Social Anthropology of Convergence and Nomadic Computing

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Abstract—The paper attempts to contribute to the largely neglected social and anthropological discussion of technology development on the one hand, and to redirecting the emphasis in anthropology from primitive and exotic societies to problems of high relevance in contemporary era and how technology is used in everyday life. It draws upon multidimensional models of intelligence and ideal type formation. It is argued that the predominance of computational and cognitive cosmovisions have led to technology alienation. Injection of communicative competence in artificially intelligent systems and identity technologies in the coming information society are analyzed.

Keywords—convergence, nomadic computing, solidarity, status.

I. INTRODUCTION

THE spectacular technological progress registered during the past few decades has given rise to much conjecturing and theorization on the future trends and their impact on our daily lives [1]. Technology, once considered as a stabilizing force in sociopolitical sphere, has clearly become the main driver for social revolution. A fundamental aspect of contemporary technological development is the concept of convergence. It is said to occur when entities and sectors previously considered independent now become competitive or complementary. The main enabler of convergence is the ability to represent all information, via multiple media, as binary data [2]. The result is that different information media can be freely mixed within applications, and processed, stored, and communicated within a common infrastructure. The concept of convergence has been applied to a succession of key developments and major paradigmatic shifts for the information and communication technology and has been used to explain the important changes that have shaped the industry we know today. From computing and communication convergence discussed in the 80's, we have witnessed the advent of converged multimedia with data, voice, image, and all other forms of information becoming capable of being communicated via the same channel. Furthermore, it has become possible to use a variety of formats and platforms involving different hardware devices. The fixed mobile convergence has allowed providers to share information and expertise on combining services that will allow users to move

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seamlessly between their home fixed line phone and mobile networks. Convergence is an ongoing process taking place on multiple: network, terminal, service, and market levels that can bring together content from different industries using alternative physical infrastructures and increase consumer choices while decreasing costs. The next phase in the information technology revolution is expected to be the convergence of control, including sensing and actuation, with communication and computing. The convergence of high-performance computing, global high-speed 4G communications, and advanced sensing and data analysis is driving the next technology inflection point and is setting the stage for business transformation. In this paper, we shall focus on the environments where human machine interactions take place, rather than on specific devices and services. The concept of a smart environment refers to intelligent systems through which services satisfying the needs of the inhabitants can be furnished proactively, and people can readily interact with machines. In a paradigmatic shift, subsystems are no longer conceived as components or objects. System entities are now conceptualized as agents that are capable of perceiving the state of the environment through their sensors, and autonomously determine their goal directed actions through their actuators. In applications like intelligent homes, pervasive medical care systems, crisis control environments, and wearable computing devices, agent cooperate and combine pervasive computing and context awareness technologies to deliver enhanced, highly usable services to mobile users. Mobility is thought to be a major distinctive characteristic of future computing environments, enabling nomadic information creation and sharing. A nomadic computing environment consists of heterogeneous assemblage of interconnected technological and organizational entities that enables physical and social mobility of computing and communication services between human and artificial agents both within and across organizational borders. At the core of future visions of technologically enhanced provision of timely services like ambient intelligence, smart environments, and ambient assisted living, is the idea that computing becomes ubiquitous by embedding it in the environment and in everyday objects and routines [1,2]. A major shortcoming of the research in these areas, however, is the implicit assumption of technological determinism and neglect of the human users. Even when the social impact of convergence and nomadic computing is investigated, attention is focused mostly on what technology can offer. There are proliferations

of both optimistic studies analyzing the emancipating potential of new technologies and pessimistic studies showing their alienating threat, mostly from an essentialist standpoint. Against this instrumental reason, a more substantive line of research is called for. Ethnographic studies of technological innovations have indicated that there is a difference between the intended use of new technologies by the designers and their real, effective utilization by users [3]. The impact of convergence and the new nomadism calls first and foremost for a social anthropological explication. The blurring of boundaries discussed in conceptualization of cyborgs and claims of posthumanism and transhumanism have not been adequately investigated in anthropological literature. Problems of empowerment, inclusiveness, participation, and especially presentation of self in the coming technologically enhanced environments also constitute important social and ethnographic categories in need of more elaborate research [4]. This paper, thus, will also be a step towards redirecting anthropological works from its traditional focus of primary and traditional communities to problems of everyday life in contemporary world as well as real and virtual cyberspaces.

II. MULTIDIMENSIONAL MODELS

A major aspect of this paper is to emphasize multidimensionality of factors that influence propensities of actors in their daily interactions with technologies and information systems. We wish to extend models developed in specific fields and apply them to analyze broader interdisciplinary questions. Let us start from the concept of what competencies are to be enhanced in the intelligent systems and environments of tomorrow. From the outset, literature on artificial intelligence was faced with the problem of competing schools of thought on the very nature of intelligence. Symbolic and cognitivist views dominated as long as computing was abstract and disembodied. That dominance was challenged especially in late eighties with the sudden surge in biomotivated research on intelligent systems and later by convergence of computing with cybernetics, as well as convergence of information technology with biotechnology and nanotechnology and importance of embedded systems in ubiquitous computing [3,4]. The theory of multiple intelligences holds that there are many dimensions to the concept of intelligence and one sidedness of machine intelligence can give rise to serious problems especially during interactions with humans. The mathematical/logical ideal model, according to this theory, constitutes only one dimension of the true intelligence. Verbal/linguistic capabilities, musical/rhythmic understanding, naturalism, visual/spatial skills, interrelational skills, intrarelational skills, and bodily kinesthetic abilities constitute other important dimensions. Acquisition has been shown to become more efficient when several dimensions are involved during the learning experience [5]. There may also be hierarchical structures for the different dimensions according to developmentalist schools. Social intelligence, and emotional

intelligence have in recent years attracted much attention in both psychological literature and applied disciplines like management and control and computing. The concepts are highly correlated. Social skills and empathy are conjectured to be important aspects of emotional intelligence. Empirical findings show EQ to be a much better predictor for future success than IQ. Concepts of affective computing, emotional control, and sentient objects have also been developed for intelligent machines. Not only can artificially intelligent systems be made capable of perceiving others' emotions and showing their own emotional states, but also allowing their feelings and emotions guide their actions. Social and emotional intelligence can also be used for enhancing communication in impoverished cybermedia and increase believability and create more naturalistic and less stressful human machine interaction [6]. The so called "triple C" model for language use, elaborated more than a decade ago by the author, has motivated several studies about the communicative, cognitive, and cultural skills of learners especially in sociolinguistic research. Educational research has shown that those bilinguals who begin to learn second language at age of 5 or 6 can achieve the communicative competence for the second language very soon, but as the cognitive competence for the first language is not fully achieved, they develop cognitive competence for the second language very slowly [7]. I have suggested that communicative intelligence should be considered of equal importance to cognitive intelligence for machines that are interacting with humans in smart environments. It is also difficult to underestimate the importance of cultural competencies of intelligent devices in their daily interactions with human users [4]. I have also elaborated two dimensional models, where decisions are made according to considerations, motivations, and ideologies in the status-solidarity plane [8]. Non- functionalist theories on role and behavioral compartmentalization and formation of multiple standards that continue to exist alongside one another despite their differential prestige have been presented where the continued existence of low prestige norms and values, often covert rather than overt and regenerated from below, has been explained through their significance in identity and solidarity oriented cosmovisions. To realize the vision of ambient assisted living technologies, it is very important to assess the inclination of various communities towards their adoption. Firstly, let us consider the status dimension and consider the impact of new technologies on power relations. Far from being emancipatory, nomadic coputing technologies have not introduced egalitarian conditions and have led to digital divides. Monitoring and surveillance capabilities of new technologies are also massively extended. Issues of control are especially relevant in relation to intelligent agent technologies executing tasks on their own authority and autonomy. Who will control their actions and who will benefit from the provision of their services? If the present trends continue, the social participation of the marginalized will not increase; and they will increasingly lose their control not only to members

of more powerful groups, but also to smart devices that act autonomously. Smart devices will have to take sides when conflict exists. Their impact on gender and age relations can already be seen today. The concept of genderscript captures the inscription and de-inscription of representations of masculinities and femininities in technological artifacts. Artifacts can become gendered because the preferences, motives, tastes, and skills of the potential users, and the norms and values in society at large are anticipated [9]. Regeneration of masculinity and femininity in nomadic computing environments takes place both through ascription of gendered roles to technology users and direct engendering of smart devices themselves. It is not accidental that housework, which seems to be a service the provision of which needs to be automated: a development with significant impact on private and public spheres and thus upon gender relations, has not gained the top priority in our research agenda. My research on relationship between gender, technology, and higher education in Iran and elsewhere, show notable genderscripts. Not only do male and female students show unequal tendencies towards using technologies like the Internet, but also their mode of use is very different. Male usage patterns are more individualistic and status oriented while females prefer more interactive, solidarity enhancing modes [3,10]. Considering the solidarity dimension, the most important aspect of technology utilization the impact on identity regeneration. User friendliness is also of utmost importance. It is especially in more informal domains that solidarity and identity oriented cosmovisions take precedence. Identity based strategies stressing common backgrounds and tacit knowledge are mainly associated with communicative abilities, while cognitive abilities usually enjoy higher prestige and are deemed appropriate especially in more formal and public domains. Once situatedness and embodiment has been removed, all we are left with is a world of hyperreality designated as simulacra. The detachment of intelligent devices from their original culturally specific situation decontextualizes them. Communicative competence, on the other hand, implies sensitivity with respect to context. Context awareness, therefore, may be the key to communicative and cultural intelligences required for technologies that are more human centered and are to be used in less public and more interactive domains like home. The concepts of intimacy and domestification, elaborated in recent works on nomadic computing furnish powerful theoretical tools for this analysis. The expression of intimacy is very important in personal and social interaction. It can be achieved through creating technologies that simulate touch, bodily and emotional contact, and interactions that imply closeness. The concept of domestification indicates a state of mind whereby computing is not merely perceived as technology or machine, but rather as natural or taken for granted. The predominance of abstract and cognitivist approaches to artificial intelligence contributes to the progressive alienation of computational technology also by making interaction with machines harder and more stressful. Domestification and intimacy can be facilitated via technologies like social and tangible computing, context awareness, and affective computing [4].

III. CONCLUSIONS

Convergence and nomadic computing is disruptive. They cause a re-evaluation of the very nature of computational systems, through concepts such as autonomy, coalitions and ecosystems. In a networked society, people are increasingly forming knowledge communities to pool information and work together to solve problems they could not confront individually. We call that collective intelligence. The paper sought to examine the social anthropological impacts of the new technologies. On the one hand they provide the possibility for oppositional, counterhegemonic subcultures and groups to produce programs expressing their own views, oppositions, and struggles that resist the massification, homogenization, and passivity. They promote participatory culture as consumers take media in their own hands, reworking is content to serve their personal and collective interests. On the other hand they create new social divides and diminish privacies. The paper attempted to present a more substantive point of view from social anthropological standpoint. Technological progress can present both promises and threats. Future development is a result of designers' and users' decisions. It would perhaps be better if instead of "convergence" we considered coevolution of interrelated platforms, disciplines, technologies. How are we to construct new metaphor of computing as social activity, as interaction between independent and sometimes intelligent entities, adapting and coevolving with one another? Can we construct a world without gatekeepers? Is meaning going to be given or can we engage in free collective sense making? Much has been said about security issues and children's rights in cyberspace. Is the future generation going to freely forge and present its own self? Are we going to be brainwashed by the mass media? The paper drew upon a two dimensional model in which factors affecting these decisions were categorized into two: status and solidarity axis. Power relations constitute the main aspect in the status dimension. Who controls the sign is the main question. Whereas in traditional media like television contents are produced by few and consumed by masses, nomadic computing technologies present the possibility for all consumers to be at the same time producers of content. But the realization of that potential will depend on our future choices and how social conflicts develop. On the solidarity axis, a main problem is the impact of technological progress on the quality of our everyday life experiences. How humane are future technologically enhanced environments going to be? Will devices embrace serendipity, playfulness, error, and other human responses that have previously rested outside the orthodoxy of technology design? How do agents and people follow culturally specified social scripts when interacting with each other? The paper discussed the concepts of intimacy and domestification and especially physical togetherness and contingency. Referring to multidimensional

models of intelligences and competencies, it was argued that the predominance of formalism and abstraction in computational sphere and cognitivist approaches in artificial intelligence led to alienating effects of nomadic computing and smart environments. It was suggested that intimacy could be enhanced by endowing smart devices and agents with more communicative and cultural competence. Context awareness was also discussed as empowering technology since recontextualization involves an inevitable transformation in signification. Finally, emotional intelligence was argued to be important in bringing about bounded rationality and satisficing, as well as implicit communication and believability.

REFERENCES

[1] E. Nercissians, and C. Lucas, "Innovative approaches to edevelopment," invited keynote response, Global eContent Summit 2006: Empowering Creators and Educators, Yerevan, Armenia, October 6-7, 2006.

[2] C. Lucas, and E. Nercissians, "Social creativity and Rural Development in Cyberera," in W. Trobbach, H. Hermann, and P. Wolff (eds.) *Communication and Interdisciplinarity: A Challenge to Agricultural Science – Festschrift fur Dm. Siawuch Amini.* Witzenhausen, Germany: Verlag: Kassel University Press, pp. 117- 133.

[3] E. Nercissians, "Ambient intelligence and otherness," Minisymposium on Ambient Intelligence, Second International Joint Conference on Knowledge Management for Composite Materials, KMCM'2008. Vancouver, B.C. Canada, July 8- 11, 2008

[4] E. Nercissians, "Ambient intelligence: the communicative dimension," Minisymposium on Ambient Intelligence, Second International Joint Conference on Knowledge Management for Composite Materials, KMCM'2008. Vancouver, B.C. Canada, July 8- 11, 2008

[5] H. Gardner, *Intelligence Reframed: Multiple Intelligences for the 21st Century.* New York: Basic, 2000.

[6] E. Nercissians and C. Lucas, "Context and cognition: injecting emotions into AI,". International Workshop on Cognitive Science and Neurophilosophy, Iranian Institute of Philosophy, IRIP, Tehran, May 3- 6, 2005.

[7] E. Nercissians, *Topics in Biligualism from the Perspective of Social Sciences*. Tehran, Iran: Cultural Heritage of Iran, 2003.

[8] E. Nercissians. "Bilingualism and diglossia: status and solidarity dimensions," In J. Jorgensen, E. Hansen, A. Holmen and J. Gimbel (eds.) *Bilingualism in School and Society*. Clevedon, Avon, England: Multilingual Matters, 1988. pp. 55- 69.

[9] B. Berner, (Ed.): *Gendered Practices: Feminist Studies of Technology and Society*. Linkoping, Sweden, Dept. of Technology and Social Change, 1997.

[10] E. Nercissians, and C. Lucas, "Technology, gender, and higher education in Iran,".in M. Fremerey, and M. Pletsch- Betancourt (eds.) in *Prospects of Change in Higher Education: Towards New Qualities and Relevance. Festschrift for Matthias Wesseler.* Frankfurt: IKO Verlag. 2006. pp. 193- 216.

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