputer use at home is cast in a familiar genre in which electrical devices appear as new domestic servants.

Between 1976 and 1981, articles directed toward the unitiated focus on "household applications" such as programs designed to manage the "local data" within households, e.g., Christmas lists, recipes, financial accounts, or to centralize the control of electical systems, such as coffee pots, lights, and air conditioning. Together these applications supply the ingrediants for several "model homes of the future." In 1976, House and Garden featured

COMPUTER WIZARDRY ADAPTED FOR LIVING

A house is a machine for living in," the late Swiss architect Le Corbusier once said, but he never imagined a house like this. An inventive design by Stanley Tigerman using industrial materials, modular construction systems, it also contains amazing devices adapted for residential use by young electronics wizard Robert Phillips. Most stunning: a central computer that can control:

All 200 ceiling lights in the house, in any combination, and with a choice of brightness levels.

All 17 telephones, which, through adjacent speakers, can convert to phone-to-phone intercoms or house-wide paging systems. Also digital read-outs for time and temperature.

The dishwasher. ☐ A snow-melting system under the driveway. ☐ The outdoor water supply.

Thermostats of the house's two heating systems (radiant heat in the floors plus forced warm air from ceiling diffusers), and heating of an indoor pool.

Television sets which can be remotely tuned. The house has several antennas, each designed for optimal reception on a single channel, the computer automatically connecting a set to the right antenna as channels change. Programs can be recorded, seen later; kitchen screen displays recipes.

Security devices: fire and burglar alarms, electric eyes that replace doorbells, closed-circuit TV that shows approaching visitors.

An automated laundry cart, now being built, and a second cart, being designed, to bring food and drinks from the kitchen.

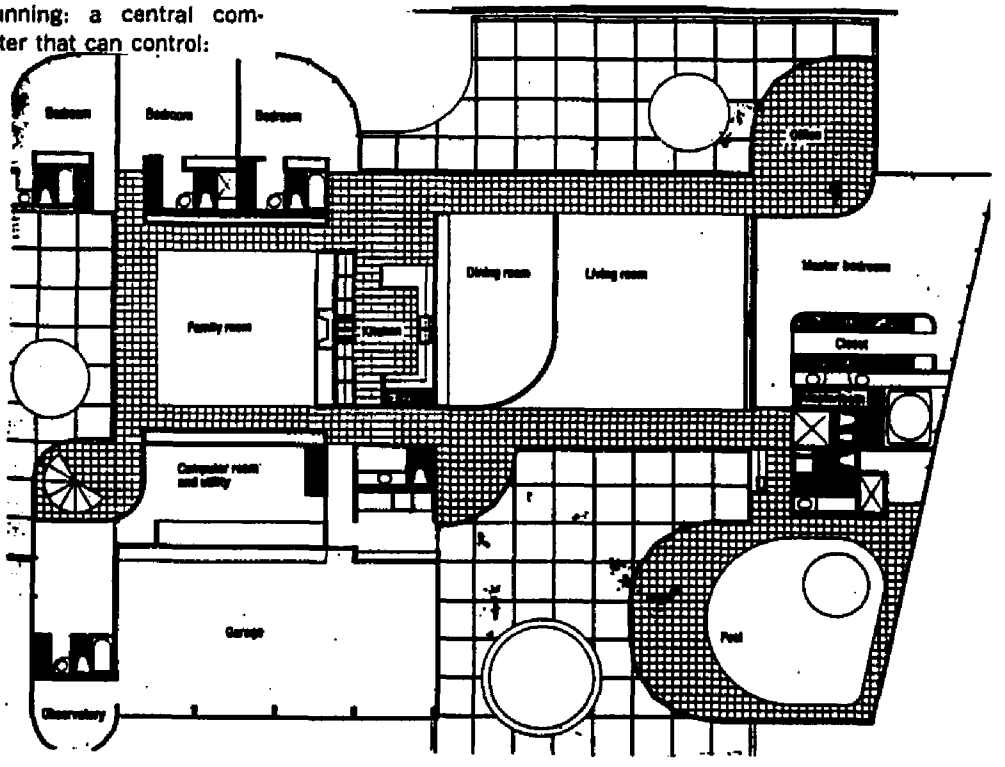


Figure 2.
A house that thinks for itself.

"The House that Thinks for Itself" by architect Stanley Tigerman (see Figure 2) for an individual client. In this luxury estate a computing system has been built into the utility room of the house, where it acts as a central control station (with remote manipulation) for the regulating of heating, lighting, cooling, entertainment, surveillance, and so on.

Computer inspired model homes have varied slightly over the last ten years. "Xanadu" was built as a display home, and its progress-- from conception to completion-- in Disney World has been well documented (Fantel, 1983; Shea, 1983; Mason, Jennings,& Evans,1983.) The applications of microcomputers to household activities have not proven, however, to be either useful or popular. They are noted here as a historical phase in the integration of computing systems into the home environment. The fact that articles on these applications have been almost entirely illustrated with cartoons of the "home of the future" suggests that the contribution that computers have made thus far to household management and housework is more fantasy than fact (see Figure 3).

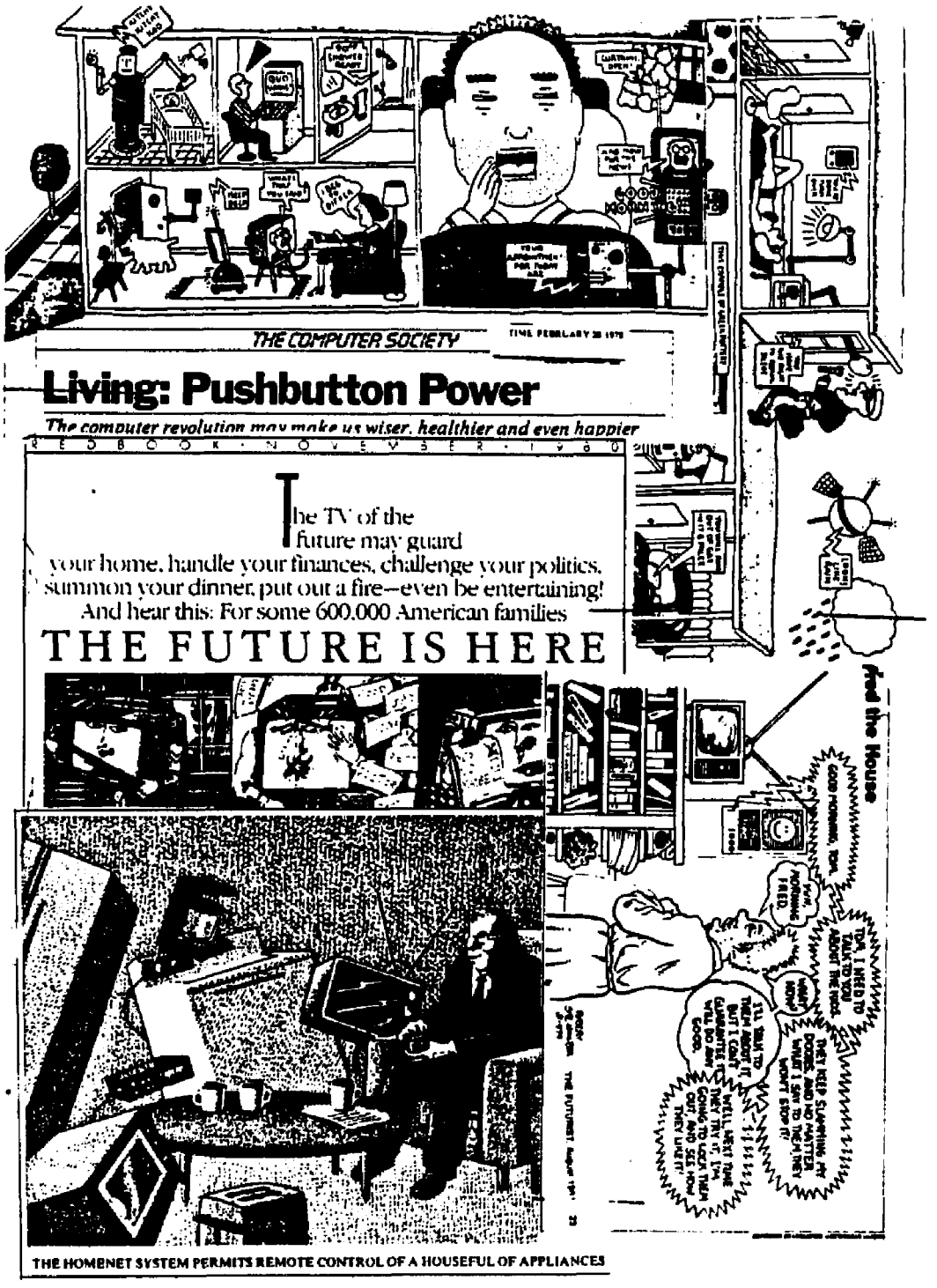


Figure 3.
The image of computer home-use as a push-button activity.

In addition to managing local data and controlling other devices, the third area in which small computing systems can be used (in budget as well as luxury models) is communications. By linking micros to telephone lines or other communications networks, they can provide interpersonal communications or the exchange of data. The interactive communications between microcomputers is a vital arena for the future understanding of the household as a computing environment; however, it lies outside the boundaries of this dissertation (see Note 1).

While the development of "push-button-control" environments was originally conceived as luxury homes, it takes on a different meaning when the technology is designed for people with mobility and sensory disabilities,. In 1984,Computer-Disability News reported:

> For persons with severe disabilities, a new computerized "house of the future" is now available....The environmentally shapeable model responds to vocalized requests made anywhere within its walls, and also to commands made over a user pre-coded telephone line.
>
> This house with a "brain" accepts and responds to requests to dim the lights, raise the temperature level, or answer the phone. It can respond to informational queries as well; for instance, persons who ask the house's main computer to state the time or date will receive a vocalized response indicating the correct information. Additionally, persons who are not mobile will likely be particularly pleased by the vocally controlled house security system. ("Latest in Computerized Environmental Systems: A House that Obeys Voice Commands," Computer-Disability News, Vol. I, #3, Winter, 1984 p.1)

The possibility that computer-based communications systems can extend the range of human problem solving capacities is unquestionable. Which problems will be addressed by the manufacturers of computing systems, and whose interests will command the resources of computing systems will determine the future impact of computers on living environments.

The Image of Computer Home-use as a Family Activity

Images of a "family computer" or of the household as a "family computing" place began to appear in 1981. They are different from the polarization between hobbyists and button-pushers depicted in the first generation of computer home-use. Photographs of the second generation of home-computing hobbyists are illustrated with adults and children crowded around their microcomputers, in living and family rooms, sharing skills and equipment (see Figure 4).

Scenarios about computer home-use as a familiy activity not only include details about women and children, for the first time, they include a new meaning of computer use: a focus on computing as the safegaurd of a family's future economic well-being.

> Alas, we are all being pulled along--some of us kicking and screaming--into a computerized world, which is destined to change the way we think, work, relate to one another and simply live. To live in this world--to cope--we must prepare. Some of us are preparing already.
>
> Dennis Manhart has had his personal computer for about one year. His Radio Shack TRS-80 is kept pretty much occupied by Dennis and two of his four children. Wife Karen has been a little too busy to spend much time on it, according to Dennis, but when she has a chance she wants to program a random food menu and base it on nutritional values. (Olson, "A Family Computer Album," Saturday Evening Post, April, 1981)

Rather than being seen in the context of an automated home of the future, these computer applications are seen in the context of the pressures of a society undergoing technology transfer. In the 1980s, the discussion of compputer applications for the household falls away. When it does appear, articles are directed toward the uninitiated woman user for whom computer-assisted cooking continues to be unrealistically portrayed as a reason for purchasing and using a microcomputer at home.

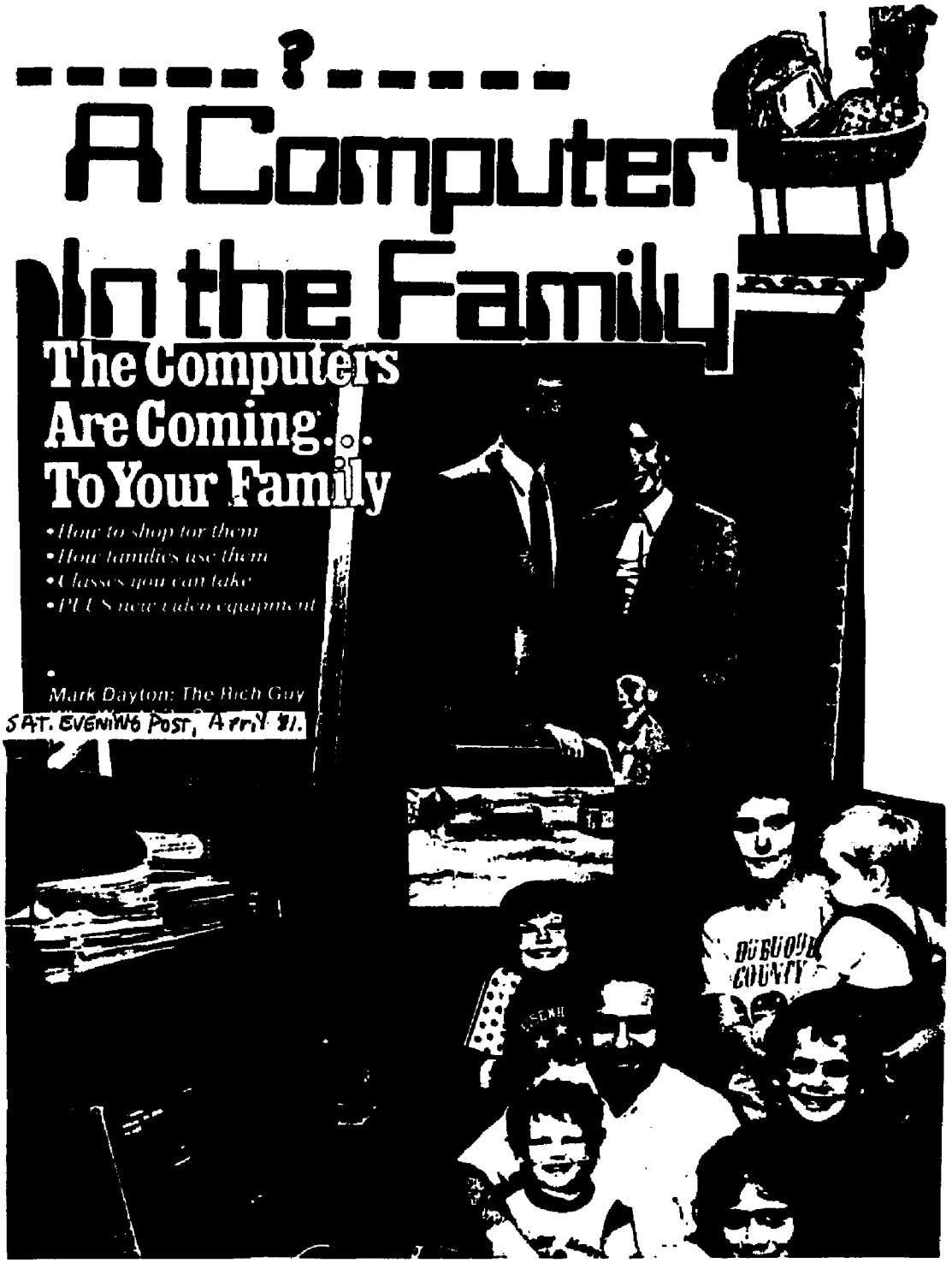


Figure 4
The image of computer home-use as a family activity.

Microcomputers require time spent learning in order to benefit from their problem solving capacities. By comparing the ways that micros are introduced to a wider audience of readers in the 1980s, clear differences appear in the ways that women's and men's magazines address microcomputer initiation. For example, in the first article devoted to the computer consumer in Essence, Worley and Laney, Jr. (1982, p. 114) advise their readers that a $2,500 microcomputer can be used for "endless possibilities" such as checkbook balancing, budgeting, investment planning, recipe files, diet plans, and educational games and learning programs for children. The previous year, Ms. Magazine (Golden, 1981) invoked a similar "push-button fantasy" in an article entitled: "Making Friends With a Talking Toaster."

On the other hand, in their first article devoted to microcomputers, The Family Handyman (Foster, 1983) advised readers that if the most complex math they do is balancing a checkbook, they should buy a $10 calculator, not a $3,000 computer; but for those who frequently work with words and numbers, they suggest that a non-technically trained user should anticipate a scenario like this:

> Regardless of the computer system you buy, you will need some help getting started. That support will probably come from your local computer retailer, but it could also come from neighbors, friends, children or other computer users. This may influence what brand you buy....Learning how to use your computer will take some time. The more tasks it can do, the longer will be your training period. For example, the more powerful a software package is for word processing, the greater the number of codes you'll need to learn. There are bound to be some frustrating moments such as losing an hour's worth of work on the computer because you pressed the wrong key. Be patient! In time it'll seem very easy and logical because it is easy and logical. (Foster, 1983, p. 40)

This journalist's account of microcomputer initiation brings common sense and realistic expectations to the non-technically trained person approaching a micro or, for that matter, any complex learning task, for the first time. Yet learning is rarely a focus of mainstream media articles that tell female readers that microcomputers are tools to file or cook with, rather than "tools to think with" (Papert, 1980).

The abbreviated depictions of "what computers do" give little indication of the time spent computing by men, women, girls, and boys who are actively using these systems. "Computer literacy" is a term that is mentioned but is not defined. With a similar sense of oversimplification, parents are advised to provide for their children's economic future simply by purchasing a computer for them. School-age children rarely have a voice of their own in articles about children and computers (e.g., "Should You Buy Your Child a Computer?" Kohl, 1982) or in articles about parents who work at home in order to be with their children during the day. In one of the only interviews with young people to appear in the Magazine Index under the category "COMPUTERS, Home-use," boys between 12 and 16 suggest that the economic present of their households has been improved by their

microcomputer use and the income-earning work they do (sometimes for their parents) with computers.

> Datamation: How did you all get into computing?
>
> Muskin (age 13): I started out in the sixth grade. I was interested in computers and started out with Basic...upgraded my system and read manuals. Now I think I've learned-- mostly taught myself--a lot of languages.
>
> Datamation: You did all this at home?
>
> Muskin: Yes, I started out with a TRS-80 but I gave that to my father so I could get an Apple. And I do all the work he needs for his business--payrolls, appointment keeping, all that stuff. The whole thing is computerized.
>
> Pencsak (age 14): I've always looked at magazines. I had a subscription to Popular Electronics and I'd look at the electronic ads. I used to be a calculator freak... Then a Computerland Store opened right by where I live, and I went up there one day. They had a kids corner and the kids would go there and play on the little Apple. So everyday after school I would go there. Finally my Dad bought me an Apple. About a week after that I got a job at the store and started adding to my Apple. ("Growing Up Computing," Datamation, June 1981, p. 211-218)

Finding computing intrinsically interesting and rewarding, these teenagers explain how they gain computational skills (outside of school) through active, creative and sometimes aggressive appropriation of resources, and by devoting an enormous amount of free time and intellectual energy toward learning and building with computers. These young men are the second generation of microcomputer hobbyists. They began when the microcomputer hardware had already been perfected and they taught themselves computer languages in order to write their own computer programs.

Over the next four years, articles about computing families include evidence of an intensification of women's uses of microcomputers, and increasing complexity in the role of a microcomputer among household members. It is important to note that women are not

seen spending time learning or exploring with microcomputers until they are seen using them for some form of income-earning work at home.

> Evalyn is a lawyer, and like many working mothers she runs her life on a tight schedule. Because she had to manage her life more efficiently, Evalyn learned to use the computer. "At first I was scared to death," she says. Once she learned to run the word processing program she discovered the computer considerably changed the economics of her practice. Evalyn works with a partner out of a third floor office in her home. They do not have a secretary and there is a lot of typing work.
>
> Evalyn has been using her husband's computer so much that Donald recently bought another IBM PC for himself....Even when on a plane, Donald takes aong his TRS-80 (a lap computer) so he can eventually transfer the material back to his IBM. "Before I would never take a vacation," he says, "but now I can sit by a pool and still do my work. (Morrisroe, "Living with the Computer," New York Magazine, Jan. 9, 1984, p. 24-25)

The subject of constant work is one that appears throughout articles describing the enterprising households that are using the microcomputers they purchased. The constant work is just different for women, men, and young people.

The Image of Computer Home-use as a Work Activity

As this study has previously mentioned, prior to 1981 there was no discussion in the mainstream media about the use of microcomputers for income-producing work at home. This does not mean that no income-earning work with computers was occurring within residential environments, but simply that the representation of computer use was in the realm of hobbying, games, keeping files for home use, possibly connecting the computer to other devices (including the telephone) for messaging, and so on.

Beginning in 1981, articles began appearing about people working

at home with computers. Many are indexed under the category of "COMPUTERS, Home-use." However, unlike the previous articles in this index (and described in this dissertation), these articles are rarely about individuals who had purchased a microcomputer for personal use.

Articles on working at home with computers appear continuously after 1981. Over the next five years, many different types of work arrangements are called "working at home." Initially, professionals and executives bringing work home from the office are portrayed as being in the same category as full-time clerical workers who are being paid "by the piece" and are being given no employee benefits such as Social Security. Articles about full-time employees who are participating in telecommuting trial programs are also interviewed, and by 1984, owner-managers of home-based businesses (such as word processing or computer programming) become the focus. These different configurations of computer work at home are briefly mentioned below.

Home as a Temporary Work Retreat

The use of the residential setting as a temporary location for office work is not new, yet it was rarely mentioned prior to microcomputer use at home. It appears among the first examples of "employees working at home" (Pollack, 1981, p. 1). By keeping a computer terminal linked by telephone to his office, this management consultant stays "connected" to his office while staying in bed.

> E. Raas is one of forty employees of...[a] management consulting firm who have a computer terminal in their homes. As the vice president and manager he can either work at home or in the office. The flexibility came in particularly handy when Mr. Raas came down with pneumonia....

> The terminal is on a desk in Mr. Raas's teak paneled bedroom....Mr. Raas with his terminal is like a child with an Atari TV game. "I can get up at four in the morning or any other time and go to work here when an idea comes to me," he says. "With this I can be locked into what is happening all the time." (Vicker, "Portable Workplaces: Computer Terminals Allow More People to Work at Home Instead of Commuting," Wall Street Journal, August 4, 1981, p. 56)

Depicting this man as "working at home instead of commuting" is not only a new cultural phenomenon: It is inaccurate. Using a residence as an alternative, and sometimes preferred, work location has been a traditional aspect of professionals life in the sense that professionals do not always work regular hours (and are not paid over-time). The capacities of new information technologies also enhance the possibility for professionals to work all the time.

> The effects of small-computer technology on the locale of work are analogous to those of the telephone. Because of the almost universal distribution of telephones it is not necessary to go to the office to call a customer....but until now it was necessary to go to the office to write or dictate a letter, read mail or find something in a file. Now...the job is no longer tied to the flow of paper across a designated desk; it is tied to the worker himself....and to the full exploitation of the virtual office through expansion of the workplace in space and time." Giuliano, "The Mechanization of Office Work," Scientific American, September 1982, pp. 163-164)

Electronic Homework

Many of the women depicted in these articles are, in fact, working at home with computers as full- or part-time electronic homeworkers. They did not, however, purchase micro-computers for income-earning work. Computer terminals or micro-computers are lent (or rented from employers) for clerical and support work. Although these women are quoted, they literally never illustrate the early articles.

The stories about the use of computers for working at home were introduced with photographs of one type of situation: middle-aged white men sitting at cluttered desks with computer terminals, with an infant within arm's reach (see Figure 5). The implication of these pictures that a computer at home creates the context for a nurturing father to work at home is never corraborated in these early articles. Such a radical departure from the standard images of domestic life (where fathers are not childcare providers during their work time) and from all the previous storylines about the domestic use of computers suggests that when a man is using a computer at home, he can actually be with his family and virtually be in his office at the same time. A microcomputer is a way for a man to bridge his roles of parent and employee. Yet the men in these articles are quoted as saying just the opposite: "I'm here to work and not to babysit" (Pollack, 1981, p. 1). In fact, it is only mothers in these articles who report working at home as time spent with children in the house.

> "I have a small child and don't have to get a baby sitter," said Terry Medlin of Columbia, South Carolina, one of the Blue Cross/Blue Shield's four cottage keyers. (Pollack, 1981, p. 1)

Women working as information processors, "keying" in information on forms, are often called "cottage keyers" by the insurance companies for which they are part-time or full-time workers. These workers are paid by the piece, receive no employee benefits, and are required to rent their terminals. Thus they absorb all the overhead costs of their labor. Women working at this economic disadvantage explain that their motivation for working at home is the cost savings of not having to get a babysitter. They also explain that these "savings" go hand in hand with the real difficulties of working while managing a household and childcare.



Figure 5.
The image of computer home-use as a work activity: Phase 1.

> Diane Greenus says working at home saved the costs of babysitting, commuting and buying a wardrobe....But working at home can cut into productivity, particularly with two pre-school children clamoring for cookies. "You always have to watch out and listen for them," she says. (Johnson, "Rush to Cottage Computer Work Falters Despite Advent of Inexpensive Technology," Wall Street Journal, June 29, 1983)

Diane Greenus's employer loans her the microcomputer she uses as a typewriter (with a memory) to retype edited manuscripts. The work, stored on floppy disks, is later picked up from her home by messengers. These disks are later transmitted electronically (using telephone lines) directly to the publisher, bypassing many previously necessary stages in the printing process. The transcribing work done by homeworkers such as Ms. Greenus or the "coding and keying" that clerical workers do for the insurance industry involves labor intensive work that may be eliminated by the next generations of information technology. Blue Cross/Blue Shield has experimented with new equipment that can "read" hand-printed letters and numbers entered on template paper sheets, which, if adopted, would eliminate the need for skilled typists (Hellman, 1985, p. 66).

Although stories about women who are working at home with computers have been mentioned since the topic of computer home-use as a work activity first surfaced in 1981 (Pollack), women have been less visible in the media. When photographs appear, children tend to be in a more controlled environment, in their mother's presence. (see Figure 6.)

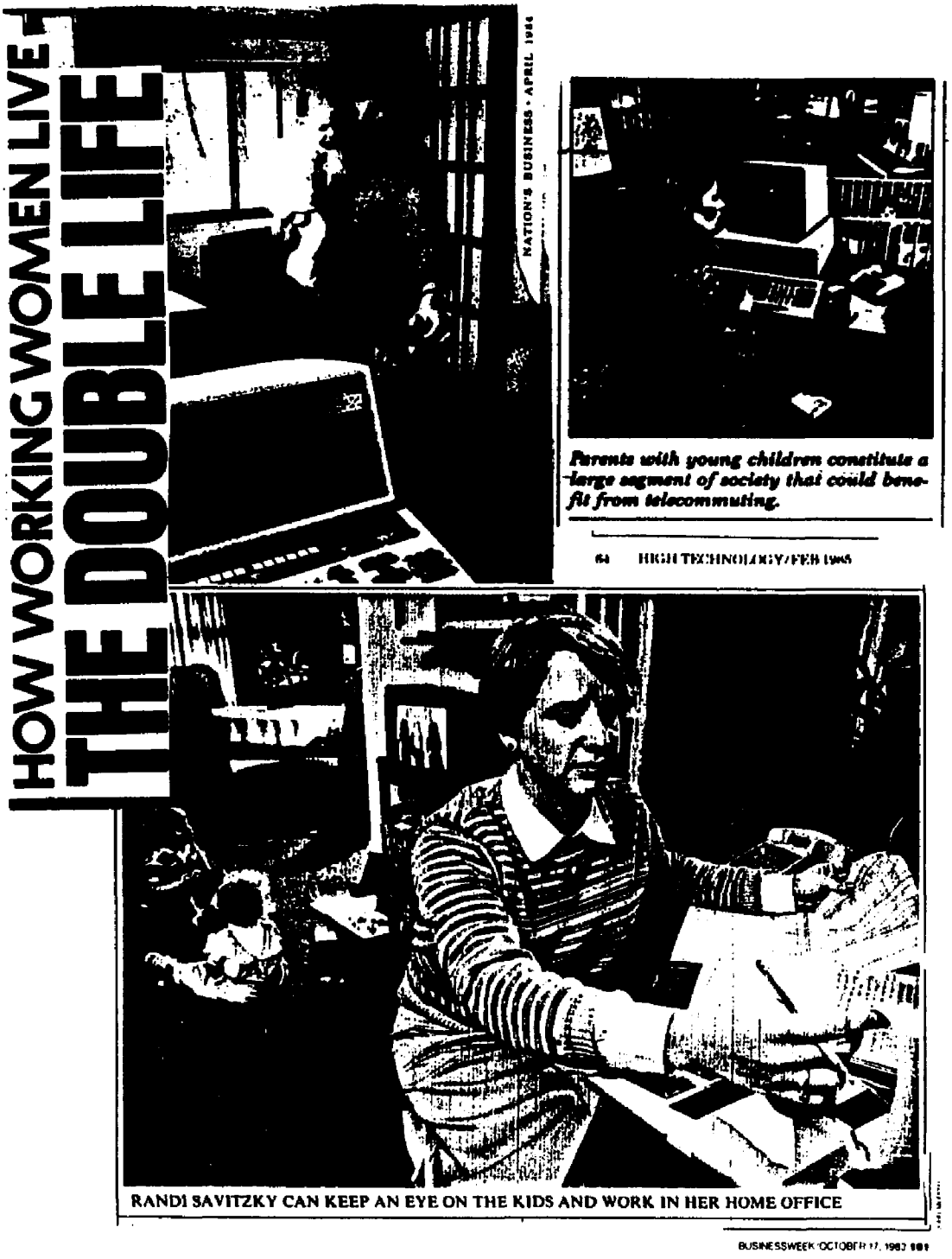


Figure 6.
The image of computer hom-use as a work activity: Phase 2.

Telecommuting

Women and men in managerial jobs that primarily involve communications through computer-based systems have also appeared in articles about employees working at home with computers. Frank and Luci Knight, who were both managers for AT&T, are the focus of five articles and are mentioned in several others. It is the Knight family story that provides the narrative about telecommuting in the first half of the 1980s (Dullea, 1982; Wollman, 1982; Nelson-Horchler, 1983; Larson, 1985).

In 1982, we learn that both Luci and Frank Knight split their work time between New York Telephone company headquarters and their electronic office at home (Wollman, 1982). In the same physical environment, sharing the same job, and nurturing their child, the Knights report different approaches to combining home and work. Luci works around their baby, Lauren's, schedule by rising at 5 A.M. (a solution mentioned by numerous women in these reports), and working while Lauren naps in order to be with her child during the time she is awake. Frank's self-reports suggest that he is physically with his daughter while he is psychologically at the office.

> Luci's modus operandi for tending both job and infant is to integrate Lauren's schedule into theirs. For instance, she plans projects requiring heavy concentration for the morning, when the baby needs less attention, and sets aside hours at the end of the day for cleaning up loose ends and preparing for the next day....Lunch hour is for feeding Lauren in the kitchen or on the sun deck. On Frank's days home, he feeds the baby meat and vegetables in the office high chair while wearing the headset and fielding phone calls. (Wollman, "The Double Life," Working Woman, September, 1982, p. 154)

The Knights also report increased productivity as well as the problem of "getting so involved in their jobs that it is hard to stop

working." Their solution is "forced breaks at specific times during the day for exercise" and attending meetings at company headquarters. We do not learn for several years that the Knights are "telecommuting product managers," but it is clear that they are promoting telecommuting. When Industry Week (Nelson-Horchler, 1983) interviews Frank Knight in 1983, he optimistically predicts that in five years New York Telephone would shift the "offices" of 20,000 of their 75,000 employees home. Just two years later, however, during the disruptions that followed the divestiture of AT&T., the Knights were returned to their office by their new employers. When last interviewed, Frank Knight now recalls that working at home was a state of constant work, like a "snow-blindness" (Larson, 1985, p. 3).

The fact that the same small group of individuals has been repeatedly interviewed in the media, and that tracking their paths during these four years has revealed frequent changes in their employers as well as short-lived experiments with homework, leads to the impression that the scope of the controversy and public attention being given to telecommuting may exceed the real numbers of people who are involved on an on-going basis. While the media may confer social approval, it cannot generate the conditions in which telecommuting, or any type of computer use at home, is a viable form of work.

The discrepancy between the amount of attention given to telecommuting and the small group of individuals reportedly involved is confirmed by the reports of telecommuting expert Jack Nilles, who said in 1984 that there are approximately 10,000 telecommuters but less than 1,000 who work at home full-time (Applebaum, 1985). There is a growing consensus among researchers, in fact, that telecommut-

ing as full-time organizational work at home "is not likely to become widespread in the future" (Olson and Primps, 1984). Recent surveys show that while 250 companies began homework programs between the early 1970s and early 1980s, only 20 to 25 continue programs and have any intention of expanding them (Kelly, 1985).

While there is no indication that the time spent using computers at home substitutes for employment outside the home among any significant portion of U.S. households, it would be a mistake to assume that income earning with microcomputers is not occurring. The Wall Street Journal estimates that "self-employed telecommuters outnumber company-employed telecommuters about 5-to-1" (Telecommuters could top 7.2 million, 1985, p. 1).

The distinctions between working at home as a full-time employee, part-time employee, or independent contractor are most significant in relation to the laws that establish who is responsible for paying Social Security tax. "Self-employed work at home" includes work by people who own their own businesses, as well as people who work part-time or as temporary workers, or who have multiple employers (and thus work "full-time" at part-time work). All of these work conditions are categorized by the IRS as "being a direct seller." The IRS distinguishes this from the situation of employees who are working at home in that direct sellers pay their own Social Security tax.

The IRS also defines a person working at home as an "independent" or direct seller when the person has "a substantial investment used in performing services" that does not including a vehicle used for transportation (Workers of the word, 1985). Given the

considerable savings that accrue to employers who do not have to pay Social Security benefits, many companies view the use of part-time or temporary employees, as well as homeworkers (who are independents), as a strategy for containing costs. The fact that many companies have assumed that a person's ownership of a microcomputer would be considered a sufficient condition for his or her classification as an "independent" has led to many disputes.

> A concern we'll call Write Away Inc. hires workers to transcribe at home tape recordings of various proceedings; the typical typist owns wordprocessing equipment that costs between $1,500 and $3,000. Before 1983, Write Away considered the workers employees and paid tax; then it began treating them as independent, arguing that computer word processors, unlike typewriters, are substantial investments. Now the IRS has ruled privately that the home transcribers are employees for whom the Social Security tax must be paid. "There is no evidence that such computers are not as ubiquitous as typwriters and...now commonly...provided by employees," it commented. (Workers of the word, 1985, p. 1)

A decision in a "private ruling," as cited above, does not apply automatically to all similar cases. However, it does discourage others from trying a similar tactic. This can mean that some employers are willing to hire part-time workers with typewriters as though they are independent contractors and sacrifice some productivity that might be gained through the use of desk-top computers, rather than accept the financial responsibilities of having employees, i.e., paying Social Security tax.

> A Chicago publisher hesitates to let his 35 homebound workers use computers despite the fact that "computers would be great for my people," says John Kuranz, president of Management Contents, Inc. which summarizes business and science stories for data-base subscribers. "The government has ruled that if I loan out computers I can't pay my homeworkers as independent contractors anymore. That means withholding Social Security benefits. I don't know if I want to get into that. (Johnson, 1983, p.1)

Thus despite the advances in information technology, wide-spread media attention, the intent of the current Administration to remove all constraints on the growth of business, as well as the growth of scholarly interest in organizational work at home via computer-communications systems (Olson and Primps, 1984; McClintock, 1981; Ramsower, 1983; Pratt, 1984), in 1984 it appeared that the population of employees working at home was decreasing in size and importance. In contrast to other cost-containing strategies by management (e.g. temporary employment) the growth of telecommuting is limited by the current definition of independent contract work.

Self-Employed Professional and Clerical Work at Home

As the relationship between microcomputers and self-employment has begun to emerge in the media in the mid-1980s, the discussion turns toward individuals who are computer software developers, systems analysts, and microcomputer consultants. Others who are self-employed use their microcomputers as an assistant in word processing or bookkeeping, or via modem and telephone lines for information research or communicating with clients.

Journalist reports on the use of microcomputers for starting and running an independent business out of one's home focus on the stresses and the creative solutions for living and working in the same space. The interactions between household members are brought into sharper focus, as are their diverse and sometimes conflicting goals. While descriptions of the temporal and spatial boundaries that are used to buffer interruptions at home have been mentioned since the early 1980s, as the media survey of this research ended,

two new issues were introduced. They are: children's perception of their parents computer home-use, and the profound differences between the social context in which women and men engage in computing and work at home. Rather than charachterizing women's microcomputer use as an enhancement to cooking, or as a benefit to on-site household management, in the mid-1980s women emerge as home-based workers whose time spent computing may be as intensive as men's, but even more subject to family role conflicts.

> Many female business owners do seek more than modest financial success from their home-based operations, however. Like men in similar circumstances, these women admit that working at home can breed professional isolation, constant work pressure, zoning clashes and a personal space crunch. But such women are also likely to have more role conflicts than men....Ms. Diamond, a language school operator, avoids some role conflicts by teaching her sons that she means business. They know so well to leave her alone in the den that her 10-year-old says he feels like she really isn't home. (Lublin, 1984, p. 11)

Observing the media history of computing at home provides one window into the fluctuations in the representation of the household in popular culture as a setting not only for computers, but also as a setting for income earning work. The periodic re-framing of the household as a computing environment poses many questions. Why do some views of the computing, and of households appear in the media spotlight, and why do they appear during a particular historic period? They pose questions, as well, about the shifting economic and social pressures in which individuals interpret and reinterpret technological innovations in their own lives and in the stories they tell and and pass along in personal and public forums.

Chapter Three Notes

1. For extensive discussions of the potentials, limits, and dangers of the extension of household service applications of microcomputers that are connected through telephones, broadcast, and other communications networks, see Zimmerman and Horwitz, "Living Better Vicariously" in Jan Zimmerman, ed., The Technological Woman, and Mosco, Pushbutton Fantasies; Tydeman et al., Teletext and Videotext in the United States.

CHAPTER FOUR

THE HISTORY OF HOUSEHOLDS THAT PURCHASED MICROCOMPUTERS FOR HOBBY, FAMILY, AND WORK PURPOSES

Chapter Three introduced the images of home as a computing environment that emerged during the first eight years in which microcomputers have been commercially available in the U.S. The householders in these articles were initially either hobbyists who became immersed in a computing culture or consumers who purchased a computer as a household appliance. Since the late 1970s, a more accessible microcomputer with applications programs (like electronic spreadsheets and word processing) offered valuable office assistance to those who might not have purchased a computer without a practical reason. As microcomputer home-use expanded beyond the hobbyist culture or the promise of button-pushing, journalism reflected a sense of shifting pressures: the perception that computing skills and computer technology were becoming the key to economic well-being. In the 1980s, the "family" was introduced as a new context of microcomputer use, and income-related work became the new focus of computer home-use. Between 1976 and 1985 what is meant by "working at home with computers" has been shifting, and with it, an image of home as a location where concentrated work takes place.

This chapter is devoted to an introduction to the six households interviewed in this dissertation. These interviews explore how the uses of micros purchased for "hobby," "family," or "work" purposes evolved over time. It seeks to understand how the environmental context of the household supported or limited the direction of uses.

The interviewees selected have much in common. They are all white, and live in metropolitan New York City or its suburbs. All the adults are in their forties and have school-age children. They all purchased computing systems that cost between $1,500 and $3,000. Thus, while they are at least middle-class, they span the broad range of this category: from a single parent who works as a skilled clerical, to two-career professional couples. One or both of the adults in each of these housholds have tried to be self-employed through the use of computer systems within their homes, although they have not all been successful at it.

The members of these households also reflect a range of types of computing training. Three adults received formal training either in college or on the job (or both) prior to working at home. Three began learning about computers when they purchased their own microcomputer. Households purchased microcomputers between 1977 and 1982. The primary adult user is female in one-half of these households.

Open-ended exploratory interviews were conducted for between three and four hours with at least two members of the households. For five of these households, the interviews took place in their own homes. The sixth household was interviewed, in-depth, by telephone, with no home visit. Whenever possible, the material conditions of these households and the neighborhoods in which they are situated are

described to convey their socio-economic status as well as the surroundings in which people work and live.

While the members of these households share many qualities and many of the same situational variables in their lives, the differences among them and the exploratory nature of these interviews, necessitates that each household be viewed individually, within its own historical context, before any comparisons or discussions of broader issues are possible.

A Household that Bought a Microcomputer for Hobbying

Sol

In the attempt to locate an individual who had become involved with microcomputers as a hobby in the 1970s and was possibly working at home in the 1980s, I contacted colleagues at an educational publishing and media company and asked them if they hired independent contractors as computer software designers. Their answer was no. However, they explained that when their software division had been reorganized (largely dismantled) in 1983, several people left the firm to work on their own. They suggested I contact Sol. I found him working out of his basement workshop on his three microcomputers, continuing to design software for children, but also writing books for hobbyists about playing games with their computers.

My interview with Sol and his family in the spring of 1984 took the better part of a Saturday. As I climbed out of the subway in Queens, I found that the main thoroughfare in this neighborhood had Italian markets and restaurants on one side of the street, and Kosher butcher shops on the other. Walking down a side street of nearly identical brick bungalows with car-ports and rose bushes in tiny yards, I noticed that each house had the name of its owner posted somewhere near the door. Three houses carried the same family name as the family I was going to visit.

Background

Sol is in his early forties. He has lived on this block all his life. The basement workshop where he works day and night with his

microcomputers is where his father used to have a television servicing shop.

Introduction to Microcomputers

After receiving his B.S. in electrical engineering, Sol worked in a computer-aided design section of a company with time-sharing computers before he went to work for an electrical design magazine in the early 1970s. As its news editor, he had been closely following the microprocessor and minicomputer industry, and he noticed an advertisement by the Apple Computer Company for a machine they called the Apple I around December 1975.

> I had seen this one-page advertisement for a microcomputer with an assembled board with everything on it that helped you to program. This was unheard of; at that time, everything else was a kit. It was a real breakthrough....So I called up the fellows in charge, to order one of those $666.66 computers. They were working out of a garage, and the telephone number in the ad was Steve Job's mother. After I got it, I found I had to add some transformers and a keyboard. I picked up a used typewriter case and brought it into the office with me, and that was the last bit of work that anyone did that day.

While this first assembled micro captured Sol's imagination and that of all of his colleagues and friends, it had no real calculating power--if you divided 3 by 2, the answer given was 1. And while it could be used as a text editor, there was no provision for printing out. Sol began by playing all the games in a book called 101 Games put out by DEC Computers. He was intrigued mostly by the text games: e.g., simulations or "games of life" like "Hamurabi" ("Suppose you're the king and you have to make a decision....") Although that first year, while waiting for a more sophisticated microcomputer, he was mostly playing games and learning about the system, from the outset Sol saw himself as a person who built computers.

> The only people who could use computers in the early days were people who could build them. If you couldn't build it, you couldn't take the time to learn how to operate it. So its use was very limited.

Sol's relationship to his microcomputer was not an outgrowth of his college training in electrical engineering. It fit into the much more fundamental pattern of how he liked to spend time at home.

> I was always a hobbyist, always working on things. I got involved in electronics when I was about five years old. My parents bought me a crystal set for my birthday. I found it in a closet and put it together one night when they weren't home and took it apart and put it back. Later, I built oscilliscopes, electric generators, amateur radio equipment, things like that. My father was involved in electronics and television servicing, so I got involved in electronics quite early [age 5]....Computers were an extension of my electronics hobby.

In 1976, Sol attended the first personal computer show on the East coast in Atlantic City, and by 1977 he bought the upgraded Apple II personal computer. Although he said that his intention when he bought it was to learn machine or programming language, he described a more exploratory process in which he was always posing questions to himself and spending more time taking things apart than actually constructing programs.

> At night and on the weekends, when I first got it and I had nothing to do, I would go over and turn it on. What I wanted was to learn machine or programming language. More than that, I kept getting interested in the ways things were protected. I was amazed the way the tapes would load and run withjustafew commands. I was mostly playing with MicroChess then. It was difficult to make a copy of it, so I wanted to find out why and how it was done. I would examine programs. I learned that you don't have to load it the way they said you do. After getting familiar with computers, I learned you could load it in differently by taking it apart, which is what I did. That's how I taught myself assembly language programming, by examining what other people had done and why.

Sol explained that after he bought the Apple II, he was spending most of his nights and weekends with it. "But there was a reason for it." He had decided he wanted to write a collection of 110 programs. "For this reason I was spending a great deal of time with the computer." But from 1977 on, the only thing that changed about Sol's relationship to the computer was his current reason for spending a great deal of time at it. In many ways he used the same format he had as an electronics hobbyist. Before microcomputers, he had written small books for electronics hobbyists about projects he had built. Afterthe personal computer was available, he began "building programs and then writing books about them."

The personal computer provided him with a continuously rebuildable set of parts as well as a better set of tools to use as a writer.

> I found it an enormously helpful tool for writing. It allowed me to be a lot more creative. I no longer had to worry about typing the whole thing over again if I wanted to make some changes. I used to write the sections and paste them up and take them to a secretary to type them. Now I don't mind making major changes.

Household Context of Computer Use

When I probed Sol's reasons for working at home, he was rather vague. He said he had always thought "in that direction." His father had always worked out of the house, and he himself had been working in the basement throughout most of his life. The computer "speeded things up a bit," he said. Sol felt that nothing about his home life really changed as a result of his working in the house. He does no more housework, and has no more responsibility for his seven- and twelve-year-old children than when he was working all day in Manhattan. But Sol does not feel that he has the quality of work environ-

ment he needs at home because he does not have the audio privacy he needs for working. Although his children are in school for a good part of the day, and his wife, Marsha, is a school teacher, the noises from the kitchen above, the washing machine next door, and his children's play room in the basement are distracting, He put an intercom system between the basement and the upstairs bedrooms in the hope of having more control over the noise level.

> Location isn't so important. I just want a quiet area. I don't need a particular "anywhere." When you're writing, you need a certain amount of mental concentration.

As I tried to understand Sol's statement that nothing much had really changed for him when he moved his work home, we discussed the time that he saved as a result of no longer commuting:

> The only thing is that I've got more flexibility during my day if I want to go somewhere and do something. I don't have to be concerned about getting to work on time. I start earlier and stay later.

We also talked about his work routines. He summed up his work experience with the following statement:

> The single most significant change is that, whether I'm writing a program or writing a book about computing, I spend a great deal of time there to the exclusion of everything else.

But some of what Sol does, now that he is an independent contractor, is different than when he worked for a children's publishing house. Sol has to <u>find work</u> now, and it was not until I asked him about other activities at home that are away from the computer terminal that he began to volunteer something about this new aspect of his work life. He now receives about 30 magazines a month, as well

as business, advertising, and marketing newspapers, in order to learn about his competition and to learn more about how to market himself. Describing the tremendous growth in his own reading as his " need to stay current," Sol explained that he does some of this work while he watches television with his family. They tend to watch T.V. together, he says, between 7:30 and 9:00 each night. It is a stable "family time" when everyone sits around together, and people also bring other things with them. Just as Sol brings his journals, his wife sometimes brings her sewing, he said.

Marsha, Sol's wife, is a school teacher, and sometimes does not come home until 6:00. I asked Sol whether he prepares dinner, runs errands, or does things with his children during the day. According to him, the only work around the house he did was as follows: "Sometimes, I clean up my area in the basement." When Marsha joined us later in the afternoon, one of the things we talked about was how things had changed around the house for her since Sol started working full-time at home. She said that it was "more work" for her, and that she had more cleaning to do, even in the basement. Marsha's story was Sol's story: Things had changed in the household, she felt, when "he got the bug, the computer bug," not when he started working full-time at home.

Both Marsha and Sol described their own and each other's family roles as very clearly traditional, and neither talked about any role changes that have accompanied Sol's moving his work location home. This did not mean, however, that there were not some frustrations or difficulties with the current arrangement. Marsha (for whom English is her second language) said:

> I get tired with the computer. At the beginning it's fun, it's nice. But now, everyday, he gets more and more equipment. He collects more and more magazines. It's just more work for me.

The frustrations didn't lead either of them to conclude that because he happened to be in the house, the division of labor in the household should be different. Marsha described Sol as living in a kind of world of his own since he began working with the computer, and even more so since he works at home. When I asked whether there was more work for her because there was someone spending his time in the house, she pointed out that he wasn't all over the house: "He has his own room where he does his work. He plays there." In addition, she described him working "around the clock. He doesn't know if it's 3:00 in the morning or afternoon." She also said: "Sometimes he doesn't do nothing, he just goes around."

It was Sol's son, Jordon, however, who explained what it was like to live in a household where Sol was working with a personal computer at home. I asked if he saw his father any more since he began working at home, To the surprise of his parents, Jordon said "No. Because mostly he comes home late and I'm sleeping."

Neither Marsha, their twelve-year-old daughter, Gail, nor their seven-year-old son, Jordon, spend much time using Sol's computers in the basement. He bought his children an Atari, which is in Jordon's room. Jordon says that when he grows up, he will be a programmer. Gail says she may use a computer in the future, "But I'll never be as good as him," she says, pointing to her father. When I asked Marsha about whether she might want to learn something about personal computers in the future, she said:

Who has the time? I am interested, but really I don't have the time. I started to read one of the books that tell you how to use the program. I understood the simple things at the beginning. But already you need to be in it to understand it. You need to be typing all the time.

Two Households that Bought Family Computers

Sonya and Dave

I attempted to locate households that might have bought what they thought of as a microcomputer for the family. I was also particularly interested in understanding if women in those families had or had not become involved with computing.

I happened to meet Sonya's husband, Dave, in the winter of 1984 while working on another project. When I asked him if he knew any women with children who were intensely involved in computing in their homes, he told me to call his wife. Although Dave had bought their Apple Computer in 1979, Sonya had only started using it in 1983: She began working at home as a self-employed word-processor, and later began writing and submitting articles to magazines about families and computers.

Sonya picked me up at a suburban train station and we ate lunch at a diner before driving back through rolling hills to their home. Their large house, with its three-car garage, is situated on a large corner lot covered by huge maple trees.

Background

Sonya, who is 45, spent two years in college before getting married. She has primarily focused on her household and volunteer work in the schools during the years when her two teenage sons were growing up. During most of those years, they

lived in Europe because Dave was working for a multi-national scientific machinery company with divisions in western Europe.

Introduction to Microcomputers

It was on a 1979 trip to the U.S. while they were living in Germany that Dave purchased their first Apple computer. Sonya was not thrilled.

> I thought of it as a toy. It was used as a toy to play games with. I remember thinking it was stupid and didn't pay any attention to it. I always hated games other than Scrabble, so I didn't go near it. All the German kids would come over to play with it. None of them had computers and they probably still don't. We were in a little village.

As I tried to understand how she had become interested in their micro, Sonya explained that while she didn't like the games, she also thought that computers were something that you had to understand at the beginning:

> It took me a couple of years to understand that they are like the dishwasher: You just have to know which buttons to push. I was intimidated by it. I didn't want to spend the time to understand it. I couldn't see any purpose for it in my life. But Dave had visions of me going into word-processing....

While nothing about their computer was "appealing" to Sonya, including word-processing ("Why shouldn't I use my typewriter?"), after returning to the U.S. several years later Sonya's perspective on her life began to change, and she looked at the computer differently as well. With her sons in high school, and living in the States again, Sonya wanted to work. After being an assistant in a classroom for learning-disabled children, she decided she had spent her adult life primarily with children, and now she wanted to do something else with it, something more creative.

Dave offered to teach her how to use the word-processing program, but Sonya didn't have the incentive to begin by first learning to use the software. So, prior to learning how to manage the program, she placed an ad in their suburban newspaper advertising her services.

> I'm the kind of person who won't do something without strong motivation. So I wouldn't learn it without having customers. I put that kind of pressure on myself. I put the ad in the paper and I figured if I had a customer--a really good reason to learn it--I'd do something about it.

With clients' deadlines already facing Sonya, Dave taught her how to use the PC and the word-processing program

> I didn't get started with this because I liked technology--I didn't like technology. I wanted to be independent and make my own hours. I did it for the money and to have independence. I wanted to be interacting with adults instead of children. This way, I could make money in the home and still be the "mother" and drive the kids to the orthodontist, things like that. But I hated it [the micro], for the longest time I just hated it....
>
> Dave bought me a very complicated and powerful word-processing program. He didn't know from "user-friendly"....It took me a good year to get comfortable with it....I can't tell you how many times I would take one of these jobs and I would type in all the text and wait for Dave to come home to put in all the commands, to indent or whatever....He's not a night person, and there were many nights when I'd have something due the next day and he'd be tired, and we'd be screaming at each other. I was totally dependent on him for months until I finally started to ask questions and take notes on what he was doing. I figured if I didn't improve and become independent, we were going to get a divorce over this.

Sonya continues to have a variety of difficulties using her word-processing program as well as her printer, and now she mostly calls on her older son or one of her friends in the neighborhood to help her. But managing to get the technical assistance she needs and achieving greater competence are not the only things that have

changed since Sonya began word-processing two years ago. Sonya also entered into the world of personal computers that is her husband's and older son, Stewart's, hobby, and an interest of her younger son, Daniel.

During this time, Sonya happened to meet a father of one of Daniel's friends, a man who was a vice president of a publishing house and software concern. Sonya managed to interest Dave (who was not happy with his work once they were back in the U.S.) in this company and interest the man in Dave being employed there. "I was instrumental all the way," Sonya said, explaining that she relished the possibility that her husband would work at something that was interesting and accessible to her. As soon as Dave began working at this company in the acquisition and marketing of educational software for children, Sonya asked him to submit to one of their many magazines the articles she had begun to write. This is how Sonya's career as a journalist specializing in "family and computer" topics developed.

Household Context of Computer Use

As we talked in front of the fireplace in the the room she recently redecorated as "the family computing room," I learned that their personal computers had always been either in the living room or on a small table in the dining room because there were always several people using them. The room that Sonya redecorated used to be the formal living room. It is directly to the side of the front door, off the main hall (with its spiral staircase) leading to the dining room, kichen, and sunken living room. Thus, this computer room is in the main passageway of the house. She says she redecorated this room so

that the children would have a computing place that was not in a dark corner of the house. It turned out, however, that her sons each have their own personal computers and say that they rarely use the "family computer room" because their mother is always using it.

In spite of her ready access to technical assistance and a work space of her own, Sonya finds that it can be very difficult for her to work in the context of household affairs and with none of the traditional boundaries of working at an office:

> It's not the positive thing I expected it to be. It's always there. You feel compelled to be working all the time. Except for running errands, I do nothing but work.
>
> I've also begun to resent the kids as intruders on my work. They come in and out and it's like I'm not working in this house. They want clean towels in the closet or they want dinner or a snack. When I travel,everything is fine. But when I'm here, everything reverts back to this role: I'm a housewife and mother. No matter how much work I have or they see me doing, it doesn't matter. They don't ever say, "Gee, if I put my dishes in the dishwasher, that would help."

Sonya and I discussed many aspects of her working at home, trying to sort out what, if anything, was unique to the experience of working with a personal computer, and what might have been simply a feature of meeting the pressures of a workday in the context of the household. One issue that had both positive and negative aspects is the fact that everyone in the house uses computers. This means that sometimes Sonya's computer is being used by someone else (there are three in the house, but often one of them is not functioning), and there have been times when someone will do something to one of her discs or printer that causes them to malfunction. She also feels that all of their lives now revolve around each other since she was able to reposition Dave in his new job and she has become a journalist.

> Now everything overlaps. I get acquisitions for Dave in the course of calling for information for an article. He makes contacts for me. Sometimes I feel like the boys are my press agents, and both Stewart and Daniel have written for the magazine.

Not only does Stewart rescue Sonya when she's having trouble with the computer, she also pays both of them, they say, to do some of her work for her. Sonya feels that she has become very tense and nervous since she began working with the personal computer.

> I don't sleep like a normal person anymore. I stay up until 3 A.M....I've almost stopped cooking....I smoke more when I'm on the computer. My scheduled breaks are work breaks. I say "I'll take a break and wash the dishes."

But Sonya explained that she has always been a person who needs to go outside of the house for relaxation. Home, she says, was never a place for to put her feet up.

> When I'm home, there is always something pulling at me, whether it's laundry or something else mundane. Some people can just put their feet up on the couch, but I just can't. My private time used to be a couple of hours before I went to bed to read and write letters, but I don't do that anymore.

When seventeen-year-old Stewart and fourteen-year-old Daniel came home from school, Sonya left the room so we could talk privately. Both boys felt that there were more interesting things to talk about in their household since their parents had begun doing microcomputer-related work. "We can share information, and relate to more things they talk about. It's more modern," Daniel said. But he also thought that what he called the "more hectic" household was due to his mother's using the PC.

> At first, when she didn't know much about the commands, or there was something she couldn't get working, she'd get real upset. While if she was doing some other kind of work, like if she missed a stitch knitting, she could change it herself. Whereas now, when something goes wrong, she doesn't feel like she can change it herself. She feels kind of tense that she can't make things work that she needs to.

Stewart is less concerned about how his mother feels. He likes being able to help her and to get paid for doing so. He thinks that the work opportunities, through his father as well, will help him in his career as a programmer.

> I used to go out somewhere if I wanted to have fun. Now I come home to have fun on my computer. I have my own little work station down the hall from my bedroom and I like it just like that. I used to work down here, but since my mom started spending more time on it, I don't anymore.

Daniel, who is three years younger than Stewart and likes to point out the ways they are different, also feels that there is something missing in their home since his mother began working there all the time. While they aren't the kind of family that used to go on picnics together, he said, he doesn't really like the way "there is so much electronics and machinery in the house."

> I like the old way of life, like "Little House on the Prairie" with a really close family and a housewife and all. Computers bring people together in some ways, but it's less home, too. Computers are everywhere now....You can't come home and find a place without computers anymore. I like nature a lot. I go into nature to get away from computers. I like the old life.

With that, he went outside to check on the maple sugar trees on their property that he was tapping.

Pam and Jack and Sarah

When a friend who knew about my research first told me about his neighbor Pam, he described her as a woman who had bought an IBM PC with the insurance money left to her and her two young children upon the death of her husband. My friend thought Pam might be working at home, but he knew that her 13-year-old son had quite a reputation in their apartment building for his computer wizardry and helpfulness, and that he had tutored several adults in their building when they first bought their computers.

When I first spoke to Pam, I learned that she had never used her PC for income-earning work at home: Though she had expected she would, she also bought the PC for her children and for "the future." I decided to interview Pam and her children because their household context represented a different kind of famiy life. Pam is the sole wage-earner of the family, and has none of the financial, emotional, or technical assistance women such as Sonya have, for example. Pam describes herself as someone who happens to feel relaxed around computers and who loves programming. I wanted to understand why her expectation that she would use her PC for working at home had not, in fact, been actualized.

Pam, her eight-year-old daughter, Sarah, and thirteen-year-old son, Jack, live in a small apartment at the northern-most tip of Manhattan near a beautiful park. The apartment has three very small bedrooms, a living room, and a kitchen. Like the other apartment houses lining the blocks, this building is a "low-rise" covered with ivy. Pam suggested that if I came shortly after she returned from work, there would be plenty of time for Sarah and Jack to talk with

me as well. At five-thirty, the park was still crowded with a heterogeneous group of children. Almost all of the older people seemed to be speaking German.

Pam brought me into their kitchen, where she and I talked for several hours, having told the children it was a private time. Later, Sarah and Jack joined us. Pam stayed, and they all continued to talk enthusiastically for several hours.

Background

Pam left college after two years (when she married) and describes herself as not very career-minded at that time. She started working at IBM in 1967 as an editor working on computer manuals. She was placed in the systems development division as an assistant editor for the PL 1 user manuals. Although she knew nothing about using the systems for which the manuals were instructional guides, Pam enjoyed her job and carried lasting feelings about IBM as a fine employer.

> When I started working at IBM, I was given responsibility, and no one was watching over my shoulder. I was treated completely differently from my previous employers. I really liked the work environment there.

After working for five years, she decided to quit when she became pregnant with her first child.

> I stayed home for the next eight years and bitched a lot about not having enough to do. I missed mostly having something challenging to do. I don't know why I waited so long.

She had remained in touch with some of the people she had worked with, and when her husband was diagnosed with cancer in 1979,

they helped Pam to begin working again, on a "freelance" basis, in her former department. For the next three years, Pam worked at home, part-time, as a technical editor. Although the texts she worked on were often about computers and programming documentation, she did not need any special equipment to do her work. She kept the dictionary in the kitchen, the typewriter in the living room, and worked at the same kitchen table where we were sitting. It is the only table in the house.

While Pam was working at home for those three years, although she found it "satisfying" to be working again, it was also very "chaotic." Not only was she working on the only table in the house, her work load was not predictable. When she had a job, she would work intensively, and then "sort of pick up the pieces after a job was done." She also got up at 4 A.M. because she found this to be the time when she was most alert and there were no interruptions.

Introduction to Microcomputers

The texts she worked on were changing as rapidly as the technology they documented, and working at home made it difficult for Pam to ask questions or receive help.

> In '67 I was an assistant editor for the PL 1 programming group. We used an automated text editor. I was editing user manuals then. The materials I worked on in 1979 were much more challenging, broader in scope, a much richer experience for me. I missed not having feedback, someone to talk to about it. You can call someone on the phone, but most times they're not there. In an environment where you can just bounce things off of people, it's not such a big deal to ask a question. I guess my lack of knowledge really began to bother me, too.

During this interval between 1979 and 1981, while she worked at home and her husband was at home and very ill, Pam began reading about technology and the changing economic scene. Megatrends and The World After Oil impressed her the most.

> ...unconsciously I was realizing I was becoming the bread-winner, and also that I could learn to understand what I was editing. I guess it was the announcement of the IBM PC and my feelings toward the company that led me to start reading up on it, and then to go to school in it. I took the Diploma Program in Computer Technology at NYU.

In spite of the difficulties Pam had experienced when she worked at home before, Pam was very excited about the prospect of being able to work at home as a programmer, something she thought would be possible with the purchase of a microcomputer and the acquisition of programming skills. In the training program she entered, two-thirds of the students were women, mostly school teachers trying to make a job change. Pam enjoyed their company and their good humor, and, to her surprise, she excelled in learning the programming languages.

> ...I feel comfortable with computers....You know, it's a more or less known quantity. I found that attractive. You are really in control. All you have to do is solve the problem. You can tell immediately whether your logic is good or bad by the results you get when you run your program.

Pam explained that it is the feedback you get from the computer that gave her the sense that she would be able to manage working at home.

> The thing I didn't like before was the lack of feedback. But with Sarah in school now, I thought I could deal with working at home if I was programming, because there's feedback there. It's from the computer.

Pam did not make a distinction between her interaction with the logic of the operating systems and the kind of feedback she would be

receiving from her manager or colleagues on a job. She had gained a sense of confidence about her skils, and imagined that if she purchased the IBM PC, it was bound to help her, one way or another. She now views this perspective as naive, and her computing skills as not strong enough to provide an income for her family. As Pam reflects about her purchase of the PC, she recalls the different reasons why she bought it, and why she now thinks that she made a good decision, even though it did not serve her expected purposes.

> I think that one of the reasons I purchased the computer was the freedom it offered me in terms of working in my own home. I thought that if I bought the computer, I'd have that extra edge...that I could turn it productively. Being self-employed was on my mind when I purchased the computer.
>
> I personally like programming. I consider it an interest, or a vocation now, not a marketable skill, because I don't think I'm good enough. Also, it's an educational tool for my children. It's better than the arcades and games. I know it's a wonderful teaching tool for my son.

As the sole support of her family, and with her level of skills, Pam decided she literally could not manage finding multiple clients and could no longer afford to work part-time with no benefits for one company. In spite of owning the tools of her new trade, Pam was relieved when, in 1982, she was hired back by IBM to work at her former job, at the same level she had left in 1972.

> Although the job I have now I pursued because of the stability it gives us, the benefits and all--the security is the issue--there's a big future to consider.

The Household Context of Computer Use

Two years after excelling in her programming course, purchasing a microcomputer, and being rehired by IBM, Pam found no opportunity to be using her computational skills or equipment. It was not

until one of her children began saying that she never even sits down at their computer that Pam volunteered:

> Well, I haven't really started to use it yet. I anticipate I'll be using it, but not yet. At work I have software and a terminal that connects to a mainframe, but not a PC. I'm learning a system now that is a means of sending electronic mail. To learn the conventions, you have to take time away from your regular job and it's really the same as when I'm at home. If I were spending time on it while I am at home, I would be feeling guilty for not taking care of, oh, you know, everything else.

For Pam, there is no place from which to steal the time to continue to develop computer-related skills.

The PC is now in her son, Jack's, room, where it was placed after he began teaching himself to program at age eleven with only the help of manuals. Since they bought a color adapter for the monitor, Jack no longer plays outside but comes directly home to play with the computer. At age thirteen, he has begun tutoring some of the neighbors who live in their apartment building.

At the time I visited them, the computer was being repaired. Jack and Sarah explained that eveyday someone said "I miss the computer." Jack says he just goes in his room and lies on his bed now since the computer isn't here. Usually, Sarah doesn't have much of a chance to use the computer, between her mother warning her not to break it and Jack using it all the time. Sarah is glad that Jack comes home and is in the house with her after school now. But she lets me know that when someone is busy at the computer, they are in a private world:

> Before, whenever I looked around and one person wasn't there, it was because they were in the bathroom. Now it's because they are at the computer.

Pam is very proud of Jack. She is not worried about the quantity of time he is spending alone or his emotional attachment to the computer. She is also proud of herself for bringing a computer into their home: a computer that she believes will provide for her children, if not for herself, added earning potential.

Three Households that Purchased Microcomputers for Income-Earning Work

Bob

Bob was recommended to me by one of the people I interviewed. He was described as a professional writer who became a computer hobbyist. The woman who recommended Bob didn't know him but had heard him speak at a writers' union meeting. Bob had volunteered to speak on a panel that the union sponsored for writers who were thinking about whether or not to make the switch to personal computers. Bob had explained the benefits of micros for writers.

I decided to interview Bob because he was unlike the others I had interviewed: He had worked at home all his life. Also, unlike the other men interviewed, he had no background in engineering or computers. As a writer, with a Ph.D. in English, Bob had never been interested in computers prior to 1982, when he purchased his Apple II solely for the word-processing capability to help him produce finished manuscripts more quickly.

I spent an evening with Bob and his wife, Sally, in the summer of 1984 in their spacious, antique-filled living room on the upper West Side of Manhattan. The apartment they own is on the sixteenth floor and looks out on a wide avenue solid with apartment buildings of similar stature, each with its own canopy and doorman.

Background

Bob and Sally are in their mid-forties and have lived together in this neighborhood since they were graduated from Columbia University. Sally was an undergraduate while Bob was working on his doctorate in English, and today she is a full-time homemaker and mother. They have two sons, ages six and ten, who were sleeping at the time of the interview.

When I arrived at their apartment, Bob was on the telephone, and Sally and I began talking before Bob joined us. Sally showed me around their apartment. Bob's office is a room that opens into both the kitchen and their dining room. Originally intended as a dining room, this space had been redesigned by the previous tenant as a psychotherapy office. In this apartment, the dining room, with its big table, is the central gathering place, and has side tables with magazines and books on them. In addition to children's notebooks and games throughout the room, a very large and sophisticated printer sits in this space, connected to Bob's computer, which is in the next room so that the noise of the printing does not disturb him when he is writing. When I visited, the printer was clacking throughout the evening.

Introduction to Microcomputers

Bob explained that his introduction to microcomputers began through his IBM 75, which is a typewriter with a memory of about 12 pages but no storage capacity. With this device, Bob was able to make changes in copy and not retype his drafts. When he was hired to work as a writer for a television series, Bob decided to purchase the

Apple II so that he could keep up with the considerably faster pace of writing for a weekly television serial. He taught himself word-processing over the weekend. He admits, "It was very intense."

> ...I was hired to work on a one-hour dramatic show and was under incredible pressure. I was hired on a Wednesday night for a show that had to start shooting on the following Monday, and the cast needed the script by the weekend. I bought the computer that Saturday, and learned how to work with it within the weekend. It was very intense, I must say. The whole schedule was extremely rigorous. The first dozen weeks, I was going to have to work like crazy. In fact, there would have been several points where we wouldn't have made it if we were working on a typewriter.

When I asked Bob if he remembers when he first started thinking about computers, he said no.

> The typing service I used had a dedicated word-processor. When I brought my manuscripts to them, I saw how they used their disks to make the revisions. I was spending about $3,000 a year for typing and xeroxing.
>
> In fact, when I bought this Apple, I didn't think of it as a computer at all. I thought of it strictly as a word-processor. I simply thought of it as a fancy typewriter. What was liberating was to realize that the printer could be off somewhere else...and also that there's nothing between you and the writing, not the physical process of having all these scraps of paper, the discarded material. If you want to insert a scene or some dialogue, you can easily do it. Compared to this, writing on a typewriter is like carving into stone.

Bob recovered his costs within about a year. He placed his personal computer on his desk in the same place as his typewriter had been, and he made no other changes in his office or in his process. But after the television show ended, he felt that he wanted to take a break from what he'd been doing.

> After the show ended, I didn't want to write for a while. I wanted to take a couple of months off. Then it dawned on me that I've got this computer and it can compute, and I've just been using it as a typewriter. I'm in a baseball league, and I thought: There's someone sitting there keeping track of all these numbers, counting it all up. I thought, "I bet I could write a program that would do all that for us." After all,

that's what computers are for.

> So I got out the BASIC manual. I thought it would be much easier than it was. I learned the hard way. I'd write a subroutine in 40 lines of code and then find out there was a command to do it. The same thing had happened with WordStar [the word-processing program he was using]. When you first read the manual, you don't understand everything. It just goes over your head. But I got in the habit, from time to time, of looking through it again. Now I say--oh, that's waht that is about--there's a command for something I've been doing the long way.... The same thing happened with the first program I wrote....I became very obsessive and it took me three months of work!

Being the statistician for the league and using the program he wrote for it is taking Bob more time than he ever imagined. During the season, he now spends at least ten hours a week figuring out the statistics on 20 leagues. But this is only one of the ways that he has been using his personal computer "as a computer" rather than as a memory typewriter. Bob kept explaining to me that this expanded use of his PC was not just a function of its capacities: It was a reflection of his nature to keep trying himself out in new domains, his desire to continually tackle whole new areas and master them. He explained this by telling his work history as a series of leaps into what looked like new areas but that he actually treated as similar kinds of tasks.

> This may sound strange to you, but there are some principles of my career. You see, my first book was my dissertation on Carlyle, very scholarly and intense. My second was a novel about cops. It was made into a T.V. movie. And when I got into screen-writing, everyone said, "Oh, but he's a novelist." And when I did a "sit-com" people said, "He can't do dramatic stuff, he's a screen-writer." I view my writing as a craftsman. Writing is writing no matter what it is. And in a sense, computing is just like that, too. I look at it as a kind of writing. You're trying to communicate with an audience of one--the machine. But you've got to communicate to it what you want it to do. I look at the chapters I write as strategic things. I create certain effects, feelings....It's similar. I really believe in the structure of the English language. It's a lot more rigid than people often realize.

Household Context of Computing

Bob feels that his involvement in computing is not only consistent with his love of writing, but also is simply characteristic of his life-long habit of working at home on self-generated projects. For instance, when he explained that he isn't disturbed by the children because he can always stay up late and write, I asked him if he tended to use the night for quiet work time.

> Yeah, I always used the night for that. In the dormitory in college, when I found the kids intrusive, I used to sleep every other night. I liked to work when no one else was there. There was a room where we had our desks, and a room with our beds, so it was possible.

Neither Sally nor their two sons use the computer. Bob says the boys seemed interested when he showed them how to load WordStar but never asked to use it again. When I asked Sally if she was interested in using it, Bob answered for her:

> I think she sees it as a typewriter, a work-saving typewriter because it allows you to correct and manage easier, that's it.

I asked if other household members might use it more if it were, for instance, in the dining room, or not being used by Bob all the time. They thought this was not an issue.

Sally had been knitting all the time we were talking, and several of her sweaters were lying on the floor and couch being blocked. I asked her if she had ever considered using the computer to help lay out the patterns or the designs for her sweaters. She replied:

> We don't have a graphics adapter. When Bob wanted graphics for a game for the kids, he wrote a program for it. He prefers it that way. I would be more likely to buy a program and use it for that. If we had a machine with those capabilities, I would use it for that. But I'm not interested in exploring the machine itself and getting into it.

Sally makes many things for her family, and she showed me the glass jars of jellies she prepares. Unlike Bob, she does not want to get involved in the abstract process of learning to write her own programs in order to make use of the computer. She doesn't want to make her tools, she just wants to use them.

Bob is enthusiastic about the flexibility he feels in his life. He feels he is able to move between his two roles as professional writer and father because he is working at home, and because they live in an apartment that supports this role transition.

> I can go into the kitchen and get coffee whenever I want and the whole family can go anywhere without going through my office. It's very good for me. I know people who write who rent offices. I wouldn't like that. I like the convenience of being able to work whenever I feel like it, and I also like being near the family, especially with the kids: If something happens, I can come out and join it. One of the great advantages of having kids and being a writer is that you don't have to go to work and come home when they're ready for bedtime.

Although Sally does not use the microcomputer that is in her home, she feels that it has changed her life because it has changed the time Bob spends at his desk. When we spoke before Bob came into the room, she explained that since their college days together, Bob had been writing full-time at home. While he has always been intensely involved in his different writing projects, he has also been in the habit of taking breaks with her or with the whole family. After he started using the microcomputer, his routine changed, and he began taking his breaks <u>at the computer</u>.

Joseph and Diane

I located Joseph and Diane by inquiring among friends and colleagues if they knew people who purchased a microcomputer in the 1980s for the express purpose of becoming self-employed and working at home. I was interested in talking to someome who had neither worked at home before, nor had been self-employed. Joseph was recommended to me as a computer systems analyst who had been dissatisfied with his job and longed to work on his own. He had purchased a micro to do just that in 1982.

When I interviewed them during the summer of 1984, neither Diane nor Joseph were working full-time at home, though both of them were spending a good part of their week at their two computer terminals. Joseph, Diane, and their five-year-old daughter, Susan, occupy the basement level and first floor of a brownstone in a heterogeneous Brooklyn neighborhood. When I arrived, Joseph and I sat and talked at the big oak table in their "eat-in" kitchen. Later in the evening, Diane joined us. Several times during the evening their daughter awoke and Diane went upstairs.

Background and Introduction to Microcomputers

When I first spoke with Joseph, he had already shifted from working full-time at home to holding a full-time office job as a systems analyst. In addition, he was moonlighting at night and on weekends to keep the clients he began working with during the year he tried, unsucessfully, to start his own business. Like Sol, Joseph has a degree in engineering.

> Prior to my decision to purchase a computer in 1981, I'd been in the [computer] business for about ten years. Because I was between jobs and a friend suggested that we could design a software package and use it for business as well as sell it, I decided to buy a Radio Shack Model II. It came with the operating system and BASIC. I've written all my own programs except a word-processing program, which we purchased.

I asked Joseph if he imagined, when he bought his personal computer, that his wife, Diane (who was, at that time, writing her dissertation and teaching part-time), or five-year-old Susan might use it. He said:

> No. In no way did I think Diane would use it, or Susan. I wanted to set up my own business. The Radio Shack has no graphic capability. I bought it as a business machine.

Although Joseph had been "in the business" for many years, in many ways the microcomputer took him by surprise. It was a pleasant surprise that gave him, he says, a sense of "other options" when he was very dissatisfied with the job he had been doing.

> Micros opened me up to new ideas. You know, they've become increasingly powerful over the last five years. Prior to 1981, they didn't have the capabilities, so they didn't interest me. I would read the specs on them and think, "Baloney, that's not the kind of computer I want to work on." Whereas today...time-sharing doesn't make sense anymore. I realize how great a change in technology there can be. I think I am not as closed-minded in other ways as well. I think realizing that has really changed me.

Joseph spent eighteen months trying to generate his own business. He has continued working with most of those clients at night and on the weekends even though he had to resume a full-time job outside of the house to "make ends meet." Although Joseph calls himself a consultant, he does many different kinds of jobs. This work is typically referred to as "small service bureau" work. Joseph says:

> I service people's needs. I run billing programs, mailing list programs. I set them up and run them on this computer.

He also takes on consulting jobs with people who own micro-computers.

> I answer ads in the paper that say things like: "Apple IIE--can't make it work." Now I don't know the IIE but I know computers, so I call and meet with them. People don't know how to make the software that they have work for them.
>
> These are mostly small businesses, I also have one union. They will spend 20% of their hardware cost on my services to set it up properly....My thought was that if I could get enough of these clients, and get some consulting jobs along with it, then I could become independent.

Joseph's goals in working at home as an independent contractor are centered on the benefits of being his own boss, and being able to have time for non-work activities. He reasons that because he is not ambitious, and his aspirations are modest, he should have been able to succeed.

> I'm not looking to make hundreds of thousands of dollars. I'm just looking to take off some Thursday or Friday afternoons and take Diane and Susan to the Botanical Gardens.

This was not the basis on which a new business was able to succeed for Joseph. Unlike many of his peers, Joseph describes himself as not particularly enchanted with computers and less swept up in the process of realizing their undeveloped potentials. Joseph tends to view each computing system in terms of its limits. What he enjoys doing is demystifying computers for people, and making sure that they serve an intended need.

> The people I work with all think they're going to write a software package and retire. They used to buy Lotto tickets. They buy microcomputers because they think there will be a share for them in the market and because they like what they can make them do. I never felt that way. I liked them because they are like puzzles. By solving the puzzle, I felt better about myself, but I never felt it was magical. My background is in systems analysis, and in the language of systems analysis, you have a problem first, and then you find a solution to it. When I read all these software ads, I read them quickly and I usually think "That's bullshit!" People are being sold a bill of goods because they don't know the questions to ask. I think the reliance on computers, the thought that they are trustworthy and unfallible is a dangerous thing.

Although Joseph had never done income-earning work at home, he explained to me that there was nothing strange for him about working at home, and that he had always thought of home as a kind of workplace.

> Before when I came home, there was always something else to do. Always someone saying: "Windows need cleaning" or "Floor needs washing." There's always been work in the house.

Joseph and Diane are not a traditional couple, in the sense that he shares in the household work and childcare, and that Diane's career development has been a significant aspect of their family life. Joseph's working at home only slightly changed this pattern. Given the new flexibility in his schedule at that time, he absorbed more of the childcare responsibilties. Diane says:

> The year Joseph was home, it was so much less pressure. He was happier, much happier. We had a more flexible schedule, alternating picking Susan up at school. It gave me longer to work. I loved it, having lunch with him, and it gave me a much more flexible childcare schedule.

During that year, Joseph also taught Diane how to use the word-processing program in order to help speed the process of editing and completing her dissertation. She was in the process of editing down a 450-page document to 150 pages, and he felt that using a word-

processor would help her.

> We spent two to three weeks, every morning for three or four hours initially, to overcome the fear. Diane had a tremendous fear of the computer. She was frightened to hell of the thing. It took her about a year to get comfortable with it.

When I asked Diane to describe her introduction to computers and her experience of using it for her dissertation, she said:

> When he first got [the microcomputer], I never imagined I would use it. It was just "a thing," just another tool of his in the house. It was in the living room, but I'm not a person who cares about a disruption in the living room. What I care about is the disruption of my study.
>
> I didn't know what to do. I was going crazy [with my dissertation....Joseph thought it would help me make revisions, so I thought I would try....At first I still worked on the typewriter...and then transferred something I had figured out onto the machine. That wasn't really necessary.
>
> Subsequently I worked directly on the machine, but there were also many problems with that. Like losing your data--which doesn't happen with the typewriter. One time, at the end of a chapter, I meant to press the "copy" button but I pressed "delete" instead. I had to reconstruct a whole chapter it had taken all summer to write. It was one thing after another. But it still saved me time. I'm still terrified of it. I really do hate it. If it didn't help me so much in not having to type things over and over again, I would never use it.

Household Context of Computer Use

Because Diane's study occupied the extra bedroom, and she did not want to move from it or share it when Joseph began working at home, he made a desk in their living room. His desk faces the wall that opens into their kitchen. There is no door to the kitchen, and their entry hall opens into the living room. Joseph's work space is essentially in the main corridor to the kitchen and is the center of family and social life. Although Joseph never suggested to me that there were any problems with the fact that his work environment was

open to the entire household's activities, he attributed his business failure, in part, to his inability to concentrate at home. His discussion of this focused on his relationship with Diane, who was home while he was working.

> We hadn't had so much contact with each other for a long time. We began to rub up against each other. They were not positive changes. For the most part, there were conflicts about space. Here I am hanging around the house and Diane had never seen me here for eight years. She was upstairs and I was down here, but we knew the other was close by. We would interrupt each other. If I got a phone call, she would want to know if it was a client. And because she had her own work to do, it became quite a problem.

When I tried to understand whether this problem could have been solved with the help of a private office in the house, closed doors, etc., Joseph insisted the problems were within him, not outside him.

> Diane and I like each other, have needs for each other. So, just knowing she is there, you know, I could easily look at a problem and say "The hell with this," and make a pot of tea and then say "I need company for tea." So it just wouldn't work.

Although Diane says that she loved it when Joseph worked at home, he says that if his moonlighting takes off, he will rent an office--outside the house--next time.

Ann

My interview with Ann differs from the others in this study. It occurred after a long search to locate someone who had participated in a telecommuting work experiment, and it occurred through several taped phone conversations rather than an at-home visit.

The search involved a day's visit with the man who was Director of Education at IBM during the 1970s, and an interview with the former president of F-International' s U.S. division, Height's Limited, a company that supplied skilled computer programmers to companies that wanted to hire part-time, at-home workers. Although this company had gone out of business in 1984 as a result of the lack of clients, he introduced me to a woman he said had "pioneered telecommuting." Ann's story is only briefly about telecommuting, however.

Background and Introduction to Computers

> When I first started work in 1967, I had no training in computers. I was a psych major and then I got a Masters in Education. I rebelled from that, though. I just didn't like it at all, and I wanted something opposite. Computers are very concrete. Without any background you could get hired in those days. The first four to six months was training. I was hired as a programmer. But they saw education in my background, so I was involved in setting up training programs for IBM employees. It wasn't anything I expected to be doing. I thought I would be programming.

By 1972, Ann was involved in a computer-based training program that IBM had just introduced for people to use for developing training materials. Ann had just written a user manual and a demo for this system when she became pregnant. She remembers thinking:

> This would be very easy to do remotely. The user manual involved using a programming system on a computer, so I could just sit down at the computer, learn exactly what I needed to do, and write the manual for it. It wasn't anything I needed to go anyplace else to do.

Ann was able to convince her management to allow her to work at home. They installed a terminal and special phone lines, and she began working full-time from the terminal they initially put in her bedroom.

> I remember the biggest problem getting into it was a sense of isolation and not being able to communicate with people I was working with. That's since gone away, but at that time everything was different. I had just had my first child and kind of worked when I could, probably about 30 hours a week. But it was difficult because I was getting paid for a full-time job and I really didn't have that much time. Everytime I sat down to read the newspaper, I felt guilty. It was tough to just manage everything. And that, in fact, is the reason I left IBM nine months later. I still wanted to do it, but IBM wouldn't make a provision for part-time work.

Even though Ann was willing to work with no employee benefits or employer Social Security contribution, her employer was not willing to maintain her employee status as a part-time worker without benefits. While there had been no trouble setting up a work-at-home arrangement, no employee was allowed to work part-time. As a result, she quit and began working on a consultant basis, initially just for IBM, using their computer equipment and a telephone line.

In 1978, Ann bought one of the first preassembled microcomputers and began seeking clients other than her former employer. She found work in training and data management among the many small and mid-size firms that began purchasing mini- and microcomputers. She built up this business to the point where her husband, Harry, quit his full-time job with a high-technology corporation in 1981 and

incorporated the business they continue to run out of their large colonial house in suburban Connecticut.

Household Context of Computer-based Work

When Ann first began working at home, she had made no definite arrangements about where she would do her work.

> We happened to put the terminal in the bedroom, and when I sat to write something, I just sat down at the dining room table. Now it's different. We've moved, I have more room, and my husband and I have separate offices.

Because her work involved designing training programs as well as writing documentation and computer programs, Ann only sat at her computer terminal when she was writing in computer code.

> Sometimes I work at the kitchen table, sometimes I spread out in the living room, which is a very low traffic room. Sometimes I'm in my office. What I'm doing determines much more of where I am going to be rather than the fact that I'm working. When I say that I'm going to do some work, I don't necessarily go someplace to do it. If I'm going to type a report, I go upstairs to the typewriter. If it's programming, you don't have a choice of where to sit. You sit at the computer and do it.

When Ann began working at home, she had a newborn baby. Finding blocks of time was her primary objective.

> Sometimes,I'd get interrupted and there was nothing I could do about it....Nap time was great, that was a good two hours when you knew you could get work done. When they were very little, it's easier because they sleep a lot. Then kindegarten is wonderful.

On the rare occasions that Ann had a baby-sitter, she felt it didn't matter because, if there was a problem, the children always came to her anyway. In contrast, when Harry began working at home as well, Ann felt relieved of the sole responsibility for the childcare.

Ann and Harry have separate offices in their home. His is in the basement and hers is in an upstairs bedroom. However, Ann explained, she continued her habit of working in her office only when she had programming work to do. Not being "tied to that particular desk and chair" was one of the reasons she liked the kind of job she had and working at home.

I asked Ann whether her children play or study in the same room she is working in, since she does not always work at her desk. She explained that her eight-year-old daughter often plays near where she is working. But over the twelve years she has worked at home, the pattern she has evolved is one of maintaining a temporal separation between her different worlds.

> When I'm really working on something, I prefer not having people go in and out, and there are times when I say, "Don't come in because I really have to concentrate now." And when I'm concentrating, I don't even really notice....To have come in doesn't really happen a lot. I'd rather not have them there, so I tend to either work, or be with them. Sometimes I work in the living room for that purpose. The living room is not a heavy traffic room...people tend to go elsewhere.

When Harry has work to do, he just goes downstairs to the basement. The children never go downstairs to the basement, and he doesn't work upstairs unless he brings a stack of journals or manuals to read and leaves them on the couch by the television to look through (as she does) while watching T.V. with their children.

Now that Harry works at home, they share childcare responsibilities. It depends entirely on each of their schedules as to whc might take their children to a doctor's appointment, for instance.

> The big difference isn't in managing the home. It is in the taking care of kids. That's where the biggest change is. Both of us are working, and working flexibly. So, it's not that it's either his job or my job, but if one of the kids nees to go to the doctor, it's who ever is available. Like today, I was away all day, so it was Harry who got the kids to camp and picked them up and all. Oh, and if I make arrangements for dinner, when I'm not going to be here, he'll make it. But, it's still pretty much weighted in my direction. That's consistent with the past.

Housework remains unchanged. Ann thinks that the principle about housework for women working at home is really one of disciplining oneself not to see it.

> You have to learn that if there's something that needs to be done, you just have to do it. You have to discipline yourself and not be distracted by the flowers in the garden or the dishes in the sink. And on the other end, there is the danger of working too much because it's always there. It can interfere with your general life and that's not good. The work is always here for the kids, too. It can be hard for them to understand that when we're working, we're here but not here.

CHAPTER FIVE

INTERPRETING HISTORIES OF MICROCOMPUTER HOME-USE

This chapter is devoted to an environmental analysis of the household histories summarized in Chapter Four. The "environmental approach" (see pages 4-10) of this analysis assumes the importance of the social context and physical surroundings in which human experience and action takes place. It does not assume that computers are acting as independent forces for change in neutral settings; but rather that the uses of microcomputers in households and among individuals are supported and limited in a number of ways. However, we do not know what aspects of this environmental context are meaningfully related to the original intentions or the evolution of computer use at home. In short, we have no concrete notions of what shape such meaningful interconnections might take.

Interviews were conducted for the purpose of discovering what might be meaningfully related to the evolution of computer use within a household. One can easily imagine that looking for relationships could lead a researcher to "discover" inter-connections that don't exist. The goal of this study was not, however, to determine which variables best predict the evolution of computer uses within the population of households that purchased micros. Rather, the intention of this exploratory inquiry was to begin to articulate

which aspects of the environment individuals perceive as meaningful in the evolution of computer use in their household, and to direct attention toward those inter-relationships that might be investigated in more systematic research.

To examine the environmental context in which microcomputer use evolved in particular households, it is helpful to shift from media categories into categories that describe particular intentions and realities. Some households that purchased a microcomputer for what they (and the media) called "hobby" or "family" reasons in the 1970s did so to explore its potential, while other households purchased a "family computer" in the 1980s with stronger expectations of what it could do for them. For example, Sol and Dave purchased micros in the 1970s to explore their potential. Pam purchased a microcomputer as a resource for her family and with the intention of using it for self-employment. With more skills than Pam, but no experience working independently, Joseph bought a microcomputer (also in 1981) to start a home-based business. When Ann (in 1978) and Bob (in 1982) purchased microcomputers, they had each been successfully self-employed for over a decade. They were not expecting microcomputers to transform their work lives: They were simply upgrading the tools of their trade.

The following list summarizes the original purposes for purchasing a micro.

I. EXPLORATION: Individuals with computing backgrounds who purchased a micro in the 1970s with the intention of exploring these new devices.

> Sol and Dave purchased computers without any clear intentions. They both had engineering backgrounds and jobs in computer fields. Although Sol was clearly an electronics hobbyist, and Dave liked to buy any new electrical device (without the same passion for exploring it), they represent those that purchased micros because of interest in their intrinsic qualities.

II. BECOMING SELF-EMPLOYED: Individuals with computing backgrounds who purchased a micro with the hope of using their skills and these tools as independent contractors.

> Although Joseph had been trained in engineering and had worked as a systems analyst for ten years, when he purchased his microcomputer in 1981, he had a hope similar to Pam's. Both wanted to use a microcomputer at home to have more control over their lives by being able to be self-employed and work at a flexible schedule.

III. UPGRADING TOOLS BY PROFESSIONALS WHO WORK AT HOME: Individuals who had been working at home for years and purchased a microcomputer to replace and upgrade equipment with no intention of changing their professional practice.

> When Ann bought an Apple II in 1978, she had been a computer professional working at home for five years. She simply replaced the terminal she had borrowed from her client. When Bob purchased his Apple IIE in 1982, he was replacing his memory typewriter with one with an expanded capability. They both placed these machines literally in the exact same location and home-office environment.

These new clusters reflect a beginning point but not the process that developed over time. The evolution of microcomputer use within the households interviewed had many unexpected turns. A summary of the shifts between initial expectations and emerging patterns of use can be seen in the following chart.

PHASE ONE

Ia. EXPLORATION

Sol, an electronics hobbyist, engineer, and inventor taught himself to take apart software packages and program

Dave, an engineer, likes devices. He bought a micro to explore and for the educational value it would have for his sons.

IIa. STARTING a HOME-BASED BUSINESS

Joseph had been a computer systems analyst for 10 years. when he tried to start his own consulting service to clients who purchased micros for business purposes.

Pam worked as a technical editor until 1981, when she decided to learn program ming in a retraining program. She purchased a microcomputer to provide herself with more flexible work and economic security and her children with an edge on the skills they would need for a secure future.

IIIa. ENHANCING TOOLS for SELF-EMPLOYED PROFESSIONALS

Ann bought an Apple II in 1978 to replace the computer terminal she had borrowed from her client during the previous five years while she was working at home designing software training programs.

Bob is a professional writer who bought a micro in 1982 to replace his memory typewriter with an expanded capability and the convenience of printer.

PHASE TWO

Ib. SELF-EMPLOYMENT

Sol's employer reorganized and he began his own software business at home in his workshop.

Dave taught Sonya word-processing so that she could start a typing business. She later began to write and sell articles to magazines.

IIb. OFFICE and HOME WORK

Joseph's home business failed. Now he's in the office all day and moonlights at home. He taught Diane word-processing, which she uses constantly.

Pam took a full-time editing job at IBM in order to get employee benefits and security. She found no chance to use her programming skills at home or at work. Now, her 13-year-old son spends all his free time at the PC and tutors neighbors.

IIIb. EXPANDING BUSINESS and DESK TIME

In 1982, Ann's husband quit working at IBM and joined her business. Now they both have offices in their home and run an expanding data-processing consulting business.

When Bob finished the writing project he bought the micro for, he taught himself BASIC and became a hobbyist.

By tracing the evolution of uses (the changes from the first column to the second column), it is clear that the direction of change was not similar even for people who appear to begin from similar points. Some who began with exploratory interests moved on through entrepreneurship, and some who started with word-processing became exploratory hobbyists. The purpose of this analysis is to examine underlying relationships in this evolution that individuals identify as meaningful, and to understand them as part of the social process and physical context in which new technologies are integrated. Toward that end, this chapter focuses on three broad sets of environmental relationships that were explored in the interviews.

Part One focuses on the autobiographical aspects of individuals' relationships with microcomputers. It considers the difference that a background in computing makes in the approach individuals take to learning and earning with computers at home. Individuals in this study have widely different levels of familiarity with computers, as well as widely different levels of awareness of, or interest in, the commercial introduction of microcomputers. The autobiographical issue of "computing backgrounds" is taken as a method of focusing on individuals approaches to learning, and to the microcomputer as a multi-purpose device that can be explored and used to "build with" and "think with" as well as a pragmatic tool for different types of information processing.

Part Two analyzes the role that the immediate physical, social environment plays in the developmental process that occurred among men, women, boys, and girls. It identifies the particular environmental context in which the evolution of computer uses have been situated in households.

Throughout this chapter, the interview material presented in Chapter Four will be excerpted or presented in more detail to illustrate the analysis.

Part One

The Evolution of Microcomputer Uses

In response to the opening question, "What was your introduction to microcomputers?", a wide range of situations, backgrounds, and considerations were mentioned. "Introduction" to microcomputers is actually a complex process that is quite varied among individuals. The process may actually begin long before ever purchasing or using a microcomputer and, in every case, extends long after it. Part One considers how computing experience, and an orientation toward computing micros is related to the development of microcomputer uses. The interviewees are divided into groups of women, men, and children with and without computing backgrounds

Individuals who described themselves as having a background in computers had among them the following experience:

- college degrees in electrical engineering
- writing for an electrical design journal
- on-the-job-training in computer programming
- working as a computer systems analyst
- being an employee of IBM who did not work directly with computers
- night-school training in programming

Those with no formal training in computing had among them the following occupations:

- professional writer
- primary-school teacher
- graduate student in a humanities field
- full-time homemaker
- being a child

Two Men with Computer Background Prior to Microcomputers

Initial responses to the first small computers by two men with identical engineering training in college were nearly opposite. A closer look at Sol and Joseph's initial responses to the announcement of the first preassembled microcomputers suggests some of the individual characteristics that enter into the ways that two engineers who had worked in computer industries perceived the first computer they could afford to purchase for home-use.

For Sol, no matter how crude the first microcomputer was, having a computer in his basement workshop was a door to new possibilities swinging open.

> As the news editor [of an electrical design magazine], I was following the developments in the microprocessor and minicomputer industry when I discovered...the Apple I. I had seen this one-page advertisement for a microcomputer with an assembled board with everything on it....This was unheard of; at that time, everything else was a kit. It was a real breakthrough. This was the end of '75, maybe '76.

Sol said he didn't really know why he sent away for the Apple I, but once it arrived he kept finding things he wanted to do with it. While it was too unsophisticated a machine for which to develop engineering applications, initially, he thought, "there are plenty of games to develop for it." But rather than developing games, Sol spent those first few years learning and exploring with the computer. He was exploring the intricacies and capacities of a computer about which he couldn't have learned anything in engineering school.

> I'd go over and turn it on. What I wanted was to learn machine or programming language....I kept getting interested in the way things were protected....I would examine programs....I learned you could load it in differently by taking it apart, which is what I did. That's how I taught myself assembly programming language, by examining what other people had done and why.

Although Sol's introduction to microcomputers was preceded by his training and work experience with mainframe computers, the way that he approached the first assembled micros had more to do with his life-time love of electronics hobbying.

> I was always a hobbyist, always working on things....Computers were an extension of my electronics hobby. Here I was building another thing.

With a microcomputer in his basement workshop, Sol began spending his discretionary time figuring out the problems that computer hardware designers had solved in a particular way. He was teaching himself what the problems were by taking apart the solutions.

Joseph also had a degree in engineering. His description of his introduction to microcomputers emphasizes the difference between Sol's tinkering, self-teaching style and his own quite different approach to using microcomputers for their computational power to solve problems rather than discover them.

Joseph did not identify with his colleagues who bought the first microcomputers. He says that they bought the early microcomputers "because they like computers and what they can make them do." He explained:

> I never felt that way. I liked them because they are like puzzles. By solving the puzzle, I felt better about myself.... My background is in systems analysis. In the language of systems analysis, you have a problem first, and then you find a solution to it. When I read all these software ads, I read them quickly and I usually think, "That's bullshit. People are being sold a bill of goods because they don't know the questions to ask."

For Joseph, the unsophisticated aspects of the early micros were not challenges to figure out, nor were they an inspiration to devise a more refined system. Having worked as a computer systems analyst for ten years, Joseph explained:

> Prior to 1981, [microcomputers] didn't have the capabilities, so they didn't interest me. I would read the specs on them and think, "Baloney, that's not the kind of computer I want to work on."

As microcomputers became more powerful and also more popular, Joseph began to change his mind about what microcomputers might do for him. It was not until he thought that high-level computational power could be purchased in these small packages, at affordable prices, that Joseph became interested in microcomputers. After a friend suggested to him that they could write a business software package, sell it, and use it for a consulting business, Joseph began to see that he could apply his computing skills to the increasingly more powerful microcomputers, and market his expertise to the expanding range of small businesses that were now purchasing a computer for the first time.

> My thought was, "If I could get enough of these clients, and some consulting jobs along with it, then I could become independent. I'm not looking to make hundreds of thousands of dollars. I'm just looking to take off some Thursday or Friday afternoons and take Diane and Susan to the Botanical Gardens.

Joseph also recalled during our discussion that his first awareness of "what a powerful little machine" the microcomputer had become by 1981 was accompanied by a sense of personal expansiveness and openness to new possibilities.

> I feel that these computers certainly do have a place....I realize how great a change in technology there can be. I think I am not as close-minded in other ways as well. I think realizing that has really changed me.

The sense of new possibilities, discovered through microcomputers, is a thread that is woven through every respondent's story. It isn't something that occurs in the same way for each person interviewed. Joseph's perception, that he became "less close-minded in other ways" after realizing "how great a change in technology" microcomputers represent, is a "kind of difference" no one else mentions. It is a powerful comment on the role of microcomputers in his personal development. It is, also, a self-awareness that has not "rose-colored" the lens he uses to view microcomputers. It is, nonetheless, the way he marks the difference between his disregard for these machines and his introduction to them.

Reflecting on the stories that Sol and Joseph tell, it is possible to see that familiarity with mainframe computers from college and computer industry employment was only one aspect of the "background" that influenced how these two men perceived the first micros. While Sol was intrigued with "what a microcomputer can do" and with mastering the languages and design of software, Joseph did not become interested until he recognized "what a microcomputer can do for me." He engaged with a microcomputer to solve problems, not discover them, and viewed micros as <u>means</u> of production, not as ends in themselves. He articulated this, again, in a slightly different way, when I asked him whether he ever talked to friends or colleagues about microcomputers:

> No. I talk about my business. Computers are a tool to do a task. It's like the guys who talk about their car that has stereophonic sound and a sun roof....My car gets me where I'm going and that's my attitude.

The business Joseph spent eighteen months trying to generate involved solving the problems of small businesses. In some cases he provided computerized billing or mailing lists for organizations that did not have the capacity to maintain these services, and in other cases he worked with people on using their new equipment to meet their needs. Joseph likes to demystify computers and help people solve problems with them. "People don't know how to make the software that they have work for them." His pragmatic systems approach to computers formed his business plan. It also led him to spend considerable time teaching his wife, Diane, how to do word-processing.

While Joseph enjoyed using his computers to solve the problems of his clients (as well as his wife), this approach did not help him solve his own work dilemma. Joseph's home-based business failed: Today he works a forty-hour-week in an office. He moonlights at night and on weekends in order to keep some of his clients and keep building a business that might permit him, in the future, to quit his office job and have a life with more flexible discretionary time.

Sol has, theoretically, achieved the flexibility of a person who is his own boss, although he uses his time much the same way he did before he began working full-time out of his basement.

> The only thing is that I've got more flexibility during my day if I want to go somewhere and do something. I don't have to be concerned about getting to work on time. I start earlier and stay later.

What Sol enjoys about his "flexibility" is the ability to work for uninterrupted periods of time. What Joseph wanted from his "flexibility" was the option to stop working on a beautiful day to take a picnic with his family.

Two Women with Computing Backgrounds

The two women in this study who described their introduction to microcomputers through a history of involvement with computers share some aspects of Sol and Joseph's experience. Although they had no technical education in college, both sought work within the computer industry. Ann was trained in computer programming "on the job." Pam worked as an editor of technical reports and manuals for the computer industry, and years later enrolled in university extension school courses in computer programming. Both found real satisfaction in doing computer programming. Both purchased microcomputers for the dual purpose of being able to earn a living doing the programming work they enjoyed, and being able to better coordinate their responsibilities as parents and working women. Prior to ever touching a microcomputer, both of these women had, like Sol and Joseph, computational training, though they had different levels of training and experience. Unlike the men, they also had worked at home because of the explicit need to be at home to care for family members. These women purchased microcomputers in the context of these pre-established interests and patterns in their lives.

Ann was hired by IBM in 1967 when she was a psychology major who "wanted something opposite." Computers are very concrete." After being trained as a programmer, they placed her in the training division, setting up training programs for IBM employees. "It wasn't anything I expected to be doing. I thought I would be programming."

Like many computer professionals in the 1970s, with both highly autonomous work and high status within their organizations, Ann saw

the possibility of taking her computer terminal and her job home from the office.

> I was involved in computer-based training....This would be very easy to do remotely....It wasn't anything I needed to go anyplace else to do.

In addition to wanting to be home with her newborn, Ann looks back over her twelve years of working with computers at home as one that expanded her opportunities to be doing more of what she likes: programming.

> I really love doing it. Of course, I hate certain parts, but really it's recreation to do what I'm doing. I can get completely lost in programming and think that 5 minutes went by when it was three hours.

Thus, prior to the commercial introduction of microcomputers, and prior to "COMPUTER, Home-use" being a newsworthy topic for mass communications, computer industry professionals were getting the idea, and being given the permission of their managements, to work at home with computer terminals linked by telephones to the mainframe computers at their central facilities. Ann continued to work out of her house with a borrowed computer terminal until she replaced it with the Apple II microcomputer she purchased in 1978. Ann's on-the-job-training within the computer industry taught her not only about programming, but also to work with people who needed to learn how to integrate new computing systems into their business practice. By the time small business microcomputers were available, Ann had been using a terminal at home, and had been in the business of introducing different types of computer systems into organizations, for more than a decade. Thus, the commercial introduction of a microcomputer--small enough, powerful enough, and inexpensive enough--for home use simply

replaced the computer terminal Ann had been using since 1972 for income-earning work at home.

Pam's introduction to computers also began, in a sense when she went to work at IBM in 1967 as an editor of technical writing. Pam was placed in the systems development division as an assistant editor for the PL 1 user manuals although she knew nothing about using the systems for which the manuals were instructional guides. She received no on-the-job training with computers.

When she became pregnant in 1971, she stopped working. There was an eight-year hiatus in her work for IBM, during which she remained in contact with her colleagues.

> I started freelancing for them again [doing the same kind of work] in 1979. My husband was ill with a terminal illness, and unconsciously I was realizing I was becoming the breadwinner.... I guess I felt I had to be here, also.

During the next three years, Pam worked at home editing increasingly complex computer user manuals at her kitchen table from four or five o'clock in the morning until it was time to get her children ready for school. She found that the text she was editing had become "a lot more challenging, broader in scope, a much richer experience for me." She also felt "really bothered" by her lack of knowledge and the recognition that she would soon be the full support of her family. It was then that Pam began reading about computers.

> ...it was the announcement of the IBM PC and my [very positive] feelings toward the company that led me to start reading up on it [microcomputers] and then to go to school in it.
>
> After reading about computers in the ordinary press, I wanted more. I used to just read Time and Newsweek, more recently I've gotten Business Week and Fortune. Before I bought the computer, I subscribed to PC Magazine and also read The World After Oil and Megatrends. But I think I bought the computer on instinct or intuition...

Pam began taking night-school courses in telecommunications and computer programming at NYU, before purchasing her IBM PC. She describes a richly rewarding experience with her fellow students, teachers, and the computer.

> I liked the people I met taking courses. A lot of them were teachers changing careers, about two-thirds were women. Highly motivated people, and they were all very likable, and entertaining. Also, I feel comfortable with computers. This may sound silly but I had a teacher who used to talk about the compiler [mainframe computer] as if it were a person, a stupid friend, but also a very forgiving....It certainly is secure....it is more or less a known quantity. I found that [the logic] very attractive. You are really in control. All you have to do is solve the problem.

Pam imagined that she could self-employed as a computer programmer with her new skills. Pam's introduction to microcomputers never involved touching a microcomputer, and since purchasing her PC in December of 1981, she has barely used it. In the 1980s, the skills she could gain in nightschool were not marketable as a freelance programmer. In addition, Pam quickly realized that she literally could not afford to work at home, because as the sole support of her children, she could not absorb the costs of health insurance, Social Security, and all the overhead costs of working for oneself, especially at the early stage of starting a business.

While both Pam and Ann say that they love programming, neither of them became involved with computers as a hobby or something to explore at home. Their positive relationship to computers involves many aspects of their lives, but it cannot be understood through a comparison to the "explorer" model used to describe Sol. Both Ann's use of her terminal (to move her job home), and Pam's acquisition of programming skills and purchase of a PC, are inextricably related to

their attempt to meet the multiple needs of family life cycles, life crises, and personal satisfaction: the need to maintain salaries and independence as they raise their children.

Four People with No Computer Background Prior to Microcomputers

Three adults and all the children interviewed described their introduction to microcomputers as the first contact they ever had with computers. These three adults began by learning word-processing, although they had quite different reasons for doing so. This section will first consider the word-processing experiences of Sonya and Diane before turning to Bob's view of word-processing. Next, this section will examine how boys and girls portrayed their introduction to the microcomputers in their homes.

Both Sonya and Diane's husbands purchased microcomputers several years before their wives were interested in using them.

> While we were living in Germany, Dave came back to the States and brought us back a computer. I thought of it as a toy...to play games with.

Unlike Sonya, Diane knew that a microcomputer was also used for work but thought it seemed irrelevent to her own current activities.

> When he first got it [the microcomputer], I never imagined I would use it. It was just "a thing," just another tool of his in the house. It was in the living room, but I'm not a person who cares about a disruption in the living room. What I care about is the disruption of my study.

In both cases, their husbands (who had engineering backgrounds and had worked in the computer industry, but had never worked with word-processing software before) offered to teach their wives word-processing. Sonya explains:

> Dave had visions of me going into word-processing, and I didn't know what he was talking about. It wasn't appealing to me if I could use the typewriter. Because he's an electrical engineer, he's always bought anything electrical that's come out recently. My gifts have always been something you could plug into the wall. Dave bought me a very complicated and powerful word-processing program. He didn't know from "user-friendly": He understands technology.

Joseph and Dave did not suggest that their wives learn word-processing simply to gain a new skill or for the enjoyment of it. Dave suggested that Sonya learn word-processing to set up a "typing service" in their suburban community. They had recently returned to the U.S. from living in Europe for many years. Sonya had been volunteering in the schools, feeling very frustrated, bored, and hungry to get started at something from which she could earn money and that would feel, as she says, "more dynamic."

> I didn't get started with this [the micro] because I liked the technology--I didn't like technology. I wanted to be independent and make my own hours. I did it for the money and to have independence....This way I could make money in the home and still be the "mother" and drive the kids to the orthodontist.... But I hated [the micro], for the longest time I just hated it.

Diane was also in the midst of a situation in which her husband Joseph thought word-processing would help her meet her goals. At that time, she was trying to edit down dissertation by two-thirds and Joseph told her that word-processing would help her make revisions without having to continually retype everything. While their husbands did more than purchase the software, and were available to assist in learning the commands, etc., both women describe having to learn to tolerate significant discomfort with the microcomputer, and a process of working with it that continued to be foreign and anxiety-producing for them. Although many hours were spent with the assistance of their husbands, the intensity of their discomfort does not seem to have been mediated by this help. Joseph and Diane recall:

> Joseph: We spent two to three weeks, every morning for three or four hours initially, to overcome the fear [of the computer]. Diane had a tremendous fear of the computer. She was frightened to hell of the thing.
>
> Diane: I was frightened that I had no control over it. It was not something I could see easily. I could just lose everything, and it did, many times.

Both women felt very pressured during their early days of learning their word-processing programs. When Sonya decided that it was a good idea to start her word-processing service, she placed advertisements in local newspapers to find clients for her services in order to "put more pressure on myself" to learn.

> I'm the kind of person who won't do something without strong motivation. So, I wouldn't learn it without having customers. I put that kind of pressure on myself. I put the ad in the paper and I figured if I had a customer--a really good reason to learn it--I'd do something about it.

Neither Pam nor Diane were interested in the intrinsic qualities of the microcomputer. They were exclusively interested in using it to resolve a problem in their lives. Sonya says:

> To this day I don't like it. I like it for my own purposes, for making money and for writing my articles, but it's much more pressured and there are many times when I'd rather be using a typewriter.

Yet, to accomplish their larger goal, they had to manage the difficulties of learning to use a system they not only disliked, but also didn't seem to know <u>how to keep learning</u>. In addition, the particular technical disadvantages of the word-processing software available to them were a plague in both women's work experience. Diane describes this paradox.

> One time, at the end of a chapter, I meant to press the "copy" button but I pressed "delete" instead. I had to reconstruct a whole chapter it had taken all summer to write....But it still saved me time. I'm still terrified of it. I really do hate it. If it didn't help me so much in not having to type things over and over again, I would never use it.

Although neither woman feels comfortable with computers, and both report a significant increase in tension and fatigue now that they are using a micro instead of a typewriter, both met their goals by learning word-processing. Sonya, in fact, went beyond setting up a word-processing service in her home, and is now spending more of her time writing articles about the personal computer culture rather than typing the correspondence and manuscripts of her clients.

The possible synergistic impacts of the evolution of microcomputer uses within one household become evident by considering the interaction among members of Sonya's household due to their individual and collective microcomputing activities. The second phase of Sonya story began when she explained that she had been instrumental in helping her husband move to a job with a publishing company that produces software as well as magazines about the computer culture. Unlike his former job, which involved working with mainframe computers in a large industry, this was a job that Sonya felt she could relate to and, it turned out, also profit from. With her husband just settling into his new job as director of acquisitions, Sonya began writing articles (that he was willing to submit for her) for one of the company's magazines.

Contacts for the articles Sonya writes about the computer age come from Dave, and when she is busy meeting a deadline for an article, Sonya now hires her sons to maintain her word-processing business. The boys also provide technical assistance for her (with

her printer or word-processing program) as well as help in making interesting contacts for her articles.

> Now everything overlaps. I get acquisitions for Dave in the course of calling for information for an article. He makes contacts for me. Sometimes I feel like the boys are my press agents....

Although Dave's engineering background provided the initial reason for purchasing a microcomputer and he was, initially, the primary source of learning for the family; now all four members of the household are sharing skills, equipment and employment opportunities.

This story about a "family computer" demonstrates how the interdependence of household members is rooted in their ability to hook into the economic and technological and social resources in the context in which they are situated. It was Pam's social skills (or what Papanek, 1979 calls "status production")which ennabled Dave to locate his new job, a position from which he was able to open doors for his whole household.

When I asked Bob about his introduction to computers, he said that he never thought of word-processing with his microcomputer as "using a computer" until more than a year after he had been working with his Apple II for text editing.

> When I got the computer, I simply thought of it as a fancy typewriter. What was liberating was to realize that the printer could be off somewhere else...and also that there's nothing between you and the writing, not the physical process of having all these scraps of paper, the discarded material. If you want to insert a scene or some dialogue, you can easily do it. Compared to this, writing on a typewriter is like carving into stone.

In addition to the above reasons, Bob bought his Apple II because he had to accomplish work at a greatly intensified pace.

> I was hired to work on a one-hour dramatic show and wasunder incredible pressure....I bought the computer [on a] Saturday, and learned how to work with it within the weekend. It was very intense, I must say. The whole schedule was extremely rigorous. The first dozen weeks, I was going to have to work like crazy. In fact, there would have been several points where we wouldn't have made it if we were working on a typewriter.

Bob explained his process of learning word-processing commands and solving the problems of losing data in terms of applying his life-long methods of self-teaching to the process of mastering his microcomputer.

> When you first read the manual, you don't understand everything. It just goes over your head. But I got in the habit, from time to time, of looking through it again. Now I say--oh, that's what that is about--there's a command for something I've been doing the long way....

"When he had problems," Bob's wife, Sally, commented, "he would never call anyone." Bob responded that he'd called the store from which he bought the computer once, but most of the time he would just pull out all the books he had and figure out what to do. He has had very few problems losing data, and this was as a result of developing a method of regularly saving his data so that even if his household blows an electrical fuse or has a power failure, he never loses very much.

Bob does not feel that he even knew that he was using a computer, however, until he had temporarily stopped writing and decided to teach himself to program by learning the language BASIC. The second phase of Bob's story begins with his discovery of himself as a microcomputer hobbyist.

> After the show ended, I didn't want to write for a while....Then it dawned on me that I've got this computer and it can compute, and I've just been using it as a typewriter....There's someone sitting there keeping track of all these numbers [his baseball league's statistics]. I thought, "I bet I could write a program that would do all that for us." After all, that's what computers are for. So I got out the BASIC manual. I thought it would be much easier than it was....I became very obsessive and ittook me three months of work.

As we talked about how and why he segued into a computer programming hobby, Bob said that this involvement with computers had no roots in electronics or hobbying, and he was not interested in the technology, even now. He felt that the way he introduced himself to microcomputers (in addition to word-processing) was by "just opening up the manual and beginning; that is really the way I got my doctorate." Bob pursued this line of reasoning, explaining:

> Yeah, I'm compulsive. I also don't know why, but I've always been self-taught. The English department where I got my Ph.D. is very strange. You don't have to take any courses, and I never thought that was a productive way of doing thngs. My dissertation is a combination of sociology, political theory, and science....I just wade through a field myself, pick up books, and start to read. You just start to figure out who's important, and figure out places to go from reading the footnotes and bibliographies. You go up a lot of wrong ways, but, on the other hand, it's very exciting because your thinking doesn't get pre-formed....The way I picked up computer manuals is no different for me than writing....My dissertation was scholarly and dense. My second book was a novel about cops. When I went to write it, people said, "I don't know if he can do that--he's a scholarly sort."

Children's Use of Microcomputers

Children's use of computers is not the special focus of this study. However, because of this dissertation's concern with the household environment, children were interviewed when possible, both about their uses of the microcomputers in their homes, as well as their thoughts about the changes that have occurred since their parents began using micros at home. I spoke with two girls, ages eight and twelve, and three boys, ages thirteen, fifteen, and seventeen. In both households with girls, there were micros in their brothers' bedrooms, but none in theirs. Both girls said they thought they might use the computer someday, but weren't spending much time with it now.

Sol's twelve-year-old daughter, Lisa, couldn't remember when she first looked at, or thought about, a computer. She reasoned that the computer her father had purchased "for the kids" was in her eight-year-old brother's bedroom instead of her own because he already had in his room the television set that is used as the monitor. When I asked Lisa if she imagined how she might use computers in the future, she said:

> I'll probably have one and use it. But I'll never be as good as him [pointing to her father].

Pam's eight-year-old daughter, Sarah, remembered when their IBM PC first arrived when she was six. She also remembers running into barriers, from the beginning, such as her mother cautioning her that if she became a real computer enthusiast, something disastrous could happen.

> Oh yes, my mom was so nervous, and when it was first here, I just kept coming across nervous things. Like my mom would say, "Be careful you don't spill anything on it." I'd think, "Oh, no," because I could just see myself just spilling something.... I was afraid I would do something wrong....Just this year, I've got the hang of it and can put the disk in the disk drive....Sometimes I play games, but I'm not that much into it....Sometimes I have fantasies about becoming a computer whiz, and then something happens like what happened in Wargames [a nuclear war nearly results from kids playing with computers].

Sarah now has computers in her school, but they are a different type than the one she plays with at home. Nonetheless, on the first day of school, when the teacher asked who had computers at home, she says she enjoyed being the only student to raise her hand.

Sarah's brother, Jack, was eleven when their mother bought their IBM PC. He remembers every detail about the night the computer arrived, and was terribly excited, after impatiently waiting for it for two months. Jack says his first encounter with a computer was when he was eight.

> I saw a computer at the World Trade Center, and I was really looking at it. But when my mother said we were getting one, I didn't really understand them. I thought I wanted an Apple because of all the games for them, but when I saw the PC had some games, I thought, "Okay."

However, the only software that Pam purchased was a word-processing program, and she didn't want Jack to use it because she was afraid he could ruin it. Without any packaged applications programs, Jack used computer manuals and books to teach himself to write programs, something he would do <u>after</u> playing outside. In many ways, Jack's experience is close to that of a microcomputer enthusiast who purchased a micro before applications programs existed, and the story he tells is about the ways that he discovered ways to begin playing with the computer, methods to locate the information he

needed, and a way of inventing new problems for himself so that he could keep playing.

> There was no one to teach me. My mom doesn't know BASIC....So I just tried every program in the book. It was a book that had all the commands for the programs. At first, I would play outside after school, or something else. It took a while before I started to save my programs. I started to get into it after we went to Barnes and Noble [a large bookstore] and got a couple of computer books that had some programs in them. That was when I started getting into them, because I just started running them and I learned what BASIC was about. The IBM book was a little complicated. As I started running these different programs, I began to see which programs did what and why they did it, and then I'd take the programs and add them together and see what would come out....Sometimes it wouldn't work, so I'd look over the whole program: That really taught me a lot, looking over it.

Last year, Pam bought a color adapter and a printer; now Jack is running straight home from school and working on music/color/text programs.

> At that time, I was starting to get into it, but it wasn't really, I don't know. It was addictive, but not really appealing, 'cause there wasn't much to do on it. Then we got the printer and the color graphics adapter and then I started running programs on my own. I started playing things on the color monitor and printer.

Their IBM PC was in the shop while I was visiting, so I asked Jack what it was like to be having a break from the computer.

> It's boring! There's nothing to do here now without the computer. When the computer's not here, I just go in my room and lie down on the bed.

Sonya's sons, Daniel and Stewart, are also deeply involved with microcomputers. Since their father brought one home when they were living in Europe in 1979, he has been instrumental in encouraging their learning. At the beginning, they mostly played games, often with their friends. When I asked seventeen-year-old Stewart when he

first started thinking about what it was possible to do with computers, he said:

> My dad had a couple of books that were about computers. He was really pushing it and we didn't really want to read them. Then I was getting bored with the games, so I thought I would pick up where my dad left off--because he had written the books.

"What did you want to learn to do with microcomputers?" I asked Stewart. "I wanted to make them," he answered.

Stewart is currently doing computer-aided tutorials, taking programming courses in his suburban high school, and finding small jobs, through his parents, tailoring software to suit individuals' needs and tutoring neighbors in word-processing. Daniel is less interested in computing. He took one programming course in high school, and uses the word-processing program to do his homework. Daniel says he's different from his brother because his hobbies are "robotics" and "nature." He explained his interest in nature by describing the beehives he wants to keep for honey farming and how he was currently tapping the maple sugar trees on their property.

Part Two

An Environmental Analysis of the Evolution of Microcomputing Within Households

Thus far, these interviews have shown that an important aspect of the introduction of microcomputers is the autobiographical context in which it occurs. When individuals talk about their initial use of micros, they are describing both a world of intentions as well as their ways of encountering an unknown. The processes of encounter they describe are quite varied. Yet, with or without computing backgrounds, people describe two distinctly different orientations toward getting to know microcomputers:

1. A micro is an orderly world of languages with which to explore and build; and

2. A micro offers office-work assistance previously available only to medium-size and large organizations.

Individuals may participate to different degrees in both of these (and other orientations) toward microcomputers. Part Two describes the environmental context in which "exploratory" and "pragmatic" orientations toward microcomputers are situated by building upon the evidence in Part One that individual behavior with micros at home is not an altogether individual matter. It does so by focusing on the physical environment, the temporal environment, and the resource environment in which individuals' uses of microcomputers evolve over time.

The Exploratory Uses of Microcomputers

Three people in this study describe taking an exploratory approach to microcomputing. They had diverse backgrounds: Sol's background included engineering, electronics, and hobbying; Bob had a Ph.D. in English and has a writing career; and Jack is a thirteen-year-old who began using micros when he was eleven and had no previous hobbies. Yet, they portray their microcomputing context in remarkably similar ways. The process of exploration that each initiated on his own is well supported by the social and physical environment in which he lived.

1. A Microcomputer in a Room of One's Own

Deciding on the physical location of the micro is part of the spatial division of resources and labor within households. For both Sol and Bob, a microcomputer fit right into the ecology of the social life of their household. Unlike the others in this study, a private office/workshop space was already an established fact in their homes before they purchased a microcomputer. For Jack, having a microcomputer for his personal use was a process in which he learned to appropriate household resources.

After keeping his first micro in the living room for a month, Sol says that he moved the microcomputer he purchased down into his basement workshop because it conflicted with television viewing among other family members. His basement workshop has been a place for "tools and building things" since he was a boy, and shared this space with his father, who used it as a television servicing shop. Today three separate niches are in the basement for his power tools

and building work, an alcove for paper work (mostly bills), and a wall with the computers and telephones. No one else in his family uses any of this equipment. Marsha, his wife, works at the kitchen table when she grades papers, and Sol is irritated by any noises in the vicinity of his work area.

Bob's private workspace has been as firmly inscribed in his environmental autobiography as Sol's. However, unlike Sol, Bob had to adapt himself and his environments to achieve this goal. The work environment that Bob has established for writing has not always been supported by a private office, or tools like a microcomputer. Bob began learning to create the kind of time and space he needed for writing when he was in college and lived in a dormitory with roommates. In order to achieve the quiet and isolation he needed to write, he began staying up all night several nights a week, and later took a job as a night watchman in order, he says, to have quiet time for writing.

Before Bob and Sally had an apartment with enough room for him to have a private office, his work environment was still well protected. He describes the living room where he also did his writing in their first apartment:

> When I sat on the couch, it was a living room. When I sat at the desk, it was an office. It was very awkward, especially for Sally. She was a student at that time and had to accommodate to that. I was writing my dissertation at that time.

Given the fact that Bob's microcomputer was purchased to replace his memory typewriter, it is no surprise that it was located on his desk in his private office, and no surprise that, when I asked Sally about using the micro, she said:

> No, Bob is a professional writer...and it's his. It wasn't bought as something for our house. While we can use it...a large part of the time it's inaccessible to us because he's using it.

Surprisingly, however, Bob says that members of his household don't use the microcommputer for their own reasons: e.g., that his son is not "very verbally oriented" and that his wife has no real reason to be using it.

There was no history of a separate work environment in Pam's household when their IBM PC first arrived, and there was no extra physical space that could be identified as "the office." When Pam had worked at home between 1979 and 1981, she worked on the kitchen table. With two young children, a husband who was home sick, and no dining room or extra bedoom, having her freelance jobs located in the kitchen was "very chaotic," she says, because she needed to keep them on the table for about a week or two.

When she bought their microcomputer in 1982, Pam placed it in the living room and thought that she might soon be self-employed as a computer programmer. Instead, she is again working full-time again at the same job she had before her children were born and before she took computer programming courses and purchased a PC. Two-and-a-half years after purchasing it, the micro is planted in Jack's room, and he is the only one using it.

The place history of the microcomputer in Jack's household demonstrates the social process through which household resources (spatial, temporal, and technological) are pooled and divided. Pam describes the place history of their microcomputer.

> At first, it went into the living room so I could see it, keep an eye on it with the children....But there really was no appropriate place for it in our apartment....There was no space where it would be accessible to everyone. That was the requirement. But it went into my son's room. I do feel that it's the family's, not that it is mine, and it's not entirely my son's either. He's taken a very proprietary interest in it. We fight about it.

As we discussed this decision, Pam's daughter, Sarah, commented that the trouble with keeping the computer in the living room was that then no one could watch television. Pam said the trouble with the living room was that it is the only place in their home where they could ever have company and relax. Jack wondered why they should have it in the living room if he was the only one using it.

Pam views the microcomputer as an intellectual resource for the whole family, yet her reason for yielding to Jack's claim on the PC is that she can find no way to create a place for concentrating in their apartment that is accessible to everyone. The size and plan of this apartment does not support an equitable location for a resource like a micro. And indeed, the organization of labor in the household does not support its equitable use, either. Without the discretionary time to use the micro herself, Pam gave in to Jack's claims. Jack won the privilege of keeping the family computer in his bedroom, but he did so in a social context in which he shared none of the earning or housekeeping responsibilites, and in which his mother thinks that a micro in the living room is incompatible with her sense of home.

2. Long Periods of Uninterrupted Concentration

For each of these individuals, a private workspace goes hand in hand with long periods of uninterrupted concentration. Yet, to understand the relationship between the physical setting of the microcomputer and the quality of concentration time one achieves there, it is necessary to consider this setting in terms of the social life in which each is uniquely situated.

Time to explore has been carved out of Sol's daily life the way it has been carved into a niche in his basement workshop, and both are standing patterns in the social organization of this household. Sol's descretionary time at home has been consistently filled with his personal hobbying activity.

> It's pretty much the same. Even before I was working at home I was going to bed late and getting up early.

Marsha, Sol's wife, has worked as a kindegarten teacher for the last ten years, and takes care of all the housekeeping, homemaking, meal preparation, and cleaning for this family with two children. She has become relatively accustomed to his habit of working on his projects in the basement most of the time. Years before he began working full-time at home with microcomputers, Sol tried to routinize communications with his family by installing an intercom in the basement "so that my wife and kids can get in touch with me."

Because he has always spent many hours in his workshop at home, even when he had a full-time job outside the house, Sol says he feels very little change.

> The only thing is that I've got more flexibility during my day if I want to go somewhere and do something.

An improved quantity and quality of work time is what Sol seeks in working at home, and what, for the mmost part, he has been able to achieve.

> The single most significant change is that whether I'm writing a program or writing a book about computing, I spend a great deal of time there to the exclusion of everything else.

In spite of being alone in the house between 8 A.M. to 3 P.M. and habitually staying up very late, Sol also feels that he does not have sufficient quiet to concentrate. Since he began working at home, his children tend to play in a basement playroom after school, and he is equally irritated by footsteps in the kitchen overhead, as well as the washing machine next to his workshop.

While Sol is disturbed by the overlapping of his work and family life, his wife and children perceive him as operating on his own clock, unrelated to the pattern of their days and nights. "He doesn't know if it's 3:00 in the morning or afternoon," Marsha says. And to his eight-year-old son, Sol's working at home does not seem to mean that his Dad has even been at home. When I asked Jordon if he saw his Dad more, now that he no longer took the subway to Manhatten everyday, he replied: "No, because mostly he comes home late and I'm sleeping." To his family, Sol is not really "at home" until he has stopped working, no matter where that work is located.

Bob's patterns are quite similar to Sol's in the sense that he has constructed a working environment that suits the erratic rhythms and long periods of isolation he needs to write. They are also simi-

lar in that Bob also had established a pattern of spending long intervals concentrating long before he purchased a computer. He has alwaysusedthe night,he says,to achieve the kind ofquiethe needs.

Sally supports his writing in every way. As a full-time homemaker, she ensures that the household is maintained, and that their children do not disrupt Bob. While Bob's patterns were not initiated because of the computer, his exploratory use of the microcomputer fit into the understanding within his household that he would become absorbed in a project to the exclusion of everything else.

The temporal rhythms of Bob's work are more complex than simply having a room of his own. Bob and Sally describe the interweaving of his writing into the very fabric of their domestic life together. Through telling their history of working at home, with and without a microcomputer, Bob described the exact quality of privacy his creative work requires. He emphasized his desire to keep shifting the degrees of contact he has with others, and the comfort he finds in working with his wife and children nearby yet without really interrupting him.

> I always liked the advantage of working at home. Well, other people can be a distraction, but usually they are not. Partially because they're very cooperative, and partially because interruptions don't bother me so much....I like the convenience of being able to work whenever I feel like it and I also like being near the family, especially the kids: If something happens, I can come out and join it....Sometimes I can come out, if I'm in the middle of something and also, they'll spend a day in there sometimes [the office]. If you look on the floor, you'll see all kinds of action figures on the floor. I work on the typewriter, and they sit there playing. <u>I like that.</u>

Sally feels that this rhythm is related to a pattern they established before their children were born. They conversed:

Sally: You're never "home from the office" either. You tend to drift back to it.

Bob: Yeah: If you "come home from the office," it [the creative thread] is gone.

Sally: That's been true since before the computer. Like when he was writing his dissertation. Before he started writing, he would start out talking at the dinner table about whatever we talked about and then all of a sudden it would evolve into his dissertation conversation. And it's continued that way ever since. Whatever he's working on or involved in, we talk about....He's also in my life in a way that so many women, whose husbands are in the office all day while they're home with little children, are lonely. And I'm never lonely, because I always have Bob.

Bob: Yeah, in fact we hardly go out at all. We rarely even go to the movies. And I even write them.

When I first walked in the door, to interview Bob and Sally, Bob was on the telephone. Sally and I began by talking about what had evolved in her household since they purchased a microcomputer. She couldn't remember when it first arrived, but was quick to tell me that there had been one big difference in her life since that time:

> He might have come out of his office more, but now he spends much more time sitting at the computer. He used to take his breaks with us, now he takes them with the computer.

Sally tried to explain the mixture of reasons for this:

> It's difficult to tell what's computer-related and what is just a result of the fact that he joined a baseball league and now he's working as their statistician.

Although he started this project as a way of saving time and energy in doing the leagues ratings, eighteen months later Bob says he now spends "a minimun of ten hours a week plugging in all the data from printed sources, and copying it from disk to disk."

The difference that a computer has made in this household is

related to the quality of the discretionary, non-work time in this household. Bob's imagination and love of a new challenge has become focused not only on writing and running computer programs for specific puposes (he doesn't do any of this for profit), but also on the new relationships he has formed with other men and social groups as a result of offering his computational services. It was not because of the way that microcomputer improved the efficiency of Bob's professional practice, but the way it extended his recreational activities outside the family that Sally perceives as the means by which the microcomputer has changed the contact and coordination that has been the rhythm of her adult life.

At thirteen, and with few household responsibilties, and no real competition for the computer, Jack devotes nearly all the time he is not in school to his microcomputer hobby. He noted that at the beginning he would "play outside, or other things before coming home. Now I run right home."

3. Perceiving One's Self to be One's Own Teacher

When Sol and Jack spoke about what it was like when they started "getting into" exploring their microcomputer, each described a process of copying programs, and manipulating systems they were trying to understand. Jack says:

> As I started running these different programs, I began to see which programs did what and why and I'd take two programs and add them together and see what would come out....and by looking over the whole program, that really taught me a lot.

Like Sol, Jack had no packaged applications software when he began, even though there was plenty of it available on the market.

Like Sol, he learned from copying programs written in books, and reading manuals until he learned how to run his own programs.

Jack constructed a learning environment much like those of Bob and Sol. It was built out of a lack of interference, an ability to stay interested in what he was doing (despite the lack of computer games software), and the absence of someone to talk to about a computer problem. Sol and Bob and Jack all describe a self-guided learning process they initiated while exploring their micros.

When he first bought his micro, Sol discovered a book put out by a computer company called 100 Games, but these games couldn't be used for his computer. A short time later, he explains:

> I spent a lot of time at the computer, but there was a reason for it. Once I had gotten the Apple, I decided to write a book, a collection of programs. I had set a goal for myself of 110 programs. For this reason I was spending a great deal of time with the computer.

Bob had decided that the way he would learn programming was by writing a program to keep the statistics for his baseball league. Generating these achievable goals is also a method of structuring one's own learning process.

4. Using Literature as Instructional Media

While none of these people mentioned that they had ever had a teacher, they frequently mentioned the importance of reading. Although I never asked about it, each spoke about the role of books, manuals, and magazines in the process of their development with computers. Sol was subscribing to "about 30 magazines a month." Most were computer-related, but since he went into business for himself,

he was also reading The Wall St. Journal, and some advertising, marketing, and business-related newspapers to "keep up."

Sally described Bob using computer manuals, instead of calling anyone, when he got into trouble with his computer. Bob began with the BASIC manual when he decided to learn programming. This approach was the same one he says he used when he was in graduate school:

> I've always been self-taught....I just wade through a field myself, pick up books, and start to read. You just start to figure out who's important, and figure out places to go from reading the footnotes and bibliographies. You go up a lot of wrong ways, but, on the other hand, it's very exciting....

Jack says it all "really began" after he and his mother went to a large bookstore and bought some books about programming, books that were better than the manuals IBM included with the PC. Jack's only resource in teaching himself programming were the manuals he used. Once, he took the subway by himself "to the IBM building" to ask a question about what he thought was a missing part of the adapter they had purchased. I asked Jack if he had ever before done anything that compared with what he was doing with computers. He said:

> No, not really. Maybe I would look something up in the encyclopedia, but I never would go down to the IBM building.

The environments in which these three people initiated their explorations into computing were rich with resources, and lacking in interferences. They were environments in which they each enjoyed considerable control through their ability to keep increasing the kind of stimuli they liked--through reading, through visual displays, through machine languages, and through elaborate projects that extended over time. At the same time, they could decrease the human

contact by staying in their own rooms. It is this combination that seems to be the enabling context for their self-teaching and expressive growth.

It is important to keep in mind that this is also, of course, a technological environment. The microcomputer each of them used can be taken apart. They are both programmable and able to receive packaged applications programs. They are well suited to the diverse and exploratory excursions that Sol, Bob, and Jack describe. As a multi-processing and multi-purpose device, the micro can be used for different applications, and the same application can be used for different purposes. Any one of these might be reconstructed or entirely new projects may be designed.

This section has discussed how the social, physical, and technological context enabled a self-teaching style of learning to begin and continue in the lives of two men and a boy who sought to use the microcomputers in their homes as a way to explore and to fabricate symbolic worlds. The next section will examine how the social, physical, and technological context mediated the experience of women and men whose orientation toward microcomputers was more pragmatic than exploratory.

Pragmatic Uses of Microcomputers at Home

Two women and one man in this study describe taking what might be referred to as a pragmatic approach to microcomputers in their homes. What unifies this group of individuals is the fact that they are not involved in exploratory uses of micros at home. In addition, none worked at home prior to working with computers at home, and each began and continued using a computer at home for the purpose of income-earning work.

The "pragmatic" relationship with micros is based, in these cases, on using their microcomputer not only as a tool of their trade, but also as a "vehicle" toward making changes in the organization of their home and work lives. Ann began working at home with computers as a way of continuing her employment within her organization after giving birth to her first child. Joseph bought a microcomputer when he was between jobs and wanting to get away from the 9-to-5 routine: He used it to write a business software program and start a small service shop in his home in the hopes of creating the option of spending more of his discretionary time with his family. Sonya began learning and earning with a microcomputer when she had returned to the U.S. with no job background she could build upon and had a need to get involved in something that would allow her to make a transition from being full-time mother to a part-time mother and full-time worker.

Without the social and physical infrastructure of a work environment already built into their home lives, the process of putting into practice a "pragmatic" orientation toward microcomputers for each of these individuals was a process of developing this infra-

structure at home. While the micro "explorers" had focused on their intellectual process in describing their self-initiated introduction to micros, the pragmatic group focused on learning how to accomplish work in an environmental context that was not dedicated to their work and creativity. Constructing the environmental context of pragmatic uses of micros at home is the subject of this section. Like the previous section, it is divided into issues related to the physical setting of computer use, the temporal organization of work, and the relationship to the resources in one's environment.

1. A Microcomputer in the Living Room

Working with a microcomputer at home was a different kind of "move" for each of the individuals in this section. For Ann, it was a transition that included moving from working in an office to working at home, and from being a working woman to being a working mother. When Joseph began doing computer-based work at home, he was making a transition from being an employee to being self-employed, as well as working in his home for the first time. Sonya was making a transition into using a computer for the first time, working for the first time in fifteen years, and working at home for the first time. Yet, without any location in the house that had been previously carved out as their own workspace, none of these people, new to working at home, seemed particularly concerned about making a private office as a way of facilitating their transition. Instead, they appear to have chosen to situate themselves in well-trafficked locations in their homes.

When Sonya's first clients began arriving with manuscripts and she was still learning word-processing, she simply began using the

microcomputer that had been in their family/living room for many years. Since its purchase in 1979, their micro had always been in either a family-type room or dining room, depending where they were living, because both her husband and children wanted to be using it. Although there were extra bedrooms in her large house, as well as a basement that could have functioned as a private office, Sonya redecorated what she refers to as "the family computer room" as her not-very-private office.

In their present house, the family room is directly off the front hall, next to the staircase, at the central axis of the house. It is a spot from which the door and the stairs are visible, and is a few steps away from the kitchen. Although Sonya refers to this room as one that allows the kids to be using computers in a cheerful place rather than in a dark corner upstairs, now that she spends almost all her waking hours working at the microcomputer there, her sons say they use the microcomputer they have upstairs.

When Joseph purchased his micro, he felt he had nowhere to put it except in the living room in their two-floor Brooklyn apartment. Joseph's wife, Diane, was using their extra bedroom as her study, where she was writing a dissertation. They thought it would not be good a good idea to share the space because they would both be using the telephone and disrupting the other through their use of it. Joseph made a desk in the living room, facing into the partial wall that divides it from the kitchen. With no door to the kitchen, and no barriers surrounding his desk area, Joseph positioned his office in the only path to the kitchen/dining area.

Ann's home work environment as an independent contractor is quite different from the work environment of many other free-lance computer professionals who work at home. It is also quite different from the work environment she inhabited when she was an IBM employee working remotely, communicating solely by telephone, to her manager and work group. After twelve years of building up her independent contract work, Ann's business has grown and her approach to working at home has evolved, as well. Because she works directly with her clients, sometimes meeting them in her home, and also sub-contracts out some of her work, Ann has a wider range of personal meetings and contacts during her workday at home than many freelancers or remote employees who are primarily at their terminal and on the telephone.

> We have meetings wherever it happens to be most convenient. I had someone here for four hours on Monday morning. We just sat at the dining room table. Then it was lunchtime, so we grabbed a sandwich and went down to the beach and continued to talk down there.

For Ann, working independently has also meant that the range of work is more diverse than when she was an employee developing computer-based training materials. During the twelve years Ann has worked at home while raising two children, she has also developed a style of working "around the house."

> Sometimes I need a huge space, so I work at the dining room table. Or, I was doing a project for a client and they installed a computer in the house--a huge thing--and all we could do was stick it in the corner of the living room and put a lamp, and a sort of inadequate table for papers, next to it....Sometimes I work at the kitchen table, sometimes I spread out in the living room....Sometimes I'm in my office. What I'm doing determines much more of where I'm going to be rather than the fact that I'm working. When I say I'm going to do some work, I don't necessarily go someplace to do it. If I'm going to type a report, I go upstairs to the typewriter. If it's programming, you don't have a choice of where you sit: You sit at the computer and do it.

Without moving into an ecological niche, established by years of long periods of uninterrupted concentration within their households, these individuals, nonetheless, constructed workspaces that fit into the existing social and spatial patterns of household life. They did so without constructing private offices in their homes, and without, sometimes, convincing those around them that they were indeed working. What underlies the physical arrangement of these workspaces is a different model of work-at-home than the traditional private office, but it is not as easily identified.

2. Scheduling Work Around Family Time

Given that each of these individuals sought work at home, in part because of their desire to be in a more flexible relationship with their work and with their households, it is not surprising that they describe patterns of working that are established in relation to patterns of activity surrounding them.

Ann describes her habit of working in many different locations in and around her house as "one of the advantages of working at home." It is, also, one of the advantages of their large house. It is one of the methods Ann uses to manage her roles as a working woman and a working mother while she is at home.

Since only some of her daily work at the computer terminal, and because she is in the habit of working in any room in the house "depending on what I'm actually doing," I spent some time talking with her about how her children knew when she didn't want to be disturbed. Ann explained that now that her children are older (they are 11 and 8), it is rarely a problem because she often works when

they are either out of the house or sleeping. When they are home, sometimes they play or do their homework near her while she is working.

> When I'm really working on something, I prefer not having people go in and out, and there are times when I say, "Don't come in because I really have to concentrate now." And when I'm concentrating, I don't even really notice....To have them come in doesn't really happen a lot. I'd rather not have them there, so I tend to either work, or be with them. Sometimes I work in the living room for that purpose. The living room is not a heavy traffic room. We don't keep people out of it, but people tend to go elsewhere.

When her children were younger, Ann become accustomed to working around naps, nursery school schedules, and so on. Even with working around their schdules, the biggest problem, she said, was in achieving "uninterrupted blocks of time."

> I didn't have anyone in the house when I was working. Sometimes I'd get interrupted and there was just nothing I could do about it.

Although the entry of a microcomputer did not initially alter any of these social or spatial relations within her household, when her husband joined her business in 1981 (which they define as a data processing consulting business), Ann says her work environment changed in one important way.

> The big difference isn't in managing the home. It is in the taking care of kids....Both of us are working, and working flexibly. So it's not that it's either his job or my job, but if one of the kids needs to go to the doctor, it's whoever is available....and if I make arrangements for dinner, when I'm not going to be here, he'll make it. But it's still pretty much weighted in my direction. That's consistent with the past.

When I asked her if Harry had developed the same habit of working in different locations in the house, and in the company of their children, since he began working at home in 1982, she replied:

> No, he does tend to just go off [to his basement office] and do it.

Ann thought that it has taken her years to make the adjustment to working at home. She feels she is lucky, also, because her children never had to learn to make the adjustment. She perceives the primary ingredient in her adjustment to working at home as a process of learning self-discipline:

> You have to learn that if there's something that needs to be done, you just have to do it. You have to discipline yourself and not be distracted by the flowers in the garden or the dishes in the sink. And on the other end, there is the danger of working too much because it's always there. So you tend to always do it. It can interfere with your general life, and that's not good.

Without a household workspace that is socially and spatially organized around "not interrupting," learning to concentrate while working at home is a significant discipline for each of these adults, though they don't all name it "self-discipline." For example, without complaining about being interrupted to pick up his daughter after school, or the disturbances that are bound to surround his workspace in the living room, Joseph attributes his business failure to his inability to concentrate at home. He focuses his difficulty on the sensitivity to each other's presence that disturbed both his own and his wife's concentration.

> We hadn't had so much contact with each other for a long time. We began to rub against each other. They were not positive changes. For the most part, there were conflicts about space. Here I am hanging around the house and Diane had never seen me here for eight years. She was upstairs and I was down here, but we knew the other was close by. We would interrupt each other. If I got a phone call, she would want to know if it was a client. And because she had her own work to do, it became quite a problem.

Joseph imagines that if he should ever try to start his business again (he is currently only moonlighting at home), he would not do so unless he could afford to rent office space outside the house. When I tried to understand whether his concentration might be supported by being able to close a door in the space where he is working at home, Joseph insisted that the difficulties were within himself, and not in his surrounding environment.

> Diane and I like each other, have needs for each other. So, just knowing she is there, you know, I could easily look at a problem and say "The hell with this," and make a pot of tea and then say, "I need company for tea." So it just wouldn't work.

A way of being at home, a rhythm of shifting activity and discontinuous contact is not a pattern that Joseph fell into only because his wife is working at home. It is part of his pattern of being at home. Unlike the other men in this study, Joseph never used his home as a place for long periods of concentrated intellectual and creative work. Rather, he describes thinking about home as a different kind of workplace and worktime. Joseph says there was nothing strange or new to him about "working at home."

> Before when I came home, there was always something else to do. Always someone saying: "Windows need cleaning" or "Floor needs washing." There's always been work in the house.

But this kind of work is interruptable, and easily accompanies the discontinuous contact and communication of household and family relations.

It would be inaccurate to interpret Joseph's eighteen-month unsuccessful experiment with homework as a result of his wife or child's interference with his business practice. Joseph sought their contact, and saw it as an advantage in working at home. He absorbed

more of the childcare responsibilties (as Ann's husband, Harry, did) and created, during this time, a more equitable division of labor within his household. Diane reports:

> The year Joseph was home, it was so much less pressure. He was happier, much happier. We had a more flexible schedule, alternating picking Susan up at school. It gave me longer to work. I loved it, having lunch with him, and it gave me a much more flexible childcare schedule.

Much like Ann, Joseph wanted to use working at home to create a more harmonious interrelationship between work and family life, and did not conceive of the presence of family members solely as interference with his work. Yet, with no experience being his own boss, and with not much of an idea about what it takes to start a business, his small service bureau did not provide an economic base on which their household could survive. Unlike Ann, Joseph did not have a spouse bringing home a full-time salary with health insurance benefits for the household. He did not have eight years of experience working part-time to learn how to work at home, to learn how to reach his market, and to build up a business while being supported by a second income in the household. With Diane working nearly full-time on her dissertation, Joseph was the only person in this study who tried to be self-employed without a second income to back up himself and his family during the first year.

Learning to achieve long periods of uninterrupted concentration has been an important aspect of Sonya's learning to work in the house as well as learning how to use a word-processing program to do a new job. The routine she has evolved is not one she would have ever expected.

> What we thought was that I would be using it [the micro] during the day for my work and magazine articles and they [her sons] would use it when they got home and in the evenings. But...they get home about 2:30, and while my intentions were always good, I often wouldn't be getting going until about 2:00 because of staying up until about 2 A.M.

Sonya's pattern is to work for a while in the afternoon and after a dinner break; when the house quiets down, she works further until long past the time her husband and children have gone to sleep. During the time when they are at home, although she has often used their technical expertise to help her with problems with her word-processing program or printer, Sonya feels they have no respect for her need for concentration while working.

> I've also begun to resent the kids as intruders on my work. They come in and out and it's like I'm not working in this house. They want clean towels in the closet or they want dinner or a snack. When I travel, everything is fine. But when I'm here, everything reverts back to this role: I'm a housewife and mother. No matter how much work I have or they see me doing, it doesn't matter. They don't ever say, "Gee, if I put my dishes in the dishwasher, that would help."

Although Sonya said that she had wanted to learn word-processing and start working out of her home as a way of continuing to be a "mother," she is increasingly irritated by the old routine now that her sons are in high school and she is trying to meet deadlines. Yet, the way that Sonya is currently dealing with this is by working when they are sleeping, sleeping while they are working, and, also, often working when they are home. Her rhythms have become difficult to coordinate with other people's, and she is finding that she rarely can ever meet a friend for lunch anymore, rarely goes to bed when her husband does, and is feeling more frantic and pressured all the time.

> It's not the positive thing I expected it to be. It's always there....You feel compelled to be working all the time. Except for running errands, I do nothing but work....I think that when you go to the office, you know you're going to leave. But, this is like being a captive, it's like being a prisoner, almost.

Ann, Sonya, and Joseph each have different relationships to their households, their work, and the people in their lives from the men who had more exploratory relationships with their micros. First of all, each them is responsible for daily household maintenance and childcare. The rhythms of their work are (in different ways) responsive to the cycles of those around them, and their discretionary time is more limited. In addition, each describes different ways in which stepping back from their work, and particularly from their microcomputers, is an important part of their lives. Unlike Sol, Bob, and Jack, they talk about being with other people as an important part of their lives, even if it is a problematic balance to create. While Sol and Bob portray themselves (as do their wives) as men who like to stay home to work, this is not the undercurrent in the stories that Ann, Joseph, and Sonya tell about their work rhythms. These individuals who have tried to use microcomputers to resolve a variety of household and work issues in their lives did not extend life-long habits of creative isolation. They have, in fact, found that they continue to need diverse contact with people, and that their sense of being connected to others has been a difficult balance to achieve while working at home.

3. Relating to the Resources in One's Environment

The environmental context in which each of these individuals began to work with computers at home was not one that entirely

supported their activity. To the extent that they were able to use their micros in the ways they intended, each constructed and was supported by a web of relationships. Each emphasized the personal relationships with friends, spouses, and professors who acted as catalysts in their decisions to purchase microcomputers, acquire skills, and use them as tools for self-employment. They also emphasized the ways in which family relationships mediated their attempts at, or experience with working at home with micros. Thirdly, they described aspects of their relationships to a market place outside the household. The process of adequately separating oneself from household interruptions in order to maintain work concentration, and connecting with the multiple client groups necessary to maintain independent contract work is the process of building the infrastructural supports of a home-based business.

Although the interviews did not probe marketing strategies for the self-employed home-based professional, individuals volunteered different aspects of how they "kept up," as well as how they found their clients. Local newspapers were a source of clients for each of the individuals being discussed in this section. Sonya advertized her word-processing service when she first got started in 1982. At that time, hers was one of the only such ads in her suburban newspaper. Today, she says, the paper is filled with advertisements for such services. Joseph scouts the New York City newspapers and responds to notices that read, for example: "Help: Apple IIE--can't make it work." Ann suggests that the way her business grows is through old contacts and new: for example, doing programming, training for local computer stores, and answering ads in the paper. All describe spending considerable time on the telephone, and developing systems for handling this, e.g., having two telephone lines, answering services, etc.

Although Ann has the advantage of having been trained "on-the-job" to do much of what she continues to do through her own business, being self-employed and working as a consultant has required an entirely different set of human relationships in her work life, as well as to her own productivity. Working remotely for a company may have been isolating in the sense of losing the many dimensions of face-to-face contact with her immediate work group, as well as all the other encounters that comprise a day, but working remotely still involves being a part of the continuity within an organization. As a consultant, this relationship to the internal organization is lost. Ann says:

> One of the things that happens because of being an outside consultant is that you don't see the results of your labor. People who need a pat on the back wouldn't be able to do it. When you work in a corporate environment, they tend to have special follow-ups and you see the results of what you do, but as an outside consultant, you turn it over to them and may never hear anything else.

All three of these individuals describe a growing relatedness, on the other hand, to their surrounding neighborhood. This evolves not only from working at home, but also because they are working for, as well as dependent upon, members of their local community, e.g., local computer stores, residents who need help learning how to make their systems work, neighbors needing word-processing and accounting services, and so on. Ann says that her relationship to her surrounding environment has changed from the simple fact of spending more time around the house.

> When you go out of the house everyday, you tend to not have as much a sense of the neighborhood and the people and things as you do when you're at home.

Not only are each of these individuals engaged in the pooling and exchanging of computing skills, equipment, leads on jobs, as well as parcels of work with household members, they also portray themselves as being resources for their families. Sonya, in particular, is aware of the "two-way street" that has evolved regarding computing activities with each member of her household.

> In some ways it has brought us closer together. We're all involved in the same thing, and I'm relating to my teenagers like no other mother...because we share the same interests. Also, I'm writing about the computer, and I have to be nice to them sometimes, because Stewart is also very mechanical and a lot of times I'm screaming for help because the printer isn't printing or there's an error message on the screen, and he has little tricks. We don't get along, on a general basis, but I guess we get along when it comes to computers because I have to depend on him.

It is her exercising of social skills, rather than technological ones, that has advanced Sonya's development as a word-processor and journalist writing about the computer culture. While her reliance on human resources more than books or manuals has sufficed in a household of three computer experts, Sonya, like Joseph's wife, Diane, also suffers from feeling that while she knows who she can call for help, she never feels that she understands, or has a mastery of the tools she depends upon.

The social context of learning computing skills seems particularly important in all the women's descriptions of their introduction to computers. Remembering that all of these women turned to working at home with computers because of needing to make a transition in their work lives, none portrayed their transitional learning context as self-guided, and each emphasized the role of other people in their learning experience.

CHAPTER SIX

SUMMARY AND CONCLUSIONS: THE REPRESENTATION AND EXPERIENCE OF WORKING AT HOME WITH COMPUTERS

Thus far, this dissertation has traced the evolution of home computing as it emerged in popular journalism and in the personal histories of six urban, middle-class families with school age children. This chapter suggests possible explanations for the changes found. The first part notes the gradual reframing of media representations of home computing as a work activity, and discusses the changing assumptions about computers and working at home which underlie these representations. The second part reflects upon the intensification of work at home reported in household interviews, and the difference that gender makes in the experience of working at home with computers. This dissertation ends by suggesting that the implications of previous empirical research on industrialization and the household continue to provide a useful theoretical framework for investigating households in an "electronic age."

The Media Representation of Working at Home with Computers

A survey of mainstream periodicals and national newspapers on the home use of computers yielded more than 400 articles. Between 1976 and 1984, 81 magazines devoted editorial space to the story of "computer home-use." Although over one-half of the magazines contained only one article on the subject, an increasingly diverse group of magazines published articles about it. One characteristic of this diffusion is seen in the migration of technical and non-technical subject matter across periodicals that had traditionally focused on only one of these concerns. For example, electronics and

hobbyists periodicals were publishing stories about computers and family life by the early 1980s, while periodicals such as Psychology Today devoted whole issues to the interpretation of microcomputer hardware and software for the uninitiated reader.

Along with providing evidence of a breakdown of some of the traditional divisions between technical and non-technical subject matter, as the story of the home-uses of computers has spread, it has also changed. Accompanying the expansion and greater accessiblity of hardware and software to a non-technically trained market, there has been an increasing focus on the work-related context of computer home-use for women, men, teenagers, and older children.

The reasons for this shift in focus are not entirely clear. Yet, it is important to note that there is no indication that it is a result of a massive relocation of computer-based employment into U.S. households. On the contrary, while more than 12.5 million microcomputers have been purchased for home-use (OTA, 1985) the Office of Technology Assessment(1986) and the National Academy of Sciences(1985) both report that no more than 10,000 individuals are estimated to be "telecommuters." Sources of data on people who work at home are based on an analysis of the 1980 census (Kraut, 1985), eliminating any consideration of households who may be using the millions of small business computers purchased after the compilation of census data.

While an analysis of the growth of independent contracting (and the role of computers in it) awaits large-scale survey research, there are many possible explanations for why reports on computing at home became redefined in terms of work, and work-related issues in

the 1980s. Two explanations are suggested. They focus on the assumptions and the empirical basis of descriptions of microcomputing activities as well as those of "working at home".

The confusion over what people do with microcomputers at home.

Describing computing activities poses a challenge to any reporter or investigator. Developing a useful typology and/or analysis of computer-related activities in the home is a complex task. It is particularly challenging because it requires defining behavior and situations which defy strict categorization. Unlike some of the jobs for which computer terminals are used at home (e.g. transcribing or data processing), individuals who were able to purchase a microcomputer may be engaged in highly varied and changeable activities.

The social meaning of computing activity in the home is neither immediately apparent nor quickly understandable. To move toward defining the computing environment of the household involves renewed attention to behavior that is often overlooked, or that tends to be looked at separately. For example, the cultural categories of work and play (as well as work and home) do not allow us to understand very well what is going on during creative activities. For example, media reports celebrate the hobbyists whose computer hardware or software innovations at home have become an entrepreneurial success. Yet, we know very little about their actual process, or the extent to which "hobbyists" work independently of computer corporations, or the extent to which they have shaped microcomputer and software industries. Looking across time helps to correct for some of the limited understanding of the initial home-uses of

microcomputers. Yet, to fully understand the interactions between microcomputers and households, greater attention (than this study can devote) needs to be directed to the infrastructure of the market that produces and supports it.

Misunderstandings about the work or non-work aspects of computing at home may have also resulted from the fact that at any given setting, a microcomputer may be used for a wide array of activities. Not only is it easy to switch between performing calculations, minor programming and text production, all in the context of one task, e.g. producing a report, but also, these individual activities may be devoted to different purposes. For example, a word-processing program may be used to write a business report, a personal letter, or keep income tax records, and learning another way of managing data at home may be used the next day at the office. The challenge of describing computing is related, in part, to the flexibility of computing systems, especially in the context of their personal use at home.

Changing assumptions about "working at home."

Other problems in identifying computing activities have resulted from the fact that when it was first labeled "work" by mainstream media (Pollack, 1981) the model of work that lay behind this description was a 9-to-5 office job. A close reading of journalistic reports of these "telecommuters" revealed that, in fact, a diversity of income related activity had been captured under the heading of "employees working at home." These ranged from professional employees who were in the habit of using their homes as a temporary work retreat, to individuals who were paid "by the piece"

for home work at clerical tasks, and who had neither the status or the flexibility of professionals, nor the security of employees.

Along with the often mistaken identity of microcomputer home users and uses, there is another reason for the shift of media attention away from "hobbying" and "household applications" and toward work and work-related purposes. Since the mid-1970s, the phrase "working at home" has begun to refer to both waged and unwaged labor. Between 1976 and 1986, the original, narrower definition of "working at home" (as in running a home-based business or being an employee who works at home) was expanding in its use in mainstream media. Increasingly, microcomputer use at home has signified a wider range of learning and income-related work activities that is portrayed as part of a new picture of the middle-class household in which everyone is constantly working (inside and outside the home). Rather than the prophecies of the early 1970s that computers would enable a large-scale shift of jobs to the home through telecommunications links in the mid-1980s, instead it appears that microcomputers are bringing more work to the home.

The idea that microcomputers have accompanied more work, not more jobs, into the home arises from many sources today. Survey research at the University of California, Irvine, by the researchers, Vitalari and Venkatesh, on the allocation of time in microcomputer owning households, reveals that the majority of individuals indicated that they spent their microcomputing time for "work-related" purposes (Abrams,1985). Similarly, in a survey of employees at Bell Laboratories and AT&T Information Systems, Robert Kraut (Kelly, 1984) supports the viewpoint that an extended work week, rather than a relocation of jobs, is a characteristic of the work

environment of individuals with the highest access to computing and telecommunications equipment. In order to understand whether new technologies are "a cause of, or at least an enabler" of remote work, Kraut surveyed workers at every level of a very highly advanced office automation and electronic networking environment. He found that nearly half the professional workers took work home with them some of the time, and those who took work home also did more work at the office in comparison to their peers who did not take work home. The amount of time these employees spent working at home was roughly equal to a full day of work, and this is in addition to time spent working "after hours" in the office.

Current media representations of computer home use reflect this theme of working after hours at home. A recent Wall Street Journal article titled, "Desire to work at home gains popularity as a motive for buying a personal computer" (Mitchell,1986), demonstrates the shifting meaning of "work at home." Each of Mitchell's interviews are with traditionally employed men who are spending part of their extended work week at home at a microcomputer. In these cases, an individual's work at home may contribute to his household's earning power without ever substituting for a daily commute downtown, or for a forty-hour work week in a traditional office setting. Because of the diffusion of systems within most workplaces, time spent learning computational skills at home has direct implications at the workplace.

> "Your managers notice when you go out and do something like this," he says. Because of his computer, he adds, he's been assigned to special projects....Ray Smith, an architect, bought an Apple IIc because he felt tracking his project costs on a computer could help him stay on budget...After seeing how much easier the computer made Mr. Smith's job, the office got one of

its own. (Mitchell, 1986, p.31)

The dynamic interaction between households and workplaces, marketplaces and consumers, and between public policy, business practices and individual opportunities are not only measured by aggregate figures. They are also measured by the changing expectations of people toward one another.

> His two young daughters, he explains, don't get upset when he works late at home the way they do when he's at the office. "I may not have said anything more to them or done anything more for them," he notes, "but they don't mind." (Mitchell,1986, p.31)

Thus, the popular image of "working at home with computers" explicitly includes professionals who bring work home from the office, as well as independent contract and part-time work. There is also empirical evidence of considerable time being spent on these forms of work in microcomputer owning households. However, the national attention being focused on the "work at home" lifestyle of enterprising families poses many questions for future researchers. With pending social policy on the de-regulation of independent contract work, and many communities debating the zoning restrictions on residential neighborhoods, this dissertation asks whether the social acceptability of income producing work at home is being influenced not only by home computing, but also by its representation as a work activity.

The Experience of Working at Home with Computers

Interviews yielded three important findings about working at home with computers. Each is summarized below, then, followed by a discussion of how these findings relate to the larger question of the relationship between technological change and households.

The Importance of a Second Income

Interviews revealed that bringing a computer into an already established professional practice (based at home) is entirely different from attempting to begin a free-lance career or a home-based business with the purchase of a microcomputer. In the six households studied, it was not only a microcomputer, but also a second, steady income that supported and facilitated the development of a new business venture at home.

The Increase in Time Spent Working at Home

Secondly, inspite of the mixed success of self-employment, individuals' reports about "working at home" are remarkably consistent in certain ways. Members of every household said that more time was being spent working at home than ever before. The reasons for this perception vary based on the "work" to which they refer.

An increase in time spent working means, in some cases, an increase in time spent earning. For example, the aftermath of a home-business failure for one computer systems analyst involved continuing with his small group of clients by moonlighting, while holding an office job during the day. In another instance, one mother hired her

teenage sons to do word-processing for her home-business so that she could keep up with her clients as well as take on the free-lance writing jobs that she preferred. In other cases, while time spent earning had not actually expanded, time spent working had.

More tasks, more responsibility, or more time needed to learn new equipment or skills are common themes described by the individuals who switched from organizational work to independent contract work, as well as by one woman who re-entered office work after having been away for ten years. One reason for the increase in work effort is that being self-employed requires providing one's own marketing, self-management, sub-contracting, etc. Similarly, while the use of word-processing programs and printers enable a microcomputer owner (or user) to produce, and reproduce, reports without the clerical or photo-copying assistance that was previously essential before, the fact remains that text production is time-consuming labor, especially for a person without clerical skills. Even with clerical skills and some computer training, one woman still found that working as a technical editor in a corporate office had greatly intensified since she held the same job ten years before. This was because her employer did not budget for learning the continually changing software or communications systems that she is expected to use (see Kling and Schacci, 1982 for a discussion of the organizational costs of "unbudgeted infrastructural supports"). Whether it is in the context of "independent" or organizational work, these interviews provide evidence that one consequence of the integration of microcomputers into some professional and service practices involves the unexpected absorption of labor and costs by individuals.

Another increase in "work" mentioned by several women referred to the increased burden of housework in their lives. One woman who taught school explained that since her husband first purchased his microcomputer, and then began working independently, the house had become filled with the growing accumulation and mess of his literature, equipment, papers, and so on. Because he did none of the housework or food preparation, she said, "it's just more work for me." For another woman who recently began earning at home, there may not actually have been any more housework than before, but now because housework became a break from working on the computer, she felt a more pointed resentment of her total responsibility for it. Feeling unable to ever stop working, she was disturbed when her teenagers interrupted her with requests for clean towels and so on. She interpreted their behavoir to mean that, in their eyes, <u>if she is in the house she is not really working.</u> The teenagers agreed that now <u>everyone</u> was working most of the time in their household. But, they complained that since their mother began working with computers at home, she also stopped doing things for them.

The perception that the purchase of a microcomputer has led to "more time spent working" also occured in relation to increased time spent on personal projects by computer-users. For example, when a professional writer began using his microcomputer for more than ten hours on computing statistics for his softball league, the fact that he was sitting at his computer, "rather than taking his breaks with us" signified "more work" to his family.

The Difference Gender Makes in Working at Home with Computers

As the above examples indicate, within the family environment "work" does not seem to be defined in relation to its product. Rather, it is defined by the social power of individuals in the overall division and organization of labor within the household. The third issue which emerged followes from this analysis: the difference gender makes in the cases studied, includes the social, physical and psychological context in which work is defined.

Interviews suggest that across households, and within the same household, the acceptability of focused concentration and intellectual immersion is not the same for men and women. For the men in these cases, working at home with computers tended to be facilitated by discretionary time, a room of one's own, and what amounts to a household policy of non-interference with their focused concentration. Whether a microcomputer is in a private office, bedroom, or shared family room, the capacity for self-absorbed thinking/action in households with children involves the possiblity of withdrawal from household attentiveness and constant responsibility. Women and girls report greater interference with, and fewer environmental supports for, their computer earning and learning activities at home.

The essential difference in the social relations in which women and men in these cases work at home can be summarized in the following comparison. As long as a man is working, he is perceived by his family as not being "at home." As long as a woman is in the house, she is perceived by her family as being "at home."

Microcomputer home-uses evolve in particular social worlds. Whether or not a microcomputer is itself "gender neutral," the households into which they are integrated are not neutral. Households are thick with meaning, and inscribed in the race, class, and gender contexts in which they are historically situated. During interviews, when individuals reflected on the evolution of microcomputer uses within their households, every adult computer-user portrayed his or her own home computing as an activity which was in keeping with their sense of home in their lives. This issue deserves further investigation and discussion, but this research suggests that an individual's sense of home, like their sense of a computing at home, is not an entirely individual matter. Instead, it is subject to social conflict and social negotiation.

Theoretical Issues for Future Research

The theoretical implications of empirical research on technology and housework discussed in Chapter One (see pages 11-18) offer considerable explanatory power for the findings described above. In the context of household life, microcomputers appear to share more of the social consequences of household utilities and appliances than might be expected. In a systematic study of a wider, more diverse population, future researchers might consider the parallels this dissertation found between what is understood about the industrialized household and about the integration of microcomputers at home. The following are parallels of particular interest.

1. Findings that the introduction of new technologies can decrease the arduous aspects of work without decreasing the time spent performing it. As Cowan (1974) and others have demonstrated, because the introduction of new equipment results in rising standards, and the elimination of specialists, (previous examples have been laundresses, or milkmen or knife sharpeners, current examples might be clerical or graphics assistants) its users become generalists who acquire the skills, and absorb the labor and time that once occupied paid workers.

2. Some of the conservative impacts of electrical devices in households (Thrall, 1982) were also found to be true of microcomputers in the study households. Microcomputers were found to support or reinforce existing social arrangements in the sense that when men began working at home with computers they absorbed no more of the household maintenance than when they worked outside the home, and when women began working at home, their total responsibility for housework was not impacted. Also, in this regard, while boys were given microcomputers in their rooms, no girls ever received this type, or any other type of computing advantage in their households. While no girls had any word-processing or computational expertise in this study, there is considerable evidence that because of their computing skills, boys enjoyed an increase in status and an expansion of roles. Teenage and older boys with computing skills were not only acting as technical assistants in their families, and sometimes tutoring neighbors, they were also employed by their parents to pick up the slack in their workload.

One contradictory indicator of Thrall's concept should be noted as well. In every household in which men began working at home,

they absorbed more childcare responsibility. Although these fathers did not always say they did more "childcare," (and children did not always say that they saw any more of their fathers just because they happened to be working in the house, instead of in an office) women consistently reported that they did. Women described the positive difference it made in their lives to have someone else be responsible, and serve as a back-up system during the working day.

3. The industrialization of the household has been portrayed by many historians and writers as a revolution that never really came "home" (e.g. Thompson, 1963; Cowan, 1979). Because work accomplished in the home, including household care, tends to be "pre-industrial" -- measured by the task and not by the clock, interruptable to the rhythms of human need, and rarely rationalized or regulated by economies of scale -- even scholars who describe the powerful interrelations between families and an industrialized economy often portray the home as a buffer against the exacting pressures and the social relations of the market place. Further study of the emergence of diverse kinds of work currently being conducted at home may indicate that the industrial revolution is finally coming home, and with it, the ability to rely on homeplaces as "buffers" may be ending.

New links between "home" and "work" are being developed through the expanding uses of computers, and the telecommunications systems which connect them. But, thus far, stories about computer home use reveal more about the continuity of an older link. A study of the first ten years of microcomputer uses at home reveals that the household is a setting in which people learn independently of their schools, and work independently of their jobs. The psychological environment

within households can foster the creativity and resourcefulness that individuals bring to one another, and to the institutions of this society. But this does not occur without the intricate and invisible labor of making and keeping a home. As future investigators seek to understand "working at home" and the influence of computers on individuals and organizations, this dissertation suggests that special attention be given to the many types of computing activities that fall between traditional categories of either recreation or wage work. In this regard, Papanek's concept of "family status production" (see pages 17-18) may be particularly useful in understanding the roles of unwaged, computer-based work in households.

This study has found that the household continues to be best understood as a locus of conflict and cooperation within itself, and in relation to other social institutions (Hartmann, 1981). Thus, the services households provide for their members and for society are subject to social negotiation. The questions raised by this dissertation lead to the need for further inquiry, not onlyon the role of microcomputers in households, but also on the roles of diverse households as they absorb the benefits and the costs of technology transfer today. By seeking to understand the environmental context of the integration of computers and households we can hope to inform the planning and design of policies and settings as the definitions of home and work are negotiated in the end of this twentieth century.

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