Terminal Signs

Approaches to Semiotics
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Terminal Signs
Computers and Social Change in Africa

by

Bennetta Jules-Rosette

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For the Kenyan and Ivorian computer professionals,
whose courage will shape the future

Preface

Technology's impact on social change in two African settings is the subject of this study. The preparation of this book has involved field research over a four-year period in Kenya and Ivory Coast. A longitudinal study has permitted me to trace the enormous changes that have taken place in the availability of microcomputers in both settings and the growth of firms and educational institutions dedicated to computer use. Part I of this book establishes the theoretical and ethnographic background for this comparative study. Part II presents ethnographic data on computer adoption drawn from work and educational settings in Kenya and Ivory Coast. Part III concludes the book with a semiotic analysis of computer adoption and post-modernity in Africa. Many institutions and individuals have supported me in this exploration of Africa and the computer. They include intellectual dialogants, research organizations, granting agencies, and, above all, the computer professionals of Kenya and Ivory Coast, whose inspiration helped me to conceive this study.

In 1984, the first phase of this study was funded by Grant #Int. 84-07272 from the International Division of the National Science Foundation. Mr. Robert Bell, then head of the Subsaharan Africa Division of the Science in Developing Countries Program at the National Science Foundation, was instrumental in assisting me to develop the research design for the pilot study. He provided me with invaluable contacts in Kenya and monitored the initiation of the research project in Nairobi. The computer experiment described in Chapter Five of this book was a byproduct of my discussions with Mr. Bell. I would like to thank Mrs. C.A. Mwango of the Office of the President in Kenya for her attention to my research projects over the years and her personal concern with my progress. Mr. Aleke-Dondo of the National Council for Science and Technology in Nairobi was helpful in guiding me in the design of the early stages of this project.

The second phase of this project was supported by a fellowship from the John Simon Guggenheim Memorial Foundation in 1985 and 1986. This fellowship enabled me to conduct follow-up research

on small firms adopting computers in Kenya and to spend an academic term as a research fellow at the Development Centre of the Organization for Economic Cooperation and Development (OECD) in Paris. In particular, I appreciate the assistance of Jean Bonvin, Director of Coordination for the Development Centre during my fellowship period, and the encouragement of my OECD research colleagues, Carliene Brenner and Winifred Weekes-Vagliani, who taught me much about the interrelationship of technology and economy.

During the 1985 research period in Kenya, I was assisted in the collection of interview data by Mary Omosa, a graduate student in the Department of Sociology at the University of Nairobi, and David Holzman, then a doctoral candidate in the Department of Sociology at the University of California, San Diego. Both Mary and David added pertinent insights to this study and alerted me to important trends in Nairobi's business world. Willie Mushioki, a member of the Nairobi Handicraft Cooperative, assisted with local interviewing and participated in the computer experiment at the cooperative. To Willie and to the management and staff of the Nairobi Handicraft Cooperative, I am more than grateful for their time, support, and eagerness to help with the computer experiment. They ventured into unknown territory with me and shared a mutual learning experience. Kevin Crews, then a Peace Corps volunteer in Nairobi, enthusiastically contributed his advice and expertise by monitoring the computer experiment in 1984 and 1985. The firm managers, computer professionals, and computer vendors in Nairobi kindly consented to share their time and expertise with me. Their interviews are the empirical foundation of this study.

The faculty members of several educational institutions in Nairobi have provided me with research support, critical feedback, and intellectual stimulation. Dr. Erasato Muga, former chairperson of the Department of Sociology at the University of Nairobi, helped me to initiate this project. As acting chairperson of the Department of Sociology, Dr. Roberta Mutisyo was instrumental in the research clearance process and offered helpful comments on this study. Dr. Joshua A'Konga of the University of Nairobi has long been supportive of this project and of my previous field research efforts in Kenya. I owe him special thanks.

Professor Robert J.P. Scott, former head of the Institute of Computer Science at the University of Nairobi, has reviewed draft research proposals, offered critical comments, and shared with me

in Berkeley, California offered useful remarks on several draft chapters. Members of my 1985 and 1986 advanced seminars in the sociology of knowledge at the University of California, San Diego also engaged in lively discussions of these chapters.

The Humanities Research Institute of the University of California, Irvine was a stimulating experimental environment in which to complete the final draft of this manuscript. I appreciate the interest of the Institute's founding director, Murray Krieger, in the implications of my research as a case study in the applied humanities. Productive discussions with fellow researchers and the support of the Institute's staff saw me through the final stages of writing this book.

Suzanne Grant Lewis of Stanford University has been a fellow traveler in the journey toward understanding new technologies in Africa. My colleague, Pierce Julius Flynn, has read many versions of this manuscript and collaborated on development of the framework for analyzing audiovisual transcripts used in Chapter Seven. No words can express my thanks to him.

Over the years, several people have been involved in the transcribing of interviews and the preparation of this manuscript. They include Berta Alexander, Paula Demong, Theodora Garr, Sylvia Moeller, and Muriel Vitaglione. Sallie Bayless has energetically and valiantly seen the manuscript preparation on this project through to the end. I owe special thanks to the staff of the Office of Learning Resources at the University of California, San Diego for their attention to detail in the reproduction of tables and diagrams for this book.

Finally, I would like to thank my parents, Walter and Bennetta Washington, for their confidence in my work, financial support, and willingness to share the daily trials of research and writing with me. I appreciate the patience and moral support of Violaine and Fred Thompson. It is my hope that the young computer professionals of Kenya and Ivory Coast will find a genuine source of encouragement in this book.

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La Jolla, California   *Bennetta Jules-Rosette*

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Introduction

> The increasing skill, speed, and scope of popularizing
> and disseminating knowledge enhances the prestige of
> the trial-and-error method at the expense of the old-
> fashioned inculcation of sacred or quasi-sacred texts
> (Karl Mannheim, 1950:250).

Introductory Remarks

Prometheus, the mythological son of a Greek Titan, was condemned
to perpetual torture for introducing fire to mortals. The Promethean
myth is a cultural narrative that reveals a long and deep-seated fear of
human mastery through technology. Yet, advances in technology are
at the core of contemporary society. New Technologies have radically
changed the business world and the international economy. These
technologies have the potential for changing the face of Africa. Africa,
however, has been ignored in the equation of technological change.

By Africa, I mean not only a continent with a specific cultural
and political history but also a symbol inherent in modern thought.
This invented Africa has been the nostalgic symbol of tradition and,
more recently, of unfulfilled struggles. In this book, I present the
results of a comparative study of computer adoption in Kenya and
Ivory Coast. The conclusions, however, are not limited to these African
settings. Computer adoption has invariant features associated with
technological learning in any cultural context. In situations where
new technologies introduce the potential for abrupt change, computer
adoption is a qualifying test and a challenge.

Technology's relationship to culture is much debated and often
misunderstood. The signs and symbols that comprise our cultural
understandings form the backdrop for receptivity to new technologies.
Therefore, semiotics, the study of processes of signification, offers
effective conceptual and methodological tools for examining the
computer as a cultural object. Programmatic studies assessing the
impact of new technologies for purposes of policy and prediction
begin by enumerating machines and measuring changes in work
productivity (cf. Wad and Radnor, 1984:18-20). The human element
involved in learning to use these technologies is often overlooked.

Interpretations of technology emerge through talk and human interactions with technological objects. Therefore, much of this book will be devoted to discourse about computers at various stages of their use. The semiotic study of narrative will be employed as a framework for analysis.

Several assumptions support a narrative approach to technology, culture, and society. Each culture embodies narratives about the transformation of human potential through the mastery of technology and the domination of nature. The Promethean myth still lives. Technological mastery promises a utopian world in which the forces of nature can be conquered. In discussing the computerization of society, Daniel Bell (1981:xi) refers to the "magic wand" of technological change through which communications, the economy, and lifestyles are transformed. Expectations that such transformations will, indeed must, occur are embedded in cultural narratives that are played out in contrasting ways under different political, economic, and social constraints.

In this book, I apply the program for the study of narrative developed by the semiotician A.J. Greimas to the analysis of cultural understandings and social processes involved in computer adoption.[1] My version of the narrative program has four stages: (1) confrontation of the human subject with new technologies; (2) mastery of technology; (3) attribution of meaning to the technologies mastered; and (4) final narrative resolution through a process of terminal signification. In Kenya and Ivory Coast, the two cases that are my primary foci, the narrative program unfolds in contrasting ways. In Kenya, a fragile computer contract is established in which new technologies are both promoted and feared. This ambivalent response to computers and related technologies denotes a reaction against foreign intervention counterbalanced by a dream of progress. The ambivalence toward technology runs deep in Kenyan society. It is reflected in traditional folktales, everyday discourse, media reports, and government policies. In contrast, Ivory Coast more openly embraces new technologies. Through a progressive computer contract, the Ivorian government attempts to promote and regulate the use of computers and new telecommunications systems as tools for economic development and sources of cultural capital.

The meaning of discourse is shaped by the cultural narratives that ground it. Greimas (1987:64-65) asserts:

[T]he generation of meaning does not first take the form of the production of utterances and their combination in discourse; it is relayed, in the course of its trajectory, by narrative structures, and it is these that produce meaningful discourse articulated in utterances.

As I interpret it, this statement does not mean that all utterances in everyday discourse constitute a narrative about the subject's actions. Rather, a narrative program that comprises the goals and motivations of acting subjects underscores discourse and offers the structural basis for its interpretation. This assertion is pertinent to analyses of discourse about technology in which the human subject is both the sender and receiver of messages and is transformed by interaction with the technological object. A narrative analysis is relevant to studies of culture and technology because narratives contain presuppositions that emerge in talk and documents about new technologies.

Plan of the Book

This book is divided into three parts that parallel the confrontation, domination, and attribution stages of the canonical narrative program. Part I applies the narrative program to an analysis of the initial stage of confrontation with computers in two African settings. Chapter One describes the social and symbolic contexts into which computers are introduced in Kenya and Ivory Coast. In Chapter Two, I analyze the discourse of confrontation found in computer-related success and disaster stories from Kenyan and Ivorian firms. These micronarratives exhibit similar patterns of utopian discourse, oriented toward final outcomes rather than procedures of computer use. The discourse about the benefits and shortcomings of computers is framed in the subjunctive mode and addresses the unrealized technological potential of computers.

Chapter Three examines the emerging roles of computer professionals — the new technicians of the sacred — as they carve out a domain of expertise in changing societies. Mastery of technology is compared with the acquisition of secret religious knowledge, and the role of technology in African societies is examined as a new arena of knowledge control. The discourse of confrontation, which has utopian religious characteristics, is the linguistic tool of the new technicians.

In Part II, I present case studies of computer adoption in Ivory

Coast and Kenya. Chapter Four contains an analysis of Ivory Coast's progressive computer contract. Following the example of the 1978 Nora/Minc report in France, Ivory Coast sponsored the first Conference for Integration of African Informatics in 1979 and has produced two national plans for the regulation of computer-related technologies. These plans cover areas ranging from education to computer contracts and sales. Their objective is to bring Ivory Coast into the twenty-first century as an important contender in technological development on the world scene. I use these plans to analyze the discourse of public policy in Ivory Coast and the relationship of public discourse to computer adoption. Focus is placed on the computer and engineering consulting companies (SSII) that are mushrooming in Ivory Coast. Their competition with major international vendors introduces fascinating complications into the narrative of computer adoption. The government attempts to regulate this competition by favoring certain vendors and computer consulting companies in their bids for government sales and contracts. In spite of the growing market for computers in Ivory Coast, the government remains the largest purchaser of computer equipment. In Chapter Four, I analyze the consequences of computer diffusion as it is depicted in interviews with computer managers and vendors. In addition, I examine the relationship of the market for computer sales and services to the educational system in a brief profile of INSET, Ivory Coast's University of the future.

The narrative of technological domination and mastery proceeds with the Kenyan case in Chapter Five. The government's ambivalence toward the importation of computers by private companies is evidenced by high import duties and taxes that restrict the availability of computers. The results are importation of outmoded equipment and attempts to circumvent government regulations. In the absence of a formal plan coordinating computer policies, the Kenyan situation superficially appears to be one of unbridled free market competition.

In fact, conditions for the sale of computers in Kenya have been so restrictive that major international vendors have withdrawn from the country. The economic impact of the withdrawal of these multi-national firms affects all sectors of the business world and not merely the computer industry. Computer-related success stories appear in firms where the management and computer personnel have made special efforts to obtain new technologies. Case studies of successful computerization in Kenyan government agencies exhibit a pattern

of reliance on foreign consultants, who have been quick to publicize their efforts. The lasting effects of these projects, however, are subject to much speculation. In the domain of education, the consequences of weak technological planning are evident in the rise of commercial computer colleges. Although these colleges respond to a felt need in the Kenyan economy, their quality and standards are mixed, and the criteria for their accreditation are unstable.

On the level of discourse, the fragile computer contract is manifested in considerable optimism at the moment of initial confrontation with new technologies. Frustration emerges during the implementation process and is evidenced in complaints about incompatible and outdated computer systems. Computer managers and systems analysts whom I interviewed in Kenya used the ambiguity of this situation to improve their job positions and increase control. They have employed technology as a source of professional entitlement. This process entails what Harold Garfinkel (1967:200-201) has referred to as the "entitlement to read" organizational texts in a privileged manner. Entitled reading enables computer experts to recode and reinforce their positions as new technicians of the sacred.

In Chapter Six, I conclude the comparative ethnographic study of the Kenyan and Ivorian settings with a focus on computer education. I examine the process of socializing workers into the new mechanical solidarity by providing an overview of public and private computer training institutions in Kenya and Ivory Coast. Using interviews with computer educators and employers, I contrast the effects of the fragile and progressive computer contracts in terms of educational content, evaluations, and outcomes. This chapter concludes with profiles of two young Kenyan computer professionals. Their cases illustrate individual successes within a restrictive technological environment.

Part III begins the shift from the domination stage of the technological narrative to final attribution. In Chapter Seven, I continue the focus on computer education with microsociological and socio-semiotic analyses of learning to labor with computers. I examine student programming sessions at a secondary school in Nairobi and emphasize the similarity between human-computer interactions and classroom instruction. A moment-by-moment analysis of videotaped learning sessions reveals the students' tendency to focus on acquisition of technical programming skills rather than on the cultural content of their lessons. The students' technical grasp of the computer's functions is more profound than their understanding of the questions

that the computer program asks about Western culture. Classroom instruction is elliptical, ritualized, and mechanical, following the pattern of the student-computer interactions. I compare the students' emergent mastery of computer skills with a computer operator's confident control of his work situation at a Kenyan car dealership. In this analysis, I probe the ritualized ways in which the computer is manipulated as part of a code of empowerment in the business world.

In Chapter Eight, I analyze the contractual exchanges that emerge at the final stage of the narrative program for computer adoption. By explaining how contracts are interpreted in everyday discourse, I demonstrate that the concept of contract is at the core of all business transactions involving computers. Contractual exchanges between the government and firms and between firms and clients constitute the fragile and progressive computer contracts. I contrast the ways in which these contractual exchanges occur in Kenya and Ivory Coast with reference to the narrative program of computer adoption. This chapter combines semiotic theories of narrative with ethnographic and textual data.

The book concludes with an analysis of terminal signs. These signs are the final narrative utterances that draw the technological scenario to a close. Terminal signs contain an ultimate attribution of meaning. These signs reverse the narrative program. Formal attribution permits the reinterpretation of all previous successes and struggles. While terminal signs bring the narrative to a close, they simultaneously deconstruct it. And a new scenario unfolds. Terminal signs index the reflexive status of the narrative program. Rather than being a method for the assessment of new technologies, these signs link technology to culture. They indicate how the meaning of technological objects is incorporated into discourse, gestures, and social actions. Four terminal signs are identified: (1) modeling devices, (2) representational signs, (3) totalizing signs, and (4) analeptic signs. I use these signs to develop a cultural projection for Africa in the postmodern era. At the end of the book, I provide a glossary of technical and popular computer-related terms used in Kenya and Ivory Coast.

The Methodological Challenge

Many studies of technology are unsatisfying to scholars interested in cultural analysis. The meaning of technologies for their users is either ignored or hopelessly stereotyped. The major methodological challenge that I have faced during the course of this study has involved confronting how the users of new technologies in Africa view themselves and their technological objects. What cultural messages do they send and receive via new technologies? In responding to this question, I have employed semiotics as a methodological resource. Semiotic theory, however, does not automatically translate into the social applications of semiotics, or a sociosemiotics (cf. Greimas and Courtés, 1979:355-358; Jones, 1985:235-252). This uncharted region is fertile ground for transdisciplinary collaboration among social scientists and semioticians. In this book, I shall attempt to steer a course through these waters by combining development studies, cross-cultural research, and ethnography with the methodological tools provided by the semiotic analysis of narrative and discourse. This combination requires the intersection of diverse and mutually enriching literatures. The ways in which the signs and symbols of new technologies are manipulated in Africa increase our knowledge of processes of signification. Conversely, an understanding of the cultural narratives that produce the receptivity to technological innovation is essential to a grasp of the challenges faced in Africa as the world enters the post-industrial era. Postmodern culture is characterized by the breakdown of the narratives of certainty and progress that define modernity. New technologies challenge the meaning structures of modernity wherever they appear.

My methodological task demands imparting ethnographic and historical facts about the emergence of postmodernity in Africa. Although ethnography's death and its replacement by the "writing of culture" has been predicted (cf. Clifford, 1986:6-8), I shall argue that our ability to understand cultural narratives depends precisely upon resuscitating ethnography. Part II of this book emphasizes the essential place of ethnography in cultural interpretation. Nevertheless, for analyses of cultural change, ethnographic studies alone are not sufficient. Examination of the fragile and progressive computer contracts in Kenya and Ivory Coast is supplemented by both a comparative method and a semiotic approach.

Discourse is linked to narrative structures by more than a cumulative process. Emanuel Schegloff (1987:229) argues: "Efforts to link the level of culture and society in the search for variation are unassured of success and uncertain in motive."[2] He claims that the analysis of speech exchange systems automatically contains a delineation of the contexts in which this speech occurs. Instead, I am utilizing the structure of cultural narratives as a resource for interpreting discourse. This approach permits analysis of spoken discourse, interaction, gestures, and written texts as part of the narrative program. Consequently, the distinction between the microanalysis of discourse and the structural analysis of cultural meaning is muted. Discourse takes on its significance as it unfolds with in the narrative program. In agreement with Schegloff, I contend that the specific work, educational, and policy-making settings in which this discourse occurs are less important than the structures of exchange that they exhibit. However, I locate these structures with reference to the progressive stages of the narrative program for computer adoption. This narrative program is relevant as an object for sociosemiotic study only as it is thematized and displayed in interactions and talk about technology. Analysis of the links between social interaction and cultural narratives requires ethnographic studies.

Illustrations of Technological Change

Three assumptions are basic to my approach. (1) *Computers are actors in a technological narrative.* (2) *Computers are agents of social change.* (3) *Computers are interactants in the discourse and practices of the workplace.* Computers have been a force in African development over the past two decades. Only recently, however, have computers contributed to large-scale transformations within the workplace. Mainframe computers used in government planning for African nations have been recordkeepers. They have served primarily as memory devices storing outdated information.

A senior programmer at a Kenya wholesale outlet attempts to manage the transition from a labor-intensive NCR keypunch computer to a new electronic multi-user system while increasing the number of employees for whom he is responsible. If he increases the number of employees, although their individual work tasks have diminished,

he will obtain the title of data processing manager and double his salary. Government administrators in Ivory Coast strive to develop a computer policy that will limit the activities of multinational computer vendors such as IBM, BULL, and UNISYS, while simultaneously encouraging these companies to invest in the country. The Kenyan government organizes the computerization of key government ministries but imposes stringent restrictions on public access to computers.

These cases are not merely management conundrums. They share a common theme. Each case illustrates an effort to manipulate the narratives of public discourse in order to delimit everyday practices that constitute the adoption of new technologies. Computer policies project a specific representation of development and change. In some African cases, such as Mali and Sudan, new technologies figure only dimly on the agenda for development planning. In other cases, such as Ivory Coast and Gabon, computers have become the technological means for entering the postindustrial era. A comprehensive analysis of the impact of computers on the African continent would encompass all of these examples.

In this study, I have selected Kenya and Ivory Coast as cases in which computer use is well underway. Yet, strikingly different technological orientations have been taken in the two countries. Adoption of computers in Kenya has been slow and unregulated. In Ivory Coast, the approach to computerization has been utopian and progressive. As of late 1986, the Office of the President in Kenya had appointed representatives from several ministries along with foreign consultants as members of a commission charged with developing a national computer policy. Computerization of government ministries, district offices, and educational institutions was to be a primary concern of the commission. In the end, this commission did not manage to devise a national computer policy. On the other hand, Ivory Coast's national computer agenda emphasizes the positive consequences of regulating computerization and automation. The goal of the national informatics plans is to establish Ivory Coast as a major regional leader in engineering research and development.

Émile Durkheim's classic society under mechanical solidarity is one in which the division of labor is simple, and social control is direct and repressive (cf. Durkheim, 1949:61-69). New technologies leave behind the evolving functional division of labor that Durkheim describes as organic solidarity. Postmodern culture has been heralded

as "haunted by the . . . representation of a lost 'organic' society" (cf. Lyotard, 1984:15). According to this view, automation and electronic technologies eradicate old forms of work specialization and increase the purview of state control. They introduce a new mechanical solidarity. Some authors argue that alternative forms of societal analysis must be developed to examine the postindustrial era (cf. Bell, 1973; Habermas, 1975; Gouldner, 1979). Daniel Bell (1973:20) has described scientific progress, theoretical knowledge, and the control of technology as key principles motivating policy formation in post-industrial society. The attention of sociologists and popular critics concerned with postmodern discourses and cultural forms has focused almost exclusively on the United States, Western Europe, and Japan. African nations have been included in this scenario only in order to illustrate their losing political and economic positions in a competitive technological game. My research reveals that postmodernity has arrived in Africa. Its advent is exhibited by the spread of new technologies and changes in public discourse. New technologies have become the hope for a great leap into a future-oriented Africa.

Computers are a concrete manifestation of changes in class structure and indigenous control in postcolonial Africa. They provide a point of entrée for studies of the new professional class. Computers offer a way of seeing the modeling of postmodernity in microcosm. The channels through which computers enter a Third World nation reflect existing patterns of domination and state control. Areas of indigenous entrepreneurship are those into which microcomputers have the potential to be used in the most innovative ways.

By examining the computer as a symbol of change, it is possible to juxtapose old and new work patterns, aspirations, and organizational styles among office workers. The innovations of these workers resemble those encountered in the informal worlds of trade and commerce in African cities. My previous studies of social change in Kenya focused on the emergence of a new commercial form – the grass-roots factory.[3] I gradually became aware that my ethnographic research also afforded me a glimpse of a much larger social and economic picture. I sought a way to utilize ethnography to uncover the formal world of African business, which I assumed was, on some level, driven by local innovations. In *Symbols of Change* (cf. Jules-Rosette, 1981:12), I argued for an analysis of how "interpretations of the past are recreated as new experiences arise." In this study, I have continued to explore the ways in which these new beliefs crystallize as symbols of modernity and postmodernity.

The open investment climates in Kenya and Ivory Coast led me to believe that computers were important concerns for businesses dealing in foreign capital. The 1976-80 development plan for Ivory Coast was designed to encourage foreign investment in all economic sectors. During the 1970s, Masini *et al.* (1979:9) found that direct mergers of capital between major foreign investors and local firms in Ivory Coast were still "relatively rare." Hence, I wished to investigate whether computer use would be more widespread in private sector enterprises involving substantial outside investment than it is in the government and small local enterprises. As a result of the growing urban and rural insider elite in Kenya, I had expected to find a larger number of computers in use among smaller, local-level enterprises. The differences in official attitudes toward technology in both countries, however, created a situation quite different from the one that I had anticipated. A positive computer policy stimulated the spread of computerization across economic sectors in Ivory Coast whereas lack of regulation produced mixed results in Kenya.

The Broken Promise of Modernity in Africa

Self-determination in many African nations brought with it the bright promises of opportunity and modernity. Pre-independence movements throughout the continent fueled a restratification of local societies. Mining, the railroads, and the heavy industrial interests of the colonial era forged a new African proletariat. In countries with an agrarian base such as Kenya and Ivory Coast, a rural proletariat emerged. Integration of more and more individuals into the wage labor system expanded the government's control over community life. However, contrary to many Marxist theories of development, state control does not determine all forms of cultural and political adaptation to social change. At one dialectical moment, economy influences society. More generally, subtle patterns of cultural innovation condition visible changes in social and economic organization. This assertion emphasizes the importance of a theory of symbols of change for interpreting the driving forces of African modernity. The broken promise of modernity refers to the sense of disillusionment generated by the social and economic obstacles to development and change in newly independent African nations. The dream of postmodernity involves the wish to fulfill and move beyond the broken promise.

With independence, the new elite and the rising bourgeoisie influenced the course of development chosen by African nations (cf. Langdon, 1981:3). Both the proletariat and the *compradore* bourgeoisie were products of the colonial political and economic experience. Colonialism introduced modern bureaucracy as a form of administrative control. Bureaucracy brought with it the civil service and the structure and atmosphere of the modern workplace. Computers have introduced a new form of organizational hierarchy based on technological expertise. This hierarchy is not dependent upon social structures inherited from the colonial past.

The newly bureaucratized workplace embodied its own hope of progress, advancement, and opportunity. A rising group of professionals – civil service administrators and office clerks – began to differentiate themselves from the proletariat and the bourgeois business interests. Research concerning the socioeconomic status of the white-collar service class in the United States and Europe is well developed (cf. Goldthorpe, 1982:1962-185; Abercrombie and Urry, 1983:122-130). This group is distinct from the working class by virtue of its level of bureaucratic responsibility, the nature of the work contract for professionals, and its economic interests. Although white-collar employment conditions may not mold a class interest group in the African context, they suggest an expanded sphere of knowledge, influence, and privilege for office workers.

As early as 1940 in the Belgian Congo, a new group of *évolués* developed. René Lemarchand (1964:94) characterizes the *évolués* as "a new class . . . composed of clerks, medical assistants, traders, artisans, and so on." Journalists, political leaders, and religious figures emerged from this group in spite of administrative efforts to woo and co-opt them. *Évolués* are an interesting case because of their foothold in the lower levels of the civil service and their indoctrination into the world of office work. They are the predecessors of today's computer professionals.

Lemarchand (1964:96) quotes a 1945 description of the *évolués* by Antoine-Roger Bolamba, a member of their ranks and editor of *La Voix du Congolais*.

> The *évolués* are well dressed and wear fasionable clothes. They meet in front of bookshops and look for new books. They read Georges Duhamel, Henri Bordeaux, Roland Dorgelès, and all the modern writers. They discuss, rightly or wrongly, current affairs. You meet them in cafés exchanging ideas on current problems with a rare exuberance.

These Congolese *évolués*, who had their counterparts in other African nations, were part of the emerging bureaucratic elite and subelite. For example, Abner Cohen (1981:45-48) points out the importance of civil service training and administrative positions for the development and domination of Sierra Leone's Creole population. The Creoles were a colonial civil service elite whose controlling position has been weakened in the contemporary context. Armed with limited education and resources, both Creoles and *évolués* represented a cultural rather than an economic challenge to the state. What has become the *évolués* today? Justin-Daniel Gandoulou (1984) suggests that they have not disappeared. In Brazzaville, they have resurfaced as the new group of *sapeurs*. Leaving secondary education without diplomas or specialized certificates, these young people form social clubs that emphasize appearance, dressing well (*se saper*), speaking well, and traveling. They spend disproportionate sums on the latest technological gadgets (a telephone at the very least), new clothes, and their initiatory trip to Europe from which they return with more gadgets and more clothes. The *sapeurs* have replaced the broken dream of modernity by the simulation of postmodernity. Marginalized by modern life, they choose to benefit from its appearances and the allure of new technological and social forms.

The *sapeurs* and the urban subelite constitute an emerging social class in African cities. This group is young and predominantly male, notwithstanding the studies of women's clerical employment in the Zambian case.[4] The subelite has limited access to formal education and little economic control because of dependence on wage labor in the lower rungs of the white-collar world. What the subelite lacks in economic capital, however, it makes up for in terms of cultural capital or, more precisely, the desire for cultural capital and an un-flagging belief in prosperity. Often school leavers, the members of the subelite are not given preference in high-level bureaucratic posts. Their credentials are vocational or job-related certificates that qualify them well for the socioeconomic niche that they occupy, but their aspirations are for wealth, status, and reputation.[5] Discontent with the broken promise of modernity, the urban subelite aspires toward a new world of social opportunity. Born neither of industrial exploitation nor economic advantage, members of the new subelite seek their rightful place in the world of urban work. Computer training provides an arena of mobility for them.

The Simulation of Postmodernity

Automated offices constitute a social microcosm in which the contemporary world is simulated and reflected. According to Jean Baudrillard (1981:10), simulation is not the creation of a referential reality, a system of signs that stand on behalf of real objects. Simulation involves reference to an infinite order of signs. The computer creates a simulation of aspects of human thought. In an applied context such as the office, the computer is part of a referential system that orders all forms of reportage, documentation, and fiscal planning. It is a work master whose systems control and organize those who use it. The computer bears the brunt of organizational and technical breakdowns. The computer-related successes and excuses discussed in Chapter Two mask a host of bureaucratic rearrangements in the workplace. In businesses, argues Rosabeth Moss Kanter (1977: 54): "Computers take over many complicated forecasting and analysis functions." In so doing, computers provide a rationale for reducing the uncertainty of the enterprise's future and the workers' roles. In the Kenyan and Ivorian firms that I have studied, computers are seldom used to make business projections and forecasts. Instead, they are harnessed to narrow economic and organizational tasks – constructing payrolls, ledgers, and stocks. In these cases, the computer's restricted use increases the workers' sense of uncertainty while expanding their repertoire of skills.

Carrying the implications of Baudrillard's argument further, the computer's simulation of social reality may be seen as a vision of the way things ought to, and will, be. The computer involves reclaiming of the broken promise of modernity. Young trainee programmers such as those whom I interviewed in Kenyan data bureaus and Ivorian computer consulting companies advance rapidly to senior programming and administrative positions and triple their initial salaries. This ever-present hope of unlimited achievement through technological competence is part of the computer's simulation of the postmodern dream. *Sapeurs* don new clothes in order to feel cosmopolitan and sophisticated. Technocrats learn new computer programs in order to gain a sense of social and bureaucratic control.

When access to the computer is manipulated skillfully, it may become the source of technological empowerment, bureaucratic control, and organizational restratification. The computer is a self-referential sign, referring back to its own presence in the workplace

and to a host of changes that it instigates in the microcosm of office work. Moreover, it is a symbolic representation of the context of postmodernity in which it appears. Not only do terminal signs conclude the narrative of the computer adoption, they are also the signs of postmodernity. They emphasize the ways in which technology influences and models human conduct.

Computers and Office Work

Computer use in Kenya and Ivory Coast has characteristics not shared by Western countries. In Kenya, import duties and restrictions limit the availability of computer equipment. The likelihood of purchasing inappropriate equipment is high. Computer managers and consultants in Kenya complain about lack of vendor support for new computer systems and limitations of on-the-job training programs and vendor assistance. These complaints are less frequent in Ivory Coast where the computer market is more vigorous. In Ivory Coast, however, competition among vendors leads to the possible reduction of after sales support. There is a tendency to distribute readily available equipment rather than waiting for higher quality technologies to arrive.

In Part II, I analyze new technologies, work organization, and the administrative revolution. The rise of office work is a distinctive feature of modern industrial and postindustrial society. Michel Crozier (1971:10) describes this development as the "administrative revolution," which he believes is equal in scope and impact to the industrial revolution of the nineteenth century. The automated workplace is the seedbed of a revolution within a revolution. Bowles and Gintis (1976:204) point out that the percentage of salaried managers and professionals in the U.S. economy has increased over sevenfold since the turn of the century. Office and commercial employees more than doubled between 1940 and 1960 in the United States.[6] Between 1966 and 1973, 92% of all new jobs created in the United States were in the finance, insurance, government, and service sectors employing white-collar workers (cf. Norman, 1980:30). Although these workers number over nine million in the United States, and are on the rise, the entire investment, banking, and insurance sector in Kenya contained only 38,547 workers as of 1979.[7] There is a time lag between the occurrence of the so-called administrative revolution in

Africa and the West. With the 1976-78 coffee boom in Kenya, employment in the public administrative sector expanded. This period coincides with the widespread introduction of mainframe and batch computing into the University of Nairobi, several government agencies, and a number of private concerns.

The contrast in the size and growth of the Kenyan finance and banking sectors and those in the West is yet another indicator of the problem of economic development in the global economy and of what Colin Norman (1980:51) terms the influence of "microprocessors on political processes." These observations suggest that computer workers, and office workers generally, are part of a small segment of privileged employees in Kenya. Complaints are common throughout government, industry, and small private concerns that there are simply not enough experienced computer professionals to meet work needs. The grounds for this complaint will be discussed at more length as part of the analysis of the Kenyan computer training and the credentialing processes in Chapters Five and Six. Now it is sufficient to note that the nature of the computer training process and the crisis over computer credentials limit the available pool of workers and their level of expertise. Many computer posts in government are vacated by reskilled computer experts who leave for more lucrative jobs in private industry.

Cross-cultural literature on the effects of computers in the workplace contains mixed findings. Some studies of new technologies in the United States and Britain argue that computerization and automation centralize power and reinforce the status of managers and computer professionals at the expense of computer operators and the clerical workers (cf. Attewell and Rule, 1984:1188; Perrolle, 1987:134-135). Contrasting studies (Markus, 1984:55) note the uneasy balance of power between bureaucratic managers and computer professionals. Results concerning the increased productivity of computerized organizations vary (cf. Attewell and Rule, 1984:1184-1185). In their report on the adoption of computers in Kenya's Ministry of Agriculture, Pinckney, Cohen, and Leonard (1987:67-93) found that the introduction of microcomputers increased the ministry's efficiency and facilitated the production of accurate and timely budgetary estimates and reports. This project, which is described in Chapter Three, relied heavily on foreign consultants. Due to conflicts between bureaucratic managers and the computer personnel, the implementation of a stable local staff to handle the computerized budget was difficult.

Pinckney, Cohen, and Leonard (1987:88) conclude their evaluation of this project by stating:

> Retention of staff is a serious problem. Microcomputer use is expanding in the developing countries, and operators will be needed in the private sector. At present, there is no government mechanism for promoting skilled microcomputer operators in Kenya.

This problem re-emphasizes the strong relationship between government policy and work conditions in the automated office. In Kenya, weak national policy, fluctuating titles, and ill-defined work tasks in the computer world are evidence of a fragile computer contract in which technological empowerment is shaped by an ambivalence toward the presence of computers. Debates concerning the deskilling and reskilling of workers are less relevant than understanding how jobs are transformed and symbolically recoded by the presence of new technologies in the workplace. Ivory Coast has confronted the problem of job entitlement in its informatics plans. Educational prerequisites are outlined for computer employees, and their job titles are specified as part of the plan. This policy filters down to the level of office work. Company managers describe entry-level qualifications and advancement potential of engineers and computer programmers with reference to the guidelines specified in the informatics plans. These guidelines do not remove negotiation and conflict between computer professionals and general management. Nevertheless, they establish a framework within which new employment patterns can evolve.

Part of the colonial bureaucratic legacy in Kenya and Ivory Coast is the overbureaucratized workplace. In both government and the private sector, overstaffed offices that operate on a strict line authority model with little decision-making autonomy and initiative at middle administrative and lower levels characterize this type of highly stratified work environment. Workers and middle managers wait long hours for directives and information from the top. Because of backlogged filing and reporting systems, the information necessary for processing reports, ledgers, orders, and sales is often not forthcoming or must be sought from an outside agency. Customers' needs are seldom filled quickly. In Kenya, the introduction of batch computing and mainframe computers in government and private businesses has partially remedied this situation by mechanized processing. This cumbersome system, which involves coding and preprocessing of data and potentially long waits for returns from data processing bureaus, is characterized by information analepsis. The backlog of data may simply be hand-

processed and placed on the computer after the fact in a card-punched or disk-logged format.

Within many public and private offices in Kenya, mainframe computers predominated until 1983. Under this system, data processing managers initially became the analogs of general office managers, often challenging their authority and control in the workplace whiie placing an equally complex set of hierarchical rules and requirements on computer operators and clerical workers. Senior programmers, systems analysts, and operations managers filled out the ever-growing office hierarchy and created a new bureaucratic layer through which information had to be filtered. The old lines of authority remained rigidly fixed with the mainframe computer, and bureaucratic control moved into the hands of foreign computer experts and outside consultants. The key word "expert" has become synonymous with new manifestations of bureaucratic control.

Microcomputers threaten this overbureaucratized system of office hierarchy. Users are able to teach themselves after brief introductory lessons. Information, ideally at least, comes more directly under the control of individuals at their work stations, and recycling of computer employees into areas related to their original work tasks is a real possibility (cf. Weekes-Vagliani with Pralong, 1983:9-11). Sociologists in the West have not viewed this type of development with unguarded optimism (cf. Braverman, 1974:342-346; Bowles and Gintis, 1976: 203-219; Crompton and Jones, 1984:52-54). They have argued that the spread of microcomputers and in-house computing have led to a deskilling of workers and a proletarianization of white-collar employees. The decline in skills and remuneration accompanying work tasks creates a fall in prestige of the job.

In Kenya, however, it is more difficult to speak of the proletarianization of a sector of employees who are a privileged minority. Other factors intervene. In some instances, as illustrated by the computerization of Kenya's government ministries, simpler computer programs that could be carried out by reskilled workers have been superseded in a short period by more complex programs requiring systems analysts with more computer training and higher organizational standing. After the initial introduction of a relatively simple microcomputer, more complex systems are installed that rebureaucratize offices following the old format of line authority. Senior programmers replace general office managers as technocratic leaders but continue to play the strategic organizational role of controlling the knowledge, work

tasks, and advancement of office workers.[8] Thus, a continuum might be drawn between the old, overbureaucratized workplace and the new, more open office of the future. The tension, however, between old and new formats persists even in small enterprises. Consequently, strategies arise to rebuild old hierarchical forms when they are challenged by the workers' increasing familiarity with new technologies.

The New Computer Professionals

Regarding the social experience of working with computers as measurable in terms of economic productivity flaws much of the literature on new technologies. This approach overlooks the symbolic process of recoding work tasks and job titles. One means of controlling this recoding process is the establishment of professional computer associations, unions, and syndicates. In Kenya, such associations have failed to materialize despite computer professionals' abortive attempts to organize during the early 1970s.[9] This situation is not merely a byproduct of low technological density, or the scarcity of computers in the country. Tanzania, for example, had only 419 institutionally owned microcomputers as of 1986 according to a survey by Lewis and Sheya (1987:9). Ivory Coast had approximately 1,221 micro-computers in 1985 as reported by the second national informatics plan (1986:26). In both cases, professional associations were formed to protect and promote the interests of computer specialists.

The Association Professionelle des Informaticiens de Côte d'Ivoire (APICI) was founded in 1973 in order to promote the interests of computer experts, regulate standards within the profession, and foster outlets for computer education. Members of the association include individual computer experts, vendors, firms, and educational institutions.[10] Their activities are carried out through seminars, monthly meetings, lobbies, and publications in the association's journal. Some computer professionals that I interviewed saw APICI as an arm of the state and a vehicle for the implementation of a uniform computer policy. However, the association's existence predates the national informatics plans. The APICI has been influential in lobbying for the implementation of policies oriented toward technological expansion in the private sector.

GIMI (Groupement Interprofessionel pour le Management et l'Informatique) is a syndicate that represents private sector companies. This organization promotes the interests of computer managers and company heads and is strongly supported by Ivory Coast's computer consulting companies (SSII). Many computer professionals are individual members of the APICI and members of GIMI on behalf of their firms. GIMI occasionally takes an adversarial stand with regard to state regulation of competition among computer consulting firms and vendors. Both APICI and GIMI reinforce the status and recognition of computer professionals. They operate as boundary maintaining organizations that separate neophyte computer users from certified professionals. These professional associations help to crystallize the position of computer specialists as the new technicians of the sacred with a secret code and a set of criteria for displaying their elite status. The APICI even has a Committee on Deontology (Commission Déontologie) designed to establish and propagate ethical and legal standards in the profession. In its maintenance of professional exclusivity, the deontology process has sectarian overtones.

According to Lewis (1987:3), interest in a national computer policy among computer professionals in Tanzania dates back to 1969. In 1986, the Computer Association of Tanzania (COMPAT) was formed as a reaction against restrictions on computer imports imposed by Tanzania's National Computer Advisory Committee. In the manner of the APICI, COMPAT attempts to balance the interests of computer professionals against national technological goals as perceived by the profession. Regardless of their on-the-job experience with computers, COMPAT members are required to hold formal credentials exhibiting their computer training. In a survey of these computer professionals, Lewis (1987:10) found that approximately 60% had overseas training. COMPAT brings together vendors, computer consultants, and managers in a single association and special interest lobby.

While the model for professionalization in the APICI derives from French professional syndicalism, the COMPAT model has been influenced by the formation of associations in the accounting profession (cf. Lewis, 1988:283). This pattern is particularly interesting because it resembles the history of professionalization in bookkeeping and clerical work in the United States and Britain (cf. Strom, 1987: 63-81). This fact emphasizes that Tanzania, like Kenya, follows an Anglo-Saxon pattern of technological change and deregulation. Lewis (1988:268) considers the Tanzanian computer association an "elite

within an elite." This association creates an alliance between computer professionals in the public and private sectors, fosters professional exclusivity, and is a source for controlling knowledge about the profession. Although I agree with this interpretation, I would further argue that computer professionals must be situated within the new postcolonial class structures emerging across Africa. Their professional and economic standing represents a break from colonial class structures. Moreover, these new professionals are part of a larger urban elite and subelite who challenge the bureaucratic and cultural hegemony of the older bourgeoisie. Considering the new computer experts as members of an emerging class as well as a profession permits an analysis of their shared cultural beliefs and narratives about the opportunity structures of contemporary society. Abner Cohen (1981:8) suggests that the cult of power and dramaturgy surrounding it be treated as a critical feature of class formation in Africa. Such an analysis includes the lifestyles, conspicuous displays, and aspirations of cultural groups as dimensions of social stratification.

The literature on class formation in Africa is fraught with debates and ambiguities. Much emphasis has been placed on the dual commitments of the emerging working class to the wage labor force and to self-sufficiency in the rural areas. Peasants who relocate to urban areas to sell their labor attempt to retain an independent agricultural base. Variations on this pattern can be found among African office workers who return to rural areas to oversee their farms on weekends. Janet Bujra (1979:48) points out that the subtleties of these processes of migration, social change, and cultural combination have been buried in the discourse of modernization theory by references to the dichotomy between traditional and modern lifestyles. Although the topic of emerging lifestyles will be considered in this study, a counterbalancing issue involves the type of collective experience that develops as a result of employment in the bureaucratic office as an idealized sociocultural microcosm.

A compelling argument concerning the influence of the new computer professionals may be developed if we examine their situation from the perspective of cultural analysis. Computer users share personal aspirations and a sense of cultural identity. The historical precedent for this sense of collective identity may be traced to the *évolué* civil service and clerical workers of the 1940s and the subelite office workers of the 1960s, prior to the recent advent of automation in the African workplace. These groups are unified by their discontent with the

broken promise of African modernity and efforts to realize a dream of prospertity through occupational advancement and the conspicuous symbolic display of status. Some computer professionals resemble the older *évolué* class by virtue of the limitations of their educational and economic possibilities. There, however, the similarity ends. *Évolués* saw political independence as the key to a better life. Computer professionals begin within an independent political context that has left their personal expectations unfulfilled.

Workers who routinely use and come into contact with computers may be divided into five categories in Kenya and Ivory Coast: (1) clerical workers; (2) programmers; (3) engineers, systems analysts, and data management experts; (4) computer vendors and their support staff; and (5) computer educators. In most Kenyan enterprises, word processing is still at a minimum. The computer is used for inventories, stocks, ledgers, budget management, and financial planning. At one large data bureau in Nairobi, over thirty people are engaged exclusively in data entry through keypunch operations. Their skills are highly developed and they are carefully screened. As is typical of the Kenyan clerical workplace, these keypunch operators are predominantly male. The feminization of the clerical work force dealing with computers has not yet occurred in Kenya and is just beginning in Ivory Coast.[11]

Scholars studying the feminization of the workplace in the West, in particular Britain, argue that the deskilling of clerical work, along with its decline in prestige and remuneration, has affected women more significantly than it has men (cf. Cromptom and Jones, 1984: 2-3). They claim that men, who are often presumed to be more geographically mobile than women, are able to progress more easily from clerical to managerial and professional positions through their participation in an internal labor market that rewards a combination of technical and managerial skills. In the Kenyan case, this internal labor market is the basis for the mobility aspirations of many young male computer professionals and trainees. In contrast, women in private sector offices are chained to typewriters and are rarely found among the programmer trainees and higher level programmers. Word processing systems, which could easily be added to multi-user computer networks, are considered too expensive for these offices. Paradoxically, however, women appear to outnumber men in rapidly growing Kenyan commercial colleges that prepare workers for careers in word processing and computer use. The restricted role of women in the clerical and computer professions is rooted in colonial history. Administrative and higher level

clerical positions are still occupied by men in many African nations (cf. Little, 1973:26-28).

Senior programmers and systems analysts are key figures in the new office hierarchy. They establish the technological redefinition and power base for new office work. Symbolically, they are the image leaders of the computer field. It is their positions toward which computer users aspire. These positions allow them to fulfill the dreams of a new technocratic subelite in terms of salary and with respect to relative autonomy in the workplace. Vendors and educators facilitate and feed off of the rising computer industry. The vendors provide the machines and basic instruction in their use. The educators, who comprise a varied group, earn their livelihood through the training and placement of new computer users.

Conclusions

Local controversies over computer policies in African nations have global consequences. In 1980 at the twenty-first session of the UNESCO General Conference, a resolution was passed to reduce the information imbalance between developing countries and the rest of the world.[12] The resolution called for improved technologies of information transfer and communication in the developing world and "the sincere will of developed countries to help them attain these objectives." A year later, the "Berg Report" on accelerated development in subsaharan Africa submitted to the World Bank suggested that problems of economic development could be resolved by the implantation of effective administrative policies by local governments.[13] These governments were viewed as standing in the way of their own progress due to poor planning, fiscal mismanagement, and lack of attention to effective development strategies. The combined effect of the Belgrade resolutions and the "Berg Report" has created an implicit mandate for international consultants to exploit possibilities for technological innovation in Africa. More importantly, these reports issue a call to action for African nations. New technologies provide an unprecedented economic resource for Africa. These technologies, however, involve both risks and responsibilities. Timothy Luke and Stephen K. White (1985:29) underscore this technological challenge when they state:

> Although the expansion of informational capital extends in new ways the loss of freedom and the loss of meaning in modern life, it nevertheless has an ambivalent character, at least in relationship to some of its new technologies. These, under radically altered conditions, could become supportive of greater human autonomy. . . . The moral-practical sphere could expand in the sense of greater participation and control of average citizens of economic and political decisions.

Problems of meaning in the moral-practical sphere of action are part of a cultural narrative. They exhibit the relationship of technological change to the political and social structures that limit human potential and autonomy. The analysis of computer adoption in Africa is a small, often overlooked aspect of the process of global technological change in the postmodern era. The computer is a self-referential sign of postmodernity's simulation and promise of progress.[14] Through the interactions surrounding it, the computer reshapes life in the postindustrial workplace and aspirations for life beyond work. As a simulation, it presents a symbolic forecast of events to come and is a modeling device for the course of individual and organizational behavior. The computer provides a convenient technological excuse for the breakdown of the new social and mechanical forms that it engenders. Human endeavors and lapses may be repaired by reference to technological errors. The computer's presence, thus, implies its own schema for the modification and repair of social behaviors in transition. The computer in Africa is a symbol of change and a rallying point for the emergence of a new profession and a new social class.

As a consequence of their access to computers, the subelite of office workers may evolve into a new technocratic class — the new technicians of the sacred who manipulate the ideologies and dreams of postmodernity in Africa. This social class will be very different from other class and interest groups molded out of the old colonial infrastructure. To the extent that this group masters and indigenizes the computer, it will not be dependent on outside sources for credentials, influence, or status. Yet, as with the older subelites of Africa, this group may remain marginal, or it may splinter into a new white-collar proletariat, controlled and enslaved by the very machines that promise to free it.

Chapter One
The Symbolic and the Social:
Computer Use in Two African Settings

> When adequately domesticated and decolonized, the
> computer in Africa could become a mediator between
> the ancestral world of collective wisdom and personal
> intuition on one side and the new world of quantified
> data and scientific analysis on the other. The sociology
> of knowledge is undergoing a change in Africa. And
> the computer is part of that process of change
> (Mazuri, 1977:303).

Structuring Interaction with Computers

Narratives sustain bureaucratic order. Cultural narratives are manifested
in office work, professional education, and government policy. They
demonstrate the similarities and differences between organizational
cultures in Africa and the West. When these narratives are decoded
by computer users, the link between narrative structure and everyday
social practices is not problematic (cf. Haferkamp, 1987:187). These
narratives contain basic assumptions motivating technological innova-
tion. The daily social practices in automated African offices include
using computers to compile inventories, ledgers, and statistics. The
accumulation of these practices structures interaction with computers.
Structuring practices, however, do not define the meaning of
new technologies.

Pierre Bourdieu (1977:72) employs the concept of "habitus" to
describe the social structures produced by everyday practices in partic-
ular environments. Both Bourdieu and Anthony Giddens (1984:28-
36) are concerned with the ways in which these structures develop
as products of human signification.[1] They assume that individuals
monitor their actions based upon their immediate goals and means
of access to knowledge. Bourdieu points out that strategies of inter-
pretation devised in one habitus may be transferred by homology to
other cultural contexts. At this point, cultural narratives resurface.

Cultural narratives are schema of interpretation that permit the
transfer of knowledge from one domain to another. Thus, neophyte

computer users in Kenya apply established social forms to their ritual-istic interactions with the machines. Folktales about the magic of technology and the rituals surrounding sacred technological objects are part of a cultural narrative. I shall expand this approach by developing the narrative program for computer adoption.

Two Models of Narrative and Performance

Two models represent the symbolic progression of events. The first is the narrative program developed by A.J. Greimas and the second is Victor Turner's model of social drama (cf. Greimas, 1970:172-180; Turner, 1957:92-94). Although I shall draw insights from Turner's approach, Greimas' narrative program will be the primary source adopted to analyze African computer use. Greimas employs the narrative program to examine the roles of actors and agents, or senders and receivers of communication. He analyzes narrative unities and organization in terms of four stages. These stages extend from the confrontation of two subjects to a final contract that establishes a resolution. The four stages may be applied to human-machine inter-action, decision making in firms, accounts of individual careers with computers, and public discourse about new technologies.

When computers enter the African scene, they are actors in an unfolding narrative. So too are organizations and entire countries in which computer policies are developed. Consequently, it is possible to classify nations in terms of their computer discourses and ideologies. Then we can examine the impact of these strategies on individuals, professional groups, and businesses. This approach to narrative encom-passes the cultural understandings behind computer practices. The narrative program applies action categories to texts. In the section that follows, I shall employ these categories to analyze texts and work environments in Kenya and Ivory Coast.

There are parallels between Greimas' model and an earlier approach to social drama developed by Turner. In his anthropological studies of Zambian villages, Turner used social drama to account for the rise and resolution of conflict and change as a community performance. The first version of the model has four parts: (1) breach, or the initial appearance of conflict and change; (2) crisis, in which the conflict is played out to the point of a cleavage in social relationships;