Digitally Mediated Interaction: Technology and the Urge System

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In this paper, I suggest that computer mediation of human interaction will transform behavior by radically altering—in fact, dissolving—many familiar contexts in which we act. This is a time of tremendous technological change. Digital technologies supporting computation and communication are a major factor in this change. These technologies are themselves changing at a dramatic pace, in their capabilities and in how they are being used. Computer systems are increasingly focused on supporting interaction among people.

Digital technology supports human interaction in several ways. Communication channels such as email, newsgroups, and buddy lists are examples of "direct" computer-mediated interaction. A wider range of technologies support human interaction by increasing awareness of actions, possibilities for action, tools for and products of action, and contexts of activity. These include intranets, the World Wide Web, mobile computing, notification servers, and collaborative filters. Not yet widely used, but attracting interest, are workflow management systems, designed to explicitly guide the activities of people working together.

The shift in emphasis from computational problem-solving to human-computer interaction to computer-mediated interaction has been rapid, but it is only beginning. The Internet is now being readied to support streaming audio and video of reasonable quality. Storage technologies are within reach of supporting multimedia on demand. Web pages are poised to support conversation among viewers drawn by the page content. Awareness and notification mechanisms are being substantially enhanced. We are at the very beginning of the era of digitally mediated interaction.

This chapter on digital mediation of human interaction builds on Toda's work on emotions and social interaction. He writes (Toda, 1999, p. 21) "With very few exceptions all emotions operate on the stage of interpersonal interactions." My focus is on the effects of placing technology in the middle of these interactions.

Novel forms of mediation alter or remove critical aspects of context associated with natural or familiar interactions. Words may be transmitted, but not the tone of voice; or voice may be transmitted, but not facial expressions; or voice and facial expressions without hand and arm gestures; or all of it may be transmitted, but from a different perspective than is available when present in person. This changes our interpretation of the information exchanged, disrupting behavioral and social conventions. Substantial research and development has focused on developing technology that enhances context by providing greater visibility of objects, people, and activity. Greater visibility can increase efficiency, but it also creates complications, raising issues of anonymity,

privacy, censorship, security, reciprocity, accountability, and trust. Cognition and emotion are intertwined throughout.

With startling frequency, technology is now part of the set for the stage on which emotions act. In exploring the effects of technological mediation, I first briefly review aspects of urge theory and their relationship to social interaction. Next, because technology has mediated and shaped human interaction since writing appeared about 5,000 years ago, I review pre-digital history. A discussion of digitally mediated interaction completes the chapter.

Urges and social interaction

As outlined by Toda, urges include expressions of an individual's state generally defined as basic emotions—fear, anger, sadness, happiness, and so forth. These are supplemented by urges that include some that are primarily social. Important among the latter are urges to establish and maintain status, which include demonstrating dominance or abeisance, and engaging in informal discourse (such as chatting).

Presumably, these urges were directly expressed and useful in the wilderness state preceding civilization. Their exercise led naturally to a constellation of social behavior patterns. Subsequently, the desire to organize larger social groups—towns, cities, nations—forced the creation of social conventions that were 'artificial' in the sense that they had been unnecessary in the wilderness. To be accepted, these artificial rules largely adapted to or channeled the innate urges. An artificial rule that violates natural tendencies excessively will encounter resistance, but adaptation is probably never perfect. As described by Toda, artificial rules help us control the expression of some urges that are triggered 'here and now' but could have consequences later. We avoid some expressions of anger and other emotions. We 'keep things in perspective,' where the perspective entails considerations that are longer-term and broader-based than those that arose in the wilderness.

The ease with which we recognize the basic emotions suggests that these have always had a significant communicative or social function. Emotions may be expressed in the absence of people or animals that recognize them, but they can serve at times as signals to other people or as the basis for purely interpersonal interaction.

Mood contagion is another manifestation of the social nature of emotions and illustrates how these phenomena are channeled in modern society. In the wilderness mood contagion contributed to small-group cohesion. It still does, but we also see considerable effort, often assisted by technology, to recruit it to serve organizational and nationalist purposes.

Technology-mediated interaction prior to the digital era

Writing and the agricultural transition

Writing was the first technology enabling people to interact unconstrained by time and place. Before writing appeared, human memory, imagination and anticipation provided links to the past and future that could temper impulsive acting in the 'here and now.' Rote memorization provided continuity of technical knowledge; memory and imagination supported story-tellers and (and prophets) who often described ways to behave that were not based solely on urges. Nevertheless, although the words of ancestors or of distant people were passed along orally, writing was a huge advance in mediated interaction and merits consideration in some detail.

Writing is not essential; even the second half of the twentieth century saw many nonliterate cultures and spoken languages with no written form. What pressures led to the development and use of writing in different places?

In general, writing trailed the development of agriculture and the concentration of populations into large towns or cities. Agricultural techniques evolved slowly. By 5000 BC, cultivation was found in today's North Africa, Europe, Asia, and Latin America, but it was not very efficient and only supported significantly larger populations when techniques or conditions prevented rapid soil depletion. The evolution from villages to large towns or cities progressed from 5000 - 2500 BC in the Nile, Tigris, Euphrates, Indus, and Yellow River valleys based largely on advances in agriculture. In Meso-America this first occurred almost 1500 years later.

As these societies grew in size and complexity, the need to record and regulate grew, and writing followed. Systems of writing appeared in these Old World locations between about 3000 and 1500 BC. In Meso-America the first known large towns were Olmec, around 1100 BC; the Olmec also developed a writing system.

Not surprisingly, writing facilitated and perhaps enabled large-scale projects. The first Egyptian pyramids appeared a few hundred years after hieroglyphics. The Olmec undertook the first major construction projects in their continent.

Insight into the role of writing in large-scale social organization is provided by an interesting exception. The empires in the Andes, notably the Inca, developed without a written language. They followed a similar progression: early agriculture was in place by 3500 BC; by 2000 BC there were some large villages, but the conditions were not good for large-scale organization. This changed dramatically in the mid-15th century A.D. when the Inca went from being a small village to an empire of 12,000,000 people in one hundred years. They did so with major advances in agriculture, extraordinarily sophisticated diplomacy and politics, no doubt luck and discipline, but without writing as we know it. They used a mnemonic device, a cord to which were attached multi-colored pendant cords. Knots in these cords represented numbers, each pendant cord corresponding to a power of ten (units, tens, hundreds…). In addition to accounting, the cords and knots could be used as a mnemonic device to deliver prose accounts. The Inca had a special class of people trained to create and recite from the cords. To make sense of a cord, a person had to know what it was associated with. A highway system was

constructed for runners carrying cords across the Inca empire. The cords were meaningless after the Spanish killed all the runner/interpreters.

Effects of writing

Writing undermines oral traditions and faced some resistance, including Plato's lament that people would forget how to use their memory. When it appeared, writing was used for bureaucratic record-keeping, to record artificial social conventions and rules, and to reenforce the status of rulers through historical or mythical accounts. Toda describes direct and natural expression of urges (which may have complex effects) in the wilderness environment to carry out the same functions on a smaller scale—to communicate and reenforce rules and to establish and maintain status. In large population concentrations, indirect or artificial means are needed to accomplish these things; writing was a much better tool than memorization. Writing mediated social interaction. Its use was typically restricted to an elite class.

We rightly see writing as a liberating technology, a powerful medium for expanding horizons, exchanging facts and ideas, for change. One person can communicate with an unlimited number of others, including those geographically distant and not present at the time of writing. But writing also has constraining, conservative effects. Once something is written, it is more difficult to change. It is not a coincidence that almost all major religions arose when writing appeared in their cultures. Religions evolved over time, but once the key texts were written, they could not continue to evolve in the same way. When practices did evolve, disparities between the text and practice were apparent. Luther's rallying cry that triggered the Reformation, "Scripture alone," argued that Catholicism had strayed from the written word. Similarly with legal practice—a written legal code allows less variation in application and constrains jurists, for better or worse.

In analyzing informal interaction or chatting undertaken to establish or maintain status, Toda notes that the ephemeral nature of speech is critical to this enterprise. Writing is generally inappropriate, an example of a constraint imposed by this more permanent medium. Other technologies such as the telephone are better for mediating informal interaction. Later I consider efforts to support asynchronous informal interaction.

The conservative effects of writing are mentioned because other technologies exhibit a mix of enabling and constraining effects, and only by considering both can we hope to understand or anticipate their effects. It may also be important with regard to Toda's 'invention urge,' which is also subject to both enabling and constraining pressures from new technologies.

With respect to writing, we probably cannot tease out a causal chain. Writing was not necessary for large-scale social organization to come into existence, but once a society reached a sufficient scale, it found writing all but necessary, the short-lived Inca experience notwithstanding. Once adopted, writing could accelerate change. It appears that social organization drove technology development and use, and the technology then influenced society.

Printing and the democratic transition

Toda describes the shift from hierarchical to democratic social organization as the second great transition away from the wilderness state. Again, a technology that enables communication to leap barriers of time and place is involved.

Printing was invented twice, utilizing seals in China and moveable metal type in Germany. The former was treated as a minor extension of writing and helped maintain the conventions of a large bureaucratic society. Gutenberg may not have had democracy in mind either (few people could read his Latin Bible), but he lived a century into the Renaissance and literacy in vernacular languages was spreading. In response to a public thirst for information, a network of publishers in Europe sprang up and eagerly sought content. Martin Luther saw the opportunity and used print to launch the Reformation in what has been described as "the first large-scale 'media campaign.'" (Edwards, 1994).

Printing greatly accelerated the distancing of human interaction from the 'here and now' by its sheer volume. News, education, and opinion that once were relayed person to person became available in mediated form. Censorship became more difficult. Printing did not cause the democratic transition any more than writing caused the large social organizations of the agricultural transition, but it contributed to its success and evolution. De Tocqueville (1848, p. 516) wrote "So the more equal men become and the more individualism becomes a menace, the more necessary are newspapers. We should underrate their importance if we thought they just guaranteed liberty; they maintain civilization."

Once again, we take note of the tremendous forces of invention, liberation, expansion and change made possible by a technology, in this case printing. "It expanded and invigorated everything" wrote Braudel (1979, p. 401). And again these are accompanied by conservative effects. Consider language evolution: the spoken and written forms of most languages have evolved over time, as noted by the progression from Old English to Middle English to English. Historical linguists agree that the arrival of printing slowed and in some cases rolled back linguistic change, through the introduction of spelling and grammar books. "Spelling has blocked or reversed many sound changes in English" wrote one (Antilla, 1989).

Transportation and other pre-digital technologies

Without delivery systems, writing would be just a memory prosthesis and printing would not be profitable. Transportation disseminates other products, and people. It is central to mediated human interaction. While opening up the world, it closes off some possible paths for development. Half of the languages that existed 500 years ago are now extinct. Cultures disappear due to technology: transport, military, and print. A language had more chance to survive if its speakers quickly produced dictionaries and grammars when they encountered writing (Kloss and McConnell, 1981).

Telegraph, telephone, photography, radio, film, and television mediate human interaction, bridging distance, time, or both. They have different effects, but collectively they allow more rapid communication among more people, many of whom will never meet in person. Today it is difficult to imagine when a momentous event in one major city could take months to be reported in another, but only a century and a half ago that was common. Battles were fought weeks after the war had ended.

These technologies are widely applauded, although the homogenization of experience to which they contribute is often deplored and the most popular, television, has numerous critics. I once spoke to an aid worker who described a government that had failed to defeat a rural insurgency until it shifted tactics from military to civilian: putting in the first television in the area, carrying government programming.

Summary: mediation and the ultimate dissociation from 'here and now'

Toda describes the challenges of living in a tamed, highly structured world with urges that evolved to support direct interaction with objects, animals, and other people in the wilderness. He notes that although our organizational and social conventions are constructed with tacit or explicit recognition of the urge system—otherwise they would not be accepted—violence and ailments such as anxiety and depression may result from the mismatch of our urges and environments. In the preceding section I argued that technology is deeply involved with this process, primarily by mediating human interaction. Below I focus on the most recent technological development, computer or digitally mediated interaction. It is quickly becoming the most pervasive communication technology. It could create the ultimate, near-total dissociation from 'here and now' interaction. The new forms of mediation change the nature of human interaction in new ways. Analysis in terms of urge theory can help us understand how people react to them. .

**Digitally mediated interaction.**

By supplementing or replacing direct human interaction with technology-mediated interaction, we support new forms of work, organization, and entertainment. However, the context of interaction changes. Often, much of the context is lost: one person is not aware of what others are doing and seeing, how they are reacting, their physical and social settings, and so on. Although the change or loss of context is recognized, its significance is severely underestimated because most of our use of context is unconscious.

The importance of context, illustrated by videoconferencing

When we interact, we often engage in a complex effort to understand the context of those with whom we interact. Understanding their context includes understanding the meanings of their words and actions, being aware of the people and objects in their physical environments, discerning their knowledge, moods, attentiveness, motivations, and intentions. This effort is both conscious and unconscious. It draws on perceptual information, prior knowledge and experience, social conventions, and inferences. The

degree of understanding that is required and the effort needed to construct it vary from situation to situation, but virtually anything and everything can serve as clues as we assemble a working understanding of those we are interacting with. A technology that mediates our communication inevitably disrupts this process.

To illustrate these points, consider the case of videoconferencing. Digital video is not widely used at present, but it has been a focus of intense research for over a decade, and the technical infrastructure to support it is coming into place. Video, whether analog or digital, is an obvious choice for making geographically distributed meetings more like face-to-face interaction: It restores facial expressions, a channel for non-verbal information. Figure 1 illustrates a typical arrangement. It seems straightforward— camera and monitor at one end of a conference table and microphone centrally placed.
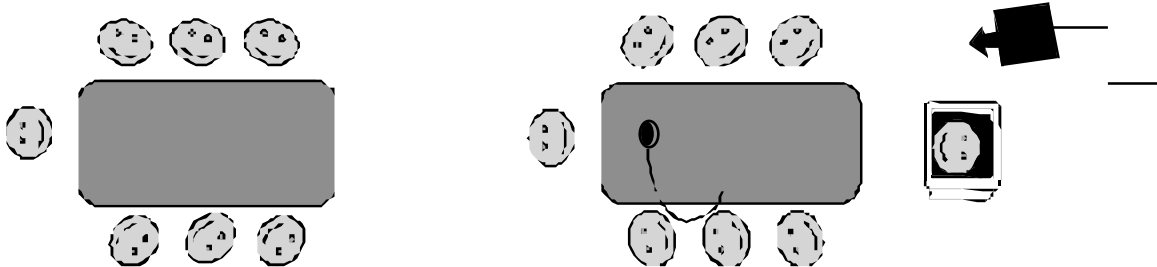
Figure 1. Meetings without and with a videoconferencing link (camera and monitor at right).

Videoconferencing has been used enough for its limitations, challenges, and inadequacies to be known. They reveal the complexity of technology-mediated interaction.

In the standard meeting on the left, the person at the end is generally the presenter or meeting leader. Participants who are less interested, intending to work quietly on other things or even slip out, are likely to sit at the right.

Consider what happens when the camera and monitor are introduced. People are drawn to displays: Attention in the room often shifts from the meeting leader to the monitor and remote participants, usually an unwelcome development from the leader's perspective. To people in the other room, the meeting leader, farthest from the camera, appears smallest; his or her reactions are less likely to be noticed. Most noticeable are the less interested people seated peripherally. Audio quality is often not good; voices in the room may be indistinguishable or mumbled without speakers realizing it. When the presenter/leader addresses the distant audience, visible in the monitor, the natural tendency is to raise the voice to be heard "across the room," but with the microphone placed centrally this is heard as shouting. (Only with technology can you mumble and shout at the same time.) Lighting is tricky; normal room lighting causes people to appear washed-out and sickly. Imperfect video transmission can result in skips and pauses. Although pauses in face-to-face interaction are often interpreted as thoughtful, jerky videoconference pauses make people appear disorganized and strange. If someone has brought an object to show or copies of a document to pass around, remote viewers usually cannot view it adequately.

In the standard meeting on the left, it is clear who is present. With videoconferencing, people may be seated outside the camera range. The video could be routed to multiple sites. Even more divergent, the distant site could be recording the event. Informal banter, sudden outbursts, jokes about people who are not present can have unexpected consequences if heard and seen by people one did not realize would observe them.

The most important observation is that most of these phenomena go unnoticed by videoconferencing participants. They may get their work done, yet leave feeling uneasy, less than fully satisfied, more uncertain about what happened and how people interpreted it. And video is a relatively simple mediating technology!

Desituated action, illustrated by newsgroup posting

Technology allows information to be disseminated easily and rapidly, with obvious benefits. But it disrupts social practices that relied on the fact that particular information would spread slowly or with difficulty.

Consider this Edupage summary of a Financial Times article (5 December 1995) titled "Tokyo Exchange Says Internet Is Too Fast: "Because of 'insider trading' restrictions that ban company officials and media representatives from dealing in securities for 12 hours after they learn earnings results, the Tokyo Stock Exchange wants companies to stop sending such results over the Internet right after they're announced in news conferences." Prior to the Internet, these people could make money on financial news because it spread slowly, so after twelve hours they retained an advantage. The Internet gets the news out quickly; by the time officials and media representatives can trade, it is too late.

Similarly Brin (1998) notes that the United States Supreme Court ruled in 1989 that computerized FBI compilations of publicly available information did not have to be released under the Freedom of Information Act because "There is a vast difference between the public records that might be found after a diligent search of courthouse files, county archives and local police stations throughout the country and a computerized summary located in a single clearinghouse." It argued that private citizens had previously benefited from a "practical obscurity" due to the difficulty of compilation.

More importantly, digital information is potentially immortal, without an opportunity to be recalled or edited. Social practices that are based on the fact that human mediators shape information subtly for different audiences, or that rely on information to disappear over time, are affected.

Ethnographers have observed that most human activity is highly situated in a particular context (Suchman, 1987). In the case of digitally mediated interaction, this is not true in a meaningful sense, because there is no way of knowing when or where digital information will turn up. A seemingly private communication may be read by one person, forwarded to a few other people, or end up in a court case and published in the newspapers.

Consider 'Usenet' newsgroups that have been distributed over the Internet for almost 20 years. Servers around the world download messages daily and keep them online for local access. After days or weeks a message is deleted from a server. Many specialized newsgroups are participated in by a limited number of like-minded people. Regular participants jockeyed for status, expressed anger or other emotion, and confided secrets when they came to trust the group. It resembled a large meeting room with like-minded people, informally contributing ephemeral information and opinions.

About ten years ago, Bellcore, researchers thought it would be great to access newsgroup contributions by people they admired. They wrote a program to archive and search newsgroups. They tested it by entering the names of a few colleagues. "We soon found," one recounted, "that we were discovering things about our friends that we didn't want to know."

The participants in newsgroups did not realize that although it *resembled* a discussion in a closed room, once their message was online it could appear anywhere, anytime. Some year later, *deja news* appeared on the Web, archiving much of the newsgroup activity, and most people have become more aware that what they post could be preserved. Most messages probably are not read outside the group, but no one can know who will read theirs: a prospective employer in five years? Your children in twenty years?

Email and the evolution of mediated chatting

The chatting urge, beautifully analyzed by Toda (1991), has a fascinating and still evolving manifestation in digital technology.

In the beginning, people struggled to define email. It has similarities to letter-writing— asynchronous, with messages often taking a day to arrive. But for people nearby it was more like a telephone conversation, several exchanges with the same person in a day were possible. Some people treated it as a letter-like medium, beginning each message with a formal greeting (e.g., "Dear Jonathan") and ending with a salutation. But to most people, it was much more like a slow telephone conversation. Disk space was too expensive to save email messages—most were short and ephemeral, again like speech.

Accordingly, for most people, email was a good medium for chatting. But some problems arose. Humor is an important element in chatting. Humor is signaled by facial expressions and tone of voice, which are absent in email. As a result, although humor is often attempted in email, the results are poor (and sometimes disastrous). When the smiley — such as ;-) — was introduced to signal humor, its use spread rapidly, but even with that signal humor is often not appreciated.

Avoiding insult is also important in chatting. If I say something that offends you, I quickly detect your discomfort and repair the damage. But if my email message offends you, it remains unchanged on the screen, oblivious to your signals of discomfort! Even as you begin to type an angry reply, my message does not become more conciliatory, violating a conversational social convention. Therefore, your reply may grow yet angrier,

leading to the online phenomenon known as flaming. When I receive an angry message, I try to avoid a 'here and now' response and wait for a day to reply. This is an adaptation to the medium, but a denial of my urges.

However, technology has advanced. Disk space is now so inexpensive that most email is preserved. This makes email a dangerous medium for chatting. Your misspellings and bad grammar could resurface (spell checkers have begun appearing in email applications). Harmless jockeying for status by exaggerated posturing as a tough adversary to impress your colleague could suddenly be subpoenaed and appear in court, treated as a real threat. As a result, people for whom email was once informal now consider it to be more formal.

Interestingly, the need to chat among people who work together has moved on to new technologies, such as instant messaging. Unlike email, instant messaging usually has no "Save" feature. It is designed to be ephemeral. Some computer users who are too young to have ever written letters explicitly describe email as a formal medium, where you worry about spelling, and instant messaging as casual.

But of course, it is possible to save and archive instant messaging.

Why this is happening?

A spiraling effect can be identified. Interaction mediated by technology is placed "on the grid" and decontextualized, but at the same time it omits familiar sources of feedback, leading to a reduction in mutual intelligibility among participants. This may have consequences for understanding, but also triggers undesirable emotional responses and may disrupt positive 'mood contagion' in the group. To compensate for these problems, technology designers create new forms of feedback, awareness, and notification: video, buddy lists, and so forth. With these new features, still more information is represented digitally, decontextualized, potentially appearing anywhere. Each year, more of our activity is carried out in a context we do not and cannot fully envision at the time we are acting.

The history of writing and printing suggest that these technologies are being employed to support a degree and form of social organization that was already taking shape: they contribute to its more efficient functioning. Making visible the activity and work products of others is usually a tremendous aid to efficiency. However, it has indirect consequences.

In a real sense, ownership of an object that is visible to a community is shared, even in a culture that stresses private property. My files are mine to change, but if I put them on a Web site visible to all, there will be more pressure to conform to social norms, to maintain the accuracy of the information, and to remove out of date items. These are conservative and constraining pressures that coincide with the tremendously expansive, liberating effects of the new technologies.

A final challenge.

In describing the situated nature of most behavior, ethnographers and other social scientists have repeatedly demonstrated that behavior is much more variable and inconsistent than we believe it to be. Consciously or unconsciously, we often tactfully overlook inconsistencies and lapses. Technologies mediating interaction are not tactful. They force us to confront the gap between actual behavior and the artificial structures of rules that groups, organizations, and societies have created. For example, we have always had speed limits, and we have always exceeded them. Now we have technology that could detect all violations, selective enforcement becomes more difficult to justify.

Consider this case, in which technology removed an illusion of fairness. A programming class instructor proposed that students submit homework solutions and receive the graded corrections via email. The students produced a counter-proposal: After grading an exercise, the instructor posts all of the graded solutions, with student names removed, for everyone to see! In this way, students can discover what had been tried, what worked and what did not, and which solutions are more elegant. They can learn from each other. It sounds great.

But... those who have graded papers may recall that after working through an entire set, you might re-grade the first few, because it takes a while to work out how many points to subtract for this or that type of error. Grading is not perfectly consistent. In this class, the grading is visible to everyone. The instructor works harder than usual to be consistent, but students still detect inconsistencies, complain, and conclude that a previously admired instructor is careless or unfair. The instructor works harder than usual to be consistent, but ends up disappointing the students. The students' illusion, their belief in the consistency of grading, is undermined by the technology. It is tempting to welcome a dose of reality, but in these examples, no one is happy about the outcome.

The benefits of disclosing information appear to be great enough to push us to adopt them. But given the risks of disclosure, it requires a level of trust and accountability. Establishing trust and accountability in mediated interaction is a challenge. Privacy and anonymity are values that generally conflict with disclosure. People feel strongly about these issues, but in my reading, urge theory suggests that visibility and disclosure are on the whole more consistent with the wilderness rationale shaping our emotions than is concealment, although both were present.

Solutions will require ingenuity and new social practices. I have frequently described the case of the hard-working programming class instructor with the dissatisfied class as an apparently insoluble dilemma. I recently presented it to Douglas Engelbart. He thought for several seconds, then said "The class could develop a collective approach to grading assignments." Whether or not this will work, it is the right way to think of the challenges we face.

Efficiency, visibility, privacy, trust, accountability, censorship, security, conformity, and anonymity are interrelated in complex ways, impossible to treat in a limited space. Yet

without understanding them, we will be handicapped in restructuring our lives, organizations, and societies to deal with the powerful new technologies of today and tomorrow.

References

Antilla, R. (1989) *Historical and comparative linguistics.* Amsterdam: John Benjamin.

Braudel, F. (1979) *The structures of everyday life, Vol. I.* Harper & Row.

Brin, D. (1998) *The transparent society: Will technology force us to choose between privacy and freedom?* Perseus Press.

De Toqueville, A. 1969 (1848). *Democracy in America.* NY: Harper & Row, p. 516.

Edwards, M. U., Jr. (1994) *Printing, Propaganda, and Martin Luther.* Berkely: University of California Press.

Kloss, H. and McConnell, G.D. (1981) *Linguistic composition of nations of the world. Volume 4.* Quebec: Les Presses de l'Université Laval.

Suchman, L. (1987) *Plans and situated action.* Cambridge University Press.

Toda, M. (1991) Common sense, emotion, and chatting, and their roles in interpersonal interactions. SCCS Technical Report 90-1-01. Chukyo University.

Toda, M. (1997) *The urge theory of emotion and social interaction.* Chapters 6 and 7. SCCS Technical Report 97-1-01. Chukyo University.

Toda, M. (1999) *The urge theory of emotion and social interaction.* Chapter 1. Emotion and urges. Manuscript.